



United States Department of the Interior



FISH AND WILDLIFE SERVICE

Ecological Services
Carlsbad Fish and Wildlife Office
6010 Hidden Valley Road
Carlsbad, California 92009

In Reply Refer To:
FWS-WRIV-870.19

JUN 22 2004

Memorandum

To: Chief, Division of Conservation Planning, Region 1,
Portland, Oregon

Chief, Endangered Species Division, Region 1, California/Nevada Operations Office,
Sacramento, California

From: Field Supervisor, Carlsbad Fish and Wildlife Office, Region 1,
Carlsbad, California

Subject: Intra-Service Formal Section 7 Consultation/Conference for Issuance of an
Endangered Species Act Section 10(a)(1)(B) Permit (TE-088609-0) for the Western
Riverside County Multiple Species Habitat Conservation Plan, Riverside County,
California

This document transmits our Biological and Conference Opinion (Opinion) in accordance with section 7 of the Endangered Species Act of 1973 (Act), as amended (16 U.S.C. 1531 *et seq.*), regarding the issuance of an incidental take permit (Permit) for implementation of the Western Riverside County Multiple Species Habitat Conservation Plan (MSHCP) pursuant to section 10(a)(1)(B) of the Act. Your May 18, 2004, request for formal consultation was received on May 24, 2004.

The proposed incidental take will occur within western Riverside County as a result of habitat loss and disturbance associated with urban development and other proposed activities (*i.e.*, Covered Activities) identified in the MSHCP. These activities will be subject to consistency with the MSHCP and include Community Environmental Transportation Accessibility Process (CETAP) transportation corridors, public and private development that require a discretionary action by a Permittee (or in certain situations ministerial actions by a Permittee), maintenance of and safety improvements on existing and future roads, implementation of the circulation elements of the Local Permittees, maintenance of Caltrans facilities, an off highway vehicle park/state vehicle recreation area at Laborde Canyon and other State Parks facilities, existing and future waste management facilities, maintenance and construction of flood control facilities, single-family homes on existing legal parcels, up to 10,000 new acres of agricultural activity within a designated Criteria Area established by the MSHCP, compatible uses in lands to be conserved under the MSHCP, and certain activities associated with the management and monitoring of the reserve system established under the MSHCP.

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The MSHCP proposes establishment of a multi-species conservation program to minimize and mitigate the expected loss of habitat values and the incidental take of “Covered Species.” The intent of the MSHCP is to minimize incidental take of these species in the Plan Area and to provide avoidance, minimization, and mitigation measures for the impacts of proposed activities on Covered Species and their habitats. Implementation of the MSHCP will require coordinated actions among the Permittees. A single permit is proposed for issuance to 22 Permittees for a period of 75 years. The MSHCP will provide for the participation of special districts and other non-permittee entities by way of a certificate of inclusion or other appropriate mechanism as set forth in the MSHCP and the Implementation Agreement. The MSHCP is also intended to be a “subregional” plan under the State of California’s Natural Community Conservation Planning (“NCCP”) Act of 2001. The term “Permits” refers to the section 10(a)(1)(B) and NCCP permits.

The County of Riverside (County); Riverside County Flood Control District (County Flood Control); Riverside County Parks and Open Space District (County Parks); Riverside County Waste Management District (County Waste); the cities of Banning, Beaumont, Calimesa, Canyon Lake, Corona, Hemet, Lake Elsinore, Moreno Valley, Murrieta, Norco, Perris, Riverside, San Jacinto, and Temecula (Cities); Riverside County Transportation Commission (RCTC); California State Parks Department (State Parks); and California Department of Transportation (Caltrans) (together “Applicants” or “Permittees”) have prepared the MSHCP in support of an application for an incidental take permit. Prior to permit issuance, the County and Cities will create a joint powers authority, the Western Riverside County Regional Conservation Authority (“RCA”), that will, through the application process, become one of the Local Permittees. The RCA will sign the IA and will facilitate, oversee, and administer Permit implementation requirements as set forth in the MSHCP. The RCA will have the authority to carry its obligations under the requirements of the MSHCP but will not have the ability to limit County or City local land use authority or prevent a Permittee from approving a discretionary or ministerial project.

Our Opinion addresses 14 federally listed animals, 11 federally listed plants, and 121 unlisted plants and animals for a total of 146 species (Table 1). Critical habitat for the federally endangered Quino checkerspot butterfly, endangered least Bell’s vireo, endangered San Bernardino kangaroo rat, and threatened coastal California gnatcatcher is also addressed. Collectively, the 146 listed and unlisted species are referred to in the MSHCP as Covered Species. Of those, 117 species are defined as Covered Species Adequately Conserved. The remaining 29 species are defined as Covered Species for which adequate conservation has not been assured. To become a Covered Species Adequately Conserved, 12 species require a Memorandum of Understanding be executed with the U.S. Forest Service that addresses management for these species on Forest Service lands. Species-specific conservation objectives, as identified in Table 9-3 of the MSHCP, would need to be achieved in order for the remaining 17 species to be considered a Covered Species Adequately Conserved. Table 1 below identifies the 29 species and the mechanism required to achieve the Covered Species Adequately Conserved status.

In order to meet issuance criteria under section 10(a)(2)(B) of the Act such that taking will be incidental to otherwise lawful activities and to the extent Covered Activities will impact unlisted

Covered bird species protected by the Migratory Bird Treaty Act (MBTA), the Covered Activities must comply with the MBTA throughout the Plan Area.

Upon issuance of the Permit, incidental take will be authorized for “covered” animal species adequately conserved. Plant species are “covered” only by the Permit in recognition of the conservation measures incorporated into the MSHCP for such species and, as with covered animal species, will receive assurances under the Service’s “No Surprises” rule.

In accordance with our “No Surprises” regulation (50 Federal Register Part 17), we will only provide assurances for species that are adequately conserved by the MSHCP, treated as if they were listed, and specifically identified on the Permit. The Applicants are seeking incidental take coverage for 121 unlisted species in the event that any of those species become listed during the proposed 75-year Permit term. At this time, we are conferencing on the unlisted species that will be identified as Covered Species or Covered Species Adequately Conserved on the Permit. Our analysis of the 28 species for which adequate conservation has not been assured will include the conservation requirements needed to establish them as Covered Species Adequately Conserved. Take authorization will only become effective if and when each of the currently unlisted Covered Species Adequately Conserved is listed. Take authorization is only valid for listed Covered Species Adequately Conserved.

Conservation measures for all species will be implemented immediately by the Applicants, regardless of the current listing status of the particular species. If the proposed Permit is issued and a species identified as a Covered Species on the Permit is subsequently listed, we will review the effects analyses contained within this Opinion and update or revise the conclusions as necessary. If the new analysis indicates that retaining the newly-listed species on the Permit would result in a jeopardy situation for that species, the permit would be suspended or revoked for that species.

Some of the proposed Covered Activities may require section 7 consultation pursuant to the Act. In this event, any take exemption to the federal agency will be authorized through the section 7 consultation process. Activities conducted by non-Permittees will not receive incidental take authorization under the subject Permit, including those entities that have entered into a Memorandum of Understanding for cooperative management, unless the non-Permittees seek incidental take authorization pursuant to the provisions of the MSHCP as stipulated in Section 11.8 of the IA. Development projects that have obtained vested development rights prior to Permit issuance will not be considered Covered Activities since entities with vested rights are no longer subject to the control of the Permittees. Entities with vested rights may choose to participate in the MSHCP to receive incidental take coverage subject to the provisions of the MSHCP and Section 11.8 of the IA. In addition, Federal wetland permitting within the Plan remains subject to the Fish and Wildlife Coordination Act and Clean Water Act and may require additional avoidance, minimization, and mitigation measures.

Table 1. Proposed Covered Species

Species Name (146 species)	Listing Status State/ Federal	Proposed Adequately Conserved	Survey Required	Requirement to Achieve Adequately Conserved Status
LISTED CRUSTACEANS				
Riverside fairy shrimp <i>Streptocephalus woottoni</i>	-/FE	✓	Riparian/Riverine/ Vernal Pool	
vernal pool fairy shrimp <i>Branchinecta lynchi</i>	-/FT	✓	Riparian/Riverine/ Vernal Pool	
LISTED INSECTS				
Delhi Sands flower-loving fly <i>Rhaphiomidas terminatus abdominalis</i>	-/FE	✓	Delhi Sands flower- loving fly Survey Area	
Quino checkerspot butterfly <i>Euphydryas editha quino</i>	-/FE	✓		
LISTED FISH				
Santa Ana sucker <i>Catostomus santaanae</i>	SSC/FT	✓		
LISTED AMPHIBIANS				
arroyo toad <i>Bufo californicus</i>	SSC/FE	✓	Additional Survey Area: ASSA	
California red-legged frog <i>Rana aurora draytonii</i>	SSC/FT	✓	Additional Survey Area: ASSA	
mountain yellow-legged frog <i>Rana mucosa</i>	SSC/FE	✓	Additional Survey Area: ASSA	
LISTED BIRDS				
bald eagle <i>Haliaeetus leucocephalus</i>	SP, SE/FT	✓		
coastal California gnatcatcher <i>Poliophtila californica californica</i>	SSC/FT	✓		
least Bell's vireo <i>Vireo bellii pusillus</i>	SE/FE	✓	Riparian/Riverine/ Vernal Pool	
southwestern willow flycatcher <i>Empidonax traillii extimus</i>	SE/FE	✓	Riparian/Riverine/ Vernal Pool	
western yellow-billed cuckoo <i>Coccyzus americanus occidentalis</i>	SE/FC	✓	Riparian/Riverine/ Vernal Pool	
LISTED MAMMALS				
San Bernardino kangaroo rat <i>Dipodomys merriami parvus</i>	SSC/FE	✓	Additional Survey Area: MSSA	
Stephens' kangaroo rat <i>Dipodomys stephensi</i>	ST/FE	✓		
LISTED PLANTS				
California Orcutt grass <i>Orcuttia californica</i>	SE/FE	✓	NEPPSA	
Munz's onion <i>Allium munzii</i>	ST/FE	✓	NEPPSA	
Nevin's barberry <i>Berberis nevinii</i>	SE/FE	✓	Additional Survey Area: CASSA	
San Diego ambrosia <i>Ambrosia pumila</i>	-/FE	✓	NEPPSA	

Species Name (146 species)	Listing Status State/ Federal	Proposed Adequately Conserved	Survey Required	Requirement to Achieve Adequately Conserved Status
San Diego button-celery <i>Eryngium aristulatum</i> var. <i>parishii</i>	SE/FE	✓		
San Jacinto Valley crownscale <i>Atriplex coronata</i> var. <i>notatior</i>	-/FE	✓	Additional Survey Area: CASSA	
Santa Ana River woollystar <i>Eriastrum densifolium</i> ssp. <i>sanctorum</i>	SE/FE	✓		
slender-horned spine flower <i>Dodecahema leptoceras</i>	SE/FE	✓	NEPPSA	
spreading navarretia <i>Navarretia fossalis</i>	- / FT	✓	NEPPSA	
thread-leaved brodiaea <i>Brodiaea filifolia</i>	SE/FT	✓	Additional Survey Area: CASSA	
Vail Lake ceanothus <i>Ceanothus ophiochilus</i>	SE/FT	✓	Additional Survey Area: CASSA	
CRUSTACEANS				
Santa Rosa Plateau fairy shrimp <i>Linderiella santarosae</i>	- / -	✓	Riparian/Riverine/ Vernal Pool	
FISH				
arroyo chub <i>Gila orcutti</i>	SSC/-	✓		
AMPHIBIANS				
coast range newt <i>Taricha tarosa tarosa</i>	SSC/-	✓		
western spadefoot <i>Scaphiopus hammondi</i>	SSC/-	✓		
REPTILES				
Belding's orange-throated whiptail <i>Cnemidophorus hyperythrus beldingi</i>	SSC/-	✓		
coastal western whiptail <i>Cnemidophorus tigris multiscutatus</i>	- / -	✓		
granite night lizard <i>Xantusia henshawi henshawi</i>	- / -	✓		
granite spiny lizard <i>Sceloporus orcutti</i>	- / -	✓		
northern red-diamond rattlesnake <i>Crotalus ruber ruber</i>	SSC/-	✓		
San Bernardino mountain kingsnake <i>Lampropeltis zonata parvirubra</i>	SSC/-			MOU with U.S. Forest Service
San Diego banded gecko <i>Coleonyx variegatus abbotii</i>	- / -	✓		
San Diego horned lizard <i>Phrynosoma coronatum blainvillei</i>	SSC/-	✓		
San Diego mountain kingsnake <i>Lampropeltis zonata pulchra</i>	SSC/-			MOU with U.S. Forest Service
southern rubber boa <i>Charina bottae umbratica</i>	ST/-			MOU with U.S. Forest Service
southern sagebrush lizard <i>Sceloporus graciosus vandenburgianus</i>	- / -			MOU with U.S. Forest Service

Species Name (146 species)	Listing Status State/ Federal	Proposed Adequately Conserved	Survey Required	Requirement to Achieve Adequately Conserved Status
western pond turtle <i>Clemmys marmorata pallida</i>	SSC/-	✓		
BIRDS				
American bittern <i>Botaurus lentiginosus</i>	-/-	✓		
Bell's sage sparrow <i>Amphispiza belli belli</i>	SSC/-	✓		
black swift (breeding) <i>Cypseloides niger</i>	SSC/-	✓		
black-crowned night heron <i>Nycticorax nycticorax</i>	-/-	✓		
burrowing owl <i>Athene cunicularia hypugaea</i>	SSC/-	✓	Additional Survey Area: BOSA	
cactus wren <i>Campylorhynchus brunneicapillus</i>	SSC/-	✓		
California horned lark <i>Eremophila alpestris actia</i>	SSC/-	✓		
California spotted owl <i>Strix occidentalis occidentalis</i>	SSC/-			MOU with U.S. Forest Service
Cooper's hawk <i>Accipiter cooperii</i>	SSC/-	✓		
double-crested cormorant <i>Phalacrocorax auritus</i>	SSC/-	✓		
downy woodpecker <i>Picoides pubescens</i>	-/-	✓		
ferruginous hawk <i>Buteo regalis</i>	SSC/-	✓		
golden eagle <i>Aquila chrysaetos</i>	SP, SSC/-	✓		
grasshopper sparrow <i>Ammodramus savannarum</i>	-/-			Species-specific objectives
great blue heron <i>Ardea herodias</i>	-/-	✓		
Lincoln's sparrow (breeding) <i>Melospiza lincolnii</i>	-/-			Species-specific objectives
loggerhead shrike <i>Lanius ludovicianus</i>	SSC/-	✓		
Macgillivray's warbler <i>Oporornis tolmiei</i>	-/-	✓		
merlin <i>Falco columbarius</i>	SSC/-	✓		
mountain plover (wintering) <i>Charadrius montanus</i>	SSC/-	✓		
mountain quail <i>Oreortyx pictus</i>	-/-	✓		
Nashville warbler <i>Vermivora ruficapilla</i>	-/-	✓		
northern goshawk <i>Accipiter gentilis</i>	SSC/-	✓		

Species Name (146 species)	Listing Status State/ Federal	Proposed Adequately Conserved	Survey Required	Requirement to Achieve Adequately Conserved Status
northern harrier (breeding) <i>Circus cyaneus</i>	SSC/-	✓		
osprey <i>Pandion haliaetus</i>	SSC/-	✓		
peregrine falcon <i>Falco peregrinus</i>	SP, SE/ delisted	✓		
prairie falcon (breeding) <i>Falco mexicanus</i>	SSC/-	✓		
purple martin <i>Progne subis</i>	SSC/-	✓		
sharp-shinned hawk <i>Accipiter striatus</i>	SSC/-	✓		
So. California rufous-crowned sparrow <i>Aimophila ruficeps canescens</i>	SSC/-	✓		
Swainson's hawk <i>Buteo swainsoni</i>	ST/-	✓		
tree swallow <i>Tachycineta bicolor</i>	-/-	✓		
tricolored blackbird (colony) <i>Agelaius tricolor</i>	SSC/-	✓		
turkey vulture (breeding) <i>Cathartes aura</i>	-/-	✓		
white-faced ibis <i>Plegadis chihi</i>	SSC/-	✓		
white-tailed kite <i>Elanus leucurus</i>	SP/-	✓		
Williamson's sapsucker <i>Sphyrapicus thyroideus</i>	-/-			MOU with U.S. Forest Service
Wilson's warbler <i>Wilsonia pusilla</i>	-/-	✓		
yellow warbler <i>Dendroica petechia brewsteri</i>	SSC/-	✓		
yellow-breasted chat <i>Icteria virens</i>	SSC/-	✓		
MAMMALS				
Aguanga kangaroo rat <i>Dipodomys merriami collinus</i>	-/-	✓	Additional Survey Area: MSSA	
bobcat <i>Lynx rufus</i>	-/-	✓		
brush rabbit <i>Sylvilagus bachmani</i>	-/-	✓		
coyote <i>Canis latrans</i>	-/-	✓		
Dulzura kangaroo rat <i>Dipodomys simulans</i>	-/-	✓		
long-tailed weasel <i>Mustela frenata</i>	-/-	✓		
Los Angeles pocket mouse <i>Perognathus longimembris brevinasus</i>	SSC/-	✓	Additional Survey Area: MSSA	

Species Name (146 species)	Listing Status State/ Federal	Proposed Adequately Conserved	Survey Required	Requirement to Achieve Adequately Conserved Status
mountain lion <i>Puma concolor</i>	- / -	✓		
northwestern San Diego pocket mouse <i>Chaetodipus fallax fallax</i>	SSC/-	✓		
San Bernardino flying squirrel <i>Glaucomys sabrinus californicus</i>	SSC/-			Species-specific objectives
San Diego black-tailed jackrabbit <i>Lepus californicus bennettii</i>	SSC/-	✓		
San Diego desert woodrat <i>Neotoma lepida intermedia</i>	SSC/-	✓		
PLANTS				
beautiful hulsea <i>Hulsea vestita</i> ssp. <i>callicarpa</i>	- / -			Species-specific objectives
Brand's phacelia <i>Phacelia stellaris</i>	- / FC	✓	NEPPSA	
California beardtongue <i>Penstemon californicus</i>	- / -	✓		
California bedstraw <i>Galium californicum</i> ssp. <i>primum</i>	- / -			MOU with U.S. Forest Service
California black walnut <i>Juglans californica</i> var. <i>californica</i>	- / -	✓		
California muhly <i>Muhlenbergia californica</i>	- / -			Species-specific objectives
chickweed oxytheca <i>Oxytheca caryophylloides</i>	- / -			Species-specific objectives
Cleveland's bush monkeyflower <i>Mimulus clevelandii</i>	- / -			MOU with U.S. Forest Service
cliff cinquefoil <i>Potentilla rimicola</i>	- / -			Species-specific objectives
Coulter's goldfields <i>Lasthenia glabrata</i> ssp. <i>coulteri</i>	- / -	✓	Additional Survey Area: CASSA	
Coulter's matilija poppy <i>Romneya coulteri</i>	- / -			Species-specific objectives
Davidson's saltscale <i>Atriplex serenana</i> var. <i> davidsonii</i>	- / -	✓	Additional Survey Area: CASSA	
Engelmann oak <i>Quercus engelmannii</i>	- / -	✓		
Fish's milkwort <i>Polygala cornuta</i> var. <i>fishiae</i>	- / -			Species-specific objectives
graceful tarplant <i>Holocarpha virgata</i> ssp. <i>elongata</i>	- / -			Species-specific objectives
Hall's monardella <i>Monardella macrantha</i> ssp. <i>hallii</i>	- / -	✓		
Hammitt's clay-cress <i>Sibaropsis hammittii</i>	- / -	✓	NEPPSA	
heart-leaved pitcher sage <i>Lepechinia cardiophylla</i>	- / -	✓	Additional Survey Area: CASSA	
intermediate mariposa lily <i>Calochortus weedii</i> var. <i>intermedius</i>	- / -			Species-specific objectives

Species Name (146 species)	Listing Status State/ Federal	Proposed Adequately Conserved	Survey Required	Requirement to Achieve Adequately Conserved Status
Jaeger's milk-vetch <i>Astragalus pachypus</i> var. <i>jaegeri</i>	- / -	✓		
Johnston's rock cress <i>Arabis johnstonii</i>	- / -	✓	NEPPSA	
lemon lily <i>Lilium parryi</i>	- / -			MOU with U.S. Forest Service
little mousetail <i>Myosurus minimus</i>	- / -	✓	Additional Survey Area: CASSA	
long-spined spine flower <i>Chorizanthe polygonoides</i> var. <i>longispina</i>	- / -	✓		
many-stemmed dudleya <i>Dudleya multicaulis</i>	- / -	✓	NEPPSA	
Mojave tarplant <i>Deinandra mohavensis</i>	SE / -			Species-specific objectives
mud nama <i>Nama stenocarpum</i>	- / -	✓	Additional Survey Area: CASSA	
Munz's mariposa lily <i>Calochortus palmeri</i> var. <i>munzii</i>	- / -	✓	NEPPSA	
ocellated Humboldt lily <i>Lilium humboldtii</i> ssp. <i>ocellatum</i>	- / -			MOU with U.S. Forest Service
Orcutt's brodiaea <i>Brodiaea orcuttii</i>	- / -	✓		
Palmer's grapplinghook <i>Harpagonella palmeri</i>	- / -	✓		
Palomar monkeyflower <i>Mimulus diffusus</i>	- / -	✓		
Parish's brittlescale <i>Atriplex parishii</i>		✓	Additional Survey Area: CASSA	
Parish's meadowfoam <i>Limnanthes gracilis</i> var. <i>parishii</i>	SE / -	✓		
Parry's spine flower <i>Chorizanthe parryi</i> var. <i>parryi</i>	- / -			Species-specific objectives
Payson's jewelflower <i>Caulanthus simulans</i>	- / -	✓		
peninsular spine flower <i>Chorizanthe leptotheca</i>	- / -			Species-specific objectives
Plummer's mariposa lily <i>Calochortus plummerae</i>	- / -			Species-specific objectives
prostrate navarretia <i>Navarretia prostrate</i>	- / -	✓	Additional Survey Area: CASSA	
prostrate spineflower <i>Chorizanthe procumbens</i>	- / -	✓		
Rainbow manzanita <i>Arctostaphylos rainbowensis</i>	- / -			Species-specific objectives
round-leaved filaree <i>Erodium macrophyllum</i>	- / -	✓	Additional Survey Area: CASSA	
San Jacinto Mountains bedstraw <i>Galium angustifolium</i> ssp. <i>jacinticum</i>	- / -	✓	NEPPSA	

Species Name (146 species)	Listing Status State/ Federal	Proposed Adequately Conserved	Survey Required	Requirement to Achieve Adequately Conserved Status
San Miguel savory <i>Satureja chandleri</i>	- / -	✓	NEPPSA	
shaggy-haired alumroot <i>Heuchera hirsutissima</i>	- / -			MOU with U.S. Forest Service
small-flowered microseris <i>Microseris douglasii</i> var. <i>platycarpa</i>	- / -			Species-specific objectives
small-flowered morning-glory <i>Convolvulus simulans</i>	- / -	✓		
smooth tarplant <i>Centromadia pungens</i> ssp. <i>laevis</i>	- / -	✓	Additional Survey Area: CASSA	
sticky-leaved dudleya <i>Dudleya viscida</i>	- / -			MOU with U.S. Forest Service
vernal barley <i>Hordeum intercedens</i>	- / -	✓		
Wright's trichocoronis <i>Trichocoronis wrightii</i> var. <i>wrightii</i>	- / -	✓	NEPPSA	
Yucaipa onion <i>Allium marvinii</i>	- / -	✓	NEPPSA	

Status Codes: ST - State threatened FT - Federally threatened
 SE - State endangered FE - Federally endangered
 SP - State Fully Protected FP - Federally proposed threatened
 SSC - State species of concern FC - Federal candidate for listing

Table Codes:

Riparian/Riverine/Vernal Pools If impacts are unavoidable, focused surveys are required for these species within the Plan Area in association with the implementation of the Protection of Species Associated with Riparian/Riverine Areas and Vernal Pools policy.

NEPPSA Site specific focused surveys for narrow endemic plant species are required in association with the implementation of the Protection of Narrow Endemic Plant Species within a defined narrow endemic plant species survey area (NEPSSA).

Additional Survey Area Site specific focused surveys are required for certain species in association with the implementation of the Additional Survey Needs and Procedures within defined survey areas: Criteria Area Species Survey Area (CASSA), Amphibian Species Survey Areas (ASSA), Burrowing Owl Survey Areas (BOSA), Mammal Species Survey Areas (MSSA).

MOU with U. S Forest Service In order for these species to become a Covered Species adequately conserved, a Memorandum of Understanding with the U.S. Forest Service will need to be executed that addresses management for these species on Forest Service lands.

Species-specific objectives In order for these species to become a Covered Species adequately conserved, achievement of species-specific conservation objectives will need to be demonstrated.

Delhi Sands flower-loving fly With the Exception of Cells 21, 22, and 55 within Area Plan Subunit Survey Area3 of the Jurupa Area Plan, surveys will be conducted for future projects within the approximately 5,100 acres of mapped Delhi Soils within the Plan Area (MSHCP Volume II-B, 1-3 and Exhibit 12)

Consultation History

Prior to initiation of this consultation, the U.S. Fish and Wildlife Service (Fish and Wildlife Service) was extensively involved with the planning and preparation of the draft and final MSHCP. Hundreds of meetings were held during the four-year planning and permitting process. Below is a summary of the several MSHCP-related committees and subcommittees in which Fish and Wildlife Service staff participated in to some degree. Key milestones during the planning process are summarized below in Table 2.

Table 2. Summary Of Key Milestones During Plan Preparation And Local Approval Process

Date	Milestone
October 20, 1998	County Board of Supervisors adopt “Consensus Planning Principles” for
August 9, 1999	“Draft Proposal” for the MSHCP released
September 9, 1999	Fish and Wildlife Service-California Department of Fish and Game joint letter
October 5, 1999	Board of Supervisors passes a resolution to proceed with the “Go” decision
October 4, 2000	MSHCP alternatives development document released
December 4, 2000	Fish and Wildlife Service-California Department of Fish and Game joint letter
December 19, 2000	Board of Supervisors direct preparation of draft MSHCP as a criteria-based plan
March 7, 2002	Partial administrative draft MSHCP and implementing agreement released to
November 15, 2002	Draft MSHCP released for formal public review
November 15, 2002	Draft EIR/EIS for the MSHCP released for formal 45-day public review
May 1, 2003	Draft responses to comments prepared and released
June 17, 2003	MSHCP EIR/EIS certified by Board of Supervisors (CEQA only)
June 17, 2003	MSHCP and implementing agreement approved/authorized for execution by

MSHCP Advisory Committee and Associated Subcommittee Meetings

This committee consisted of members, appointed by the Board of Supervisors (Board) of the County of Riverside, that represented a wide range of stakeholder interests. The purpose of this committee was to provide input to the Board on the MSHCP. The Committee met monthly and generally on Thursdays. This committee met approximately 74 times from March 25, 1999, to May 8, 2003. Some of these meetings consisted of special sessions and/or work sessions, which

were held in addition to the standard Thursday meetings. Several subcommittees described below were established by the advisory committee to address certain issues in a more focused manner.

Reserve Science and Design Subcommittee Meetings

The purpose of this subcommittee was to review available biological data and species lists and to provide input for the August 9, 1999, decision by the Board regarding whether to proceed further with the MSHCP. This committee met a total of 14 times, approximately once a month from March 10, 1999, to January 6, 2000. Aside from the meetings listed above, this group held a three-day habitat assessment workshop at U.C. Riverside from April 27-29, 1999.

Policy Subcommittee Meetings

This subcommittee was created to identify potential tools and incentives that could be used to guide the MSHCP formation and implementation strategy. This subcommittee met a total of 11 times from March 16, 2000, to February 28, 2002.

Funding and Implementation Subcommittee Meetings

This subcommittee was established to develop funding and implementation strategies for the MSHCP. The Habitat Acquisition and Negotiation Strategy process incorporated in the MSHCP emerged from this subcommittee, including the first elements of the funding plan included in Section 8.0 of the MSHCP. This subcommittee met approximately 27 times from May 20, 1999, to March 15, 2001.

Integration Subcommittee Meetings

This subcommittee was established to assist in coordinating the General Plan and CETAP components of the Riverside County Integrated Project (RCIP). These components were reviewed with this subcommittee and integration issues identified. This group met approximately 19 times from September 29, 1999, to March 23, 2001.

Western Riverside Council of Governments (WRCOG) Meetings

WRCOG Technical Advisory Committee (TAC) Meetings

This standing WRCOG committee made up of city managers from western Riverside County has a permanent agenda item to discuss the MSHCP. Discussions during the consultation period usually consisted of updates and any question/answers that city managers had regarding the status or components of the MSHCP. This committee meets monthly, every third Thursday. This group met approximately 22 times during preparation of the MSHCP. The Fish and Wildlife Service and the California Department of Fish and Game (“The Department”) attended a meeting of this group on October 18, 2001.

WRCOG Executive Committee Meetings

This standing WRCOG Committee includes an elected official (usually a city council member) from each city in western Riverside County and the five County supervisors. When the MSHCP process began, this committee added a permanent agenda item to discuss progress and updates of this project. This committee meets every first Monday and, during preparation of the MSHCP, met approximately 19 times.

WRCOG Planning Directors' TAC Meetings

This standing WRCOG Committee includes the western County City Planning Directors. When the MSHCP process started, this committee added a permanent agenda item to its monthly agenda to discuss progress and updates on the MSHCP. Approximately 12 meetings occurred during preparation of the MSHCP. This committee formed a subcommittee called the MSHCP Implementation Ad-Hoc Committee, which consisted of elected officials, WRCOG, County planning staff, city staff, and consultants. The Fish and Wildlife Service attended subcommittee meetings on April 15, May 1, May 9, May 22, June 12, and June 26, 2002.

Wildlife Agencies Policy Meetings

These meetings were established to provide coordination at a policy level between the County and the Fish and Wildlife Service and The Department during plan preparation. These meetings were attended by the Fish and Wildlife Service, The Department, County staff, County Counsel, lawyers retained by the County, and the County's MSHCP consultants. The meetings consisted of all-day working sessions to discuss schedule and progress on the plan, technical elements of species accounts, conservation analyses, implementation approaches, and policy language for incorporation into the draft and final MSHCP and IA. Department of the Interior Solicitor's Office staff, the Department legal staff, and County elected officials occasionally attended these meetings. A total of 55 meetings/working sessions were held beginning from May 31, 1999, to March 12, 2003.

Ad Hoc Stakeholders Group Meetings

An Ad Hoc Stakeholders Group consisting of certain MSHCP Advisory Committee members representing the broad range of stakeholders met occasionally during the latter stages of the MSHCP preparation process to identify policy issues and possible solutions. Approximately eight meetings occurred from June 20, 2002, to February 10, 2003. At their May 17, 2003, hearing on the MSHCP, the Board directed staff to meet with the Ad Hoc Stakeholders Group and Wildlife Agencies to address issues raised during the hearing process and report back to the Board.

Small Working Group Meetings

The Fish and Wildlife Service and the Department met with County-elected officials and staff, other consulting team members, and Federal and State agency representatives (*e.g.*, U. S. Army Corps of Engineers (Corps of Engineers), U. S. Environmental Protection Agency (EPA),

Federal Highway Administration (FHA), Caltrans) in a series of Small Working Group and related subcommittee meetings. These meetings, which are still ongoing, focused on policy issues. Approximately 16 of these meetings were held from March 8, 2000, to October 17, 2002.

Scientific Review Panel Meetings

The Fish and Wildlife Service, County staff, and the County's MSHCP consultant met with the Scientific Review Panel and separately with panel members at various points during the MSHCP planning process. Approximately five meetings were held from February 14, 2000, to July 30, 2002.

Other Non-Committee-Related Meetings

The Fish and Wildlife Service met in early 1999 with members of the Riverside County Habitat Conservation Agency, County staff, and County's MSHCP consultant to discuss initial MSHCP strategies. Approximately three meetings were held to discuss the relationship between the past and ongoing habitat conservation efforts within the County and the proposed MSHCP. The Service and County's MSHCP consultant held several working sessions to discuss the initial species accounts prepared by the Fish and Wildlife Service and methods/data to incorporate in the MSHCP planning process. Approximately three meetings were held to discuss this topic between June and August 1999. On August 26, 1999, the Service met with County staff and the County's consultants to discuss their initial response to the August 9, 1999, Draft Proposal for the Western Riverside County Multiple Species Habitat Conservation Plan. Several meetings were held early in the process to discuss integration of the MSHCP with the other components of the RCIP. These meetings were held on November 18, 1999, December 1, 1999, February 3, 2000, February 8, 2000, April 19, 2000, and January 22, 2002.

The Fish and Wildlife Service participated in several public workshops to inform the public regarding the MSHCP planning process and respond to questions. These meetings included two presentations in front of the County Board of Supervisors on December 20, 1999, and July 23, 2002, and a series of workshops to discuss issues in each of four identified "subareas" within the MSHCP Plan Area. These workshops were held on February 9, February 16, February 24, and March 2, 2000. The Fish and Wildlife Service participated in meetings involving the cities that were anticipated signatory agencies to the County's permit. These meetings involved the cities of Lake Elsinore, Temecula, Murietta, Hemet, Riverside, Banning, Canyon Lake and Calimesa. Approximately 28 meetings took place between March 10, 2000, and August 2003.

The Fish and Wildlife Service, County staff, and the County's MSHCP consultant participated in County sponsored weekly or bi-weekly "Interim Project Review" meetings to discuss current projects within the Plan Area. These meetings were attended by the Fish and Wildlife Service, County staff, applicants as appropriate, the County's MSHCP consultant as appropriate, and other consultants. Approximately 45 of these meetings were held beginning on April 19, 2000.

The Fish and Wildlife Service participated in many meetings devoted to specific topics such as public access to reserve areas, the General Plan open space element, an early implementation proposal (the Habitat Transaction Method), reserve management, brush management, flood

control, public lands, State Parks, biological resource survey requirements, and species groupings for purposes of species account organization and reserve assembly methods. Approximately 13 of these meetings were held throughout the planning process.

The Fish and Wildlife Service, County staff and the County's MSHCP consultant met with property owners throughout the planning process. These meetings were scheduled to discuss specific development proposals on concerns of property owners. Approximately nine meetings with property owners occurred. The first of these meetings occurred on August 8, 2000, and the last on September 18, 2002.

The Fish and Wildlife Service, County staff and the County's MSHCP consultant met with property owners and the Riverside County Flood Control and Water Conservation District to discuss the San Jacinto River Flood Protection Project. Beginning on November 21, 2000, and ending on January 21, 2003, a total of seven meetings occurred for this purpose.

Administrative Record

This Opinion was prepared using the following information that is hereby incorporated by reference:

- 1) The MSHCP prepared by Dudek and Associates, Inc. for the County of Riverside, Transportation and Land Management Agency, dated June 17, 2003. The MSHCP consists of 3 Volumes: Volume I, Part 1 and 2, the Plan; Volume II, Part 1 and 2, The Reference Document; and Volume III, the Implementing Agreement (IA). Volume II, Part 1 of the Reference Document includes Section A- the MSHCP Conservation Area Description, Section C- Habitat Accounts, and Section D-Literature Cited and References. Volume II of the Reference Document is comprised of Section B- the Species Accounts (Species Accounts);
- 2) letter from the County dated May 21, 2004, to the U.S. Fish and Wildlife Service regarding the Western Riverside County Multiple Species Habitat Conservation Plan Errata (MSHCP Errata) provided in Appendix 1;
- 3) U.S. Fish and Wildlife proposed FESA section 10(a) permit terms and conditions dated May 26, 2004 (Appendix 2);
- 4) U. S. Fish and Wildlife Service Master Database for the Western Riverside MSHCP (see below discussion on Evaluation Methods);
- 5) available scientific literature and interviews with species and area experts;
- 6) California Native Plant Society list of sensitive plant species provided in Appendix 3 of this Opinion;
- 7) List of scientific names provided in Appendix 4 of this Opinion; and

- 8) other information in the U.S. Fish and Wildlife Service's files.

The complete administrative record for this consultation is on file at the Carlsbad Fish and Wildlife Service Office.

BIOLOGICAL AND CONFERENCE OPINION

The MSHCP is one element of a comprehensive regional planning effort begun in 1999. To accommodate Riverside County's anticipated growth, the County must provide a range of housing alternatives, encourage economic development, create new jobs at a rate that exceeds its population growth, and build the supporting infrastructure. Local officials recognized that without a well-defined and implementable regional plan, it would be difficult for the County to successfully accommodate such growth.

To address this challenge, the Riverside County Board of Supervisors and Riverside County Transportation Commission (RCTC) initiated the Riverside County Integrated Project (RCIP). The RCIP includes:

- The Multiple Species Habitat Conservation Plan (MSHCP), which forms the nucleus of an open space plan for the western part of Riverside County.
- An updated General Plan for the unincorporated portion of Riverside County, which addresses land use, circulation, housing and open space, conservation, and other mandatory elements in conformance with State law.
- The Community and Environmental Transportation Acceptability Process (CETAP), which identifies future transportation corridors in the western part of Riverside County and provides the appropriate environmental documentation to allow early preservation of the necessary rights-of-way for future corridor development.

The MSHCP was developed in the context of the overall RCIP and an MSHCP Advisory Committee was established by the County Board of Supervisors to ensure representation by a broad range of stakeholders in the MSHCP planning process. As part of that planning effort, recommendations were given by the MSHCP Advisory Committee and the County Board of Supervisors provided the direction to prepare the MSHCP as a criteria-based plan. The criteria-based approach reflects the policy direction of the Board of Supervisors, existing land use and ownership patterns within the Plan Area, and the need to provide flexibility in assembly of the MSHCP Conservation Area over time.

The framework for the criteria-based plan is a Criteria Area comprised of individual cells and cell groups. The Criteria Area represents the area from which approximately 153,000 acres of new reserve lands (Additional Reserve Lands) will be assembled to contribute to an overall approximately 500,000-acre MSHCP Conservation Area. The MSHCP Conservation Area will be comprised of approximately 153,000 acres of Additional Reserve Lands and 347,000 acres of existing Public/Quasi-Public lands (PQP Lands) (MSHCP Figure 3-1).

DESCRIPTION OF THE PROPOSED ACTION

The proposed action is the issuance of a section 10(a)(1)(B) incidental take¹ permit that addresses 146 species (14 listed animals, 11 listed plants and 121 unlisted plants and animals) (Table 1) that will be affected by the loss and modification of approximately 466,000 acres of habitat from implementation of the activities proposed for coverage in the MSHCP.

Plan Area

The proposed MSHCP Plan Area (MSHCP Figure 1-1) includes an area of approximately 1.26 million acres (1,966 square miles) and encompasses unincorporated portions of western Riverside County and 14 incorporated cities (Banning, Beaumont, Calimesa, Canyon Lake, Corona, Hemet, Lake Elsinore, Moreno Valley, Murrieta, Norco, Perris, Riverside, San Jacinto, and Temecula). The Orange and San Bernardino County lines define the western boundary of the proposed Plan Area. The San Bernardino and San Diego County lines form the northern and southern boundaries of the proposed Plan Area, respectively. The eastern boundary of the proposed Plan Area is formed by Banning Pass and the crest of the San Jacinto Mountains.

The MSHCP Plan Area is divided into Area Plans for development planning purposes and bioregions for conservation planning purposes. Area Plans are a composite of identified areas in the County General Plan and City boundaries. The Area Plan boundaries provide a framework for analyzing the Criteria Area using established planning boundaries.

MSHCP Conservation Area

The proposed MSHCP Conservation Area (500,000 acres) will be comprised of approximately 153,000 acres of Additional Reserve Lands (e.g. new conservation lands) and 347,000 acres of existing PQP Lands (MSHCP Figure 3-1). The MSHCP proposes to acquire, protect, and manage 153,000 acres of habitat for the Covered Species generally contiguous with, or linked to, existing PQP Lands that provide conservation value. The Permittees will acquire 103,000 acres of the Additional Reserve Lands as mitigation for Covered Activities in the Plan Area. Of these 103,000 acres, State Permittees (Caltrans and State Parks) will acquire 6,000 acres as mitigation for their projects. The County, Cities, and other Local Permittees will be responsible for the remaining 97,000 acres as mitigation for private development and Local Permittee projects. The Plan estimates 56,000 acres of the 97,000 acres will be acquired through acquisition and the remaining 41,000 acres from the Local Permittees using their land use authority. The Permittees will be responsible for managing, in perpetuity, 55,000 acres of locally owned PQP lands and the 103,000 acres of Additional Reserve Lands. It is anticipated that the State and Federal Agencies will acquire 50,000 acres of new conservation lands through grants, bond, etc., which will complement the 103,000 acres of Permittee's mitigation. These actions will result in

¹ "Incidental take" as used in this opinion in reference to the Covered Species Adequately Conserved refers solely to covered animal species. Plant species are "covered" by the permit in recognition of the conservation measures incorporated into the MSHCP for them and, like covered animal species adequately conserved, receive assurances under the Service's "No Surprises" rule.

approximately 153,000 acres of land being acquired as Additional Reserve Lands for the conservation of Covered Species (MSHCP Section 8.3.1). If the State and Federal contribution commitment to the MSHCP Conservation Area cannot be provided, the MSHCP will be reevaluated, with possible adjustments made to Permit coverage and assurances (MSHCP Section 4.4.2).

Conservation Strategy

The proposed MSHCP (Section 9.2) identifies a conservation strategy that will be implemented that consists of: 1) a global biological goal; 2) global biological objectives; 3) species-specific conservation objectives; and 4) management and monitoring activities. The species-specific conservation objectives for each of the proposed Covered Species are presented in each of the individual species accounts contained in the Species Accounts (MSHCP Volume II, Section B) and in Table 9-2 of the MSHCP. The quantitative information presented in these accounts is provided to set the overall parameters for species conservation and reserve assembly but will not be regarded as absolute. The MSHCP anticipates that some variation from the provided numbers is expected as new information is gathered as provided for in the Plan and the Additional Reserve Lands are assembled. This variation will provide for flexibility in reserve assembly and will enable responses to changing conditions on the ground during the long-term reserve assembly process. Additionally, the species conservation levels are preliminary and may be modified based on future data collection efforts and as jointly agreed upon by the affected Permittees and Wildlife Agencies.

Reserve Assembly

The precise location and configuration of the 153,000 acre Additional Reserve Lands has not been mapped or precisely identified but rather is based on textual descriptions to be interpreted for the purposes of assembling and configuring the Additional Reserve Lands (MSHCP Section 3.0). The MSHCP defines a 310,000-acre Criteria Area that represents the area from which the Additional Reserve Lands will be assembled. The Criteria Area is divided into cells of approximately 160 acres. Each cell or cell group has associated written criteria (Criteria) that describe the conservation expected within individual cells or cell groups (MSHCP Section 3.2.3). Individual cells and cell groups are aggregated to form Area Plans and Subunits for which target conservation acreage have been established. In addition, applicable cores and linkages, planning species, and biological issues and considerations for purposes of reserve assembly are identified on a Subunit basis. Assembly of the Additional Reserve Lands is expected to occur within the first 25 years of permit issuance based on the projected new development within the Plan Area.

The assembly of the Additional Reserve Lands will complement and provide connectivity between existing PQP Lands in the Plan Area. Existing locally owned PQP Lands and Additional Reserve Lands will be managed and monitored in perpetuity by the Permittees to achieve the conservation goals of the Plan. The Permittees along with the Wildlife Agencies (Fish and Wildlife Service and California Department of Fish and Game, collectively) will work cooperatively to enter into Memoranda of Understanding or other appropriate agreements with non-Permittees (*i.e.*, entities not signatory to the IA) managing land within the MSHCP

Conservation Area to manage lands in conformance and compliance with the MSHCP in order to achieve the conservation goals of the MSHCP (Section 18 of the IA). The MSHCP does provide some flexibility for the use of Permittee management and monitoring funds to benefit the total MSHCP Conservation Area (MSHCP Section 8.3.6)

Property Owner Initiated Habitat Evaluation and Acquisition Negotiation Strategy (HANS)

The Property Owner Initiated Habitat Evaluation and Acquisition Negotiation Strategy (HANS) process is proposed as the strategy to be used by most of the Local Permittees to assemble the Additional Reserve Lands. It will be implemented by the County and those Cities that choose the HANS process as their implementation mechanism. HANS is described fully in Section 6.1.1 of the MSHCP. Permittees that do not commit to using the HANS process will be responsible for implementing an appropriate alternative method similar to HANS to ensure compliance with the Criteria.

All proposed discretionary development projects under the authority of a Local Permittee implementing HANS within the Criteria Area will be subject to review under the HANS process, or other appropriate process, and monitored through a uniform computerized tracking system. A shortened process has been proposed for grading and site preparation permits for individual single family homes or mobile homes on existing lots.

Upon submittal of an application, property that is within the Criteria Area will be subject to review in order to determine whether all or part of the property is needed for inclusion in the Additional Reserve Lands. The property owner will provide available biological information regarding the property. The Permittee may also require that a habitat assessment be performed to assist with the determination as to whether all or part of the property is needed for inclusion in the Additional Reserve Lands. If it is determined that all or a part of the property is needed for the Additional Reserve Lands, then the property owner and the Permittee will enter into negotiations for conservation of the relevant portion of the property.

Other Permittee Contributions to Reserve Assembly

Section 13.0 of the IA identifies the obligations of the County and Cities, County Flood Control, County Park's, County Waste Management, RCTC, Caltrans, and State Parks that include contributions to the reserve assembly through funding and/or acquisition of mitigation lands.

Reserve Assembly Accounting Process

A Reserve Assembly Accounting process ("Rough Step") (MSHCP Section 6.7) will be implemented to ensure conservation of lands occur in rough proportionality to development, are being assembled in the configuration as generally described in the MSHCP, and that habitat conservation goals and objectives are being achieved. An annual report (MSHCP Section 6.7) that includes, but is not limited to, documenting habitat loss and conservation within the Plan Area will be prepared by the RCA and provided to the Wildlife Agencies. If at the end of any five year period the "rough proportionality" test has not been met, the Permittees and the

Wildlife Agencies will meet within 90 days to address the balance between conservation and development.

Reserve Management and Monitoring

The MSHCP proposes to use a flexible approach to management and monitoring of the MSHCP Conservation Area that includes adaptive management to ensure that the Covered Species and vegetation communities are maintained and/or enhanced. To achieve the overriding management goal of the MSHCP, to establish and maintain a self-sustaining MSHCP Conservation Area, the MSHCP proposes an integrated multi-disciplinary effort that incorporates adaptive management principles along with the MSHCP monitoring. Adaptive management programs will rely on the monitoring efforts to detect changes in species, habitats (vegetation communities), and/or threats. When change is detected, Reserve Managers will evaluate the information and respond by initiating, modifying, or ending a particular management strategy as appropriate.

Management activities will be implemented by the Reserve Managers and the RMOC to carry out species objectives and provide for biological values identified in the MSHCP. The MSHCP Monitoring Program, described below and in Section 5.3 of the Plan, focuses on collecting baseline data during the first five years of the MSHCP. The MSHCP biological monitoring program will be implemented by a Monitoring Program Administrator (MPA) in coordination with the Wildlife Agencies. Staff provided by the Wildlife Agencies will be responsible for developing the long-term monitoring program (MSHCP Section 5.3.9) with the Department designated as the MPA for the first 8 years of plan implementation (MSHCP Section 6.6.6). The initial data will include the status of resources (*i.e.*, species and vegetation communities conditions) and the status of threats to these resources (*e.g.*, invasive non-native species, disturbances, and erosion and sedimentation). The RMOC will provide biological, technical, and operational expertise involving oversight of the MSHCP Conservation Area, including technical assistance to the MPA.

The MSHCP identifies species-specific conservation objectives (MSHCP Section 9.0; Volume II-Part B; Species Accounts) that are intended to provide for the long-term conservation of the Covered Species. A critical relationship exists among the management plan, species objectives, biological monitoring program, and adaptive management strategy.

The level of available information on the Covered Species, vegetation communities, and threats limits the management program. Additional data will be needed to implement the Management Program. Quantitative distributional studies have not been conducted to determine accurate population numbers and trends. Time series data must be collected to determine whether populations are fluctuating, increasing, or decreasing (either naturally or human induced). Therefore, the initial objective of the MSHCP management program is to develop and quantify baseline data for Covered Species, vegetation communities, and threats to those species and communities. These data will be gathered in the first five years of the MSHCP to implement a functional management program.

The three to five-year monitoring work plans will be submitted annually by the Monitoring Program Administrator to the Reserve Management Oversight Committee (RMOC) for review and comment and then submitted to the RCA for funding approval. The structure and duties of the RMOC are identified in Section 6.6.4 of the MSHCP. The RCA, with input from the RMOC, prioritizes funding for management and adaptive management activities, based on the monitoring activities described in Section 5.3 of the MSHCP and a review of the Reserve Managers' annual reports. The RCA will address conflicting management policy among MSHCP Conservation Area management entities.

The MSHCP Conservation Area is divided into five management units based on existing ownership/management structures, common biological issues, and geography. The relative importance of each of these three considerations varies substantially among management units. The five management units are shown in Figure 5-1 of the MSHCP and are Unit 1, Santa Ana River Management Unit; Unit 2, Badlands/San Jacinto River Management Unit; Unit 3, National Forest Management Unit; Unit 4, Lake Mathews/Lake Skinner Management Unit; and Unit 5, Upper Santa Margarita River/Wilson Creek/Anza Valley Management Unit.

The MSHCP provides for the preparation of Reserve Management Plans within five years of Permit issuance. Section 5, Page 5-38 of the MSHCP provides an appropriate format for the Reserve Management Plans.

The Department's Resource Assessment Program has developed long-term collaborative relationship with the University of California, Riverside Center for Conservation Biology to assist in developing monitoring strategies that will be used consistently throughout the MSHCP Plan Area and in other NCCP areas. The involvement of the The Department's Resource Assessment Program is to ensure that data are collected in a consistent manner throughout the State and that data collected is stored and accessed through a centralized database.

Reserve Management

The Reserve Managers and RMOC will implement management activities commensurate with priorities identified by those entities to carry out species-specific conservation objectives (MSHCP Volume II- Part B "Species Accounts"; MSHCP Table 9-2) and provide for biological values identified in Section 3.2 of the MSHCP. Management activities will take place within the MSHCP Conservation Area, and emphasis will be given to maintaining and/or improving habitat conditions and ecosystem functions within the MSHCP Conservation Area. The Reserve Managers will prepare and submit annual management work plans to the RMOC for review and comment. Management work plans would then be submitted to the RCA for funding approval. Reserve Managers will implement management measures and species-specific management activities and provide documentation of such activities in annual reports to the RMOC.

General management activities will occur at two levels: habitat- or landscape-based management activities and species-specific management activities. The habitat- or landscape-based management activities will ensure habitats are being maintained in an appropriate condition to support Covered Species while the species-specific management activities will ensure that the management needs of individual species are met.

General management measures will be undertaken to benefit all Covered Species throughout the MSHCP Conservation Area and address ecosystem processes, threats, and disturbances that affect the habitat and the natural communities. The proposed General Management Measures are listed in Section 5.2.1 on page 5-5 of the MSHCP.

Species-specific management activities address identified threats to specific species. Species-specific management activities were identified using a matrix depicting core locations, primary habitat type, and known threats for each species. The MSHCP Covered Species Management Matrix (MSHCP Table 5-2), identifies the General Management Measures and species-specific management activities for each Covered Species. The matrix incorporates the core locations, primary habitats and threats information assembled for each species as noted above. The matrix also notes the key Management Units within which the species are located.

Adaptive Management

Adaptive management will be implemented as necessary or appropriate for a species based on new information. Adaptive management provisions will be linked to measurable biological goals and monitoring. In addition to the general and species-specific management activities, experimental adaptive management activities will be undertaken as identified, prioritized and funded by the RCA (with recommendations from the RMOC). Adaptive management hypothesis testing will occur throughout the life of the Permit. The extent of the testing will be determined based on the “conceptual models” developed for various species and the identified stressors.

Monitoring

The monitoring section of the MSHCP (Section 5.3) does not describe a detailed plan for monitoring because it is not possible to determine in advance the number of plots, transects, sampling protocols, or sampling frequencies needed without a scientific basis for establishing the monitoring strategy. The first five years of the monitoring program will be devoted to gathering objective data on species distribution and relative abundances that will be used to determine the number of plots, transects, sampling protocols, or sampling frequencies needed to implement the long-term monitoring strategy. The monitoring program includes a framework, an initial inventory and assessment phase, and an adaptive work plan.

The initial phase of the monitoring program will focus on assembling existing data, mapping vegetation communities, and inventorying Covered Species. These inventories are critical to understanding the biogeography of the Plan Area and determining the distinctiveness of vegetation communities and species distributions necessary to the identification of the most appropriate strata for partitioning sampling and to facilitate the development of appropriate survey, sampling, and monitoring protocols. The MSHCP considers monitoring as evolutionary, rather than static, to help ensure the monitoring program maintains a good foundation as the scientific understanding of species and habitats change.

The information collected through the monitoring program will assist Reserve Managers in adapting management activities to meet species and vegetation community/habitat objectives and

to identify appropriate management actions. The species objectives will influence the type and intensity of monitoring that needs to be implemented to address biological questions on species and habitats. The monitoring program will focus in part on how sampling protocols can provide feedback to whether the species objectives are being met. In turn, the adaptive management strategy will rely on the presence of an appropriate level of monitoring to drive management decisions if objectives are not being met.

The initial inventory of Covered Species and vegetation communities in the Plan Area is described in Section 5.3.5 of the MSHCP. Representative questions to be addressed through inventory and monitoring activities are listed in section 5.3.2 of the MSHCP. The proposed monitoring implementation sequence and the inventory monitoring and sampling strategy are described in Sections 5.3.3 and 5.3.4 of the MSHCP, respectively.

MSHCP Implementation

As described in Section 6.6 of the Plan, implementation of the MSHCP will be overseen by the RCA. The RCA will sign the IA and will be a Permittee; however, the RCA will not limit County or Cities local land use authority. Duties and responsibilities of the RCA are described in detail in Section 6.6.2 of the MSHCP and include: coordinating Plan implementation between the Permittees and Wildlife Agencies; identifying and making decisions regarding Reserve Assembly and local funding priorities; assembly, approval and submittal of annual reports and other required documentation to the Wildlife Agencies; management and coordination of the local funding plan outlined in Section 8.0 of the MSHCP; and oversight of reserve management and monitoring activities. The RCA will also establish a Joint Project/Acquisition Review Process to ensure that the requirements of the Permits, the MSHCP, and the IA are being met. These project review processes are described in detail in Section 6.6.2 of the MSHCP.

The Permittees will enter into an Implementing Agreement (IA) with Wildlife Agencies for the MSHCP. The IA will define the individual and collective roles and responsibilities of the parties in implementing the MSHCP. The IA is intended to ensure that the MSHCP will be implemented over the next 75 years and that Federal and State Take Authorizations will be in effect for the same time period, subject to the terms of the IA. The Counties, Cities, and RCA have selected legal mechanisms to ensure implementation of the terms of the MSHCP and IA (IA Section 11.1). The Permittees will transmit to the RCA and the Wildlife Agencies relevant documents showing adoption and/or execution of the implementation mechanisms.

The MSHCP proposes a number of measures that will ensure that the MSHCP Conservation Area, as generally described in Section 3.0 of the MSHCP, is assembled in a manner consistent with the MSHCP conservation goals. These measures include, but are not limited to: consistency with the cell conservation Criteria; process for initial project reviews within the Criteria Area (MSHCP p. 6-83); maintenance of existing habitat conditions prior to reserve assembly (MSHCP Section 6.1.5); verification of the conservation value of PQP Lands within the first five years of permit issuance (MSHCP Section 3.2.1); implementation of the Reserve Assembly Accounting process (MSHCP Section 6.7); and funding provisions for reserve assembly and management (MSHCP Section 8 and Appendix B).

Criteria Application

As set forth in the MSHCP (Section 3.2.1), the Criteria Area represents the area within which the MSHCP Criteria will be applied. Covered Activities within the Criteria Area will be designed and implemented in accordance with the Criteria (with the exceptions provided for in the Plan regarding new agricultural lands and single-family home or mobile home on an existing legal lot) and all other applicable MSHCP requirements. In the event that refinements to the Criteria are appropriate, the Criteria Refinement process will be utilized

Criteria Review Consistency Process

Reserve assembly guidance is provided in the Criteria Review Consistency Process (MSHCP pp. 3-122 to 3-124) and is intended to occur sequentially, beginning at the broad, landscape scale and proceeding through the individual cell Criteria. Permittee review of Covered Activities will consider the overall MSHCP Conservation Area by relating projects to the MSHCP Conservation Area description provided in Section 3.2.3 of the Plan which includes assembly of biological core and linkage areas. The sequential process should continue with the identification of the specific Area Plan and Area Plan Subunits within which a particular project is located. The process would then continue with a review of the specific conservation Criteria for the identified cells or cell group. The individual cell or cell group Criteria typically identifies vegetation communities toward which conservation should be directed along with connectivity requirements (to adjacent cells). The cell Criteria identify a range, by percentage, of conservation desirable within each cell or cell group. Achievement of the variable target acreage will be measured on a core and linkage or Area Plan and Area Plan Subunit basis, not on an individual project or cell/cell group basis. Implementation of the reserve assembly guidance is intended to provide a reserve configuration that supports Covered Species and their habitats.

Implementation of the aforementioned sequential process will be documented by findings made by the Permittees. These findings will be included in the appropriate project review and approval documentation. In general, the findings will include: a brief project description including the project location relative to applicable MSHCP core or linkages, Area Plan subunit, and cell or cell group; brief description of onsite biological resources; brief analysis of the relationship of the project to the biological resource issues and discussion of the proposed project's contribution toward achieving the MSHCP Criteria; brief discussion of any conflicts with the MSHCP Criteria due to project design features; and statement of findings that the proposed project has been determined to be consistent with the MSHCP Criteria and the rationale for this determination. Further details of these findings are found in the MSHCP (pp. 3-122 to 3-124).

Criteria Refinement Process

Covered Activities within the Plan Area are expected to be designed and implemented in accordance with the Criteria for each Area Plan. In cases where the refinements to the Criteria are desirable to facilitate reserve assembly or where the Permittees request refinements for either the purposes of correcting minor discrepancies or for evaluating alternative conservation

proposals that are of equivalent or superior benefit to Covered Species, the MSHCP Criteria Refinement Process (MSHCP Section 6.5) will be implemented.

The process for evaluating and accepting refinements to the Criteria will include assembly of project information and completion of an equivalency analysis by the Permittees. This analysis will address: 1) the effects on habitat, Covered Species, core, linkages, habitat blocks, non-contiguous habitat blocks, MSHCP Conservation Area, and ecotones; 2) equivalent or greater acreage contributed to the MSHCP Conservation Area; and 3) an applicant must demonstrate agreements or control over mitigation property being offered under the equivalency analysis. The equivalency analysis will draw conclusions regarding the degree to which the proposed project, incorporating the refinements, is considered to be biologically equivalent or superior to a project on the same site not deviating from the MSHCP Criteria. Projects where the Refinements to the Criteria are determined to be biologically equivalent or superior would not require an amendment to the MSHCP. Projects not determined to be biologically equivalent or superior will be determined as unacceptable deviations from the MSHCP Criteria and an amendment to the MSHCP would be required in order for the project to be a Covered Activity under the MSHCP.

If a Permittee determines that Criteria Refinements are appropriate, the affected Permittee will meet with the RCA Executive Director and the Wildlife Agencies to discuss the proposed refinements (MSHCP Section 6.6.2.F.3). Prior to Permittee approval of projects incorporating a proposed Criteria refinement, the Permittee will notify the Wildlife Agencies in writing and allow for a 60-day review and response period. The written notice will include the relevant project information. In the event there is disagreement regarding the Criteria refinements for a project, RCA staff shall schedule and hold a meeting with affected parties. In the event the parties are unable to resolve the disputed issues, the matter may be appealed to the RCA Board of Directors for final determination. Criteria Refinements that are proposed to incorporate conservation outside the Criteria Area to meet equivalency findings will be subject to concurrence by the Wildlife Agencies.

Initial Project Review

To ensure the requirements of the MSHCP, a joint review process will be instituted whereby projects within the Criteria Area will be reviewed jointly by the RCA and Permittees for consistency with the MSHCP. The Permittees will submit relevant project information to the RCA. In turn, RCA will prepare comments that address compliance with the MSHCP. RCA comments will be forwarded to the Permittee, private project applicant, and the Wildlife Agencies. The Wildlife Agencies will submit comments in response to the RCA's comments within 10 days of receipt. The Permittees will send the final decision documents to the RCA.

The Wildlife Agencies and the State Permittees will jointly review proposed projects that are within the Criteria Area and those projects outside the Criteria Area that affect narrow endemic plants species, riparian/riverine areas and vernal pools, and species requiring additional survey needs and procedures. State Permittees will submit relevant project information to the Wildlife Agencies and the RCA during preparation of a Project Identification Document or equivalent process that includes application of the MSHCP requirements.

Maintenance of Existing Habitat Conditions Prior to Reserve Assembly

The Permittees will, through their existing ordinances and permit review process, ensure that habitat is not cleared, grubbed, or graded without review for consistency with the MSHCP (MSHCP Section 6.1.5).

Verification of PQP Lands

Within five years of permit issuance, the Permittees through the RCA will verify the precise acreage location, amount, and status of PQP Lands. This information will be submitted to the Wildlife Agencies for review.

Funding

The MSHCP proposes several funding mechanisms that will be used by the Local Permittees for acquisition, monitoring, and management including collection of local development fees, density bonus fees, regional infrastructure project contributions, and landfill tipping fees. The funding and financing of the reserve assembly and management is detailed in Section 8.0 and Appendix B of the MSHCP.

Conservation Measures to Avoid and Minimize Take of Covered Species

The MSHCP specifies a variety of “conservation measures” that will be implemented in association with Covered Activities to ensure impacts to Covered Species are avoided, minimized, and/or mitigated. These measures include: 1) Protection of Species Associated with Riparian/Riverine Areas and Vernal Pools (MSHCP Section 6.1.2); 2) Protection of Narrow Endemic Plant Species (MSHCP Section 6.1.3); 3) Database Updates and Additional Survey Needs and Procedures (MSHCP Section 6.3.2); 4) Guidelines Pertaining to the Urban Wildlands Interface (MSHCP Section 6.1.4); 5) process for projects that would impact PQP Lands (MSHCP Section 3.2.1); 6) best management practices (MSHCP Section 7 and Appendix C.); 7) construction, siting, and design criteria (MSHCP Section 7.5), and 8) fuels management (MSHCP Section 6.4). Project minimizations measures have also been identified for specific Covered Activities (MSHCP Section 7). The Permittees will be required to make findings (MSHCP p.3-123 and 3-124, Section 3.3.1; p. 6-47 and 6-48 Section 6.1.5,) on a project by project basis that demonstrate consistency with the MSHCP for activities within the Criteria and outside the Criteria Area.

Protection of Species Associated with Riparian/Riverine Areas and Vernal Pools

According to the MSHCP implementation structure, the Protection of Species Associated with Riparian/Riverine Areas and Vernal Pool policy (MSHCP Section 6.1.2) will be implemented throughout the MSHCP Plan Area to provide for protection of riparian/riverine areas and vernal pools (including fairy shrimp habitat) as well as the 34 species (MSHCP Section 6, pp. 6-20 and 6-21) associated with these habitats. An additional 31 species (MSHCP Section 6, pp. 6-26 and 6-27) are identified to benefit from this policy. In general, the policy requires that riparian, riverine, vernal pool/fairy shrimp habitat, and other aquatic resources are mapped and assessed

on a project by project basis and an avoidance alternative implemented, if feasible. Because fairy shrimp are not restricted to the “classic” definition of vernal pools, potential habitat (*e.g.* stock ponds, ephemeral pools and other features) will be determined by a qualified biologist. The mapping information will be used to identify aquatic resources that may be acquired for inclusion into the Additional Reserve Lands.

Long-term conservation of the avoided areas and its associated functions and values will be ensured through: deed restrictions, conservation easements, or other appropriate mechanism; long-term management; and implementation of appropriate project design features to address edge effects (*e.g.*, lighting, noise, urban runoff, exotic plant infestation, domestic pet invasion, unauthorized recreational use, etc.).

If an avoidance alternative is not feasible, a practicable alternative that minimizes direct and indirect effects to riparian/riverine areas, vernal pools/fairy shrimp habitat, and associated functions will be selected and unavoidable impacts will be mitigated. To ensure adequate replacement of lost functions and values, the Permittee is required to make a determination of Biologically Equivalent or Superior Preservation, as described in the Plan (pp 6-24 and 6-25), that evaluates the effects to habitats, effects on the species to which the purpose of this policy is intended to protect (MSHCP Section 6.0, pp. 6-20, 6-21, and 6-23), and the effects on riparian linkages and the function of the MSHCP Conservation Area. This analysis must demonstrate that a proposed action, including design features to minimize impacts and compensation measures (*e.g.*, restoration, enhancement), will provide equal or better conservation than avoidance of the riparian, riverine, vernal pools, or fairy shrimp habitats. The Wildlife Agencies will be notified and provided a 60-day review and response period prior to an approval of a Biologically Equivalent or Superior Preservation determination by the Permittee.

In addition to the aforementioned process regarding habitats, focused surveys for the least Bell’s vireo, southwestern willow flycatcher, western yellow-billed cuckoo, and fairy shrimp species (Riverside, Santa Rosa Plateau, and vernal pool fairy shrimp) will be conducted if suitable habitat for these species is present on the project site and an avoidance alternative is not feasible. Areas identified through the Riparian/Riverine Areas and Vernal Pool policy that are important for the long-term conservation of the focused survey species will be included in the MSHCP Conservation Area by way of implementation of the species-specific objectives (see MSHCP Section 9) as referenced in this policy (such as species-specific objectives that require avoidance and conservation of 90 to 100 percent of those occupied areas within the Plan Area that provide for the long-term conservation of the species including 100 meters of undeveloped landscape adjacent to avoided areas, etc.).

For those occupied areas that are not necessary for inclusion into the Conservation Area, 90 or, in the case of the southwestern willow flycatcher 100 percent, avoidance and long-term management and protection of the occupied area will still be required unless a Biologically Equivalent or Superior Preservation Determination can demonstrate that a proposed alternative, including design features to minimize impacts and compensation measures (*e.g.*, restoration, enhancement), will provide equal or better conservation than 90 or 100 percent avoidance of the occupied property. The Wildlife Agencies will be notified and provided a 60-day review and

response period prior to an approval of a Biologically Equivalent or Superior Preservation Determination by the Permittee.

Protection of Narrow Endemic Plant Species

The Protection of Narrow Endemic Plant Species policy (MSHCP Section 6.1.3) will be implemented to ensure the appropriate conservation of 14 narrow endemic plant species. The purpose of the policy is to provide a better understanding of the presence and distribution of these species within the Plan Area and guide reserve assembly. The policy requires that site-specific focused surveys for the 14 plant species (MSHCP Section 6, p. 6-28) will occur within defined survey areas as identified in Figure 6-1 of the MSHCP as modified by the MSHCP Errata (Appendix 1), should appropriate habitat or soils be present. The information obtained from these surveys will be used to prioritize areas for acquisition into the MSHCP Conservation Area with consideration given to species populations, vegetation communities, and reserve design and function.

For those areas with positive survey results that may be impacted by projects, a minimum of 90 percent of those portions of the property that provide for long-term conservation value of the species on the project site will be avoided (but not conserved). The avoided areas will remain in “status quo” until it is demonstrated that species conservation goals including species specific objectives have been met or the avoided areas are included into the Additional Reserve Lands. Avoided areas will not be considered conserved until the avoided area is incorporated into the Additional Reserve Lands at which time the land would be protected and managed. The RMOC and MPA will make recommendations to the RCA regarding the inclusion of the avoided areas into the Additional Reserve Lands. Acquisition considerations will include an evaluation of the long-term viability of the avoided area, beneficial contribution to applicable species, and potential contribution of the avoided area to the overall MSHCP Conservation Area (*e.g.*, contributions to the maintenance of functional linkages, ecosystem function, or buffers for other conserved areas).

An Equivalency Finding (MSHCP Section 6, p. 6-40) will be made by the Permittee to demonstrate that, at a minimum, the 90 percent avoidance threshold has been met on the project site. If the 90 percent avoidance threshold is not feasible, then a Determination of Biologically Equivalent or Superior Preservation will be made by the Permittee as outlined in the Plan (MSHCP Section 6, p. 6-41). This determination must demonstrate that although a proposed project will exceed the 10 percent loss, design features and compensation measures will result in an overall MSHCP Conservation Area design and configuration that is equivalent or superior to that which will occur if the 90 percent avoidance could be achieved. The proposed biologically equivalent or superior alternative will be evaluated with respect to the benefits it will provide to narrow endemic plants considering the effects on habitat with long-term conservation value, populations, and linkages and function of the MSHCP Conservation Area. The Wildlife Agencies will be notified and provided a 60-day response period prior to an approval of a Biologically Equivalent or Superior Preservation Determination.

At such time as the species conservation goals including species-specific objectives (MSHCP Section 9.2 and the Species Accounts) are met, the Plan identifies procedures for discontinuing

surveys (MSHCP Section 6, p. 6-38) and releasing the 90 percent avoidance areas (MSHCP Section 6, p. 6-39) for development.

Additional Survey Needs and Procedures

The Additional Survey Needs and Procedures policy (MSHCP Section 6.3.2) will be implemented to address the lack of information regarding certain species and guide reserve assembly. The policy requires surveys be conducted for 13 plant and 7 animal species within defined surveys areas. The Plan identifies the survey areas for the 13 plants on Figure 6-2 (Criteria Area Species Survey Area, MSHCP Section 6, p. 6-64 as modified by MSHCP Errata Appendix 1) and the survey areas for the 7 animal species are detailed in the Amphibian Species Survey Areas With Criteria Area (MSHCP Section 6, Figures 6-3, p. 6-66), Burrowing Owl Survey Areas With Criteria Area (MSHCP Section 6, Figure 6-4, p. 6-67), and Mammal Species Survey Area With Criteria Area (MSHCP Section 6, Figure 6-4, p. 6-68). The procedures under this policy are similar to those discussed above for the Protection of Narrow Endemic Plant Species including the avoidance of 90 percent of those portions of the project site that provide for the long-term conservation of the species, Equivalency Findings, Biologically Equivalent or Superior Preservation Determination, and discontinuation of surveys. Avoided areas will be considered for acquisition and conservation within the Additional Reserve Lands. Avoided areas will not be considered conserved until the avoided area is incorporated into the Additional Reserve Lands. At such time as the species conservation goals including species-specific objectives are met, avoided areas may be released for future development if they do not contribute to the overall long-term conservation of the species or MSHCP Conservation Area configuration.

Guidelines Pertaining to the Urban Wildlands Interface

The MSHCP contains guidelines intended to address indirect effects, e.g., edge effects, associated with locating development in proximity to the MSHCP Conservation Area. Measures are included to ensure that the quantity and quality of runoff discharged to the MSHCP Conservation Area is not altered in an adverse way when compared with existing conditions. Stormwater systems in these areas will be designed to prevent the release of toxins, chemicals, petroleum products, exotic plant materials, or other elements that might harm or degrade biological resources. Discharge of untreated surface runoff from developed and paved areas into the Conservation Area will be avoided. In addition, night lighting will be directed away from the MSHCP Conservation Area. Noise generating land uses will incorporate setbacks, berms, or walls. Also, when approving landscape plans for development adjacent to the MSHCP Conservation Area, Permittees will consider the list of non-native plants identified in the Plan (MSHCP Table 6-2) and require revisions to landscape plans (subject to the limitations of their jurisdiction) so that the use of invasive plants is avoided. Proposed land uses adjacent to the MSHCP Conservation Area will incorporate barriers, where appropriate, in individual project designs to minimize unauthorized public access, domestic animal predation, illegal trespass or dumping in the area. Furthermore, manufactured slopes associated with development will not extend into the MSHCP Conservation Area.

Fuels Management

The MSHCP identifies fuel management activities that may occur adjacent to the MSHCP Conservation Area whereas: 1) existing reserves occur adjacent to existing developed areas, the brush management zone may encroach into the MSHCP Conservation Area; 2) the Permittee will evaluate fire management issues when acquiring land and where reserve assembly proceeds adjacent to existing developed areas, the MSHCP Conservation Area boundaries should be established to avoid such encroachment; and 3) new development that is planned adjacent to the MSHCP Conservation Area or other undeveloped areas, brush management will be incorporated in the development boundaries and will not encroach into the MSHCP Conservation Area.

Fire management activities necessary for human safety and protection of biological resources may also occur within the MSHCP Conservation Area. Such activities may include construction of fire breaks, fuel reduction zones or efforts to manage fuel loads. To minimize negative effects and maximize positive effects on the MSHCP Conservation Area, within one year following approval of the MSHCP, the MSHCP Reserve Management Oversight Committee will begin work with fire protection entities to identify and map potential fuel reduction zones or firebreak locations as well as access routes for fire equipment. These activities will be sited and designed to avoid sensitive biological resources, preferably at the top or bottom of a slope, rather than across a slope, and through use of existing firebreaks such as natural ridge lines and fire roads where available. In smaller, fragmented conserved areas, fuel loads will be managed in a manner most consistent with the protection of biological resources. On those lands designated as State Responsibility Area, the California Department of Forestry and Fire Protection is the primary agent for any fire related activity occurring involving the vegetative cover.

Guidelines for Facilities within the Criteria Area and PQP Lands

Section 7.5 of the MSHCP sets out guidelines for siting and design of planned roads, construction of wildlife crossings, and general construction guidelines that will be implemented by the Permittees for proposed Covered Activities within the Criteria Area and PQP Lands.

Siting and Design of Roads

Prior to design and construction of transportation facilities, appropriate biological surveys will be conducted including vegetation mapping and appropriate species surveys. Planned roadways will be located in the least environmentally sensitive location feasible, such as already disturbed and developed areas and existing roadways. Covered Species and wetlands will be avoided, if feasible. In addition, roadway design features will consider wildlife movement requirements (see discussion below). According to the MSHCP, clearing of habitat for any construction, maintenance, and operation activities within the Criteria Area and PQP Lands is proposed to be conducted outside the active breeding season defined for purposes of the MSHCP as March 1 to June 30. However, to the extent Covered Activities will impact unlisted Covered bird species protected by the MBTA, Covered Activities must comply with the MBTA (see also Appendix 2 Proposed Permit Condition 5).

Construction of Wildlife Crossings

The MSHCP discusses both general considerations and specific design guidelines for the construction of wildlife crossings in conjunction with roadway construction activities (MSHCP Section 7, pp. 7-81 to 7-87). The Specific Initial Guidelines for Wildlife Movement Design Considerations within the Criteria Area (MSHCP Section 7, p. 7-84; see MSHCP Errata Appendix 1) also will apply to PQP Lands. Wildlife crossing requirements will be assessed and addressed by the entire road or cluster of roads affecting a particular constrained location rather than by small segments. The Permittees will ensure that appropriate features that provide for wildlife movement are incorporated into the project design. Measures will also be incorporated to address human presence that could deter usage of the wildlife movement design features. To facilitate monitoring activities, pre-wired lock boxes to accommodate photographic or video cameras will be installed within the walls of the newly constructed large mammal culverts, overpasses, and underpasses.

Construction Guidelines

The MSHCP contains construction guidelines that include, but are not limited to, development of water and pollution control plans, implementation of sediment and erosion control measures for soil stabilization, the use of sand bags or other methods for short-term stream diversions, silt fencing or sediment trapping, procedures for settling pond maintenance, the siting of equipment, fueling and staging areas in non-sensitive habitats, and construction personnel training. Construction sites will be watered regularly to control dust. Appropriate fire-fighting equipment will be available on the project site. The limits of construction will be clearly defined and marked in the field prior to project. Exotic species removed during construction will be properly handled to minimize further infestations. The timing of construction will consider seasonal requirements for breeding birds and migratory non-resident birds. As proposed in the MSHCP, clearing of habitat within the Criteria Area and PQP Lands will be avoided during the active breeding season defined for purposes of the MSHCP as March 1 to June 30. However, to the extent Covered Activities will impact unlisted Covered bird species protected by the MBTA, Covered Activities must comply with the MBTA (see also Appendix 2 Proposed Permit Condition 5) The Permittees will ensure that the guidelines and best management practices are implemented by requiring ongoing monitoring and reporting during construction activities.

Best Management Practices

Best management practices are identified in Appendix C of the MSHCP and include training sessions for construction employees, implementation of water and erosion control plans, stream diversion and sedimentation procedures, removal of exotic species that prey upon or displace target species, monitoring of construction activities by a qualified biologist, avoiding and minimizing removal of native vegetation to the maximum extent feasible, and returning temporary impact areas to pre-construction contours and re-vegetating with native species.

Guidelines for Public Access and Recreation in the MSHCP Conservation Area

The Plan identifies specific policies and guidelines (MSHCP Section 7, p. 7-74 to 7-80) to avoid and minimize the potential impacts associated with proposed conditionally compatible uses (MSHCP Section 7.4.2) that would allow, and provide for, public access to the Conservation Area. All decisions related to public access will be made in a manner that is most protective of biological resources. In the event conflicts arise between public access policies and resource protection, resource protection will take precedence as stated in the MSHCP (Section 7, p. 7-77).

Guidelines for the Siting and Design of Trails and Future Facilities

These guidelines include locating trails and facilities in the least sensitive areas (*e.g.* existing dirt roads); conducting biological surveys (*i.e.* vegetation mapping and species surveys) prior to design and construction; avoiding highly erosive soils; implementing environmentally sensitive grading techniques, drainage management, water breaks, and vegetation buffers for trail and facility runoff absorption and filtration; incorporating design features to discourage and prevent intrusion into environmentally sensitive areas; avoiding wildlife crossing points; avoiding the use of non-native invasive plant species for landscaping requirements; incorporating design features into new facilities to minimize impacts from lighting; and accessing trails and facilities by existing or already planned roadways.

Trail type, width, and intensity of trail use will be consistent with the protection of the resources being traversed. Trails will be sited along the edges of large sensitive areas. Trails that allow dogs will be located in areas of low habitat value or edges and leashes will be required at all times to restrain pets. Mountain bike trails will be limited to areas of grade no greater than 25 percent, with low susceptibility to erosion, and out of wetlands and other sensitive areas. Equestrian use will be limited to designated trails. Trailheads will be sited in areas consistent with resource protection goals such as along the edge of the Conservation Area.

Guidelines for Operations and Maintenance

Only passive recreational uses will be permitted in the MSHCP Conservation Area (*i.e.* bird watching, hiking, equestrian use, biking, photography, picnicking). Activities such as camping, off-road vehicle use (with the exception of operations, maintenance, and emergency vehicles) and activities that require construction of new facilities and roads other than that identified in the MSHCP will be prohibited. Motorized vehicle access by the public to the MSHCP Conservation Area will be prohibited. Access to the MSHCP Conservation Area will be controlled through properly maintained fencing and signs. The MSHCP Conservation Area will be patrolled on a regular basis to ensure that visitors remain on designated trails and all other rules and guidelines to protect natural resources are observed. Signage will be placed in the appropriate areas to clearly identify access areas and prohibited areas.

Appropriate daily and seasonal limits on trail use will be established. Trails will be closed and passive recreational uses restricted, as necessary. Following heavy rains, the use of the designated equestrian trails will be prohibited to avoid trail damage and impacts to habitat. If mountain bike use becomes heavy or problematic, an access control system will be developed

and permits may be required. At the discretion of the Reserve Manager, public access may be restricted within and adjacent to wetlands, vernal pools, restoration areas, and sensitive wildlife habitat. Fencing or other barriers will be used to restrict access to sensitive areas when protection of biologically sensitive resources are required. Trails, facilities, signs and barriers will be maintained to discourage and prevent intrusion into environmentally sensitive areas.

Litter and trash will be controlled and closed garbage cans will be provided at trailheads and access points. Litter and trash will be collected on a regular basis. Wildlife undercrossings will be kept free of all debris, trash and other obstructions.

Covered Activities

The following is a summary of the activities proposed for coverage under the MSHCP. Further information regarding these activities can be found in Section 7.0 of the MSHCP.

Outside Criteria Area

Public and private development including construction of buildings, structures, infrastructure and all alterations of the land, which are carried out by Permittees, Participatory Special Entities, and Third Parties Granted Take Authorization, are proposed as Covered Activities under the Plan, subject to consistency with MSHCP policies that apply outside the Criteria Area (such as policies related to Protection of Species Associated with Riparian/Riverine Areas and Vernal Pools, Protection of Narrow Endemic Plant Species, species that require Additional Survey Needs and Procedures, and mitigation fee payments).

Within Existing Public/Qusai-Public Lands

Section 3.2.1 of the MSHCP identifies the procedure that will be used in the event that a Permittee elects to use PQP Lands in a way that alters the land use such that it will not contribute to reserve assembly. Alterations of PQP Lands (e.g. implementation of proposed Covered Activities) in such a manner will require the Permittees to locate and acquire or otherwise encumber replacement acreage at a minimum ratio of 1:1 taking into account direct and indirect effects of PQP Lands in one location with PQP Lands in another location. This procedure requires the Permittees to make findings through an equivalency analysis that compares the effects/benefits of the proposed project including specific mitigation relative to the effected PQP Lands. The biological equivalency or superior analysis shall address the effects on habitats, Covered Species, core areas (as identified on the MSHCP Core and Linkage Map), linkages and constrained linkages (as identified on the MSHCP Core and Linkage Map), MSHCP Conservation Area configuration and management (such as increases or decreases in edge), and ecotones (defined as the areas of adjoining Vegetation Communities, generally characterized by greater biological diversity) and other conditions affecting species diversity (such as invasion by exotic). The Permittees shall submit the equivalency analysis in narrative and graphic form comparing the effects/benefits of the proposed project to the Wildlife Agencies for review and concurrence. Impacts to habitats within existing PQP Lands will be compensated by purchase and dedication of land into the MSHCP Conservation Area that is in addition to the Additional Reserve Lands. Actions within PQP Lands will also be subject but not limited to MSHCP

policies related to the Protection of Species Associated with Riparian/Riverine Areas and Vernal Pools, Protection of Narrow Endemic Plant Species, and species that require Additional Surveys Needs and Procedures.

Some activities may be proposed on Federal lands, or may involve Federal agency approvals (*i.e.*, have a Federal “nexus”). To the extent that these Covered Activities involve a Federal nexus and are determined to affect federally listed species, compliance with section 7 of the Act will be necessary. Incidental take of federally listed species will occur through the section 7 process, not through the MSHCP. The Fish and Wildlife Service’s Obligations and Assurances provided for in Section 14.9 of the IA describe how section 7 consultations will be processed for Covered Activities.

Existing Roads within PQP Lands

Both publicly- and privately-maintained roads occur on PQP Lands, as summarized in Table 7-1 of the MSHCP. Proposed maintenance activities on privately-maintained roads include only such grading as necessary to restore a smooth driving surface, maintain existing graded shoulders within the existing rights-of-way, and essential weed abatement, excluding the application of any herbicides, subject to the submittal of an application for Certificate of Inclusion.

Some of the existing County maintained unpaved roads may be paved within the existing roadbed as future traffic, safety and/or environmental conditions warrant. Proposed maintenance activities include: signage, traffic control devices, guardrails and fences, pavement repairs, accident response, tree trimming, natural disaster damage/restoration of emergency access, storm drainage, weed control, grading shoulders (up to 12 feet), grading existing dirt roadways, dust stabilization, culverts/drop structures, curbs/gutters/sidewalks, roadway widening, berms, roadway resurfacing, ditch clearing, landscape maintenance, bridge maintenance, and roadway reconstruction. In addition, safety improvements to other publicly maintained existing roadways within PQP Lands are proposed.

Planned Roads within PQP Lands

New circulation element roads or improvements to existing circulation element roads proposed within existing PQP Lands include Butterfield Stage Road, Anza Road, Bautista Canyon Road, Gilman Springs Road and Roads crossing the Santa Ana River, including a potential new crossing at Schleisman Avenue. Siting, design and construction of these facilities will be subject to the minimization guidelines provided in Sections 7.5.1, 7.5.2, and 7.5.3 of the MSHCP and will also be subject to the best management practices identified in Appendix C of the MSHCP. Specific planned roadway projects will be subject to additional restrictions or a process for coverage, as set forth in Section 7.2 of the MSHCP and Section 20.4.2 of the IA. These roadway projects include certain CETAP corridors (MSHCP Section 7.2.2), and the Cajalco Road Realignment and Widening (MSHCP Section 7.2.3). Several planned roadways will also extend into the Criteria Area (see below Planned Roadways within the Criteria Area and Covered Activities Subject to a Minor Amendment)

Future Facilities within PQP Lands

Proposed future facilities within existing PQP Lands including water, sewer, electrical, gas and solid waste facilities, described in more detail in Section 7.2.4 of the MSHCP, will be subject to a finding of equivalent conservation provided through individual project mitigation. An equivalency analysis will be provided to the Wildlife Agencies by either the Permittee or the entity requesting a Certificate of Inclusion. This analysis will include narrative and graphic information comparing the effects/benefits of the proposed project including specific mitigation and compensation measures for lost conservation values. The process for future facilities within PQP Lands to be covered under the Plan is identified in Section 7.2.4 of the MSHCP.

Existing Facilities within PQP Lands

The Permittees propose to conduct maintenance on existing public facilities that are located within existing PQP Lands. This maintenance will occur only within areas of existing disturbance and without any changes in the operating characteristics of the facility.

Existing Agriculture within Local PQP Lands

Existing agricultural uses within Local PQP Lands are proposed as Covered Activities subject to the provisions of Section 6.2 of the MSHCP. Agricultural land expansion or increased intensity of agricultural use is not proposed as a Covered Activity within the PQP Lands. In order to verify the location of existing agricultural operations, the County proposes to establish a database that will identify existing agriculture operations (MSHCP Section 6.2).

Inside the Criteria Area

Covered Activities within the Criteria Area will be subject to the Criteria (see exception below under single family or mobile home on existing legal parcel and new agriculture) and such MSHCP policies related to the Protection of Species Associated with Riparian/ Riverine Areas and Vernal Pools, Protection of Narrow Endemic Plant Species, and Additional Surveys Needs and Procedures.

Public and Private Development within Criteria Area

Public and private developments within the Criteria Area that are consistent with the Criteria and comply with the applicable requirements of the MSHCP are proposed as Covered Activities.

Single Family Homes on Existing Parcels

Development of an individual single-family home or mobile home on an existing legal parcel in accordance with existing land use regulations is proposed as a Covered Activity within the Criteria Area. As described in Section 6.1.1 (p. 6-18) of the MSHCP, an expedited review process is proposed to assist in determining the appropriate location of a single-family home or mobile home on an existing lot within the Criteria Area. Within the Criteria Area, an application for the issuance of a grading permit for an individual single-family home on an existing lot or a

site preparation permit for a mobile home on an existing lot will be subject to review against the MSHCP conservation Criteria solely in order to determine the location of a building foot print area and any necessary access road(s) on the least sensitive portion of the lot (MSHCP Section 7.3.2). A habitat assessment for certain species may be required in order to assist in determining the most appropriate location for the area of disturbance and any necessary access road(s). Upon completion of the review, the Permittees will determine the location of the area of disturbance and the location of any necessary road(s). Any necessary firebreaks will be included within the area of disturbance. The Permittees will monitor and report on an annual basis the number of grading or site preparation permits for this type activity.

Agriculture Lands within the Criteria Area

Existing agricultural uses and conversion of natural lands to agricultural use, as defined and outlined in Section 6.2 of the MSHCP and 11.3 of the IA, are proposed as Covered Activities. Agricultural operations include the production of plants (horticulture), fish farms, animals and related production activities, including the planting, cultivation and tillage of the soil, dairying, and apiculture; and the production, plowing, seeding, cultivation, growing, harvesting, pasturing and fallowing for the purpose of crop rotation of any agricultural commodity, including viticulture, apiculture, horticulture, and the breeding, feeding and raising of livestock, horses, fur-bearing animals, fish, or poultry and all uses conducted as a normal part of such operations; provided such actions are in compliance with all applicable laws and regulations. Expansion of existing agriculture within the Criteria Area requiring a County or City discretionary authorization would be subject to the Criteria and other requirements identified in the Plan (MSHCP pp. 6-58 and 6-59) unless construction and operation is confined solely to the existing building footprint.

All agriculture operations on parcels included on the Existing Agricultural Operations Database that do not require a County or City discretionary authorization will receive take authorization as existing agriculture without the need to comply with the Criteria or MSHCP mitigation requirements (IA Section 11.3.4). Take authorization will be applied to a limited number of new lands for agricultural operations (including expansion of existing agriculture not requiring a discretionary permit or authorization), or subsequently determined to be converted to agriculture use, after the effective date of the IA consistent with the goals of the MSHCP (“new agricultural lands”). Issuance of a “Certificate of Inclusion” or other written instrument must occur prior to take authorization. New conversions to agricultural use within the Criteria Area will be covered up to an established threshold of 10,000 acres over the life of the Permit. The proposed guidelines for coverage of new agricultural operations and mechanisms for implementing the new agricultural lands cap are discussed in Section 6.2.F of the MSHCP and Section 11.3.6 of the IA.

To verify the location of the existing agricultural operations, the County will establish a database on or before the effective date of the IA or the issuance of a section 10(a) permit identifying existing agricultural operations (“Existing Agricultural Operations Database”) as specified in the Section 11.3.3 of the IA. The “new” agricultural operations that will count towards the current 10,000-acre cap within the Criteria Area will be in addition to the activities recorded in the Existing Agricultural Operations Database (MSHCP sections 6.2 and 7.3.3) as such operations

go into agricultural production. Aerial photographs of the Criteria Area will be reviewed every three years to determine the level of agriculture activity. Agricultural activities will be included in the annual reports to the Wildlife Agencies.

Existing Roads within the Criteria Area

As described in Section 7.3.4 of the Plan, maintenance of existing roads within the Criteria Area is proposed as a Covered Activity under the Plan. Existing roads within the Criteria Area will not be included in the total acreage of Additional Reserve Lands and therefore will not be included as part of the MSHCP Conservation Area. Existing roadways within the Criteria Area include interstates, freeways, State highways, City and County maintained roadways, as well as local roads, which are not City, or County maintained that provide property access. This latter category of other maintained roadways are generally maintained by the adjacent property owners, either individually or collectively. Table 7-3 in the MSHCP provides an estimate summarizing the extent of these various types of existing roadways that are permitted to remain within the Criteria Area.

Maintenance activities on privately-maintained roads are afforded limited coverage, subject to the a Certificate of Inclusion. The proposed maintenance activities for these roadways is substantially limited in scope, including only such grading as necessary to restore a smooth driving surface, maintain existing graded shoulders within the existing rights-of-way, and essential weed abatement, excluding the application of any herbicides. Guidelines identified in Section 7.5.3 of the MSHCP are proposed to minimize impacts to sensitive species and habitats occurring adjacent to the existing roadway. Best management practices (MSHCP Appendix C) will be applied as appropriate.

Some of the existing County maintained unpaved roads may be paved within the existing roadbed as future traffic, safety and/or environmental conditions warrant. Proposed maintenance activities include: signage, traffic control devices, guardrails and fences, pavement repairs, accident response, tree trimming, natural disaster damage/restoration of emergency access, storm drainage, weed control, grading shoulders (up to 12 feet), grading existing dirt roadways, dust stabilization, culverts/drop structures, curbs/gutters/sidewalks, roadway widening, berms, roadway resurfacing, ditch clearing, landscape maintenance, bridge maintenance, and roadway reconstruction. Guidelines identified in Section 7.5.3 of the MSHCP are proposed to minimize impacts to sensitive species and habitats occurring adjacent to the existing roadway. Best management practices (MSHCP Appendix C) will be applied as appropriate.

Planned Roads within the Criteria Area

Planned roadways are defined as either existing facilities that require improvements (*i.e.*, widening) or new facilities that need to be constructed. Planned roadways include seven types of roadways, CETAP corridors, freeways, and other major facilities that have been identified on Figure 7-1 of the MSHCP. Specific Caltrans freeways proposed for improvements include I-215, I-15, I-10, and SR-91 (MSHCP pp. 7-36 to 7-38). Roadways other than those identified in the Plan will not be covered without an amendment (see below for exceptions under Covered Activities Subject to a Minor Amendment) to the MSHCP in accordance with the procedures

described in Section 6.10 of the MSHCP and Sections 20.4. or 20.50 of the IA. Roads with special environmental issues due to their location within particularly sensitive areas are listed in Table 7-4 of the MSHCP, which also identifies specific design features and alignments that will be implemented to address environmental concerns. Section 7.5 of the MSHCP identifies guidelines for siting and design of planned roads, guidelines for construction of wildlife crossings, and construction guidelines for planned roads that will be implemented.

The proposed SR-60 improvements (MSHCP, page 7-37) would allow for the widening of the freeway from 6 lanes up to an additional 8 standard or HOV lanes. These improvements in Riverside County include a 75-foot wide rail corridor, which would need to extend to San Bernardino County and perhaps beyond. SR-60 is currently a 6-lane facility in Riverside County (Page 7-37 of the Plan), while SR-60 consists of 8 standard and 2 HOV lanes to the east in San Bernardino County (Cathy Bechtel, Director of Transportation Planning and Policy Development, Riverside County Transportation Commission, pers. comm. April 22, 2004). The addition of 4 standard or HOV lanes in Riverside County would make the number of lanes equal in this portion of SR-60 to that found in San Bernardino County. In light of the current disparity in lane number, the potential addition of 8 standard or HOV lanes in Riverside County would not necessitate a reciprocal addition of lanes (*i.e.*, 4 standard or HOV lanes) within the existing continuation of the freeway to the west in San Bernardino County. Coverage for the railway within the Plan Area will not limit or preclude corridor alternatives immediately outside the limits of the Plan area because it is anticipated that the railway alternatives would look beyond the Plan Area at the time of project design and be flexible in location and design.

1. Community Environmental Transportation Accessibility Process (CETAP)

- a. Hemet to Corona/Lake Elsinore Corridor

The transportation agencies are continuing their planning process for the Hemet to Corona/Lake Elsinore CETAP transportation corridor. The Permittees have proposed several alternative corridor alignments (Alternatives 1a, 1b, 5a, 5c, 5e, Hybrid 1, and Hybrid 2) for a major east to west transportation facility that may traverse both Criteria Area and PQP Lands (MSHCP pp. 7-40 to 7-44). Only one east to west CETAP transportation corridor will be constructed and eligible for coverage under the MSHCP. Project specific information is unavailable at this time with the exception that no interchanges will be constructed within PQP Lands. Therefore, interchanges on PQP Lands are not a Covered Activity. Any interchanges that may be proposed in the future within PQP Lands will require an amendment to the MSHCP (Section 7.0, p. 7-10).

- b. Winchester to Temecula Corridor

Three alternatives for a north to south CETAP transportation corridor (Winchester to Temecula Corridor) are identified in the Plan (Alternatives 1,7a, 7b) but will not be built based on the Final Environmental Impact Statement for the Winchester to Temecula Corridor (Riverside County Integrated Project Consultant Team 2003), which identifies a “hybrid” alternative as the preferred alternative to be constructed and that is not specifically described in the MSHCP. Therefore, the alternatives identified in the Plan on pp. 7-38 to 7-40 will not be assessed in this biological opinion or permitted under the Plan. Although, the “hybrid” alternative is not

specifically described in the Plan, the components of the alignment are proposed as a Covered Activity under the widening of I-15 and I-215, and the circulation element (Date Street). Therefore, the “hybrid” alternative replaces those alternatives specified in the MSHCP for the Winchester to Temecula Corridor and it is only the “hybrid” alternative that is proposed as a Covered Activity (see MSHCP Errata in Appendix 1).

c. San Bernardino to Moreno Valley (Riverside County) Corridor

This major transportation corridors is proposed to be located in the vicinity of I-215 and Ironwood Avenue, Riverside County and extend to California Street in San Bernardino County. As stated in the MSHCP, the proposed transportation corridor will be tunneled beneath the Box Springs Reserve and tunnel portals sited outside of the Criteria Area. The alignment would proceed east from Box Springs Reserve generally along Center Street and span Reche Canyon Road before entering San Bernardino County. In the absence of a mechanism to comprehensively address the impacts of this proposed activity, a minor or major amendment to the MSHCP will be required once additional information is assembled regarding the design and location of the facility and the relationship to impacts within San Bernardino County (MSHCP pp. 7-44).

d. Orange County to Riverside County Corridor

RCTC and Orange County Transportation Authority are studying a transportation corridor between Riverside and Orange counties. Since a specific alignment has not been determined, the MSHCP provides a process for coverage within the Plan Area. Six conceptual alternative alignments/locations are under study of which only one will be selected and considered a Covered Activity under the MSHCP. These conceptual alternatives are described in the MSHCP on pages 7-45 through 7-48. Coverage of this transportation corridor is subject to criteria and conditions outlined in the MSHCP. Four of the alternatives (A through D) will enter Orange County within its Central and Coastal Subregion NCCP area and the other two (E and F) will enter into the Southern Subregion NCCP area.

The MSHCP identifies a process (MSHCP pp. 7-48 to 7-55) such that if certain criteria and conditions can be met, including resolution of issues in Orange County, then the alignment could be considered a Covered Activity under the MSHCP through the minor amendment process upon the Wildlife Agencies concurrence (see below Covered Activities Subject to a Minor Amendment). If the Wildlife agencies do not concur, the project would require a major amendment to the MSHCP in order to become a Covered Activity. The process will be undertaken in the future when more specific project information is available and a specific alignment selected. RCTC will need to provide the Wildlife Agencies with a determination of consistency with the MSHCP that includes an analysis of the effects on habitats, covered species, core areas, linkages and constrained linkages, and the configuration and management of the MSHCP Conservation Area. General criteria and conditions along with specific criteria for each conceptual alternative are detailed in the MSHCP and will need to be incorporated into the alignment selection and design process.

For Alternatives A through D, consistency must be demonstrated with the existing Central and Coastal Subregion NCCP, and the alternative selected must fully mitigate any direct impacts that may result from an alignment within that NCCP plan area. For Alternatives E and F, MSHCP coverage will be conditional upon approval by the Wildlife Agencies of a NCCP plan for the Southern Subregion that considers such a corridor, including all cumulative and growth-inducing impacts of the facility within the Southern Subregion planning area.

Flood Control Facilities within the Criteria Area

Flood control facilities (improvements and new construction) within the Criteria Area that are undertaken by a Permittee consistent with the MSHCP are proposed as Covered Activities. Proposed maintenance of existing flood control facilities within PQP Lands (some of the County Flood Control District lands are proposed to be included in the PQP Lands database) or the Criteria Area are described as those activities that will be subject to a Memorandum of Understanding or agreement with The Department (MSHCP Section 7.3.7). Other proposed activities within the Criteria Area are listed in Table 7-14 of the MSHCP (Note: there are no planned flood control improvements for Prado Basin see MSHCP Errata in Appendix 1). In addition to the proposed San Jacinto River Project (see below Covered Activities Subject to a Minor Amendment) other proposed activities include Ramona Expressway bridge and culvert, Nuevo Road bridge, San Jacinto Avenue crossing, I-215 bridge and levee, Case Road bridge, Burlington Northern Santa Fe Railroad bridge, Goetz Road bridge, Ethanac Road bridge, Perris Valley Storm Drain Channel, and Romoland Channel.

Future Facilities within the Criteria Area

Future facilities are facilities that are necessary to support planned development. Certain future facilities have been preliminarily identified by the agencies responsible for their construction, operation and maintenance, while others have not been or cannot be identified and/or located at present. Future facilities that are carried out by a Permittee, Participating Special Entities and/or Third Parties Granted Take Authorization are proposed as Covered Activities.

There are three general categories of future facilities that may need to be located within the Criteria Area due to the fact that such facilities are linear or involve engineering constraints that make avoidance of Criteria Areas not practicable or feasible. The three categories include: water/wastewater facilities, electrical utility facilities, and natural gas facilities.

Water and wastewater facilities generally include, but are not limited to, pipelines, pump stations, lift stations, force mains, reservoirs, wastewater treatment plants, filtration plants and appurtenant facilities. There are several potential future projects by electric utility purveyors that may be located within the Criteria Area. These include new or upgraded/replacement transmission lines and electrical generation facilities that require specific locations (*e.g.*, water, and wind power facilities). Activities related to natural gas facilities will largely be comprised of operation and maintenance of gas utility purveyors' existing and planned facilities and pipelines. The following are examples of activities that may be conducted to install, test and maintain pipeline: right-of-way repair, including grading, blocking and dragging; below-grade

pipe and coating inspections; leak excavations; installation or replacement of anodes; placement of cathodic protection units; repair of large pipeline washouts; and road improvements.

For facilities proposed within the Criteria Area where the area proposed for the facilities has not yet been assembled into the MSHCP Conservation Area, the facilities will be subject to the Criteria contained in Section 3.0 of the MSHCP. If the facilities are determined to meet the Criteria and other applicable provisions of the Plan, construction of the facilities will proceed as a Covered Activity within the Criteria Area. If the facilities were determined not to be consistent with the Criteria, the facilities may still proceed as a Covered Activity within the Criteria Area, provided that either the location and/or characteristics of the facilities are modified to meet the Criteria, and/or the Criteria Area is amended through the Criteria Refinement Process identified in Section 6.5 of the MSHCP. Future facilities siting criteria are provided in Section 7.3.9 of the MSHCP. Ongoing take associated with the operation of future energy facilities (*e.g.*, wind power facilities, water withdrawals, etc.) is not covered by the MSHCP.

Waste Management Facilities within the Criteria Area and PQP Lands

Operations, maintenance and expansion activities at the existing active waste management facilities listed in Table 7-15 are proposed as Covered Activities. Proposed operations, maintenance, and expansion activities will be performed within the existing boundaries (ownership or lease area) of the active facilities. Although El Sobrante Landfill is located within the MSHCP Conservation Area, activities at this facility are governed by its approved Habitat Conservation Plan. Development of waste-related activities including energy production (such as gas-to-energy operations), transfer and recycling facilities, and state-mandated maintenance activities within the existing disturbed use areas at inactive landfill sites is also proposed. Landfill operations and maintenance activities will be carried out in a manner consistent with regulatory authorizations and/or permits.

Covered Activities Subject to a Minor Amendment

The MSHCP identifies certain Covered Activities that are subject to the Minor Amendment Process (IA 20.4.2) in order to be permitted under the Plan. The minor amendment will be based on the project specific biological criteria/consistency analysis identified in the Plan that will be submitted by the Permittees to the Wildlife Agencies for review and concurrence. If the Wildlife Agencies do not concur with the analysis supporting the minor amendment, the projects would be subject to a major amendment. These activities include the Cajalco Road Realignment and Widening (MSHCP Section 7.2.3), State Route 79 Realignment (Newport Road to Gilman Springs Road) (MSHCP Section 7.3.5, p. 7-32), Orange County to Riverside County CETAP corridor (Appendix 2 Proposed Permit Condition 9), and flood control measures on the San Jacinto River between the Ramona Expressway and the mouth of Railroad Canyon (“San Jacinto River Project”). Specific details regarding the criteria/analysis and process for coverage of these facilities by the Plan are included in the above referenced MSHCP sections and the IA.

State Parks Facilities

An Off-Highway Vehicle Park/State Vehicle Recreation Area (SVRA) is proposed for construction within Sections 12, 13, 24 T3S.R2W and Sections 18, 19 and 20 T3S.R1W and access developed to the site through sections 20, 21, 28, 29, 30, 31 and 32 T3SR1W. A complete list of the project specific measures are identified in the Plan (MSHCP Section 7, pp. 7-56 to 7-57) and will need to be implemented in order for this activity to be considered as a Covered Activity. These measures include the requirement to permanently conserve 3,000 acres (in the general vicinity of Laborde Canyon) as part of Additional Reserve Lands prior to or concurrent with construction in order to offset the loss of an initial 600 acres within the Criteria Area. A 0.75 mile wide linkage/live-in habitat area westerly of the SVRA location will be permanently protected. For losses over 600 acres inside the Criteria Area, acquisition above the 3,000 acres will be required (*i.e.*, 500 acres permanently conserved for each 100 acres affected by the SVRA; MSHCP Section 7.3.6, p. 7-56). Also, for each 100 acres used outside the Criteria Area for access, staging and support facilities for the SVRA, an additional 500 acres will be permanently conserved. In addition, the SVRA must comply with siting criteria and other conservation obligations outlined in the MSHCP including protection of linkages (MSHCP Section 7.3.6, p. 7-56).

Existing State Park facilities within the MSHCP Conservation Area include the Lake Perris State Recreation Area, Chino Hills State Park, Mount San Jacinto State Park, San Timoteo State Park and Anza-Borrego State Park. The following is a description of existing and future activities and acreage (including brush management areas) within these State Park facilities.

Lake Perris State Recreation Area: Existing visitor use facilities are primarily located along the north shore of the lake and on the south shore in the Bernasconi Pass area. The main administrative facility is located below the dam. Existing use areas consist of approximately 220 acres of campgrounds, 120 acres of parking areas, 200 acres of day use areas, 10 acres of administrative uses, 5 acres of water treatment and storage facilities, a 5-acre museum, 54 acres of roads and 10 acres of trails. Future uses/expansions of existing uses are anticipated to include a 2-acre visitor center, 15 additional acres of parking, a 15-acre swim lagoon, 1-acre campfire center, 7 additional acres of campgrounds, 1 additional acre of trails/bridges, and 4 additional acres of roads.

Chino Hills State Park: Existing improvements within portions of the Chino Hills State Park that are within the MSHCP Plan Area are limited to two acres of existing roads. Future improvements will include two acres of parking and one acre of campgrounds.

Mount San Jacinto State Park and State Wilderness: This park facility includes 20 acres of campgrounds, 5 acres of parking areas, 10 acres of day use areas, 1 acre of administrative facilities, 1 acre of water facilities, 15 acres of roads and 9 acres of trails. Future improvements will include a 2-acre visitor center, 5 additional acres of parking, 15 additional acres of campgrounds, 2 additional acres of trails, and 2 additional acres of roads.

San Timoteo Park: Land is currently being acquired to establish a State Park. Existing improvements to the land include one acre of administrative facilities and eight acres of roads.

Proposed future improvements include a 2-acre visitor center, 5 acres of parking areas, 15 acres of campgrounds, 2 acres of trails, and 2 additional acres of roads.

Anza Borego State Park: No Covered Activities are proposed in the MSHCP.

Allowable Uses within the MSHCP Conservation Area

Compatible Uses

The following uses are considered to be compatible with the overall conservation goals and objectives of the proposed MSHCP and are proposed as Covered Activities within the MSHCP Conservation Area subject to the provisions identified in Section 7.4.1 of the MSHCP.

Reserve Management and Monitoring Activities: Activities related to the management and monitoring of the new reserve lands and PQP Lands include such activities as weed control, fuel modification, access control, habitat enhancement, and the capture, handling, and making of individual species for monitoring purposes. Take of Covered Species Adequately Conserved will be authorized provided such take occurs consistent with the provisions.

Emergency Repairs: Emergency repairs to public infrastructure facilities and utilities carried out by Plan participants within the MSHCP Conservation Area.

Conditionally Compatible Uses

The following uses are considered conditionally compatible with the overall conservation goals and objectives of the proposed MSHCP and are proposed as Covered Activities within the MSHCP Conservation Area subject to the guidelines and criteria detailed in the MSHCP (pp. 7-74 through 7-80, Section 7.4.2).

Public Access and Recreation: Proposed public access activities include trails, facilities, and passive recreational activities within the MSHCP Conservation Area. No impacts or improvements to existing community trails will be covered under the MSHCP. However, the construction and operation of adopted regional trails including 14 trailheads, 5 interpretive centers, and 4 maintenance facilities are proposed as Covered Activities.

PLAN AREA ENVIRONMENTAL BASELINE

Regulations implementing the Act (50 Federal Register §402.02) define the environmental baseline as the past and present impacts of all Federal, State, or private actions and other human activities in the action area. Also included in the environmental baseline are the anticipated impacts of all proposed Federal projects in the action area that have undergone section 7 consultation and the impacts of State and private actions that are contemporaneous with the consultation in progress.

For our analysis, the action area is generally defined as the Plan Area in that we anticipate the direct and indirect affects to Covered Species would be confined to within the Plan Area. The

exception being our analyses for the California gnatcatcher and the Delhi sands flower-loving fly that was expanded to include San Bernardino County because of the direct and indirect effects to these species associated with the proposed action. There are two proposed Covered Activities, the Moreno Valley to San Bernardino County Transportation Corridor and the Riverside County to Orange County Transportation Corridor that would extend beyond the action area. However, these specific actions would not be covered under the proposed MSHCP until the affects of these facilities are addressed in San Bernardino and Orange counties, respectively. Because of the landscape nature of the proposed action, we are providing a general assessment (see also Evaluation Methods below) of the existing conditions of the Plan Area. The baseline for individual species is provided in the Species by Species Evaluation section of this biological opinion.

The Plan Area encompasses approximately 1.2 million acres. It is characterized by rural, urban, and suburban development intermixed with agricultural operations and areas of undeveloped lands of which approximately 797,450 acres (66 percent) support natural vegetation or open water. Large expanses of land along the southern, eastern, and western boundaries of the Plan Area are National Forest lands. Urban development is more prevalent in the western portion of the Plan Area. The topography in the Plan Area is generally lowland valleys intersected with rolling hills surrounded by mountain ranges. Lowland valleys occur at elevations below 600 meters (2,000 feet), and hillsides dominated by scrub and chaparral occur at elevations of 600-900 meters (2,000-3,000 feet). Mountainous areas range from 900 to over 3,000 meters (3,000-10,000 feet) above mean sea level.

The Plan Area is divided into 16 categories of land use or vegetation communities including: chaparral; coastal sage scrub; Riversidean alluvial fan sage scrub; desert scrub; montane coniferous forest; woodlands and forest; peninsular juniper woodland; grassland; riparian scrub, woodland and forest; meadow; meadow and marshes; cismontane alkali marsh; playas and vernal pools; open water; agriculture; and developed or disturbed lands. Within these generalized or “collapsed” categories there are more specific habitat associations or “uncollapsed” vegetation categories. Vegetation communities in the context of individual species and their modeled habitats are addressed in the Species by Species Evaluation section of this biological opinion. The following discussion sets the framework for the vegetation communities within the 1,212,502-acre Plan Area that are summarized in Table 3.

Developed or disturbed land (259,443 acres) and agricultural lands (155,609 acres) together comprise 415,052 acres (34 percent) of the Plan Area. These areas are anticipated to provide minimal value to most of the species addressed by the MSHCP. However, urban areas with tree or shrub vegetation may provide a minor amount of habitat for some migratory birds. Agricultural areas generally provide little functional value but can provide limited support for certain species. For example, field edges may provide habitat for species such as burrowing owl and field croplands may provide foraging opportunities for species such as mountain plover or white-faced ibis when crop rotation leaves newly plowed or stubble fields. Some agricultural lands can continue to support vernal pools and alkali playas that provide habitat for species associated with these habitat types. Also, agricultural lands can provide connectivity between habitat areas and act as buffers between developed and natural areas.

Table 3. Vegetation Communities within the Action Area

Collapsed Vegetation Category	Specific Vegetation Category	Total Public/ Quasi Public Land	Total Land within the Action Area
Montane Coniferous Forest	Jeffrey Pine	7703	11665
	Lodgepole Pine	577	579
	Lower Montane Coniferous Forest	4951	6685
	Mixed Evergreen Forest	3886	4345
	Southern California White Fir	3219	3700
	Subalpine Coniferous	27	28
Montane Coniferous Forest Total		20363	27002
Woodlands and Forest	Black Oak Forest	4	4
	Broadleaved Upland Forest	2273	2357
	Coast Live Oak Woodland	2199	6302
	Dense Engelmann Oak Woodland	1755	4058
	Oak Woodland	14189	18906
Woodlands and Forest Total		20421	31627
Coastal Sage Scrub	Coastal Scrub	1814	3633
	Diegan Coastal Sage Scrub	5174	15438
	Riversidean Sage Scrub	26778	129532
Coastal Sage Scrub Total		33766	148603
Riversidean Alluvial Fan Sage Scrub	Disturbed Alluvial	268	1019
	Riversidean Alluvial Fan Sage Scrub	1381	5262
Riversidean Alluvial Fan Sage Scrub Total		1649	6281
Desert Scrub	Big Sagebrush Scrub	939	6207
	Semi-desert Succulent Scrub	0	2424
	Sonoran Desert Scrub	161	282
Desert Scrub Total		1099	8912
Chaparral	Chamise Chaparral	11	355
	Chaparral	173881	344591
	Red Shank Chaparral	32787	62947
	Semi-Desert Chaparral	0	15
Chaparral Total		206679	407909
Playas and Vernal Pools	Alkali Playa	2665	7005
	Southern Interior Basalt Vernal Pool	31	51
	Vernal Pool	17	19
Playas and Vernal Pools Total		2713	7075
Grasslands	Non-native Grassland	19501	129754
	Valley and Foothill Grassland	2315	2731
Grasslands Total		21816	132484
Riparian Scrub, Woodland, Forest	Arundo/Riparian Forest	440	489
	Montane Riparian Forest	212	286
	Montane Riparian Scrub	1	6
	Mule Fat Scrub	81	516
	Riparian Forest	595	1212
	Riparian Scrub	749	2925
	Southern Cottonwood/Willow Riparian	4855	6435
	Southern Sycamore/Alder Riparian Woodland	60	187
	Southern Willow Scrub	190	1510
	Tamarisk Scrub	0	272
Riparian Scrub, Woodland, Forest Total		7183	13837
Meadows and Marshes	Coastal and Valley Freshwater Marsh	215	374
	Marsh	19	81
Meadows and Marshes Total		234	455
Meadow	Meadow (Montane)	59	147
	Wet Montane Meadow	26	325
Meadow Total		84	472

Collapsed Vegetation Category	Specific Vegetation Category	Total Public/ Quasi Public Land	Total Land within the Action Area
Peninsular Juniper Woodland	Peninsular Juniper Woodland and Scrub	273	1067
Peninsular Juniper Woodland Total		273	1067
Cismontane Alkali Marsh	Cismontane Alkali Marsh	2	150
Cismontane Alkali Marsh Total		2	150
Agricultural Land	Dairy & Livestock Feedyards	146	5335
	Field Croplands	9306	113819
	Grove/Orchard	1277	36455
Agricultural Land Total		10729	155609
Water	Open Water/Reservoir/Pond	9058	11576
Water Total		9058	11576
Developed, Disturbed Land	Residential/Urban/Exotic	9923	259443
Developed, Disturbed Land Total		9923	259443
Grand Total		345994	1212502

Chaparral (407,909 acres; 33.6 percent) is the predominant natural vegetation community in the Plan Area. Chaparral is generally found along the foothill and lower mountain slopes, with some exceptions in the lowlands at the Gavilan Hills, Lakeview/Double Butte, and Sedco Hills areas. Coastal sage scrub (148,603 acres; 12 percent) is the second most abundant natural vegetation community and is disbursed throughout the Plan Area mostly in lowlands and foothills slopes up to about the 1,500 foot elevation. Riversidean alluvial fan sage scrub (6,281 acres; 0.5 percent) and desert scrub (8,912 acres; 0.7 percent) also contribute to the total scrub community in the Plan Area. Grasslands (132,484 acres; 11 percent) in the Plan Area are comprised of mostly non-native grassland (129,754 acres) with a relatively small native grassland component (2,731 acres). While they are a small component of the total acreage within the Plan, native grasslands contain structural and biotic elements that non-native grasslands lack and therefore are important to grassland associated species.

Chaparral, scrub communities, and grasslands each exist in dense stands but in some areas have a more sparse or open character. These vegetation communities are found in contiguous stands, but they also may have a patchy distribution and exist in a matrix with other habitats. These differences in density and distribution lead to differing suitability for species' use. However, due to the limitations of our dataset, we were unable to map the habitats at that scale. Therefore, we may overestimate or underestimate habitat available for any particular species. Overall, these vegetation communities support a wide number of the species addressed under the MSHCP and provide habitat connections within the Plan Area and to adjacent areas.

Playas (7,005 acres) and vernal pools (70 acres), meadows, meadows and marshes, and cismontane alkali marsh (1,077 acres inclusively) and riparian scrub, woodland and forest (13,837 acres) total about 21,989 acres (1.8 percent) within the Plan Area. While these wetland habitats comprise a relatively minor amount of the total acreage within the Plan Area, they support a large number and wide variety of sensitive, wetland-dependent or wetland-associated plant and animal species that cannot exist or are unlikely to be found in other habitat types. Riparian scrub, woodland and forest areas also frequently provide vital corridor or linkage areas that facilitate wildlife movement within the Plan Area and to adjacent areas. Of note are the vernal pools that support numerous species that depend on vernal pools and their surrounding

watersheds as habitat. Further discussion of the baseline for vernal pools in the Plan Area is provided later in this document under the Species by Species Evaluations.

The remaining vegetation communities of montane coniferous forest (27,002 acres; 2.2 percent), woodlands and forest (31,627 acres; 2.6 percent), peninsular juniper woodland (1,067 acres; 0.09 percent), and open water (11,576 acres; 0.95 percent) comprise a relatively small percentage of the overall habitats in the Plan Area. However, these vegetation communities provide important habitat for many species considered under the MSHCP; for example, montane coniferous forest supports species that are usually found only at the higher elevations of the Plan Area.

Existing Roadways

An extensive network of roadways currently exist within the Plan Area including Federal and State highways, urban arterials, secondary roads, and rural roads (both paved and unpaved). Roadways are prevalent and a major feature of the landscape within the lowlands area while fewer improved roads are located in the mountain or more rural portions of the Plan Area. There are approximately 1,393 miles of roadways within the proposed MSCHP Criteria Area and approximately 438 miles of roadways located within PQP Lands.

Riverine Areas

Within the Plan Area, portions of many riverine areas have been modified by past actions that have removed, straightened, hardened, and/or otherwise modified natural streamcourses. Modifications include hardening and straightening of floodways at most road crossings to protect road infrastructure. Major alterations include channelization of portions of the Santa Ana River, Temecula Creek, Santa Gertrudis Creek, and San Jacinto River. Other stream areas are maintained by vegetation and sediment removal such as portions of Murrieta Creek. These modifications have generally been made to reduce flood threat to adjacent developed areas or facilitate the development of floodplains. In addition, some streamcourses have been dammed or otherwise altered to create lakes for water storage and/or recreation. However, the Plan Area still supports extensive areas of relatively unmodified stream courses that provide habitat support functions for many species. In general, modifications to riverine areas are more prevalent in the more developed areas, while fewer modifications have been implemented in less developed portions of the Plan Area.

Public/Quasi-Public Lands

Approximately 345,994 acres of PQP Lands are identified within the Plan Area. PQP Lands are owned or controlled by Federal, State, local government or private entities. For clarity and context, the PQP Lands are described in reference to their proposed inclusion within the MSHCP Conservation Area (cores and linkages). A Schematic Core and Linkages Map is provided on Figure 3-2 in the MSHCP. Some PQP Lands have already been conserved for species conservation within the Plan Area through previous habitat conservation plans or other means. However, not all PQP Lands within the Plan Area provide conservation value to Covered Species due to alternative uses, such as flood control, recreation areas, water conservation, and other conflicting uses.

Federal Lands

Federal lands include the Cleveland and San Bernardino National Forest owned by the U. S. Forest Service (Forest Service), Prado Basin owned by the U.S. Army Corps of Engineers (Corps of Engineers), and Bureau of Land Management (BLM) owned lands. Federal lands included in the PQP Lands total approximately 247,789 acres. A full description of the Federal lands are included in *Description of Existing Reserves Western Riverside County MSHCP* (Dudek 2000a), incorporated herein by reference.

National Forest

Portions of the San Bernardino and Cleveland National Forests are within the Plan Area boundary. The San Bernardino National Forest forms a natural barrier between eastern and western Riverside counties and delineates the eastern edge of the Plan Area. The Cleveland National Forest comprises the western and southern boundaries of the Plan Area. The San Bernardino and Cleveland are two of the four national forests that make up the Southern California Province. The Southern California Province prepared a report titled the *Southern California Mountains and Foothills Assessment; Habitat and Species Conservation Issues* in response to species listings and to aid in the revision of existing Forest Resource and Land Management Plans. This assessment of existing conditions and available resource materials encompasses the 6.1 million acres owned and managed within the Southern California National Forests (U. S. Forest Service 1999).

The San Bernardino and Cleveland National Forests are largely managed for the purposes of recreation and wildlife preservation. The National Forests are divided into Ranger Districts; there are several Ranger Districts within each of the forests that are further subdivided into planning areas or management areas. These Ranger Districts have control over the various management areas where specific management directives are applied (U. S. Forest Service 1988). Specific management practices conducted by the Forest Service for each of the planning areas within the MSHCP are described in Dudek 2000a.

The San Bernardino National Forest is described in Section 3.0 of the MSHCP as Existing Core K. The San Bernardino National Forest provides the largest block of habitat within the Plan Area boundary of about 150,000 acres. This forest connects western Riverside to eastern Riverside County and provides habitat for several species including narrow endemic plant species. This core area provides habitat for peninsular spine flower, San Bernardino kangaroo rat, slender-horned spine flower, graceful tarplant, mountain lion, California spotted owl, granite spiny lizard, Johnston's rock cress, western pond turtle, Stephens' kangaroo rat and several other species proposed for coverage under the MSHCP. The San Bernardino National Forest is subject to activities such as off-road vehicles, recreation, and hunting. In addition to the Forest Service, BLM also has a role in managing some of the land within this core area.

The Cleveland National Forest is described in the Section 3.0 of the MSHCP as Existing Core B. The Cleveland National Forest consists of 2 large and 2 small blocks of PQP Lands, totaling about 71,490 acres. This core area is connected to Existing Core A (Prado Basin/Santa Ana River) in the north via two Constrained Linkages; by Proposed Linkage 1 to the Lake

Mathews/Estelle Mountain area and in the south by Proposed Linkage 9 to the Tenaja Corridor. This core area represents the second largest habitat block in the Plan Area and provides core habitat and linkage areas for mammals such as the mountain lion and the bobcat. It also provides habitat for the Cooper's hawk, southern California rufous-crowned sparrow, Bell's sage sparrow, golden eagle, turkey vulture, yellow warbler, mountain quail, downy woodpecker, purple martin, California spotted owl, tree swallow, Palmer's grapplehook, prostrate spine slower, graceful tarplant, and small-flowered microseris.

Prado Basin

Prado Basin is located northwest of the City of Corona within the upper Santa Ana River watershed. It supports riparian vegetation and disturbed grasslands. Prado Basin is primarily comprised of Federal lands; however, portions are owned by the County of Riverside and private landowners. It is generally managed for recreation and flood control/water quality purposes. The Corps of Engineers maintains and operates their facilities at the Prado Dam and within the 4,000-acre Prado Flood Control Basin. The County of Riverside owns the 1,837-acre Prado Basin Park and leases 110 acres to a private entity for various events. The Orange County Water District owns about 2,400 acres within Prado Basin that it manages as a flood control basin. These lands include about 465 acres of constructed wetland and 300 acres of wetland mitigation. An additional entity operating in the Prado Basin area is the Santa Ana Watershed Project Authority (SAWPA), a joint powers authority, which is composed of five major water districts that service the Santa Ana watershed. SAWPA was formed to coordinate planning and building of facilities to protect water quality in the watershed. A recent reconnaissance study proposed the preparation of a feasibility study to develop information and analytical tools to define water related resource problems and opportunities within the Upper Santa Ana River watershed. This proposed study may affect future management practices in the Prado Basin.

Prado Basin is in Existing Core A of the MSHCP. In addition to being a core habitat area, it also functions as a linkage to Orange and San Bernardino counties. The Prado Basin core habitat area is connected to Existing Core B (Cleveland National Forest) by both upland and riparian connections (Proposed Constrained Linkage 1 and Proposed Constrained Linkage 2). Prado Basin is surrounded by existing urban development, agricultural uses, and planned development. This area supports the largest known populations of the southwestern willow flycatcher and least Bell's vireo within the Plan Area as well as providing habitat for the yellow warbler, yellow-breasted chat, western yellow-billed cuckoo, and suite of other birds, plants, mammals, reptiles, and fish.

Bureau of Land Management

Approximately 27,000 acres of land within western Riverside County are owned and managed by the BLM. These holdings are located throughout the Plan Area. Large ownership concentrations are in the Potrero Valley area, portions of the Badlands adjacent to the Soboba Indian Reservation, Oak Mountain, the Santa Margarita River, and Beauty Mountain. About 660 acres of land also exist north of the Cahuilla Indian Reservation. Smaller parcels ranging from less than 1 acre to 40 acres are also located throughout Plan Area. Some of the BLM lands are considered split estate holdings, where the Federal government owns underground mineral

resources, while the surface area is privately held (Dudek 2000a). Lands owned and managed by the BLM within the Plan Area cover an array of elevations, landform, and habitat types. The habitat types include sage scrub, chaparral, alluvial fan sage scrub, wetlands, riparian, oak woodlands and grasslands.

The California Desert District of the BLM manages all its land under various Resource Management Plans. The South Coast Resource Area which includes the Plan Area is managed through the policies and parameters outlined in the South Coast Resource Management Plan. This resource management plan focuses on: 1) land tenure adjustment and use authorizations; 2) threatened, endangered and other sensitive species; 3) open space; 4) recreation and public access; and 5) oil and gas leasing and sand and gravel development.

The BLM is currently involved with several land exchanges with the intent of eliminating disjointed parcels throughout Riverside County in order to consolidate land within a few geographical areas. Lands with designations such as Areas of Critical Environmental Concern and Wildlife Study Area are not available for disposal. All Federal laws governing air quality control, listed endangered or threatened species, and other land management directives will not be compromised by management practices outlined in the Resource Management Plan (BLM 1994).

The Potrero Area of Critical Environmental Concern includes 1,030 acres of BLM public land with approximately 12,000 acres of private land proposed for acquisition. The Potrero Valley Reserve contains over 1,900 acres of occupied Stephens' kangaroo rat habitat. The BLM currently manages several parcels within the reserve as well as other lands adjacent to the preserve area. This area is unavailable for mineral extraction and is a right-of-way avoidance area; grazing is allowed if deemed compatible with habitat management. The resource management plan outlines the intent of the BLM to acquire 11,952 acres of additional land to be included in the Potrero Area of Critical Environmental Concern (BLM 1994). This area is within Existing Core K, as described in the MSHCP.

The Santa Margarita Ecological Reserve has also been designated an Area of Critical Environmental Concern. BLM holdings within this area are adjacent to lands owned by the Department and the San Diego State University Foundation (SDSU Foundation). The Santa Margarita Ecological Reserve makes up Existing Core G. This Core Area provides habitat for arroyo chub, California rufous-crowned sparrow, and Bell's sage sparrow and may serve as a linkage for bobcat and mountain lion moving between the Santa Ana Mountains and the Aqua Tibia Wilderness. SDSU Foundation administers the 1,230 acres of BLM public lands under a Memorandum of Understanding. Due to the presence of least Bell's vireo, deer grass, orange-throated whiptail, southwestern pond turtle and sticky-leaved dudleya, this area has been designated a right-of-way avoidance area and is unavailable for mineral use or grazing purposes.

The Million Dollar Spring has been designated an Area of Critical Environmental Concern. This 5,830 acre area is located within the eastern portion of the Beauty Mountain Wildlife Study Area and within both San Diego and Riverside counties. The Beauty Mountain Management Area is located in Existing Core L. This area contains three perennial springs, south coast live oak riparian forest, and willow riparian forest. In order to maintain the integrity of these water

resources, this area has been designated a right-of-way avoidance area and is not available for material sales. All activities including grazing, public access, and hunting must be in conformance with the BLM-California 208 Water Quality Management Plan.

BLM also manages 660 acres north of the Cahuilla Indian Reservation that supports populations of the Quino checkerspot butterfly. This area is described as the Existing Noncontiguous Habitat Block C in the MSHCP.

State Lands

State lands identified as PQP Lands include Lake Perris Recreation Area, San Jacinto Wildlife Area, Chino Hills State Park, Anza Borrego Desert State Park, Mount San Jacinto Wilderness State Park, Santa Margarita Ecological Reserve, Santa Rosa Plateau Ecological Reserve, Motte Rimrock Reserve, Box Springs Reserve, Emerson Oaks Reserve, and University of California James San Jacinto Mountain Reserve. The State lands within the PQP Lands total about 34,409 acres. The State lands are owned by one or a combination of State Parks, Department of Parks and Recreation, the Department, The Nature Conservancy, California State University, or University of California Regents. A full description of the State lands is included in *Description of Existing Reserves Western Riverside County MSHCP* (Dudek 2000a), incorporated herein by reference.

Lake Perris Recreation Area

Lake Perris State Recreation Area (SRA) is located south of State Route 60, east of Interstate 215, and north of Ramona Expressway, near the Lakeview Mountains and San Jacinto River. Lake Perris SRA is 8,800 acres and is managed by the California Department of Parks and Recreation. Lake Perris is a 2,000-acre reservoir created by Perris Dam. The park contains grasslands, riparian and sage scrub habitat. The recreational areas within the Lake Perris SRA are located primarily north of the lake. Improvements may be undertaken to provide for recreational activities. Upland game hunting occurs to the northeast and east of the lake. The non-recreational areas are managed as a state park. Lake Perris conducts prescribed burns in order to restore grassland habitat for Stephens' kangaroo rat, in accordance with the Stephens' kangaroo rat Habitat Conservation Plan. California Department of Parks and Recreation conducts annual surveys for plants and Stephens' kangaroo rat. They also conduct exotic plant species removal in riparian areas and are proposing reintroduction of pronghorn antelope and native bunch grass. Lake Perris SRA is within Existing Core H of the MSHCP and may provide a connection to the Badlands and the San Jacinto River. Lake Perris SRA along with Santa Jacinto Wildlife Area total about 17,470 acres. This area provides habitat for a suite of plant and animal species addressed in the MSHCP including some of the narrow endemic plant species and vernal pool associated species.

San Jacinto Wildlife Area

The San Jacinto Wildlife Area is located in the northern portion of the Plan Area northeast of the community of Nuevo and the San Jacinto River and contains about 7,116 acres. The San Jacinto Wildlife Area is owned and managed by the Department. As stated above, Lake Perris SRA

along with San Jacinto Wildlife Area total about 17,470 acres. The wildlife area has about 400-600 acres of wetlands and 5 miles of restored riparian habitat; its management plan is currently being revised. The San Jacinto Wildlife Area is within Existing Core H of the MSHCP. There is a Proposed Extension of Existing Core 4, along the Santa Ana River and Proposed Core 3 to the east of the San Jacinto Wildlife Area. This will create a larger block of core habitat to the east that is connected to west through linkages and constrained linkages. This area may provide connections to other Core Areas in the Badlands and the middle reach of the San Jacinto River. This area provides habitat for a suite of plant and animal species proposed for coverage under the MSHCP including some of the Narrow Endemic Plant Species (alkali species) and vernal pool species. Species proposed for coverage in the MSHCP within this area include bobcat, Stephens' kangaroo rat, Los Angeles pocket mouse, smooth tarplant, San Jacinto Valley crowscale, Wright's trichocoronis, mud nama, Davidson's saltscale, spreading navarretia, vernal barley and thread-leaved brodiaea.

Chino Hills State Park

Chino Hills State Park, managed by the California Department of Parks and Recreation, is located within Orange, San Bernardino and Riverside counties. The southeastern tip is in western Riverside County, north of State Highway 91 and west of State Highway 71. Chino Hills State Park totals approximately 13,000 acres, of which 350 acres is within Riverside County. The park permits hiking, biking, horseback riding, picnicking and camping onsite. Chino Hills State Park is within the Puente-Chino Hills and consists of valleys, canyons, hills and steep slopes. The two principal drainage areas are Telegraph Canyon and Aliso Canyon. The dominant vegetation type in the park is non-native annual grassland. However, walnut woodlands, sage scrub, coast live oak woodland, sycamore woodland, chaparral, and riparian scrub also make up the landscape.

The park is working to restore habitat affected by livestock grazing, fire suppression and non-native species. There are efforts to remove invasive plant species through prescribed burns or manual removal. There are also programs to remove exotic wildlife. Chino Hills depends on interconnections to other open space areas for the exchange of genetic material, dispersal of plants, movement of animals and as a source of repopulating after a natural catastrophe. Habitat linkages for Chino Hills are Coal Canyon, Sonoma Canyon and the Prado Basin area. Chino Hills State Park is located in Existing Core A and provides core and linkage habitat for several species proposed for coverage under the Plan.

Anza Borrego Desert State Park

Anza-Borrego Desert State Park extends north into Riverside from San Diego County. The 600,000-acre park includes about 40,000 acres within Riverside County. The park is located east of San Diego and is roughly bounded by State Highway 86 to the west, State Highway 74 to the north, State Highway 79 to the west and Interstate 8 to the south. The park is managed by the California Department of Parks and Recreation. The park contains 12 designated State Wilderness areas that total 404,000 acres. The park permits camping, backpacking, hiking, mountain biking, horseback riding, picnicking and off-highway vehicular use in designated areas. At lower elevations, desert scrub and grassland dominate the landscape while scrub oak,

oak woodlands and conifer forests can be found at higher elevations. Riparian communities are present in various canyons throughout the park. The park is being managed for riparian vegetation communities, the Peninsular bighorn sheep, least Bell's vireo and other wildlife. In addition, park managers conduct removal of non-native plants and animals. The Anza-Borrego Desert State Park is within Existing Core L, is contiguous with Proposed Core 6 and 7, and provides connection to San Diego County and eastern Riverside County. Species within this area include the Quino checkerspot butterfly, Stephens' kangaroo rat, golden eagle, burrowing owl, Los Angeles pocket mouse, bobcat, mountain lion and Aguanga kangaroo rat.

Mount San Jacinto Wilderness State Park

Mount San Jacinto State Park is approximately 10,000 acres and abuts the San Bernardino National Forest to the north, west and south. The park is managed by the California Department of Parks and Recreation. The park contains mountain peaks, state designated wilderness areas, campgrounds, trails, a visitor center and picnic areas. The park supports habitats typical of high elevations: subalpine forests, fern-bordered mountain meadows and montane coniferous forests. Most of the park is designated as State Wilderness. Mount San Jacinto State Park is located within Existing Core K. This area provides habitat for several species including some Narrow Endemic Plant Species. This core area provides habitat for peninsular spine flower, San Bernardino kangaroo rat, slender-horned spine flower, graceful tarplant, mountain lion, California spotted owl, granite spiny lizard, Johnston's rockcress, western pond turtle, and Stephens' kangaroo rat.

Santa Margarita Ecological Preserve

The Santa Margarita Ecological Reserve is located west of Interstate 15 and south of Sandia Creek Road in the southwest corner of Riverside County. The ecological reserve is located along three miles of the Santa Margarita River. The reserve totals 4,344 acres and is a component of the San Diego State University Field Station Program (San Diego State University College of Sciences). Approximately 939 acres are managed under lease from the BLM, 230 acres are managed in cooperation with the CDFG, and 21 acres are managed in cooperation with The Nature Conservancy. Of the remaining land, 7 acres are held by the Metropolitan Water District (MWD) for a pipeline easement, while the remaining 3,147 acres are controlled by the California State University system. Management of the Santa Margarita Ecological Reserve is funded by an endowment from the Murray Schloss Fund, San Diego State University College of Sciences and the SDSU Foundation. The reserve north of the river largely consists of southern willow scrub and Diegan coastal sage scrub intermixed with southern mixed chaparral habitat. Several isolated patches of non-native grassland are located near the northern banks of the river. The southern portion of the preserve is dominated by southern mixed chaparral and Diegan coastal sage scrub; coast live oak woodland and southern willow scrub intersect these habitats along tributaries to the Santa Margarita River. Currently, there are numerous research project being conducted on the reserve. The Santa Margarita Ecological Reserve makes up Existing Core G. This area provides habitat for arroyo chub, California rufous-crowned sparrow and Bell's sage sparrow and may serve as a linkage for bobcat and mountain lion moving between the Santa Ana Mountains and the Aqua Tibia Wilderness.

Santa Rosa Plateau Ecological Reserve

Santa Rosa Plateau Ecological Reserve totals about 9,000 acres and is located west of Interstate 15, east of Clinton Keith Road and north of De Luz Road in the southwest corner of Riverside County. Other acquisitions are in process that will add to the reserve including a parcel that will link it to the Trabuco Ranger District of the Cleveland National Forest. The reserve is managed cooperatively by The Nature Conservancy, Riverside County Regional Park and Riverside County Open Space District, the Department, Fish and Wildlife Service and MWD. The reserve is managed as a whole unit even though it is owned by several entities. Management of the reserve is funded by an endowment from the Department, private grants and MWD. The Santa Rosa Plateau Ecological Reserve is situated on an approximately 15,000-acre plateau at the southern end of the Santa Ana Mountains. A perennial creek supports vernal pools and other riparian vegetation. Chaparral, sage scrub, oak woodlands and approximately 3,000 acres of native grasslands are found on the reserve.

Access through the reserve is primarily limited to foot travel. Motorized or wheeled vehicles are only permitted on the reserve during specially scheduled events. Collecting or disturbing any plants, animals, or rocks is prohibited. Management of the reserve is focused on riparian habitat, vernal pools, oaks, grasslands and listed species such as the California red-legged frog, vernal pool fairy shrimp and several plant species. Most of the management efforts involve restoring habitat. Santa Rosa Plateau Ecological Reserve makes up Existing Core F. Core F proposes to connect other MSHCP conserved lands in the southeast through several linkages including Proposed Constrained Linkage 13 (Murrieta Creek) and Proposed Linkage 10. Proposed Linkage 11 (De Luz Canyon) and 12 (Sandia Canyon) connect Core F to San Diego County while Proposed Linkage 9 (Tenaja Corridor) connects it to the Existing Core B to the west. This area represents a large habitat block that provides habitat for many of the species addressed under the MSHCP.

Motte Rimrock Reserve

The Motte Rimrock Reserve is northwest of the City of Perris. The reserve is 644 acres and is managed by University of California Riverside. The staff at the Motte Rimrock Reserve also manage the Box Springs Reserve and Emerson Oaks Reserve. The Motte Rimrock Reserve is located on a low granitic plateau. The reserve contains sage scrub, riparian, grassland and chaparral habitats. Six seasonal springs are located within the reserve. The reserve also provides habitat for the coastal California gnatcatcher, Stephens' kangaroo rat, coast horned lizard, orange-throated whiptail lizard and Bell's sage sparrow. The Motte Rimrock Reserve is considered Existing Noncontiguous Habitat Block 4 within the MSHCP.

Box Springs Reserve

The 160-acre Box Springs Reserve is located about four miles east of the City of Riverside. The reserve, established in 1965, is under lease from the BLM and is part of the University of California Natural Reserve System owned by the University of California Regents and funded by University of California Riverside. The Box Springs Reserve is located on steeply sloped, rugged granitic terrain in the northern part of the Plan Area. The site contains sage scrub and

chamise chaparral habitat types. The Box Springs Reserve is subject to trespassing and vandalism. The Riversidean sage scrub is disturbed due to frequent human-caused fires and off-road vehicles. A spring on adjacent property gives rise to freshwater seeps and an intermittent stream. The reserve harbors several species of reptiles including three that are Species of Special Concern and several mammal and bird species. There are currently no monitoring programs and few land management activities occurring at Box Springs Reserve. The Box Springs Reserve is within Noncontiguous Habitat Block A of the MSHCP and is constrained by existing urban development. This Noncontiguous Habitat Block is connected by Proposed Constrained Linkage 8 and is connected to other reserve lands through Proposed Constrained Linkage 7 and Proposed Linkage 4 (Reche Canyon). Box Springs is also in close proximity to Sycamore Canyon (Existing Core D).

Emerson Oak Reserve

Emerson Oaks Reserve is a 245-acre reserve located 5 miles southeast of the City of Temecula in the Temecula Valley. The reserve is bordered by Pechanga Indian Reservation, Agua Tibia Wilderness, Dorland Mountain Artists' Retreat, agricultural land, private residences and lands owned by BLM. The reserve is part of the University of California Natural Reserve System owned by the University of California Regents and funded by University of California Riverside. Oak woodlands and sage scrub habitats occur on the lower slopes, while the higher elevations support stands of oak and chaparral. The Emerson Oaks Reserve is fenced on the north side and has a few dirt roads and trails traversing the property. The reserve has begun inventory of the fungi, vertebrates and plants found within Emerson Oaks. There are currently no monitoring programs in place and land management activities include exotic species removal. Emerson Oaks Reserve is within the Existing Core M area and Proposed Linkages 17 and 18. This area provides habitat for the Quino checkerspot butterfly, coastal California gnatcatcher, Stephens' kangaroo rat, least Bell's vireo, bobcat, mountain lion and several Narrow Endemic Plant Species. This Proposed Core will be connected to other large cores, providing live-in habitat and movement corridors.

University of California James San Jacinto Mountain Reserve

The 29-acre University of California James San Jacinto Mountain Reserve is located 9 miles north of Idyllwild, off of State Highway 243. The reserve is west of Lake Fulmor and is surrounded by the 500-acre Hall Canyon Research Natural Area owned by the Forest Service. The reserve is part of the University of California Natural Reserve System owned by the University of California Regents. The reserve is managed and funded by the University of California. The James San Jacinto Mountain Reserve is situated at an elevation of approximately 5,380 feet on an alluvial bench on the western portion of Black Mountain. The habitats on the reserve are mixed conifer and hardwood forests, montane chaparral and montane riparian forest. There is also a rapidly flowing mountain stream that enters Lake Fulmor downstream of the reserve. The James San Jacinto Mountain Reserve is fenced on all sides and access into and out of the reserve is limited to the main gate. The reserve has monitoring programs for several species of birds and herptofauna and conducts photo-monitoring of vegetation. The James San Jacinto Mountain Reserve is within Existing Core K, which proposes to address a suite of species under the MSHCP.

Local Government/Local Entities/Special District Lands

The balance of the PQP Lands include Kabian Park, De Anza Cycle Park/Norton Younglove Reserve, Harford Springs Reserve, Box Springs Mountain Reserve, Santa Ana Regional Park, Lake Skinner Recreation Area, Bogart County Park, Riverside County Habitat Conservation Agency Lands, Orange County Water District Lands, Sycamore Canyon Wilderness Park, Lake Mathews/Estelle Mountain Reserve, Southwest Riverside County Multiple Species Reserve, MWD Lands, Riverside County Flood Control and Water Conservation District Lands, March Air Reserve Base Reserve, Southern California Edison Lands, San Diego Gas and Electric Lands, Mitigation Banks/Conservation Banks, and other conservation lands set aside through section 7 or section 10 of the Act. These PQP Lands total about 64,330 acres, including 9,000 acres of open water lakes. The lands are owned primarily by State or local government entities including, but not limited to, County of Riverside, MWD, Riverside County Habitat Conservation Agency, City of Riverside, CDFG, and Orange County Water District, Riverside County Flood Control and Water District. A full description of these lands are included in *Description of Existing Reserves Western Riverside County MSHCP* (Dudek 2000a), incorporated herein by reference.

Kabian Park

Kabian Park is located immediately south of the San Jacinto River, southwest of the City of Perris. Kabian Park consists of 640 acres owned by BLM and managed by the Riverside County Parks and Open Space District. There are an additional 640 acres owned by BLM southwest of the park. The park is dominated by sage scrub hillsides intermixed with chaparral. Community park facilities make up a small portion of the land while the remainder consists of native habitat. Hiking, picnicking and equestrian uses are allowed the park. The Riverside County Parks and Open Space District actively maintains facilities and monitors uses of the park. Kabian Park is within Proposed Linkage 7 and is a major component of one of the main east-west connections within the Plan Area. This linkage proposes to provide for movement of species to Sedco Hills, Alberhill, and upstream along the San Jacinto River. Species occurring within this area include Bell's sage sparrow, coastal California gnatcatcher, least Bell's vireo and bobcat. The linkage provides soils that are capable of supporting several Narrow Endemic Plant Species.

De Anza Cycle /Norton Younglove Reserve

The De Anza Cycle Park/Norton Younglove Reserve is located north of State Route 60, west of Interstate 10, in the City of Moreno Valley. The reserve is located within the Badlands area and is owned by the County of Riverside. This land was purchased with state recreational vehicle funds as the original intent for the area was an off-highway vehicle park. Upon further consideration by the County of Riverside, it was determined that significant biological resources were located onsite; therefore dedication of this area as an open space reserve is being explored and has not been resolved. Recent studies documented the presence of sensitive species including several bird species, reptiles and mammals. The presence of non-native grassland, valley needlegrass grassland, riparian, agriculture, eucalyptus woodland, and disturbed habitats were documented throughout the sites (Dudek 1999a). De Anza Cycle Park/Norton Younglove Reserve is within Proposed Core 3 located in the northeastern portion of the Plan Area and is

connected to Proposed Linkage 12 (north San Timoteo Creek), Proposed Linkage 4 (Reche Canyon), Proposed Constrained Linkage 22 (east San Timoteo Creek), Existing Core H (Lake Perris), Existing Core K (San Jacinto Mountains), Proposed Linkage 11 (Soboba/Gilman Springs) and Proposed Constrained Linkage 21. Proposed Core 3 also serves as a linkage connecting San Bernardino National Forest to the San Bernardino County line to the north.

Harford Springs Reserve

Harford Springs Reserve is located south of the eastern portion of Lake Mathews/Estelle Mountain Reserve. This 325-acre park is located within the Gavilan Hills and is owned and maintained by the County of Riverside Parks and Open Space District. Harford Springs Reserve consists of a mixture of chaparral, sage scrub, grassland, woodland and forest habitats. Harford Springs Reserve is largely undeveloped and is managed for equestrian use as well as hiking and wildlife viewing. Day uses such as picnicking and hiking are permitted; overnight camping is not permitted. Harford Springs Reserve is within Existing Core C of Lake Mathews/Estelle Mountain.

Box Springs Mountain Reserve

Box Springs Mountain Reserve is located east of Interstate 215 and State Route 60, near the San Bernardino County line. This open space area abuts the University California Riverside and the western segment of the City of Riverside. The reserve is owned and managed by the Riverside County Parks and Open Space District. Box Springs Mountain Reserve is characterized by sage scrub dominated hillsides intermixed with rock outcrops. Several eastern areas of this 1,155-acre reserve are dominated by chaparral hillsides and grasslands, but the reserve is constrained by existing urban development. Permitted uses on the reserve include equestrian and hiking. The reserve is patrolled by County of Riverside personnel. Box Springs Mountain Reserve is within Existing Noncontiguous Habitat Block A that is linked together by Proposed Constrained Linkage 8 and is connected to other reserve lands through Proposed Constrained Linkage 7 and Proposed Linkage 4 (Reche Canyon). Box Springs Mountain Reserve likely provides habitat for many bird species, Nevin's barberry, and movement habitat for mammal species.

Santa Ana Regional Park

Santa Ana Regional Park refers to the parks, wildlife areas and other open-space areas along the portion of the Santa Ana River located in the northwestern section of Riverside County. Santa Ana Regional Park is under the jurisdiction of several landowners that include Riverside County Regional Parks and Open Space Districts, the Department, City of Riverside, and Riverside County Flood Control District. The park includes the County of Riverside-owned 1,300-acre Hidden Valley Wildlife Area; the 40-acre Martha McLean-Anza Narrows Park; Santa Ana River Wildlife Area; and the 350-acre Rancho Jurupa Park. The Department owns a small portion of the river channel within Hidden Valley Wildlife Area. The areas that make up the park are situated alongside the Santa Ana River and support primarily riparian vegetation and disturbed grasslands.

Management of the parks within the Santa Ana Regional Park varies according to the presiding agency. County Parks are managed for recreation and habitat conservation purposes. All County Parks permit biking, hiking, equestrian use, and camping. Martha McLean-Anza Narrows Park and Rancho Jurupa Park have improved campsites, and the latter has accommodations for recreational vehicles. There are no camping facilities at Hidden Valley Wildlife Area. Management of Hidden Valley Wildlife Area emphasizes habitat conservation and enhancement. There are efforts to improve habitat value in the riparian areas by removing giant cane. The City of Riverside also maintains several wetland ponds as part of their sewage treatment process.

The Santa Ana Regional Park is within Existing Core A. In addition to being a core habitat area, it also functions as a linkage to Orange and San Bernardino counties. Existing Core A is connected to Existing Core B (Cleveland National Forest) by both upland and riparian connections (Proposed Constrained Linkages 1 and 2). It is surrounded by existing urban development, agricultural uses and planned development. This area provides habitat for the southwestern willow flycatcher, least Bell's vireo, yellow warbler, yellow-breasted chat, western yellow-billed cuckoo, and suite of other birds, plants, mammals, reptiles and fish.

Lake Skinner Recreation Area

The 6,040-acre Lake Skinner Recreation Area, owned by MWD, is located along the eastern shores of Lake Skinner in the southern portion of the Plan Area. This area is dominated by a combination of grassland and sage scrub vegetation. A large portion of this area consists of developed campsite and recreational facilities. The recreation area is managed by the County Parks and Open Space District for lakeshore-oriented recreation. Recreational facilities consist of 41 developed campsites and 18 developed equestrian campsites. Fishing, boating, camping, group camping, picnic facilities, recreational vehicle hookups, a swimming pool, two boat launch ramps, a group picnic area, a camp store and a dry storage area are also located onsite. Hiking and interpretive trails as well as equestrian trails are also located throughout the area. Management involves an onsite team responsible for patrolling, trash pick-up and campsite monitoring. The grassland and sage scrub vegetation are within Existing Core J and provide habitat for many species. These species include, coastal California gnatcatcher, Stephens' kangaroo rat, Quino checkerspot butterfly and golden eagle.

Bogart County Park

Bogart County Park covers about 500 acres and located about 4.5 miles north of the City of Beaumont at the north end of Cherry Valley. The park has equestrian trails, equestrian campground, fishing, group camping, hiking and picnic facilities. There is existing urban development around the park. This publicly-owned area is Existing Noncontiguous Habitat Block B and is connected to other MSHCP conserved lands by Proposed Constrained Linkage 23 (Cherry Valley Linkage). Bogart County Park may provide limited conservation value due to the volume of alternative uses. Species such as the San Bernardino Mountain kingsnake, Bell's sage sparrow, bobcat and Los Angeles pocket mouse may occur within the park.

Other Parks

Several park and recreation facilities are located throughout western Riverside County that will not likely contribute to species conservation. These facilities are managed for recreational purposes and support a high volume of campers, hikers and horseback riders. These facilities include McCall Park, Hurkey Creek Park, Idyllwild Park and San Jacinto River Park (Dudek 2000a).

Orange County Water District Lands

Orange County Water District (OCWD) owns approximately 2,400 acres behind the Prado Dam in western Riverside County. The OCWD lands are part of the Prado Flood Control Basin and consist of nearly 465 acres of constructed wetland and a 300-acre wetland mitigation site along the Santa Ana River. OCWD leases another 130 acres for recreational purposes and the rest is classified as upland undeveloped land (Dudek 2000a). Prado Dam is a major flood control facility on the Santa Ana River holding up to 196,000 acre-feet of water. The captured water is a major source for groundwater recharge for Orange County's groundwater basin. OCWD set aside 124 acres of least Bell's vireo habitat and provided funding for a conservation program for this species. The conservation program includes cowbird trapping and removal of giant reed along the Santa Ana River. OCWD funds and maintains their lands. OCWD permits duck hunting within the constructed wetlands and pheasant hunting on adjacent areas. There are also facilities for dog training and a shooting range located adjacent to the wetland areas. The OCWD lands are within Existing Core A and are connected to Existing Core B (Cleveland National Forest) by Proposed Constrained Linkages 1 and 2. The habitat onsite includes wetland and riparian areas that provide habitat for a suite of species including the southwestern willow flycatcher, least Bell's vireo, yellow warbler, yellow-breasted chat and western yellow-billed cuckoo.

Riverside County Habitat Conservation Agency Lands

The Riverside County Habitat Conservation Agency (RCHCA) owns approximately 10,000 acres of land within western Riverside County that are dedicated to habitat conservation. These lands are associated with the Southwestern Riverside County Multiple Species Reserve, Lake Mathews/Estelle Mountain Reserve, San Jacinto/Lake Perris Core Reserve, Sycamore Canyon/March Air Reserve Base Core Reserve, Steele Peak Core Reserve, Potrero Area of Critical Environmental Concern Core Reserve and Motte Rimrock Core Reserve. Each of these reserves is described within this baseline section of the biological opinion, except for a 100-acre parcel of land located along the San Jacinto River. This 100-acre parcel along the San Jacinto River was donated to the RCHCA by a private citizen. This parcel contains several sensitive plant species. The 100-acre parcel is not currently being managed for the benefit of any particular species or habitat. This 100-acre area is along the Proposed Extension of Existing Core 4. This extension will provide more habitat within Core H at Lake Perris State Recreation Area and San Jacinto Wildlife Area.

Sycamore Canyon Wilderness Park

The Sycamore Canyon Wilderness Park totals approximately 1,550 acres and is located east of Canyon Crest Drive, south of Central Avenue, west of Interstate 215 and north of Alessandro Boulevard. Sycamore Canyon forms the main landmark within the park. About 100 acres of the park is owned by the California State Wildlife Conservation Board. This parcel is referred to as the Sycamore Canyon Ecological Reserve. The reserve consists of a mixture of sage scrub and grassland habitats. A portion of the canyon is inhabited with riparian vegetation associated with Sycamore Canyon. Tequesquite Arroyo is a drainage west of the reserve. Water within Sycamore Canyon and Tequesquite Arroyo drain into the Santa Ana River. This reserve was designated as a core habitat area under the Stephens' kangaroo rat Habitat Conservation Plan. The City of Riverside Parks and Recreation Department owns and manages the reserve. In addition to managing the area for Stephens' kangaroo rat, management efforts have focused on the eradication of giant reed. The Sycamore Canyon Reserve is within Existing Core D, which is connected to Existing Noncontiguous Habitat Block A (Box Springs Mountains) by Proposed Constrained Linkage 7. Sycamore Canyon also provides habitat for granite spiny lizard and Wilson's warbler and may provide movement corridors for mammals.

Lake Mathews/Estelle Mountain Reserve

The Lake Mathews/Estelle Mountain Reserve is located east of Interstate 15 near Lake Mathews in the northwestern Riverside County. The Lake Mathews Multiple Species Habitat Conservation Plan/Natural Communities Conservation Plan (MSHCP/NCCP) established a 2,544-acre mitigation bank adjacent to the existing 2,565-acre State Ecological Reserve. RCHCA owns about 6,296 acres, and BLM owns about 1,032 acres within this habitat block. These lands all contributed to the establishment of a reserve for multiple species use in western Riverside County encompassing over 12,000 acres. The combined reserve is composed of the multiple species reserve that consists of the State Ecological Reserve and the Lake Mathews HCP Mitigation Bank, Lake Mathews/Estelle Mountain Core Stephens' kangaroo rat Reserve, the Estelle Mountain Ecological reserve owned by the Department, and land owned by the BLM located within the RCHCA's proposed Stephens' kangaroo rat Core Reserve. Collectively, these lands comprise the Lake Mathews/Estelle Mountain Existing Core reserve area of the MSHCP. There are several private inholdings within and adjacent to the reserve that are being considered for addition to the management area. Agreements have been made with Riverside County Waste Management for future contribution of an additional 286 acres to the reserve as a result of impacts incurred at the El Sobrante Landfill.

The reserve area within the vicinity of the south shore of Lake Mathews is largely comprised of grassland and sage scrub habitats. Several areas drain into Lake Mathews from the surrounding hills and consist of riparian vegetation types. The western portion of the reserve is characterized by steeply sloping hillsides dominated by sage scrub vegetation. The eastern slopes of the reserve are composed of a mixture of sage scrub, chaparral and grassland habitats. The southern portions of the reserve are dominated by a mixture of grassland and sage scrub vegetation. A portion of agricultural land is located within the reserve area southwest of Lake Mathews. The landscape is dotted with areas of woodland and forest habitat as well as tributaries and drainages to Cajalco Creek and the Temescal Wash. Aside from small roads, Cajalco Road, La Sierra

Avenue and Mockingbird Canyon Road, the reserve is devoid of major arterial circulation routes. Thus, this reserve is one of the largest blocks of contiguous habitat within the Plan Area.

A Reserve Management Committee has been formed to develop management directives for the reserve management team. The management team is responsible for day to day maintenance, patrolling, scientific research and development of management proposals for review by the Reserve Management Committee (Dudek 2000a). In addition to Lake Mathews/Estelle Mountain Reserve management, the reserve manager is involved with corresponding policy development and management of other reserve areas throughout western Riverside County. Management activities take place on about 50 percent of the reserve. The reserve is not open to public for recreational uses but is subject to grazing, illegal dumping and off-road vehicles. Management of the reserve focuses largely on the Stephens' kangaroo rat and coastal California gnatcatcher. The Lake Mathews/Estelle Mountain is Existing Core C reserve area of the MSHCP. The MSHCP proposes to build off of Existing Core C to the west (Proposed Extension of the Existing Core 2) and create a habitat linkage to the east (Proposed Linkage 3) to other existing conserved lands.

Southwestern Riverside County Multiple Species Reserve

The Southwestern Riverside County Multiple Species Reserve was created in 1992 as a mitigation measure for impacts resulting from the Diamond Valley Lake Reservoir. The reserve is largely located within the area north of Lake Skinner and south of Diamond Valley Lake. Rawson Canyon, a north-south drainage, is located north of Lake Skinner as are Bachelor Mountain and Crown Valley. The Domenigoni Mountains and South Hills are also located within this reserve. There are several private land holdings in and around the reserve. The Southwestern Riverside County Multiple Species Reserve is comprised of about 13,000 acres. Approximately 9,400 acres are owned by MWD, 2,500 acres by the RCHCA, 360 acres by BLM, and 600 acres by the Riverside County Parks and Open Space District. Lands are added to the reserve based on the financial ability of the Reserve Management Committee to purchase adjacent parcels. This reserve was funded in part by an endowment from MWD and funds from the RCHCA.

The reserve area surrounding Diamond Valley Lake is a mixture of grassland and sage scrub habitats. The slopes south of Diamond Valley Lake are characterized by a mixture of chaparral and sage scrub. The habitat surrounding Lake Skinner are almost entirely composed of sage scrub and grasslands. The remainder of the reserve consists of a mixture of sage scrub and chaparral with occasional grassland-dominated areas. Woodland and forest vegetation is located along the tributaries associated with Rawson Canyon. Bachelor Mountain serves as the dominant landform in the southern portion of the reserve while the Domenigoni Mountains, South Hills, and Crown Valley are located in the northern portion. The reserve is one of the Stephens' kangaroo rat core reserves. The Southwestern Riverside County Multiple Species Reserve comprises Existing Core J. The MSHCP proposes to add Extensions to Existing Cores (5, 6 and 7) and to connect Core J to Proposed Cores to the west, south and east by Constrained Linkages and Linkages (13, 14, 17, and 18). This will create blocks of core habitats that are linked together. The Southwestern Riverside County Multiple Species Reserve provides a large

block of habitat for species such as the coastal California gnatcatcher, Quino checkerspot butterfly and the Stephens' kangaroo rat.

Metropolitan Water District Lands

MWD owns land associated with water storage, transportation and distribution facilities throughout Southern California. In western Riverside County, MWD ownership includes Lakes Mathews, Skinner, and Diamond Valley and much of their adjacent land. MWD also owns the associated canal and pipeline rights-of-way surrounding these lakes. A 40-acre parcel called Upper Salt Creek, within the vicinity of southern Hemet, was purchased by MWD as a mitigation measure for impacts from the Eastside Pipeline. This reserve area consists of alkali playa and vernal pool habitat. Sensitive species including little moustail and smooth tarplant are located within this parcel. Two additional parcels east of the pipeline and adjacent to the multiple species reserve are owned by MWD. MWD also owns land north of Domenigoni Parkway that largely consist of agricultural fields and lands within the Inland Feeder right-of-way. This 40 mile right-of-way corridor begins at Eastside Reservoir and ends within the vicinity of Devil's Canyon in southern San Bernardino County.

MWD's lands contain sage scrub, chaparral, grasslands, wetlands, alluvial scrubs and alkali playas and associated wetland systems. These habitat areas are located in Existing Cores C and J. These large blocks provide habitat for many species including the Stephens' kangaroo rat, Quino checkerspot butterfly and coastal California gnatcatcher.

Riverside County Flood Control and Water Conservation District Lands

The Riverside County Flood Control and Water Conservation District owns approximately 40,960 acres of land throughout Riverside County (Dudek 2000a). Major land holding areas include portions of the San Jacinto and Santa Ana rivers, Temescal Wash and various canals and channels throughout the County of Riverside. Much of the land owned by the Riverside County Flood Control and Water Conservation District is located within riparian areas and floodways that support riparian woodlands and Riverisidean alluvial fan sage scrub and are important for many species. The linear nature of these areas may also function as movement corridors. However, the Riverside County Flood Control and Water Conservation District also owns lands that are channelized and are periodically maintained or maintained such that they are devoid of vegetation providing no live-in habitat for species.

March Air Reserve Base Reserve

The March Air Reserve Base (MARB) is located between the cities of Moreno Valley, Perris and Riverside and straddles Interstate 215. Approximately 1,178 acres of habitat largely in the northwest portion of the base has been dedicated as reserve land and transferred to the March Joint Powers Authority. The reserve area is primarily grassland habitat intermixed with riparian systems. MARB, in conjunction with Sycamore Canyon, was one of the core habitat areas identified in the Stephens' kangaroo rat Habitat Conservation Plan (HCP). The Center for Natural Lands Management has been contracted to manage the 1,178-acre conservation area. The management of this reserve is focused on the elimination of non-native invasive grasses and

monitoring Stephens' kangaroo rat populations. The MARB and Sycamore Canyon make up Existing Core D of the MSHCP. The MARB reserve lands established by the Stephens' kangaroo rat HCP are currently proposed to be traded for lands in the Potrero Valley. The Stephens' kangaroo rat HCP had a provision to enable this land transfer. Thus, when the proposed transfer is complete, the MARB lands will no longer be in conservation.

Other Conservation Lands

Other Conservation Lands within PQP Lands include habitat that was set aside through consultations under section 7 or 10 of the Act. The section 10 mitigation lands are described under the Existing Habitat Conservation Plans section below and are included in Appendix 5. Any lands set aside under section 7 are also listed in Appendix 5 and generally discussed under the Past Federal Actions section below.

Private Conservation and Mitigation "Banks"

Several proposed or informal mitigation and conservation "banks" are located within the MSHCP Plan Area. Acreage within the mitigation/conservation "banks" are not included in the total acreage for the MSHCP PQP Lands. All of the following informal mitigation or conservation "banks" have draft mitigation banking agreements. These include Goldrich, Silverado Ranch, Wilson Valley/Won Yoo, Sedco Hills, Wilson Creek/Joe A. Gonzalez, and Four Seasons. The mitigation banks and conservation "banks" total approximately 7,000 acres. All of the mitigation/conservation "banks" were primarily established for sage scrub and grassland habitats and for species such as the coastal California gnatcatcher, Quino checkerspot butterfly and Stephens' kangaroo rat. The Skunk Hollow (Barry Jones) Wetland Mitigation Bank has a finalized banking agreement and was established for wetland mitigation within the Plan Area. The Skunk Hollow Bank is 140 acres that includes a 33-acre vernal pool and 107 acres of watershed. The mitigation/conservation bank lands are within the MSHCP Existing and Proposed Cores, Proposed Expansion of Cores, and Linkage areas.

Existing Habitat Conservation Plans

Seventeen individual Habitat Conservation Plans (HCP) have been approved within the MSHCP Plan Area. These permitted HCPs authorized incidental take for single and multiple species and listed and non-listed species. The HCPs addressed the loss of up to 20,455 acres of habitat and provided for the conservation of 21,197 acres. These HCPs include Stephens' Kangaroo Rat Long-Term and Short-Term, Lake Mathews, El Sobrante Landfill, Assessment District 161, Citation Builders Ridge at Cresta Verde, John Laing Properties, Cornerstone Homes/Railroad Canyon, Antelope Road, Corona Development Company, Granite Homes, Harley John Reservoir, Pacific Gateway Homes, Rancho Bella Vista, Redhawk Development, and Temecula Ridge Apartments/Temecula Village Development. The Redhawk Development HCP addressed the Riverside fairy shrimp and another five of these approved HCPs were large scale and addressed many of the species addressed by the MSHCP. These six HCPs are described below. In addition, please refer to Appendix 5 for the list of species addressed in our internal section 7 consultations for the above referenced HCPs.

Stephens' Kangaroo Rat Habitat Conservation Plan

In 1996, a section 10(a)(1)(B) incidental take permit was issued to the RCHCA for take of the federally endangered Stephens' kangaroo rat during the implementation of the Long-Term Stephens' Kangaroo Rat Habitat Conservation Plan (SKR HCP). The Short-Term SKR HCP identified study areas in support of the Long-Term SKR HCP and was subsumed into the Long-Term SKR HCP. The SKR HCP Plan Area is located entirely within the MSHCP Plan Area. The SKR HCP addressed the loss of 15,000 acres and the conservation of 15,000 acres within the SKR HCP Plan Area boundary. The SKR HCP Plan Area encompasses 533,954 acres within 8 jurisdictions of western Riverside County. The SKR HCP addressed take associated with residential, commercial, and industrial development; property improvements; and ongoing agricultural operation and contained provisions for public facilities, services and utilities. With the recent acquisition of Potrero Valley by CDFG, about 15,000 acres of land are conserved and managed as part of the SKR HCP.

The SKR HCP established seven core reserves for Stephens' kangaroo rat. These existing core reserves include Lake Mathews/Estelle Mountain, the Southwestern Riverside County Multiple Species Reserve (Diamond Valley Lake/Lake Skinner), Steel Peak, Lake Perris/San Jacinto Wildlife Area, Motte Rimrock Reserve, MARB/Sycamore Canyon, and Potrero Area of Critical Environmental Concern. Funding for management of Lake Mathews/Estelle Mountain, the Lake Skinner area, Motte Rimrock Reserve, and Sycamore Canyon was a component of the SKR HCP. Most of the established Stephens' kangaroo rat core reserves are being included as existing core habitat areas within the MSHCP. These existing core habitat areas include Lake Mathews/Estelle Mountain (Existing Core C); Diamond Valley Lake, Lake Skinner and Johnson Ranch (Existing Core J); Lake Perris/San Jacinto Wildlife Area (Existing Core H); Sycamore Canyon area in the north region of the Plan Area (Existing Core D); Steele Peak (part of Proposed Core 1); and Motte Rimrock Reserve (Noncontiguous Habitat Block 4). Lake Mathews/Estelle Mountain is one of the largest contiguous habitat blocks within the MSHCP Plan Area.

The SKR HCP will continue to be implemented independently of the MSHCP. However, the core reserves established by the SKR HCP will be managed as part of the MSHCP Conservation Area consistent with the SKR HCP and other management agreements for the existing core reserves. Actions will not be taken as part of the implementation of the SKR HCP that will significantly affect other species proposed for coverage under the MSHCP. The MSHCP proposes take of Stephens' kangaroo rat within the MSHCP Plan Area, but outside of the boundaries of the SKR HCP Plan Area.

Although MARB and Sycamore Canyon were included as one of the core reserves for the SKR HCP, MARB is currently proposed to be traded for Potrero Valley. Thus, the MARB reserve lands will no longer be conserved. Potrero Valley is a large block of occupied habitat outside of the SKR Plan Area boundary, but within the MSHCP Plan Area, that provides habitat for Stephens' kangaroo rat and other species.

Lake Mathews MSHCP/NCCP

The Lake Mathews MSHCP/NCCP was prepared by MWD and the RCHCA for properties located east of Interstate 15 near Lake Mathews in northwestern Riverside County. The Lake Mathews MSHCP/NCCP addressed the least Bell's vireo, southwestern willow flycatcher, Stephens' kangaroo rat, slender-horned spineflower, Braunton's milkvetch, Munz's onion, Quino checkerspot butterfly, coastal California gnatcatcher, and bald eagle. In addition to the 9 listed and proposed species, the HCP also covered 56 non-listed species for a total 65 covered species. Of the species addressed by the Lake Mathews MSHCP/NCCP, 46 are addressed in the MSHCP.

The Lake Mathews MSHCP/NCCP established an 882-acre operations/projects area and a Multiple Species Reserve (MSR) that conserved a 2,544-acre mitigation bank adjacent to the 2,565-acre existing State Ecological Reserve. Of the 2,544-acre mitigation bank, 1,269 acres were used by RCHCA to replace habitat under their Short-Term SKR HCP toward achieving the 15,000-acre requirement for the Long-Term HCP. MWD proposed to mitigate for potential loss of 618 acres of habitat due to operations and maintenance activities by conserving 618 acres of wildlife habitat. MWD conserved an additional 657 acres in the mitigation bank to offset future MWD projects in the region.

In addition to the MSR, the Lake Mathews MSHCP/NCCP assisted in establishing a multi-jurisdictional reserve encompassing over 12,000 acres managed for multiple species use in western Riverside County. The combined reserve is composed of the MSR that consists of the existing State Ecological Reserve and the Lake Mathews HCP Mitigation Bank, Lake Mathews/Estelle Mountain Core Stephens' kangaroo rat Reserve, the Estelle Mountain Ecological reserve owned by the Department, and land owned by BLM located within the RCHCA's proposed Stephens' kangaroo rat Core Reserve. Collectively, these lands comprise the Lake Mathews/Estelle Mountain Existing Core C area of the MSHCP. The MSHCP proposes to build off of Existing Core C to the west (Proposed Extension of the Existing Core 2) and create a habitat linkage to the east (Proposed Linkage 3) to other existing conserved lands.

Assessment District 161

The Assessment District (AD) 161 HCP addressed 16 species, including the take of 13 animal species, that will be affected by the loss and modification of 2,495 acres of habitat resulting from the implementation of 19 projects. The projects are private and public within and in the vicinity of AD 161 in western Riverside County. The AD 161 Plan Area is located adjacent to the cities of Temecula and Murrieta. Generally, the AD 161 HCP Plan Area is located east of Interstate 15, south of Clinton Keith Road, and adjacent to State Route 79.

The AD 161 HCP addressed the take of Quino checkerspot butterfly, Riverside fairy shrimp, California Orcutt grass, coastal California gnatcatcher and its designated critical habitat, and 12 other species. Of these species addressed by the AD 161 HCP, all are proposed for coverage under the MSHCP.

Incidental take of covered species will occur during construction of single- and multi-family housing, commercial and light industrial facilities, schools, parks, associated infrastructure, and public projects within the 4,070-acre plan area. Collectively, the projects will permanently eliminate 2,495 acres of suitable habitat for the covered species. The AD 161 HCP proposes the conservation of 1,441 acres within the plan area. The conservation will occur on 9 properties in 3 areas; the Johnson and Roripaugh Ranch area, along Warm Springs Creek, and east of Interstate 215 near Clinton Keith Road. The largest of these areas (674 acres) is on Johnson Ranch, of which 503 acres is subject to ongoing agricultural use. The AD 161 HCP proposes to continue agriculture for up to 3 years in its current footprint as a method of weed control.

Management will begin when the conservation lands are transferred from individual property owners to a conservation organization and will end when or if management responsibilities are secured through the MSHCP. Management of some of the properties will be funded by individual property owners. If the MSHCP is not adopted, then the applicants propose to fund long-term management of the conservation areas through a transfer lien on the sale of each house.

Habitat acquisition of Johnson and Roripaugh Ranch area, along Warm Springs Creek and east of Interstate 215 near Clinton Keith Road will contribute regionally to conservation within the remaining linkage area. The Southwestern Riverside Multiple Species Reserve and Lake Skinner Core Reserve are part of the Existing Core J, northeast of the AD 161 HCP Plan Area. Due to existing development patterns in the County, the Assessment District and adjacent lands are within the only possible proposed linkages (Constrained Linkages and Linkages) between the Southwestern Riverside Multiple Species Reserve (Core J) and Lake Mathews/Estelle Mountain Core Reserve (Core C).

Rancho Bella Vista HCP

The Rancho Bella Vista HCP is located within the County of Riverside's AD161, north of the City of Temecula, and is bordered by the proposed Silverhawk development on the east, Johnson Ranch on the west, and extension of Murrieta Hot Springs Road on the south. The Rancho Bella Vista HCP boundary occurs within the Plan Area boundary of the Long-Term SKR HCP. The Rancho Bella Vista HCP and subsequent permit authorized Pacific Bay Properties to develop the 798-acre site that included 102.3 acres of habitat. The project included 1,998 single-family residences, an elementary school, a middle school, 2 active parks, a passive park, and 300 acres of open space. In addition, through the minor amendment process, an additional 25 acres of impacts may be taken with appropriate onsite or offsite mitigation to allow for minor changes in project design.

The Rancho Bella Vista HCP addressed 12 species. These species included least Bell's vireo, Quino checkerspot butterfly, Riverside fairy shrimp, California Orcutt grass, San Diego ambrosia, Munz's onion, coastal California gnatcatcher, the Bell's sage sparrow, burrowing owl, southern California rufous-crowned sparrow, southwestern pond turtle, and western spadefoot toad. Of these species addressed by the Rancho Bella Vista HCP, all are addressed by the MSHCP.

The total project resulted in the loss and modification of 8.9 acres of Riversidean sage scrub, 59.2 acres of disturbed Riversidean sage scrub, 0.5 acre of willow riparian woodland, 3.9 acres of southern willow scrub, and 29.7 acres of non-native grassland habitats. Authorization was also given to the project proponent for any effects to listed species that may occur as part of long-term management of open space. The conservation for the Rancho Bella Vista HCP included preserving 86 acres of Riversidean sage scrub and 28.8 acres of disturbed Riversidean sage scrub, 6.2 acres of riparian and wetland habitats, and 41 acres of non-native grassland. The mitigation package for the HCP also included 4.4 acres of riparian habitat within the floodplain areas of Tualota Creek, a 400-foot open space corridor linking Skunk Hollow with the knoll onsite to open space in the surrounding area, and a 250- to 700-foot wide corridor along Tualota Creek, creating a link from Santa Gertrudis Creek south of the site, northeast to the Southwestern Riverside County Multiple Species Reserve (Core J). This HCP provided Existing Constrained Linkages that linked the Proposed Core 2 to the Johnson Ranch property (Core J) to the east.

El Sobrante Landfill Expansion HCP

The El Sobrante Landfill Expansion HCP is located north of Dawson Canyon, west of Monument Peak, south of Lake Mathews, and east of Temescal Canyon Road, in an unincorporated area of western Riverside County. The project occurs within the boundary of the SKR HCP Plan Area. The Lake Mathews/Estelle Mountain Core Reserve occurs to the north and east of the El Sobrante Landfill HCP. The El Sobrante Landfill HCP addressed Stephens' kangaroo rat, coastal California gnatcatcher and its designated critical habitat, and an additional 29 nonlisted species. Of the species addressed by the El Sobrante Landfill HCP, 27 are addressed by the MSHCP.

The El Sobrante Landfill HCP proposed to construct a phased excavation, operation, closure, maintenance, and restoration of the Landfill Project. The existing landfill (Phases I-V) will be expanded in ten phases (Phases VI-XV). Each expansion phase will prepare an area adjacent to the active landfill for disposal operations. Operations areas that reach capacity will be closed, capped, and restored with Riversidean sage scrub. This sequence will continue over a 33-year period (or longer), at intervals tied to the storage capacity of the active operating areas. Responsibilities of USA Waste include a 30-year post-closure monitoring of the landfill cap.

The landfill excavation area is approximately 645 acres that includes the existing landfill, the locations of all existing and planned structures, all lands that will be disturbed by the Landfill Project, and all areas that will be restored to Riversidean sage scrub under the HCP. Once restored, the Landfill Project will include a minimum of 450 acres of Riversidean sage scrub to ensure there is no permanent loss of Riversidean sage scrub resulting from the proposed project. The restored acres include mixed Riversidean sage scrub/grassland and will be managed for both Riversidean sage scrub and grassland species. Cactus restoration and many-stemmed dudleya restoration efforts will be conducted. Of the 1,330 acres that will ultimately be conserved, approximately 28 acres will be facilities and roads, leaving approximately 1,305 acres for conservation.

USA Waste is responsible for funding implementation of the El Sobrante HCP for the life of the associated incidental take permit. Approximately 292 acres of undeveloped lands has been

permanently conserved with a conservation easement (including 282 acres in undisturbed open space parcel and 10 acres that will be impacted and later restored in the landfill expansion parcels), and an additional 406 acres will be permanently conserved with either a conservation easement or restrictive covenant prior to implementation of Phase VII of the HCP.

At the end of the post-closure monitoring and maintenance period for the landfill, USA Waste will convey a conservation easement over the entire 1,330-acre landfill area (including all restored Riversidean sage scrub) in favor of Riverside County or another party approved by the Fish and Wildlife Service. These lands will be conserved and managed in perpetuity. The 1,330-acre area provides for the extension of the Existing Lake Mathews/Estelle Mountain Core C and assists in providing habitat linkages for Stephens' kangaroo rat, coastal California gnatcatcher, and other species to the southwest into the Existing Core B in the Cleveland National Forest.

Redhawk Development HCP

The Redhawk Communities HCP addressed the take of Riverside fairy shrimp associated with the grading and construction for the Redhawk development. The Redhawk Communities HCP is located near the city of Temecula. This HCP Plan Area consists of 3 parcels on 102.81 acres. Incidental take occurred during the construction of 326 single-family residential units and approximately 84 condominium units.

The Redhawk Communities HCP includes conservation measures to offset adverse effects to Riverside fairy shrimp associated with the Redhawk development. Riverside fairy shrimp were found and/or assumed to be present in 19 temporary erosion control sediment basins (1.01 acres) onsite. Prior to filling the basins to facilitate development of the project site, soil bearing cysts from each of the 19 basins were translocated to pools created, as a result of the HCP, within the nearby Johnson Ranch conservation lands. The HCP provides for the conservation and management of 1.5 acres of created vernal pools and the surrounding watershed. In order to meet success criteria the pools are required to produce female Riverside fairy shrimp bearing viable cysts for at least three years.

Redhawk Communities, Inc., is responsible for funding the habitat mitigation plan. The conservation measures will preserve the affected population in perpetuity and result in the restoration of a significant amount of vernal pool habitat. The offsite conservation of vernal pools is expected to conserve the Riverside fairy shrimp on the Johnson Ranch property. The restored lands will be conserved and managed in perpetuity. Once success criteria have been met, the long-term management authority will be the responsibility of the Department or another entity approved by the Fish and Wildlife Service.

The proposed restoration and conservation of dedicated lands on Johnson Ranch is expected to contribute to the long-term conservation of Riverside fairy shrimp and core reserve system for the MSHCP. Johnson Ranch, along with Lake Skinner and Diamond Valley Lake, are included in the Existing Core (Core J) reserve unit in the MSHCP. The MSHCP proposes a western Extension (Proposed Extension of Core 5 and 6) of this Existing Core J area to link habitat blocks to the west.

Past Federal Actions

Appendix 5 describes past actions within the action area that have been evaluated under section 7 of the Act. This appendix outlines previous federal actions that have affected the environmental baseline within the action area in general terms and cannot be used to precisely summarize previous impacts. In some cases, projects were not implemented as described in our biological opinions or were not implemented at all. In cases for which we have specific knowledge regarding implementation, we describe actual results of project completion. Where appropriate, specific circumstances are briefly described in the “comments” column of Appendix 5.

EFFECTS OF THE ACTION

Evaluation Methods

Occurrence Data and Modeled Habitat

The abundance and distribution of a species within an area is unknown in the absence of species-specific focused surveys. However, in general, individual species depend on certain necessary elements within the environment for survival. This suite of elements, some of which are better understood and/or more important than others, constitutes the habitat for a species. However, the vegetation communities in which the species occurs can generally serve as a useful surrogate for describing a species' habitat needs, recognizing that some species' habitats are better described by inclusion of certain specific physical environments or attributes (*e.g.*, wetland types, soil associations, elevation).

The vegetation communities described in the MSHCP Habitat Accounts (Volume I of V: The Plan, Section 2; Volume II of V: The Reference Document; Appendix II-C) form the basis for identifying the vegetation communities in the Plan Area and are used later in this document to analyze the proposed action including lands that will be conserved under the Plan. Each of the vegetation/habitat associations and their relationship to the Plan Area are described in the MSHCP and are herein incorporated by reference. We acknowledge that due to the landscape approach of the vegetation mapping it is not possible to precisely capture the extent of all vegetation communities or habitat types; therefore, some vegetation communities may be overestimated while others are under represented. In general, the use of vegetation communities likely over represents the extent of habitat that an individual species uses and does not represent the abundance or distribution of a species within those area.

The MSHCP characterizes the Plan Area by biogeographical regions. Bioregions were identified to help describe the existing diversity of habitats on a regional scale within the Plan Area with the assumption that regional diversity translates directly into biological and genetic diversity. These bioregions are an attempt to address the complex relationship between biotic and abiotic features of the Plan Area. The bioregions were defined to represent areas with similar physical and biological features that are likely to function in a similar manner. Seven distinct bioregions were identified: Santa Ana Mountains, Riverside Lowlands, San Jacinto Foothills, Agua Tibia Mountains, Desert Transition, San Bernardino Mountains, and San Jacinto Mountains. These

bioregions are further described in Volume II, Part 1, Section 2.1.2 and Figure 2-6 of the MSHCP.

We derived acres of “modeled habitat” for each individual species within the Plan Area based on our understanding of an individual species’ requirements in the context of our master geographic information system (GIS) database (*e.g.*, vegetation communities and/or elevation, soils, bioregions, historic and recent species occurrence distribution). To construct this master database, we incorporated the following individual datasets:

- 1) Vegetation of western Riverside County distributed by Dudek and Associates. The vegetation data we used were based upon a 1994 classification of vegetation compiled by KTU+A (1994). These data were based on an Existing Land Use map developed by LSA in 1999 for use in the Existing Conditions Report prepared for the RCIP. The methodology used to develop the Existing Land Use map involved windshield surveys, review of 1993 to 1996 aerial photography, and 1997 SCAG data where available. Existing land use categories were then identified by LSA Consultants and digitized using GIS. The developed land use category from this map was then intersected with the MSHCP vegetation map by RBF Consulting (RBF, 2000) to identify habitat lost to development since the 1994 vegetation classification (MSHCP Section 3.1.6). An updated MSHCP vegetation map was not prepared.
- 2) Elevation of western Riverside County distributed by Dudek and Associates. The elevation dataset is based on a 30-meter Digital Elevation Model (DEM) compiled by U. S. Geological Survey. Dudek and Associates provided us with a metric dataset with contours divided into various elevation “bands.” We used the same DEM to construct a dataset with contours divided into 100-foot “bands” to better fit individual species’ life history criteria.
- 3) Public/Quasi-Public Lands distributed by Dudek and Associates to us on August 5, 2003. This dataset identified the Federal, State, and local public lands within the Western Riverside County MSHCP Plan Area and is based on parcel level data developed by the County.
- 4) MSHCP Bioregions distributed by Dudek and Associates. The bioregions dataset was created by Dudek and Associates to identify separate biogeographic regions within the Western Riverside County MSHCP Plan Area.
- 5) Narrow endemic plant select soils areas distributed by Dudek and Associates. This soils dataset was created by Dudek and Associates by digitizing select soils polygons from the 1971 Western Riverside County Soil Survey.
- 6) Basalt soils distributed by Dudek and Associates. The basalt soils dataset was provided to us by Dudek and Associates on August 21, 2003.

- 7) Criteria Area cells distributed by Dudek and Associates. The criteria area dataset was created by Dudek and Associates as the basis for defining the 310,000 acre Criteria Area within the MSHCP. This dataset was provided to us on June 19, 2002.
- 8) Fish and Wildlife Service Conceptual Reserve Design (CRD) for the Western Riverside County MSHCP developed by us through our interpretation and application of the written cell Criteria provided in the text of the MSHCP.
- 9) MSHCP species occurrence data base (Species 8) provided by Dudek and Associates, including herbarium data referenced in the MSHCP (Section 2.1.1, pg. 2.6). Though included and addressed in the Plan, additional species occurrence points were provided to us on January 6, 2004..
- 10) Narrow Endemic Plants Species Survey Area (NEPSSA) distributed by Dudek and Associates. The NEPSSA dataset defined discrete areas for which specific narrow endemic plants species would be surveyed for within the Plan Area. This dataset was received by us on August 14, 2003.
- 11) Criteria Area Species Survey Area (CASSA) distributed by Dudek and Associates. The CASSA dataset defined discrete areas for which specific plant and animal species would be surveyed for within the Plan Area. This dataset was received by us on August 14, 2003.

In one instance, we were able to discern that an area described in our dataset as disturbed/developed actually provided habitat for species. In this case, the area was included as part of the modeled habitat; however, not all areas classified in our vegetation data layer as “disturbed or developed” were reviewed to verify their condition and may in fact provide habitat for some species.

To facilitate our analysis, we developed a single, generalized model to represent the modeled habitat for those Covered Species that are associated with vernal pool and alkali playas using the following features within the Riverside Lowlands and the Santa Ana Mountains bioregions: 1) vernal pools and playas; and 2) clayey soils (Altamont, Auld, Bosanko, Claypit, and Porterville), alkali soils (Willows, Traver, and Domino), and Santa Rosa Plateau basalt flow soils. Given the limitations of our soils dataset, we were unable to include additional soil types, that may harbor vernal pools, such as Murrieta stony clay loam, in our model. We also acknowledge that not only do vernal pools and alkali playas require specific soil types but the occurrence of these habitats is also dependent on very localized conditions related to hydrology and micro-topographic relief that we are unable to capture in our modeled habitat. Therefore, the acres of modeled habitat within the Plan Area is most likely an overestimate for vernal pool and alkali playa associated species. However, we better refined our model for the three vernal pool associated species (Santa Rosa Fairy Shrimp, San Diego button celery, and prostrate navarettia) that are only known to occur from the Santa Rosa Plateau by limiting our modeled habitat to the Santa Ana Mountains Bioregion.

Our assessment of modeled habitat that occurs within the action area, and hence our analysis of potential impacts to and conservation of species, may differ from that reported in the MSHCP. Reasons for any discrepancies include the following: 1) our use of updated land use data that reflected more recent conversion of natural vegetation communities to disturbed or developed areas (RBF Consulting 2000); 2) our use of more specific “uncollapsed” vegetation communities rather than the broader vegetation communities used in the MSHCP (MSHCP Section 2.1.3) that allowed us to refine modeled habitat; 3) our interpretation of the written conservation Criteria (see below Conceptual Reserve Design) that may have differed from that of the MSHCP; 4) our use of species occurrence data that we limited to the period between 1988 to 2003; and 5) our use of recovery plan data (e.g. Quino Checkerspot Recovery Plan) not available at the time the MSHCP species accounts were finalized.

Available information regarding species occurrences or locations in the Plan Area was compiled and included in our dataset to assess the locations/occurrences that will be conserved within the proposed Conservation Area. We used our Fish and Wildlife Service Geographic Information System database for listed animal species occurrences and the Department’s California Natural Diversity Database (CNDDDB) for listed and non-listed animal and plant occurrences. Both these databases have internal review processes for quality control of the information entered, which allows review of the original report of the occurrence. We also used a dataset provided by RBF Consulting that contained data compiled by the University of California Riverside (UCR) and other sources. We included the UCR occurrence data since it augmented the best available information in our and the CNDDDB datasets; however, we are uncertain as to the level of quality control on that dataset since there was no apparent cross-reference to the survey, environmental document, or other data source for that dataset.

The occurrence data we used also have various limitations that are either inherent in the data or that we imposed. First, it is unclear as to the amount of overlap between the three species occurrence datasets; for example, what appears as two or three occurrences in the combined data may actually only reflect a single occurrence. There are also instances where clusters of points reflect multiple surveys of the same occurrence over several years; that cumulative information will appear as multiple points but does not necessarily mean a greater number of plants or animals at that location. Also, because species-specific surveys were not conducted throughout the Plan Area, the absence of occurrence locations may be a reflection of survey effort rather than species’ absence. In addition, because many species’ locations are a result of surveys undertaken prior to urban development, these locations may no longer be extant.

We limited occurrences to data from 1988 to 2003 to better reflect the current distribution of species within the Plan Area given the extent of land use changes that have occurred within the Plan Area. However, we acknowledge that occurrences reported prior to this time period may or may not be extant. In addition, we only used occurrences that had an accuracy assessment that was useful in our analysis of the distribution of species within the Plan Area. The best accuracy indicates an occurrence that is within a specific bounded area. The minimal accuracy which we used indicates that an occurrence has one “x” or one “y” coordinate that is greater than a specific bounded area and less than 2 x 2 kilometers (and up to 3 x 3 kilometers can be included). We mapped the centerpoint of the data polygon; therefore, there is some error associated with the mapping precision. Data with accuracy assessments greater than 2 kilometers were not used

since they did not add useful information for our analysis of species distribution within particular vegetation communities or proposed Conservation Area.

Conceptual Reserve Design

Implementation of the MSHCP will result in a 500,000-acre Conservation Area comprised of approximately 347,000 acres of PQP Lands and 153,000 acres of Additional Reserve Land. The MSHCP does not provide a “hard lined” map of the Conservation Area but rather textual descriptions to be interpreted for the purposes of assembling the Additional Reserve Lands. For the purposes of our analysis, we mapped a “Conceptual Reserve Design” (Figure 1) based on the existing PQP Lands and our reading and interpretation of the written conservation criteria (Criteria) from within the MSHCP Criteria Area.. This resulted in a Conceptual Reserve Design comprised of 152,795 acres of Additional Reserve Lands and 345,994 of PQP Lands. Since we are unable to distinguish between lands that would be acquired by the Permittees (103,000 acres) to assemble the Additional Reserve Lands for mitigation purposes and State and Federal land purchases (50,000 acres), our analysis is based on the total amount of Additional Reserve Lands that we derived from the written Criteria.

Our Conceptual Reserve Design is intended to describe a possible configuration of the eventual 153,000-acre Additional Reserve Lands that will be assembled in conjunction with the existing PQP Lands in order to provide for species long-term conservation. Our interpretation of the Criteria included the larger contextual information provided by the cores and linkages discussion in Section 3 of the MSHCP. The Criteria identify a range, by percentage, of conservation desirable within each cell or cell group. Our rendition of the Additional Reserve Lands was mapped based on the mid-range of conservation identified for each cell or cell group as well as the habitat type, position within the cell/cell group, and juxtaposition to neighboring cell/cell groups as described by the Criteria. If we could not capture the percentage of habitat conservation in the portion of the cell/cell group called for in the Criteria because of various factors (*i.e.*, existing development) then, when possible, we delineated the conservation in other portions of the cell or cell group in order to maintain reserve design (*e.g.*, connectivity).

Areas that we did not include in our Conceptual Reserve Design that are important to individual species conservation or overall reserve design will need to be evaluated during the actual assembly of the Additional Reserve Lands. Given that the Plan allows for flexibility during reserve assembly, we anticipate that those areas important to individual species conservation and/or reserve design configuration will be included within the Additional Reserve Lands to achieve the 153,000 acres. Those areas of importance that we were able to identify at this time are depicted on our Conceptual Reserve Design (Figure 1). Because roadways are not to be included as part of the Conservation Area, acreage associated with the circulation element (MSHCP Figure 7-1) was not included in the total acres calculated for our Conceptual Reserve Design.

To analyze the range and configuration of vegetation communities and species habitats that could be conserved in the Conservation Area, we used our Conceptual Reserve Design to examine whether the range of habitats within the Plan Area are likely to be conserved and how well they will be represented across the range of environmental gradients. Using our master

database, boundaries of the PQP Lands, Additional Reserve Lands, and Bioregions were overlaid on our vegetation community mapping to tabulate the amount and location of each vegetation community within the Plan Area relative to each Bioregion.

Species Evaluations

To evaluate potential conservation of individual species locations and their habitats within the Conservation Area, we intersected our Conceptual Reserve Design (PQP Lands and Additional Reserve Lands) and species occurrence data to quantify the known occurrences and amount of modeled habitat that will be lost outside the Conservation Area, conserved in the Additional Reserve Lands, and the extent of habitat within the PQP Lands.

To better understand the impacts and level of conservation that will be achieved for some species, we combined the available datasets with our individual species models in several ways. For each of the narrow and endemic plant species listed in Table 6.1 of the MSHCP, we combined the habitat model results with the narrow and endemic plant species survey area (NEPSSA) boundaries. With the results, we determined the amount of modeled habitat within the Plan Area that fell inside and outside of the various NEPSSA survey areas. We also used the results combined with the information on Figure 6-1 and Table 6.1 of the MSHCP that identifies which species will be surveyed within each specific NEPSSA survey area to determine the amount of modeled habitat that will be subject to the narrow and endemic plant survey policy (Appendix 6). This analysis also quantified the extent of modeled habitat that will not be surveyed.

For each of the criteria area survey plant species listed in Table 6.1 of the MSHCP, we combined the habitat model results with the criteria area species survey area (CASSA) boundaries. With the results, we determined the amount of modeled habitat within the Plan Area that fell inside and outside of the various CASSA survey areas. We also used the results combined with the information on Figure 6-2 and Table 6-1 of the MSHCP that identifies which species will be surveyed within each specific CASSA survey area to determine the amount of modeled habitat that will be surveyed for each criteria area survey plant species (Appendix 7a). This analysis also quantified the extent of modeled habitat that will not be surveyed. A similar analysis was conducted utilizing the proposed survey areas and modeled habitat for 3 amphibians (MSHCP Figure 6-3), the burrowing owl (MSHCP Figure 6-4), and 3 mammals (MSHCP Figure 6-3) identified for additional survey needs (Appendix 7b).

Evaluation Assumptions²

The proposed action addresses 146 species within a 1.26 million-acre action area. In addition, focused survey information does not exist for all Covered Species for the entire action area. Moreover, the impacts associated with this action could occur at anytime over the 75-year term of the permit. Therefore, we made the following assumptions to evaluate the impacts to Covered Species:

² These assumptions do not reflect all of the obligations/conditions set forth in the MSHCP.

1. All of the provisions and obligations set forth in the MSHCP, Implementation Agreement and all permit terms and conditions will be carried out and implemented by the Permittees.
2. Specific vegetation communities (*e.g.*, coastal sage scrub) and/or physical environmental features (*e.g.*, soils) are correlated with the habitat of nearly all Covered Species (species-specific habitat information is provided in the species accounts effects analysis below). Additionally, for the purposes of determining impacts to and conservation of Covered Species, the extent of impacts to or conservation of the vegetation community or environmental feature will result in commensurate or relative extent of impacts to and conservation of the species as a whole. The species habitat models we developed using the available vegetation and physiographic features information represent a reasonable surrogate with which to assess the impacts to and conservation of Covered Species within the action area.
3. The conservation Criteria identified within each individual cell/cell group of the Criteria Area will be achieved, or if appropriate, refined through the Criteria Refinement Process (Biological Equivalent or Superior Conservation) and that the conservation in each cell or cell group will be assembled to achieve a reserve configuration (Conservation Area) including cores and linkages etc. as generally described in Section 3 of the Plan. The Criteria Refinement Process (section 6.5 of the Plan) will be implemented to facilitate assembly of the Additional Reserve Lands in those instances where refinements to the Criteria are desirable for individual species conservation or reserve design configuration.
4. Assembly of the Additional Reserve Lands will result in 153,000 acres of land configured as generally described in Section 3.0 of the Plan including the appropriate vegetation communities and species populations/occurrences/locations identified in the Plan (or from new species/habitat information gathered in association with the Plan) that will achieve the species-specific objectives and the overall biological goals of the Plan.
5. Species-specific surveys provided for in the Plan will be conducted by a qualified biologist(s) at the appropriate time of the year(s) (which may vary, depending on the subject of the survey) to the extent necessary (in area and effort) such that if the subject of the survey is not detected, then it is reasonable to conclude that the subject does not occur within the surveyed area. Additionally, information gathered in conjunction with the surveys will adequately quantify (numerically and/or spatially, as appropriate) the relevant habitat and species so that the avoidance (or conservation), minimization, and mitigation measures provided for in the Plan can be implemented. Biologists conducting surveys provided for in the Plan will obtain all necessary permits, including those authorized under section 10(a)(1)(a) of the ESA, and will adhere to all survey protocols associated with such permits.
6. The PQP Lands provide habitat to support the long-term conservation of Covered Species and such lands will be managed consistent with the biological and species-specific conservation goals and objectives identified in the MSHCP. Within 5 years of permit issuance, information submitted to the Wildlife agencies by the Permittees through the

RCA verifying the precise acreage, location, amount, and status of PQP Lands will demonstrate that approximately 347,000 acres of PQP Land within the Conservation Area provides conservation value for the Covered Species. In addition, the Permittees will obtain Memoranda of Understanding or other appropriate agreements with non-Permittee PQP Lands owners/managers within the MSHCP Conservation Area so that all lands within the MSHCP Conservation Area are managed in conformance and compliance with the MSHCP.

8. Although project-specific information for the proposed Covered Activities is not available at this time, we assume that these activities will meet the conservation requirements as defined by the cell Criteria or will be otherwise refined through the Criteria Refinement Process subject to a Biologically Equivalent or Superior determination.
9. Approximately 85 acres desirable for conservation from within the Criteria Area will be lost annually in association with single-family homes mobile home on existing legal lots. Appropriate reviews will be made by the Permittees to determine the siting of these individual structures and associated access roads. Conservation lost in association with the construction of single-family homes or mobile home on existing legal lots will not substantially reduce the opportunity to assemble the Additional Reserve Lands for species conservation or reserve design configuration. Annual reporting will determine whether single-family/mobile home construction within the Criteria Area occurs in such a manner.
10. No more than 10,000 acres of land within the Criteria Area will be lost in association with new agricultural lands. This loss will not substantially reduce the opportunity to assemble the Additional Reserve Lands for species conservation or reserve configuration. Annual reporting, which includes review of aerial photographs every 3 years, will determine whether Reserve Assembly is being precluded from that described in the MSHCP.
11. The MSHCP does not conflict with, supersede, or amend the provisions of any adopted Habitat Conservation Plan. However, this assumption does not preclude the processing and/or approval of a future joint amendment to the MSHCP and any other adopted Habitat Conservation Plan.

Generalized Effects

Direct impacts to Covered Species and their habitats are anticipated to occur within the Plan Area upon issuance of an incidental take permit due to land alterations primarily associated with urban development. Based on our Conceptual Reserve Design, approximately 466,000 acres of undeveloped land will be lost outside the proposed MSHCP Conservation Area. However, we anticipate these acres to represent a maximum loss. Although not included for conservation within the MSHCP Conservation Area, general plan land use designations such as rural mountainous that restrict or limit certain development activities will result in some additional natural areas remaining undeveloped. Designated rural mountainous lands, specifically those

adjacent to the Conservation Area, may provide habitat for certain species within the Plan Area as well as function as a buffer to the Conservation Area.

Of the 498,780 acres that we derived within our Conceptual Reserve Design (Figure 1), approximately 70 percent occurs within the existing PQP Lands and 30 percent will be conserved within the Additional Reserve Lands. Table 4 below summarizes our estimates of habitat loss outside the MSHCP Conservation Area, conservation within the Additional Reserve Lands, and the extent of habitat that is anticipated to support Covered Species within PQP Lands. However, the MSHCP proposes to provide an MSHCP Conservation Area of 500,000 acres comprised of a minimum of 153,000 acres of habitat within the Additional Reserve Lands and 347,000 acres of habitat within PQP Lands which slightly differs from the acreage calculated for our Conceptual Reserve Design. This difference is likely a result of variations on the interpretation of the written Criteria. An analysis of our Conceptual Reserve Design is provided below under MSHCP Conservation Area Analysis.

In addition to the direct loss of habitat outside the Conservation Area, effects associated with the issuance of an incidental take permit include habitat fragmentation, increased invasion by exotic plant and animal species, noise effects, disruption of the natural fire regime, increased anthropogenic disturbances, changes in hydrology, and changes to water quality and quantity.

Section 7 of the MSHCP identifies various activities (Covered Activities) that will impact Covered Species and their habitats. These activities will occur within the Plan Area including activities within the Criteria Area from which the Additional Reserve Lands will be assembled and, to a limited extent, within PQP Lands. These activities include private and public development projects, roadway construction, road maintenance, flood facilities and maintenance, agriculture, recreation, waste management facilities, future facilities, and reserve monitoring and management.

Urbanization

Fragmentation

A primary effect of urban development is fragmentation of the natural landscape. Habitat fragmentation can result in a variety of negative effects to populations of many species. In Southern California, effects of fragmentation have been shown to decrease the number of resident bird species, decrease the diversity of small rodents, and decrease the diversity and cover of native plant species (Soulé *et al.* 1988; Bolger *et al.* 1991; Alberts *et al.* 1993; Bolger *et al.* 1997a).

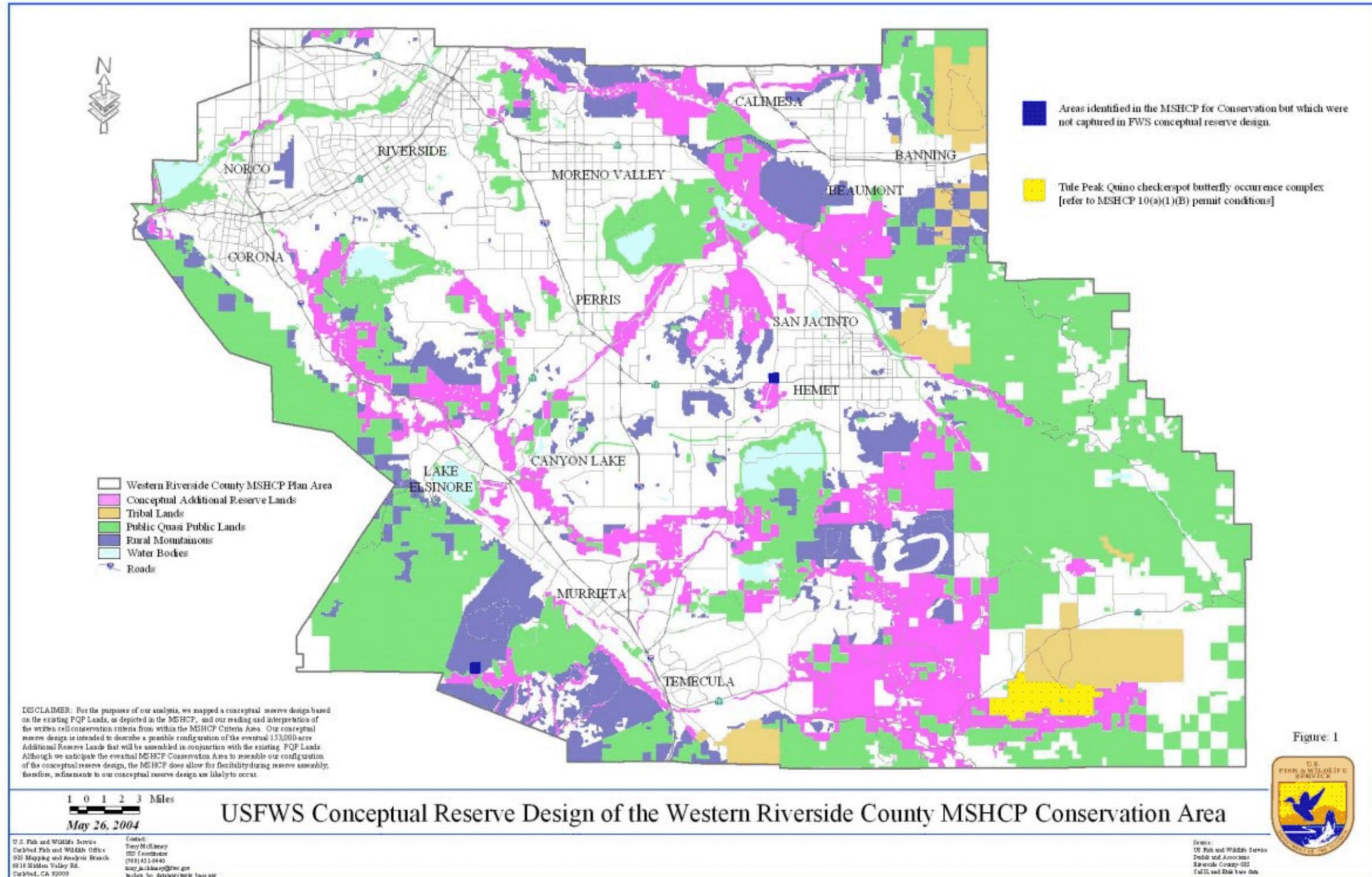


Table 4. Generalized Effects on Vegetation Communities within the Action Area

Collapsed Vegetation Category	Specific Vegetation Category	Total Acres in the Plan Area	Total Public/Quasi Public Lands	%	Total Additional Reserve Lands	%	Total MSHCP Conservation Area	%	Lands Not Conserved	%
Montane Coniferous Forest	Jeffrey Pine	11665	7703		0		7703		3962	
	Lodgepole Pine	579	577		0		577		1	
	Lower Montane Coniferous Forest	6685	4951		18		4969		1716	
	Mixed Evergreen Forest	4345	3886		0		3886		459	
	Southern California White Fir	3700	3219		0		3219		481	
	Subalpine Coniferous	28	27		0		27		1	
Montane Coniferous Forest Total		27002	20363	(75%)	18	(0%)	20382	(75%)	6620	(25%)
Woodlands and Forest	Black Oak Forest	4	4		0		4		0	
	Broadleaved Upland Forest	2357	2273		0		2273		83	
	Coast Live Oak Woodland	6302	2199		813		3012		3290	
	Dense Engelmann Oak Woodland	4058	1755		713		2468		1590	
	Oak Woodland	18906	14189		832		15021		3885	
Woodlands and Forest Total		31627	20421	(65%)	2358	(7%)	22779	(72%)	8848	(28%)
Coastal Sage Scrub	Coastal Scrub	3633	1814		77		1891		1743	
	Diegan Coastal Sage Scrub	15438	5174		1196		6370		9068	
	Riversidean Sage Scrub	129532	26778		43612		70390		59142	
Coastal Sage Scrub Total		148603	33766	(23%)	44885	(30%)	78651	(53%)	69952	(47%)
Riversidean Alluvial Fan Sage Scrub	Disturbed Alluvial	1019	268		522		790		229	
	Riversidean Alluvial Fan Sage Scrub	5262	1381		2230		3611		1651	
Riversidean Alluvial Fan Sage Scrub Total		6281	1649	(26%)	2753	(44%)	4402	(70%)	1880	(30%)
Desert Scrub	Big Sagebrush Scrub	6207	939		1004		1942		4264	
	Semi-desert Succulent Scrub	2424	0		2344		2344		80	
	Sonoran Desert Scrub	282	161		0		161		121	
Desert Scrub Total		8912	1099	(12%)	3348	(38%)	4447	(50%)	4465	(50%)
Chaparral	Chamise Chaparral	355	11		76		87		268	
	Chaparral	344591	173881		58662		232543		112048	
	Red Shank Chaparral	62947	32787		5422		38209		24738	
	Semi-Desert Chaparral	15	0		0		0		15	
Chaparral Total		407909	206679	(51%)	64160	(16%)	270839	(66%)	137069	(34%)
Playas and Vernal Pools	Alkali Playa	7005	2665		3363		6028		977	
	Southern Interior Basalt Vernal Pool	51	31		13		44		7	
	Vernal Pool	19	17		1		17		1	
Playas and Vernal Pools Total		7075	2713	(38%)	3377	(48%)	6090	(86%)	985	(14%)
Grasslands	Non-native Grassland	129754	19501		18593		38093		91660	
	Valley and Foothill Grassland	2731	2315		390		2705		26	
Grasslands Total		132484	21816	(16%)	18982	(14%)	40798	(31%)	91686	(69%)
Riparian Scrub, Woodland, Forest	Arundo/Riparian Forest	489	440		43		483		6	

Collapsed Vegetation Category	Specific Vegetation Category	Total Acres in the Plan Area	Total Public/Quasi Public Lands	%	Total Additional Reserve Lands	%	Total MSHCP Conservation Area	%	Lands Not Conserved	%
	Montane Riparian Forest	286	212		4		216		70	
	Montane Riparian Scrub	6	1		6		6		0	
	Mule Fat Scrub	516	81		250		331		184	
	Riparian Forest	1212	595		309		904		308	
	Riparian Scrub	2925	749		1066		1815		1110	
	Southern Cottonwood/Willow Riparian	6435	4855		932		5788		647	
	Southern Sycamore/Alder Riparian Woodland	187	60		9		69		118	
	Southern Willow Scrub	1510	190		551		741		769	
	Tamarisk Scrub	272	0		272		272		0	
Riparian Scrub, Woodland, Forest Total		13837	7183	(52%)	3442	(25%)	10626	(77%)	3212	(23%)
Meadows and Marshes	Coastal and Valley Freshwater Marsh	374	215		126		341		33	
	Marsh	81	19		27		47		34	
Meadows and Marshes Total		455	234	(51%)	154	(34%)	388	(85%)	67	(15%)
Meadow	Meadow (Montane)	147	59		0		59		89	
	Wet Montane Meadow	325	26		0		26		299	
Meadow Total		472	84	(18%)	0	(0%)	84	(18%)	387	(82%)
Peninsular Juniper Woodland	Peninsular Juniper Woodland and Scrub	1067	273		336		609		458	
Peninsular Juniper Woodland Total		1067	273	(26%)	336	(31%)	609	(57%)	458	(43%)
Cismontane Alkali Marsh	Cismontane Alkali Marsh	150	2		26		27		122	
Cismontane Alkali Marsh Total		150	2	(1%)	26	(17%)	27	(18%)	122	(82%)
Agricultural Land	Dairy & Livestock Feedyards	5335	146		284		430		4906	
	Field Croplands	113819	9306		5276		14582		99237	
	Grove/Orchard	36455	1277		677		1954		34500	
Agricultural Land Total		155609	10729	(7%)	6236	(4%)	16966	(11%)	138643	(89%)
Water	Open Water/Reservoir/Pond	11576	9058		1134		10192		1384	
Water Total		11576	9058	(78%)	1134	(10%)	10192	(88%)	1384	(12%)
Developed, Disturbed Land	Residential/Urban/Exotic	259443	9923		1578		11501		247943	
Developed, Disturbed Land Total		259443	9923	(4%)	1578	(1%)	11501	(4%)	247943	(96%)
GRAND TOTAL		1212502	345994	(29%)	152786	(13%)	498780	(41%)	713722	(59%)

*Total Conservation Area includes Public/Quasi Public Lands and Additional Reserve Lands

Fragmentation can result in landscapes with many small habitat patches rather than few large patches. Small habitat patches tend to have altered species composition, reduced community diversity, and smaller population sizes for individual species. Species with greater susceptibility to the effects of reduced habitat patch size are more likely to be extirpated from these small patches. Reduced community diversity and altered species composition can change natural ecological functions, which can result in unpredictable effects given the complexity of community dynamics. Smaller populations are more susceptible to extirpation due to random fluctuations in population dynamics or catastrophic events (Ewens *et al.* 1987; Shaffer 1987). Small habitat patches also have high perimeter to area ratios, which increases edge effects that can result in even smaller populations. If small populations are isolated from nearby populations, they will be susceptible to deleterious genetic effects of inbreeding depression (Lande and Barrowclough 1987), and extirpated populations may not be replaced by dispersing individuals from other populations (Gilpin 1987).

Fragmentation studies by Soule *et al.* (1988) and Crooks and Soule (1999) concluded that the decline of top predators in fragmented landscapes could lead to the release of smaller predators that, in turn, strongly limit populations of prey species. This phenomenon, known as mesopredator release, has been implicated in the decline and extinction of prey species worldwide (Willis and Eisenmann 1979; Matthiae and Stearns 1981; Whitcomb *et al.* 1981; Wilcove *et al.* 1986; Soule *et al.* 1988; Terborgh 1988; Sovoda *et al.* 1995; Crooks and Soule 1999; Haas and Crooks 1999). Parks and Harcourt (2002) found that preserves adjacent to high density development had significantly more large mammal extinction. Mesopredator release may also be facilitated through predator control programs. Human populations in close proximity to top predators can lead to the lethal removal of individual animals as a result of real or perceived threats to humans.

The effects of habitat fragmentation can be minimized by maintaining linkages (Soule 1986; Saunders *et al.* 1991; Beier and Noss 1999). Linkages are connections between larger blocks of habitat which allow for wildlife movement, recruitment, and colonization between different core biological areas. Linkages are important for allowing species to move or disperse from their natal areas to sites where they may reproduce. Linkages that provide for successful movement between core population areas reduce genetic isolation and allow for recruitment into areas where populations have been extirpated due to natural or anthropogenic disturbances or stochastic events (Soule and Simberloff 1986; Lande 1988). Several factors influence the effectiveness of habitat linkages including length, width, and species targeted for use (Meffe and Carrol 1998). When large blocks of habitat remain intact, the rate of successful dispersal between core population areas is higher. At a minimum, dispersal habitat within linkages should provide some level of foraging and limited protection from predators. When the distance between core populations of a species is greater than the dispersal distance for individuals, effective linkages must provide live-in habitat. It is important to recognize that the effectiveness of any habitat linkage varies considerably by species. Linkages are critical to the design and function of any conservation area.

Edge Effects

The deleterious effects of conversion of natural habitats to other land uses often extend beyond project footprints resulting in “edge effects.” The biological integrity of habitats adjoining development can be diminished by adverse effects of noise, lighting, exotic plant and animal invasion, predators, parasitism, disturbance from human activities, changes in fire regimes, and other factors. The severity of these effects depends on distance to land alteration boundaries, source of disturbance, and the affected species. Species that are particularly vulnerable to edge effects, known as interior species, require large patches of habitat that are relatively free from edge effects.

Land uses adjacent to habitat areas may introduce noise and artificial lighting that are likely to impact wildlife species. The impact of noise on wildlife is likely to differ from species to species and is not only dependent on the decibel level of the noise, but also on the duration and frequency. For example, birds rely on auditory signals in the form of songs, and alarm or scolding calls, to establish and defend territories, attract a mate, feed and care for young at the nest, and to locate and evade a potential predator. Noise may alter these time-consuming and energetically expensive behaviors of birds. Increased noise levels have the potential to lower reproductive fitness by affecting territorial defense, mate acquisition, the ability to detect conspecific encroachments, foraging, and predator avoidance. Noise may also be detrimental to birds by causing nest neglect or abandonment due to startle effects, cause sleep interference, or otherwise elicit physiological responses or annoyance that have energetic costs (Ward and Stehn 1989). Construction and the use of heavy equipment can result in noise and vibration impacts that are thought to be potentially harmful to a variety of bird species (Gunn and Livingston 1974; RECON 1989; Pike and Hays 1992).

Non-native species invasion and increased predation are important consequences of urbanized edges and natural areas. Habitat edges are particularly vulnerable to introduction of non-native species. A number of potentially harmful invasive plant species are listed in Table 6-2 of the MSHCP. Many of these species are known to displace native species. Invasion by non-native plant species may alter microhabitats and disrupt natural ecological processes that in turn may negatively affect native animal and plant species. Numerous predators such as opossums, raccoons, skunk, ground squirrels, and various corvids thrive on edges by making use of the additional food and water sources provided by residential and golf course development adjacent to habitat areas. Brood parasitism by brown-headed cowbirds, which can lower the reproductive success of native avian species, is likely to be exacerbated by urban development, particularly golf courses and equestrian/livestock centers, by providing foraging habitat for this species.

Irrigation practices may contribute to overall wetter soil conditions, thereby, creating more favorable soil conditions for invasive ant species such as the Argentine ant, which are known to be abundant in landscaped areas and invade habitat edges (Suarez *et al.* 1998). The Argentine ant can pose a predation threat to the young of low lying avian nests. For example, Argentine ants can move up to approximately 1,300 feet from an urbanized edge (Suarez *et al.* 1998) and have been documented as predators of the California gnatcatcher (Sockman 1997, Atwood and Bontrager 2001). The Argentine ant is ubiquitous in southern California developments. Thus, it is expected that the eggs and/or nestlings of avian species adjacent to urbanized areas will be

vulnerable to increased predation by Argentine ants. In addition, the Argentine ant can alter the native arthropod community, thereby significantly reducing their diversity and abundance (Bolger *et al.* 2000). A reduction in the native arthropod community may result in reduced food resources for arthropod predators, such as the California gnatcatcher.

Undeveloped lands adjacent to developed areas can provide convenient access to natural areas. The use of off-road vehicles within the MSHCP Conservation Area could result in habitat destruction and degradation (*e.g.* soil compaction, soil erosion, increase fire potential, increased opportunities for non-native species introduction, increase access opportunities by creating more trails). Where development occurs adjacent to habitat, domestic pets, including cats, can intrude into natural areas and opportunistically prey on certain avian and small mammal species. Since domestic cats have been documented to range up to 3,100 feet from their home (Barratt 1997), an increased risk of predation to species may result from development in proximity to the MSHCP Conservation Area.

Where the Conservation Area is near urban or residential developments, natural fire regimes will likely be altered resulting in the elimination (suppression) of natural fire regimes or an increase in fire frequency from anthropogenic ignition. Repetitive fire may cause type-conversion of vegetation communities away from more perennial systems (*e.g.*, shrublands) into more annual systems (*e.g.*, non-native grasslands).

Urbanization outside of the Conservation Area may result in changes to local (and regional) hydrology, run-off, and sedimentation. These changes could indirectly impact species associated with riverine and vernal pool systems by altering natural hydrogeomorphic processes that sustain habitat within the Conservation Area. Increased urban run-off into natural habitats and channelization for flood control could result in highly erosive rain-flows and increased rates of scouring, which could result in downstream habitat loss. Urban run-off may also increase sediment loads that could result in downstream habitat degradation. Species that rely on alluvial type habitats could be impacted by changes in sedimentation. Increased channel flow could disrupt the meandering nature of small or intermittent flowing riparian systems and thereby adversely affect species that occur on sand banks along streams. The timing and duration of stream flows in the Conservation Area could be altered by urban run-off. The vegetation communities that are associated with intermittent streams may be type-converted to other habitats if flows become more perennial. Similarly, reduced flow caused by water diversion may reduce scouring events that maintain appropriate habitat for flood plain-dependent species. Urban run-off may also contain contaminants that may impact downstream habitat and/or species.

Roads

Although the MSHCP identifies road maintenance, road widening, and new road construction as proposed Covered Activities, we do not have site specific project information. While roadways are not included as part of the Conservation Area, there is the potential to increase the degree of fragmentation of the Additional Reserve Lands and PQP Lands depending on the location, nature, and design features of the proposed new or improved roads. In the absence of project

specific information, we are providing a generalized analysis of the effects of roadways to wildlife species.

New Roadways

Placement of roadways within the natural landscape can cause direct loss of habitat and individuals, alter quality of adjacent habitats, disrupt hydrologic regimes, cause road kills, and fragment habitat. This in turn can result in the decline of certain species populations (particularly smaller populations that can be more susceptible to genetic isolation and local extinction), a loss in species diversity near roadways, and impede animal movements.

The direct effects associated with new roadway construction are the permanent loss of habitat and direct mortality of individuals. Temporary impacts to habitat is also likely to occur during actual construction in conjunction with such activities as land contouring, construction staging and vehicle access, increased noise and dust generation, and the possible introduction of night lighting if construction is not limited to the dawn-to-dusk hours of daylight.

The habitat altering effects of new road construction include the creation of new microclimates and a change in other physical conditions extending beyond the road's edge, increase of exotic plant species, and direct mortality and/or relocation of flora and fauna from the area of the road as a result of habitat loss and/or physical disturbance (Spellerberg 1998). In general, the effects of roads on wildlife can extend beyond the road edge into an area described as the "road effect zone" (Forman *et al.* 1997). The road effect zone is the area from the road edge to some outer limit within which road traffic has significant ecological effects on wildlife. The width of the road effect zone is based on traffic intensity, the number of lanes in the roadway, the species present along the roadway, and a variety of ecological variables. Changes in traffic intensity can alter the effect of roads and the width of the road effect zone. The threshold where the distance of the road effect zone ends varies for each species (Forman and Deblinger 1998).

The effects of roads on the physical environment include noise, light, dust and other particulates, metals such as lead, cadmium, nickel, and zinc, and gases such as carbon monoxide and nitrogen-oxygen complexes (NO_x). Heavy metals are known to accumulate in the tissues of plants and animals up to 200 meters away from roads (Trombulak and Frissel 2000). Noise and artificial lighting have been shown to affect some wildlife species given that many species rely on sight or sound to communicate, navigate, avoid danger, and find food. Car traffic has been correlated with a reduction in the density of breeding bird populations adjacent to roads (Reijnen *et al.*, 1995 in Spellerberg 1998). Reijnen *et al.* (1995) documented a reduced ability of male willow warblers close to highways to attract and keep mates possibly due to the distortion of the song by traffic noise. The effects of road and traffic lighting on plants and animals appear to be wide ranging (Spellerberg 1998).

Dust effects have been documented primarily on plants and include physical effects such as cell destruction and blocked stomata that can lead to reduced photosynthesis, respiration and transpiration. In addition to dust, other road pollutants may cause physiological stress in some plants, making them more susceptible to pest attack, as has been shown by aphid infestations in roadside trees (Braun and Fluckiger 1984 in Spellerberg 1998).

Where roadways cross or parallel watercourses or drainage areas, changes to hydrology and water quality are likely to occur as a result of stream channel and floodplain constrictions and runoff from impervious road surfaces. Road construction can alter hydrological processes in a number of ways including velocity and flow direction. Shifts in velocity can result in increased scour, headcutting, and downstream sedimentation. Changes to hydrology from either redirecting flows or creating wet habitat where none previously existed can alter species' habitats. Potential contaminants emitted from vehicles onto roadways through tire wear, fluid leaks, brake-lining wear, rust, and exhaust are mostly transported through water flow (Forman *et al.* 2002). A review of toxic substances introduced into flowing water from roadways indicated that although a wide range of pollutants could be described, species responses were variable depending upon life form (plant or animal) and life-stage such that few generalizations can be made (Hellowell 1988 in Spellerberg 1998).

Where roads bisect or abut areas with wildlife, mortality due to vehicular collisions is likely to occur. Wildlife collisions are influenced by vehicle speed, traffic volume, and the juxtaposition of the roadway in relation to habitat cover and movement corridors (Forman *et al.* 2002). Some species are attracted to roads and roadsides for thermoregulation and are more vulnerable to traffic mortality and predation. Other species are attracted to roadways to scavenge road kills thereby increasing risk of mortality from vehicle collisions. Few comparative data are available regarding the significance of road mortality measured against the relative importance of natural sources of mortality such as predation (Forman *et al.* 2002). However, based on the studies conducted to date, road mortality is known to have significant effects on frogs and toads (Fahrig *et al.* 1995) and snakes (Bernardino and Dalrymple 1992; Rosen and Lowe 1994). Wide-ranging carnivores appear to be especially susceptible to road mortality. Vehicle collisions are likely the most important source of mortality for mountain lions in both Florida (Maehr *et al.* 1991) and the Santa Ana Mountains in southern California (Beier and Barrett 1991). Although, the long-term effects on population dynamics of affected species is lacking, road kill seems to have the most detrimental effect on species with small or diminishing populations (Spellerberg 1998).

The most prominent indirect impact of roads is habitat fragmentation (see above Urbanization discussion). In addition to habitat fragmentation, new or improved roadways can facilitate growth in areas of natural habitats by improving access to previously remote areas. Vehicular accidents, hazardous material spills, and related emergency procedures along with increased fire frequency are also likely to occur along roadways that in turn can degrade species' habitats.

Road Improvement Projects

Where roadways are widened or otherwise modified, direct effects similar to those described above for new roadways are likely to occur in areas beyond the existing roadbed. The incremental effects from road widening are dependent on the degree of the widening from the existing facility, changes in the level of use, and upgrades (*e.g.* dirt road to paved road, introduction of a median barrier) as well as the individual species movement patterns and ability to cross roads. Roadway improvements often provide for increased capacity and/or function resulting in increased volume, speed, and potentially total use time that will likely expand the extent of the road effect zone (*sensu* Forman as described above). The percentage of individual animals killed on roadways has been reported to increase with the width of the road and the

number of vehicle trips (Carr and Fahrig 2001 in Longcore and Rich 2001). Forman *et al.* (2000) also reported that road mortality has been significantly correlated with vehicle speed. Depending upon a species' ability to move about and migration needs, widening roadways from as little as two to four lanes can sever population connections between habitats (Longcore and Rich 2001), thereby contributing incrementally to habitat fragmentation and possible species decline.

General Effects from Roads on Specific Taxa

1. Invertebrates

Given the diversity of invertebrates, it is difficult to generalize the effects of roads for this taxon. However, movement of invertebrates can be affected by the introduction of a new road or the widening of an existing road where traffic volume and speed are significantly increased. As with road kill of larger fauna, this will have a more significant effect on ephemeral or insect species particularly those that fly low to the ground. For many invertebrates, traffic may be a significant mortality source while others avoid crossing roads and experience the effects of habitat fragmentation. Many insect species are capable of flying over roads and may not experience direct deleterious effects from roadways. Changes in disturbance patterns and vegetation communities can result in alterations of invertebrate species composition, especially for species with specific host plant or microhabitat requirements.

2. Fish

Fish species are likely to be negatively affected by changes to hydrology and water quality as a result of new and improved roadways. Fish can be affected by sedimentation, changes in water quantity and temperature, and road runoff. Sedimentation increases turbidity thereby reducing the amount of light in the water column and primary nutrient production. Significant sedimentation may also change streambed characteristics by increasing overall silt content of the bed and potentially suffocating aquatic organisms, including previously deposited eggs. Changes in hydrology can favor non-native predatory species. Contaminants associated with road runoff can be detrimental to reproduction and recruitment. Many "urban" streams are already highly modified and are likely to be more susceptible to the additional effects of new roadways.

3. Amphibians and Reptiles

In general, amphibians and reptiles have highly restricted home ranges and frequently follow genetically-controlled migratory paths. They are, therefore, more susceptible to mortality and the effects of habitat fragmentation, and local or restricted populations may become rare (Jackson 1996 in Forman and Deblinger 1998).

Amphibians are likely to be vulnerable to the effects of roadways as described above for fish species. In addition, many amphibian species require both aquatic and terrestrial habitats for survival. Narrow, linear disruptions next to streams can result in barriers or increased risk of mortality as species transit between upland and aquatic habitats. Amphibians with moist skin

have highly permeable skin and are especially sensitive and vulnerable to pollutants (Hayes *et al.* 2002). Temporary pools of water created by road runoff may attract amphibians to breed therein, but juvenile survivorship and recruitment may be low due to the chemical and/or temporary nature of the pond, increased risk of road kill, frequent disturbances, and road-related pollution and contaminants. Therefore, changes to natural hydrology caused by new road or road improvements can severely disrupt breeding and migratory capability and therefore overall fitness in amphibious species. In addition, many amphibian species are highly sensitive to light; changes in the light regime may prohibit some species from foraging altogether leading to their extirpation from an area (Buchanan 1993; Jaeger and Hailman 1976 in Longcore and Rich 2001).

Reptilian species such as snakes are often attracted to the heat stored in asphalt roads and shoulders for thermal regulation thereby increasing their susceptibility to road kill mortality and predation. While the effects of road-related mortality have not been documented on any particular species in the Plan Area, roads are known to be significant sources of mortality in both Florida and Arizona (Bernardino and Dalrymple 1992; Rosen and Lowe 1994). General principles apply in that road-related mortality and habitat fragmentation will have greater effects on rare or already restricted, threatened, or endangered species and to those that are long-lived and have low reproductive rates than on common, more wide-ranging species.

4. Birds

Edge effects associated with roads include increased light and noise, which can disrupt breeding and foraging behavior and communication necessary to successful mating (Reijnen *et al.* 1997; Bergen and Abs 1997 in Longcore and Rich 2001). The detrimental effects of road noise have been recorded for wetland avian species. A zone of significantly decreased density of birds extending from the roadway was measured to be from 500-600 meters for rural roads and 1600-1800 meters for highways (van der Zande *et al.* 1980 in Longcore and Rich 2001).

In addition, changes to existing roadbeds, bridges, and/or barriers and guardrails can change sound characteristics in certain habitats, thereby altering ambient conditions for sensitive and/or threatened and endangered riparian bird species (Biological Assessment for the SR-38, Mill Creek Bridge Project, Caltrans District 8, San Bernardino County, California, December 2001). Non-migratory birds such as the gnatcatcher, exhibit strong site tenacity. New roadway construction and/or the widening of existing roads may prevent movement across roadways or increase mortality of individuals attempting to cross (Forman and Godron 1986; Forman and Alexander 1998; Forman *et al.* 2003). The introduction of traffic or a significant increase in ambient traffic noise, volume, and speed associated with road widening may also disrupt bird communication that for some species is a significant factor in pair establishment (Longcore and Rich 2001).

Indirect effects of roads can also include increased access to previously remote areas by both humans and nest-predator species such as corvids and raptors that do well in human-modified environments (*e.g.*, kestrels, crows, and ravens). For example, American crows frequently benefit from inhabiting areas changed by artificial lighting and increased populations of crows can have detrimental effects to other native bird species (Gorenzel and Salmon 1995 in Longcore and Rich 2001).

5. Mammals

The introduction of new roadways or an increase in traffic volume and speed as a result of road improvements increases barriers to dispersal for mammals (Forman *et al.* 2003). Apart from increased risk of mortality associated with new or expanded roadways, barriers to movement may create genetically isolated subgroups within populations (Baker 1998). If the subgroups are sufficiently small and restricted, potentially deleterious population genetic effects such as inbreeding can occur (Allendorf and Leary 1986). In addition, artificial light introduced by roadways and associated traffic may inhibit foraging and mating behaviors of nocturnal species and increase the risk of predation. The presence of road kill attracts various predator species such as hawks, owls, and eagles that are known to also hunt rodent and small mammals along road-side areas. New roads in habitat for rare or threatened and endangered species may attract novel predators to sensitive habitats thereby increasing the rate of predation.

Roadways Proposed as Covered Activities

As stated in the MSHCP (pp. 7-31), roadways other than those identified and described (*e.g.* urban arterial, secondary road, etc.) in the Plan (MSHCP Figure 7-1) are not Covered Activities without an amendment to the MSHCP (see above project description for exceptions under Covered Activities Subject to a Minor Amendment). Although the MSHCP proposes multiple alternatives for three of the four CETAP corridors, only one facility for each of the proposed corridors identified in the Plan (*e.g.*, Hemet to Corona/Lake Elsinore, Riverside County to Orange County, Riverside County (Moreno Valley) to San Bernardino County) will be built and eligible for coverage under the MSHCP.

The MSHCP (Section 3.2.3 Core and Linkages Discussion) identifies those roadway projects that will potentially effect reserve design configuration. In addition, Table 7-4 in the MSHCP identifies roads with special environmental issues due to their location within particularly sensitive areas along with specific considerations for design and alignments. Implementation of these design features and alignments will minimize the effects of fragmentation .

All roadway projects are subject to the MSHCP implementation structure including, but not limited to, consistency with the conservation Criteria for individual cells, the Protection of Narrow Endemic Plant Species Policy, Additional Survey Needs and Procedures, Protection of Species Associated with Riparian/Riverine Areas and Vernal Pool policy, Guidelines for Siting and Design of Planned Road in the Criteria Area and PQP Lands (MSHCP Section 7.5.1), Guidelines for Construction of Wildlife Crossings (MSHCP Section 7.5.2), Construction Guidelines (MSHCP Section 7.5.3), and the Best Management Practices identified in Appendix C of the MSHCP. In addition, a process and/or specific criteria have been identified for several of the proposed roadways in order to obtain coverage under the MSHCP (see below; MSHCP Section 7.0; and IA 20.4.2). Roadways that are proposed to impact PQP Lands will be subject to the Determination of Biologically Equivalent or Superior Preservation process whereby specific project information and assessments will be submitted to the Wildlife Agencies for review and concurrence. Impacts to PQP Lands will be compensated by contributing areas to the MSHCP Conservation Area that are in addition to the Additional Reserve Lands. Implementation of the MSHCP requirements is anticipated to avoid and minimize impacts to Covered Species and the

habitats; avoid and minimize impacts to PQP Lands; and ensure that the overall biological goals and objectives of the MSHCP including the species-specific conservation objectives are achieved for the benefit of Covered Species.

Circulation Element

Approximately 336 miles of existing circulation element roadway improvements and 125 miles of new roadway are proposed to occur within the Criteria Area (pers. com. Joe Monaco, Dudek and Associates, 2003). The MSHCP reports the impacts associated with the circulation element (MSHCP, Figure 7-1) to be a total of 5, 840 acres; however, the footprint of the existing roads was included in this calculation. Therefore, the total acres of impact reported in the MSHCP is an overestimate of the potential direct impacts associated with the circulation element. Although not specifically quantified in the MSHCP, roadway improvements or new construction of the following roadways could impact PQP Lands: Cajalco Road, Butterfield Stage Road, Anza Road, Bautista Canyon Road, Gilman Springs Road, and roads crossing the Santa Ana River.

State Route 79 Realignment

Since the extent of improvements, alignment, and right-of-way for SR-79 between Newport Road and Sanderson Avenue (improvements to the segment of SR-79 south of Domenigoni Parkway are included as part of the circulation element) have not yet been determined, specific effects to Covered Species can not be determined at this time. However, improvements to SR-79 have the potential to affect habitats within the Criteria Area from which the Additional Reserve Lands will be assembled. Improvements to SR-79 may result in direct and indirect impacts (*e.g.* loss of vernal pool/alkali playa habitats and associated watersheds, fragmentation, water quality and quantity) to Proposed Non-contiguous Habitat Blocks 6 and 7 and Existing Constrained Linkage B (Salt Creek). The purpose of Proposed Non-contiguous Habitat Blocks 6 and 7 is to provide for the conservation of vernal pool and alkali playa habitats and their associated Covered Species. Existing Constrained Linkage B is to provide live-in habitat for vernal pool and alkali associated Covered Species and movement for other species between the area of Hemet area and Canyon Lake.

In the absence of project specific information, the MSHCP (pp. 7-32 to 7-36) identifies a procedure to include the SR-79 improvements as a Covered Activity through the Minor Amendment Process (IA Section 20.4.2). RCTC will provide a technical study for review and concurrence by the Wildlife Agencies through the Minor Amendment Process (IA Section 20.4). If the Wildlife Agencies do not concur with the analysis supporting the minor amendment, the project would be subject to a major amendment.

The technical study will identify plant and wildlife impacts associated with the selected alignment including project proposals to replace habitat to Covered Species and an analysis that evaluates proposed mitigation against the project impacts. The technical study will address the following: 1) effects on habitat; 2) effects on planning species identified for Proposed Non-contiguous Habitat Blocks 6 and 7 and Existing Constrained Linkage B; 3) effects on core areas, linkages/constrained linkages; and 4) effects on MSHCP Conservation Area configuration and management. The MSHCP (Section 7, pp. 7-34 to 7-36) also identifies specific criteria that will

need to be evaluated/achieved in order to reach a determination of equivalency. Mitigation that supports a finding of biological equivalency will be in addition to the 153,0000 acres of Additional Reserve Lands. Adherence to this process is anticipated to avoid and minimize impacts to Covered Species and ensure that the overall biological goals and objectives of the MSHCP, including the species-specific conservation objectives, are achieved.

Caltrans Projects

The MSHCP identifies preliminary improvements to five State freeways (I-215, I-15, I-10, SR-60, and SR-91) operated and maintained by Caltrans. Approximately 1,010 to 1,175 acres of impacts are estimated to occur within the Criteria Area from which the Additional Reserve Lands will be assembled and include natural vegetation communities such as chaparral, coastal sage scrub, grasslands, meadow and marshes, riparian scrub/woodland/forest, and riversidean alluvial sage scrub. Although not specifically identified in the MSHCP, it appears that PQP Lands may be impacted by improvements to each of these State freeways.

Road widening projects proposed for State freeways will impact areas proposed for inclusion into the MSHCP Conservation Area including several proposed or existing linkages and cores (MSHCP Figure 3-2). Widening of the I-215 through the area of Proposed Constrained Linkages 15 and 16 may further limit dispersal opportunities to and from the Antelope Valley area (Proposed Core 2). Road improvement of the I-215 where it bisects Proposed Constrained Linkage 19 may further limit dispersal and alter fluvial processes along the San Jacinto River. Similarly, I-10 bisects Proposed Constrained Linkages 22 and 23 and may limit dispersal to and from the Badlands/Potrero Core Area (Proposed Core 3).

Improvements to SR-91 will further fragment Proposed Constrained Linkages 1 and 2, which are proposed to connect the Prado Basin (Existing Core Area A) to the Cleveland National Forest (Existing Core B). As with SR-91, improvements to I-15 will further fragment the connections at Proposed Constrained Linkages 3, 5, 6 and Proposed Linkage 1 that will connect the Cleveland National Forest to the Lake Mathews/Estelle Mountain Core Area (Existing Core C and Proposed Extension to Existing Core 2). Expansion of I-15 at Temecula Creek (Proposed Constrained Linkage 14) and Warm Springs Creek (Proposed Constrained Linkage 15) may further limit wildlife movement functions since options for reserve assembly are already limited by existing development. In addition, I-15 will impact lands proposed for reserve assembly through the Alberhill area (Proposed Core 1) and the Santa Ana River (Existing Core A). SR-60 improvements will impact Proposed Constrained Linkage 7 that will provide connectivity between Sycamore Canyon (Existing Core D) and Box Springs (Noncontiguous Habitat Block A). SR-60 also bisects the Badlands/Potrero Core Area (Proposed Core 3) and Proposed Noncontiguous Habitat Block 1. The SR-60 widening is addressed later in this opinion under the species-specific analysis for the Delhi sands flower-loving fly. Proposed expansion of each of the State freeways may limit dispersal or otherwise increase habitat fragmentation in the areas described above.

The Plan also refers to impacts associated with other Caltrans facilities such as SR-74, SR-79 and SR-371 that are included as part of the circulation element (MSHCP Table 7-4). Although SR-74 improvements within the City of Lake Elsinore will impact lands from which Proposed

Core 1 (Alberhill area) would be assembled, a specific proposal to address potential increases in habitat fragmentation of this area include incorporation of a wildlife overcrossing between the conservation areas at North Peak and Ramsgate (MSHCP Table 7-4).

Improvements to SR-79 south of Domenigoni Parkway will contribute to the habitat fragmentation of land from which Proposed Constrained Linkages 17 and 18 will be assembled. These linkages are proposed to be assembled in order to provide habitat connections between Antelope Valley (Proposed Core 2) and Diamond Valley Lake, Lake Skinner and Johnson Ranch (Existing Core 7 and Proposed Extension of Existing Core 7). Specific design features identified to minimize impacts to this connection include a habitat bridge overcrossing in the vicinity of Scott Road and SR-79 and a wildlife undercrossing north of Auld Road. Improvements to SR-371 will contribute to the fragmentation of the large habitat block in the Sage/Aguanga area (Proposed Core 7).

Since the magnitude, location, right-of-ways, widths, and alignments for the improvements to existing Caltrans facilities are not currently known, specific effects can not be determined at this time. However, the Plan (page 6-84) requires that State Permittees provide project-related information in the early stages of project development for a joint review with the Wildlife Agencies and RCA (*i.e.*, Project Identification Document or equivalent). Information to be provided by the State Permittees includes, but is not limited to, project description, location, and application of the MSHCP requirements. We anticipate that this coordinated review of proposed activities will ensure consistency with the overall biological goals and objectives including species-specific conservation goals and the MSHCP reserve design configuration.

Community Environmental Transportation Accessibility Process (CETAP)

1. Hemet to Corona/Lake Elsinore Corridor

As stated in the Plan, Alternative 1a will impact a total of 260 acres of PQP Lands. Alternative 1b will impact approximately 275 acres of PQP Lands and 580 acres within the Criteria Area. Construction of Hybrid 1 and Hybrid 2 will result in impacts to 215 acres and 170 acres of PQP Lands, respectively. The potentially affected PQP Lands include mitigation lands set aside in association with habitat conservation plans for the Stephens' kangaroo rat and other multiple species. Although Figure 7-1 indicates that Alternative 1a and both Hybrids will impact the Criteria Area, the Plan does not quantify these impacts.

The Lake Mathews/Estelle Mountain Reserve (Existing Core C) will be encroached upon by Alternatives 1a (215 acres), 1b (230 acres), Hybrid 1 (215 acres), and Hybrid 3 (170 acres). Alternatives 1a, 1b, and Hybrid 1 will impact Criteria Area from which the proposed Extension of Core Area 2 (lands to extend the Lake Mathews Reserve) will be attained and possibly proposed Constrained Linkage 4 (Temescal Wash east of Lake Mathews). Alternative 1b and presumably 1a since they share portions of the same alignment will impact 45 acres of the San Jacinto Wildlife Area/Lake Perris State Recreation Area (Existing Core H). Criteria Area that will assemble lands along the San Jacinto River to expand the San Jacinto Wildlife Area/Lake Perris State Recreation Area (*e.g.*, proposed Extension of Existing Core 4 in the Plan) and lands proposed to assemble Constrained Linkage 20 will be impacted by Alternatives 1a and 1b.

Hybrid 1 and Hybrid 2 will also bisect Criteria Area that will expand the San Jacinto Wildlife Area/Lake Perris State Recreation Area but further south than Alternatives 1a or 1b.

Alternative 5a and 5c will impact approximately 198 and 213 acres within the Criteria Area, respectively. Alternative 5e will affect approximately 470 acres within the Criteria Area. All of these alternatives will bisect Criteria Area that will assemble Proposed Core Area 1 in the Meadowbrook area and proposed Linkage 7 (lower San Jacinto River) as well as existing Constrained Linkage B (Salt Creek).

2. Winchester to Temecula Corridor

Impacts associated with the Winchester to Temecula Corridor “hybrid alternative” are addressed above under Circulation Element and Caltrans Projects.

3. San Bernardino County to Moreno Valley (Riverside County)

As stated in the MSHCP, the proposed San Bernardino to Moreno Valley transportation corridor will be tunneled beneath the Box Springs Reserve and tunnel portals sited outside of the Criteria Area. The Plan (MSHCP Section 3.0) identifies this transportation facility as a major activity that could impact Proposed Linkage 4 (upland habitat of Reche Canyon) and Noncontiguous Habitat Block A (Box Springs Mountain). A total of 370 acres of habitat (grassland, coastal sage scrub, chaparral, riparian scrub/woodland/forest) will be impacted within the Criteria Area from which the Additional Reserve Lands are to be assembled.

There is insufficient project information to fully assess the affects of the proposed CETAP San Bernardino County to Moreno Valley transportation facility. In the absence of information related to the impacts associated with this transportation facility, a major or minor amendment will be required once additional information is assembled regarding the design location of the facility and its relationship to potential direct, indirect, and cumulative impacts within San Bernardino County.

4. Orange County to Riverside County Corridor

Since a specific alignment has not been determined, the effects of the activity cannot be assessed at this time. However, the Plan does provide a process (MSHCP pp. 7-48 to 7-55; see also IA Section 20.4.2; and Appendix 2 Proposed Permit Condition 9) for coverage whereby certain criteria and conditions will need to be met subject to concurrence by the Wildlife Agencies through the minor amendment process.

Cajalco Road

If it is not feasible to build an east to west CETAP corridor (Hemet to Corona/Lake Elsinore) in the alignments north of Lake Mathews (e.g., Alternatives 1a and 1b), the MSHCP proposes a process (MSHCP Section 7.2.3) to include as a Covered Activity through a Minor Amendment, the realignment and widening of Cajalco Road from two lanes to a four lane arterial, or other configuration. The process requires RCTC to submit an equivalency analysis to the Wildlife

Agencies for review and concurrence. The analysis will need to adequately assess the effects/benefits of realigning and widening of Cajalco Road compared to the northerly CETAP alternatives. The analysis must demonstrate that the Cajalco Road realignment and widening will result in equivalent conservation value when compared to the Hemet to Corona/Lake Elsinore CETAP alternatives. The effects to habitats, covered species, core areas, linkages and constrained linkages, MSHCP Conservation Area configuration and management, ecotones, and other conditions affecting biodiversity will also need to be addressed in the analysis. Impacts associated with habitat fragmentation will be thoroughly analyzed and discussed. In addition, the equivalency analysis will address the effects to, and consistency with, existing habitat conservation plans and/or Natural Community Conservation Plans. Mitigation lands associated with existing habitat conservation plans adjacent to or in the vicinity of Cajalco Road that could be affected by a Cajalco Road project include the Lake Mathews Multiple Species Habitat Conservation Plan, Stephens' kangaroo Rat Habitat Conservation Plan in Western Riverside County, and the El Sorbrante Landfill Habitat Conservation Plan. Impacts to existing habitat conservation plans will need to be addressed according to the provisions of their respective plans.

The MSHCP identifies specific design features to facilitate the biological equivalency determination (MSHCP Section 7, p. 7-13) including mitigation through acquisition and conservation of lands that are in addition to the 153,000 acres of Additional Reserve Lands at an appropriate ratio to support the finding of a biological equivalent or superior determination. If the Wildlife Agencies determine that the Cajalco Road realignment and widening is not biologically equivalent or superior to the CETAP northerly alternatives, the action will not be a permitted activity. However, the Permittees could seek a major amendment per the amendment process identified in the Plan. Should the Cajalco Road realignment and widening be constructed, the CETAP alternatives proposed for north of Lake Mathews will not be constructed.

Since it is unknown at this time if the CETAP alternatives currently proposed north of Lake Mathews are infeasible or what configuration Cajalco Road might be widened and realigned to, we are unable to assess this action without further information, hence, the process outlined in the MSHCP and referenced above. Although we do not have specific project information, a road of 4-lanes or other configuration will likely impact and fragment existing mitigation lands at the Lake Mathews/Estelle Mountain Reserve (Existing Core C) and lands proposed to expand this area (Extension of Core Area 2). The intent of the MSHCP Conservation Area configuration is to build upon the existing Lake Mathews/Estelle Mountain Reserve lands. Proposed Core 1 is intended to be contiguous with Existing Core C so that the areas together will function in providing conservation for Covered Species (MSHCP Section 3, p. 3-61). Conserving large contiguous habitat blocks that are interconnected is essential for the MSHCP reserve configuration and the conservation of species. As stated in the MSHCP, the potential adverse impacts related to fragmentation will be thoroughly analyzed in the biological equivalency analysis and concurrence from the Wildlife Agencies will be necessary in order for the Cajalco Road realignment and widening to be a permitted activity.

Road Maintenance

Proposed roadway operation and maintenance activities conducted by the Permittees will mostly be confined to existing roadway beds and shoulders. Maintenance and operation activities include signage, traffic control devices, guardrails and fences, pavement repairs, accident response, tree trimming, non-chemical weed control, dust stabilization, roadway resurfacing, landscape maintenance, natural disaster damage/restoration of emergency access, storm damage, maintenance of existing graded shoulders and dirt roadways, culverts and drop structure maintenance and repair, curbs/cutters/sidewalks, berms, ditch clearing, bridge maintenance, and reconstruction of existing facilities. Minor lane widening for safety purposes (not capacity) may extend beyond existing disturbed areas and result in a limited extent of permanent impacts to habitat. Privately maintained roads will be afforded limited coverage by way of obtaining a Certificate of Inclusion. The activities for privately maintained roadways are limited in scope to grading as necessary to restore a smooth driving surface and maintaining existing shoulders within existing rights-of-way.

Because the footprint of these types of activities will occur within already disturbed areas, which typically support limited habitat and the MSHCP provides policies, construction guidelines, and best management practices to avoid and minimize adverse effects to species and their habitats, we anticipate that the impacts associated with road maintenance and operation to be minimal.

Flood Facilities

Although section 7 of the MSHCP identifies flood control facilities (MSHCP Table 7-14) and maintenance activities as proposed Covered Activities, project specific information is not currently available. In the absence of project specific information, we are providing a generalized analysis of the effects of these types of activities to wildlife species.

Hydrologic alteration is one of the largest causes of habitat degradation, fragmentation, and species imperilment in aquatic systems (Stern and Stern 1980; Simpson *et al.* 1982). The channelization of streams for irrigation, industrial use, recreation, power generation, and to maximize land development has increased with human population growth. Once developed, flood control channels often require maintenance of vegetation and sediment which can compound the impacts of the initial construction by periodically (sometimes annually) removing riparian vegetation and sediment, thereby suppressing riparian habitat functions for many species, particularly those species that require vegetative structural diversity.

Flood Control

Flood control projects typically result in the channelization of stream courses. The effects of channelization on the physical and biological attributes of riverine systems are well documented (Simpson *et al.* 1982). Channelization typically results in the widening, realignment, clearing, and lining of the river channel in various degrees. These activities may reduce habitat heterogeneity, reduce stream length, eliminate instream cover and riparian vegetation, modify the hydrologic cycle, alter stream hydraulics and sediment relationships, drain adjacent palustrine wetlands, degrade water quality, and alter trophic relationships (Simpson *et al.* 1982).

Physical impacts from stream channelization include changes to channel depth and width, surface area, length, configuration and bedform, substrate, cover, gradient, flow and velocity, and hydroperiod. The physical attributes of the water column such as solids and sediments, light, and temperature can be changed. Chemical characteristics that are altered by stream channelization include dissolved oxygen and other gases, dissolved solids, oxygen demand, nutrients, and toxic substances.

Channelization projects can severely reduce the extent of alluvial influenced floodplains by cutting off main channels from side channels and adjacent floodplains and by reducing the meander patterns which slows stream velocity and dampen the effects of flooding. Overbank flooding necessary to deposit sediments, disperse seeds, rehydrate floodplain soils, and flush accumulations of salts, is reduced or precluded. Channel cutting further reduces water tables adjacent to the river precluding seedling establishment because of the increased depth to groundwater. Channelization can increase the intensity of extreme floods because reductions in upstream storage capacity produce accelerated water flow downstream. Channelization also reduces the width of wooded riparian habitats, increasing the proportion of edge (Finch and Stoleson 2000). Channelization alters streambanks, typically elevating them well above groundwater levels and thus preventing the roots of most native riparian shrubs and trees from accessing groundwater. Armored streambanks often preclude the establishment of native vegetation.

Stream channelization directly affects biological resources through mortality or injury to plants and animals and loss of habitat. Indirect effects include post-construction shifts in community composition, dominance, diversity, richness, and biomass. As the community structure changes, stresses are placed on individual plants and animals (Bolton and Shelberg 2001). These stresses, depending on the tolerance of the species and individual, may limit growth, abundance, reproduction, and survival (Lynch *et al.* 1977). Shifts in community composition can also favor organisms including non-native species that are more tolerant or better adapted to the altered physical and/or chemical conditions. Impacts from channelization may affect areas up and downstream of the channelization, but downstream effects are usually greater. Impacts to riparian species occur from the loss of substrate, removal of snags, detritus, and debris; loss of instream and streamside vegetation; loss in stream connectivity; disruption of the run-riffle-pool sequence; loss of stream length; increased gradient and velocity; dewatering of adjacent areas; alteration of the physicochemical regime; and reduction of allochthonous inputs (Simpson *et al.* 1982). Terrestrial and riparian areas are affected by vegetation clearing, dredging, and spoil deposition. Draining and dewatering indirectly affects vegetation isolated from the channelized area and may lead to further vegetation community degradation as a result of the changes in available water.

Maintenance of channelized areas may include the removal of vegetation, sediment or both. The extent of required maintenance activities will depend on channel width, channelized length, physical stream characteristics, project design flow capacity, and vegetation growth potential at the site. While soft-bottom channels can provide habitat for various plants and wildlife, frequent maintenance activities may limit these riparian communities to early seral development thereby precluding establishment of structurally diverse vegetation communities that are important for some species. Vegetation adjacent to the low flow channel is often cleared to maintain flow

capacity resulting in changes in water temperatures from a lack of vegetation canopy. If maintenance activities are delayed or an infrequent maintenance strategy is adopted the resultant impacts may be less frequent but more severe. While this strategy may be advantageous for some species, it can result in the creation of a population sink for others, as they are attracted to the riparian habitat before it is removed.

General Effects to Specific Taxa

1. Plants

Flood flow is the primary environmental control on the spatial distribution of riparian and floodplain associated plant species. Riparian plant communities in regulated rivers often have a lower richness and density of species and reduced plant cover compared with free-flowing rivers (Nilsson *et al.* 1991; Nilsson *et al.* 1997; Jansson *et al.* 2000a). Changes in hydrologic regime, especially for floodplain inundation or lowering of water tables can affect reproduction of riparian vegetation (*e.g.*, Braatne *et al.* 1996). In those instances where plant dispersal is constrained, species composition can be altered (Friedman *et al.* 1998; Johnson 1998; Andersson, Nilsson and Johansson 2000; Jansson *et al.* 2000b; Merritt and Cooper 2000).

Channelization often alters streambanks and fluvial dynamics necessary to maintain native riparian vegetation. Channelization often devastates bankside plants (Brooker 1985). The response to changes in stream hydrology and morphology is likely to vary among species but may have a greater effect on habitat specialists and narrow endemics than those plants that are well adapted for growing under a wider range of environmental conditions (typically exotics and generalist species). Changes in hydrologic regime, especially floodplain inundation or lowering of water tables, can affect reproduction of riparian vegetation (*e.g.*, Braatne *et al.* 1996). Altered surface and subsurface water levels can also influence the distribution and abundance of wetland and riparian plant species. If upland land uses changes following channelization, there can be widespread destruction of natural plant communities (Bolton and Shellberg 2001).

The construction of soft-bottom channels may allow for some in-channel plants to persist; however, depending on channel width, plant species may be subject to a higher than normal within-channel water-table and more frequent and intense flood disturbances. Furthermore, unlined channels are often subject to severe incursions due to the need for vegetation and sediment removal to maintain certain flow levels for flood protection levels (*e.g.*, Griggs 1984). Such activities can result in the complete loss of all or a large portion of plants within the channel every few years.

2. Invertebrates

Channelization activities disrupt invertebrate communities (Wene and Wickliff 1940; Haynes and Makarewi 1982; Simpson *et al.* 1982; Quinn *et al.* 1992). Morris *et al.* (1968) reported a reduction of benthic area of almost 70 percent and an 88 percent decrease in standing crop of macroinvertebrate drift 15 years after channelization and dredging eliminated brush piles and pools. Hansen (1971) found a decrease in macroinvertebrates but an increase in drift organisms following dredging of substrate that provided attachment areas. Realignment of a channel that

changed the substrate and reduced pools and shading led to a 75 percent decrease in invertebrate biomass per unit area (Moyle 1976a). Schmal (1978) noted seasonal effects on invertebrate populations with an increased instability of substrate following dredging. Stoneflies were eliminated, and the new vegetation and silty substrate favored snails and midges. If substrate changes are avoided following channelization, the recovery of invertebrates can be rapid (*e.g.*, Crisp and Glendhill 1970; Duvel *et al.* 1976; Hortle and Lake 1982; Brooker 1985). If permanent alteration of the substrate occurs, a shift in species composition, diversity, density and biomass can be expected (Simpson *et al.* 1982). A reduction in the invertebrate population may limit food resources for avian, reptilian, amphibian, and fish species.

The removal of vegetation, wood, and snags from channels decreases the ability of the channel to store organic matter that provides food and habitat for invertebrates (Bilby and Likens 1980; Quinn *et al.* 1992). The effects of vegetation maintenance schemes on invertebrates, including weed cutting and vegetation removal, are variable, depending on the amount, species composition and timing of the vegetation removal, as well as whether the substrate is disturbed (Brookes 1988).

3. Fish

The major habitat requirements of fish inhabiting riverine ecosystems are barrier-free migration, suitable substrate, water quality and habitat connectivity for spawning, incubation and rearing, food availability, and shelter from extreme flows and predators (Brookes 1988). The natural processes that create and sustain suitable habitat for fishes are often altered by channelization (Bolton and Shellberg 2001).

Traditional construction of levees and revetments with bare riprap faces reduces protective vegetation in streams, which often provides forage and refuge areas for juvenile and adult fish (Simpson *et al.* 1982). The absence of vegetation also increases water temperature and decreases biodiversity by reducing or eliminating populations of insects and microorganisms essential in the food web. Because vegetation is more efficient than bare rock in absorbing a stream's energy, lack of vegetation can lead to increased streamflow velocity and the erosion and siltation of downstream spawning beds resulting in destruction of fish eggs.

Construction of levees and revetments also cuts off side channels and wetlands from the main channel (Simpson *et al.* 1982). These areas not only serve as important refuges for various fish species during periods of high main-channel flow, but they also function as rearing habitat and safe havens from predators for juvenile fish.

4. Amphibians

Streams are an important source of food and cover and are essential for reproduction in some amphibians (*e.g.*, arroyo toads). Habitat loss through reduction of meanders, pools, overhangs, and bank vegetation, coupled with upland habitat land use changes, can result in lower amphibians numbers along channelized streams (Barclay 1980). Increased flow velocities from channelization may alter the amount of suspended sediments in downstream areas. These

heightened flows can flush amphibian egg masses or tadpoles downstream and eliminate suitable breeding pools.

Within the channelized portion of streams, amphibians can be crushed during construction or maintenance activities. Post-construction, those amphibians that use upland stream terraces for overwintering or foraging (*e.g.*, spadefoot toads and arroyo toads) may lose substantial amounts of habitat as the natural stream process of sediment redistribution is disrupted. Without scouring and deposition upland terrace soils may become armored or dense with vegetation, limiting the availability of friable soils for burrowing amphibians. Upland areas that are paved for development may not only limit available habitat for amphibians but may also result in edge effects (*e.g.*, predatory pets, trash, contaminants, illegal collection). If the banks of the channelized stream are too steep, the connectivity between riparian areas and upland areas may be decreased; that is, amphibians may be less likely to ascend the streambanks or they may be more susceptible to predation while ascending concrete or manufactured banks due to a lack of cover.

Longitudinal connectivity may also be adversely affected in lined channels due to physical barriers and the lack of cover and other habitat elements. Lost connectivity greatly increases the chance of local extirpations through stochastic events such as fires, floods, and drought; or, from increased predation of larval toads from introduced aquatic predators. This is because the isolated remnants of the population are precluded from recolonizing any part of the remaining habitats (Campbell *et al.* 1996). This logic follows the theory of island biogeography which states that small isolated populations are much more likely to go extinct than populations (large or small) that are interconnected with one another (MacArthur and Wilson 1963).

Unlined channels may provide for suitable longitudinal connectivity, but lateral permeability may still be depauperate. Periodic vegetation clearing and sediment removal in unlined channels can cause direct mortality to amphibians that burrow within the substrate or may indirectly affect these species by fragmenting existing habitats and reducing the suitability of the remaining habitat for breeding, feeding, and sheltering.

5. Reptiles

Riparian systems provide habitat for 40 percent of the reptiles in California (Brode and Bury 1984). Stream channelization impacts to reptiles includes loss of habitat and cover for reproduction, dispersal and escape, loss of food resources, species composition changes, decreased diversity, decreased density and numbers, and increased susceptibility to predation or human disturbance (Simpson *et al.* 1982). There are few scientific studies describing the effects of channelization on reptiles. However, habitat loss through reduction of meanders, pools, overhangs, and bank vegetation, coupled with upland habitat land use changes, can result in lower reptile numbers along channelized streams (Barclay 1980). Benson and Weithman (1980 as cited in Simpson *et al.* 1982) reported that channelization and drainage of wetlands nearly decimated populations of reptiles in Wisconsin. Reptiles that are aquatic obligates (*e.g.*, turtles), may be particularly susceptible to the adverse affects of river channelization. These adverse effects may include direct disturbance during vegetation and sediment removal operations, a

reduction in habitat diversity, species richness, and fragmentation of populations with potential demographic and genetic consequences (Bodie 2001).

Turtles and most garter snakes depend on aquatic environments and occur primarily in the riparian zone throughout their lives (Brode and Bury 1984). Some lizards and snakes have rather general habitat requirements but become riparian obligates in arid portions of their range. The remaining reptiles that occur in riparian systems are more generalized in their habitat requirements, but they frequent ecotones and water-bodies associated with riparian areas. In arid regions, continuity of riparian habitats may be particularly important for dispersal of reptiles (Brode and Bury 1984). Modifications to stream courses can fragment reptile populations that depend on riparian habitats for long-distance movements. Such fragmentation can cause a loss of genetic continuity and loss of population heterogeneity, which can ultimately lead to local extinctions (Brode and Bury 1984) or destabilized metapopulations.

Sabo and Power (2002) documented strong links between riverine insects and riparian lizards and terrestrial invertebrates. Aquatic insects subsidize riparian lizard populations leading to higher growth rates of these lizards in near-river habitats (Sabo and Power 2002). Loss or degradation of riparian habitat associated with channelization and maintenance may reduce the abundance and diversity of invertebrates through reduced habitat diversity, fluctuating water levels, altered thermal regime, and the reduction of primary productivity (Munn and Brusven 1991). As invertebrate resources become scarce or as their composition shifts, those reptiles specially adapted to particular invertebrate species will likely suffer lower growth rates, lower survival rates, and increasing competition from exotic species and prey generalists.

6. Birds

Many bird species rely on riparian habitats for nesting, feeding, sheltering, or migrating. The importance of riparian areas to many bird species may be highlighted in the arid and semi-arid West, where water and cover availability are limited. Impacts to riparian bird species include loss of habitat and cover for reproduction, dispersal and escape, loss of food resources, species composition changes, decreased diversity, decreased density and numbers, and increased susceptibility to predation or human disturbance (Simpson *et al.* 1982).

Carothers and Johnson (1975 as cited in Simpson *et al.* 1980) found lower breeding bird density, number of breeding species, and total number of species in channelized stream segments when compared with un-channelized segments. Channelization often alters stream banks and fluvial dynamics necessary to maintain native riparian vegetation (Brooker 1985). The quality of riparian habitats to support avian species downstream can be altered by upstream modifications that disrupt natural hydrology and sediment transport.

Those birds that are dependent upon native riparian vegetation for reproduction, feeding, and sheltering (*e.g.*, least Bell's vireo and southwestern willow flycatcher) can be extirpated from reaches where native vegetation is removed. While soft-bottom channelized streams may allow native riparian habitat to persist, periodic channel maintenance often results in vegetation clearing or thinning and sediment removal that will have varied effects on bird species depending on the magnitude, duration, and periodicity of such events. Disturbance of riparian

areas often provides the opportunity for non-native species such as salt cedar and *Arundo* spp. to proliferate. Although some riparian birds have been documented nesting in salt cedar and *Arundo* spp., these birds are likely to experience higher mortality rates, brood parasitism rates, and nest failure rates because these exotic plant species do not provide the branch architecture, thermal cover, hiding cover, or insect fauna to which native riparian birds are adapted (Finch and Stoleson 2000).

7. Mammals

Some small mammals are dependent on riparian zones for feeding, breeding, and/or sheltering. Changes to vegetation characteristics, as a result of channelization, may negatively impact riparian specialists, while favoring generalist species and those small mammals that are more adapted to upland environments (Simpson *et al.* 1982). Impacts to mammals include loss of habitat and cover for reproduction, dispersal and escape, loss of food resources, species composition changes, decreased diversity, decreased density and numbers, and increased susceptibility to predation or human disturbance (Simpson *et al.* 1982). Possardt and Dodge (1978) found impacts from stream channelization on small mammals was most dramatic where streamside vegetation had been extensively destroyed. Stream channelization and the associated loss of floodplain processes can result in loss or degradation of habitat that support small mammal populations reliant on alluvial terraces.

Riparian areas provide important movement and dispersal corridors for mammals such as the mountain lion. It is estimated that California's riparian areas are perhaps the most important habitat type for mammals in respect to migration, foraging, and cover and that the "decline in riparian corridors may represent a catastrophic loss for mammalian biodiversity" (Williams and Kilburn 1984 in Stein 1995). The reduction in width and canopy cover as a result of flood control activities may reduce the value of riparian systems to function as travel lanes for mammalian species. If vegetation is removed to construct or maintain a channelized stream, small mammals may experience an increased susceptibility to predation (Simpson *et al.* 1982). The straightened channel and reduced ground and canopy cover make hunting easier for carnivores and raptors. Access and visibility are increased, while hiding places and continuous travel lanes for small mammals are reduced. Reduction in the number and diversity of birds, small mammals, and herpetofauna within modified riparian habitat may also limit food resources for large mammalian predators (Simpson *et al.* 1982).

Flood Control Facilities and Maintenance Activities Proposed as Covered Activities

We do not have information as to the extent, magnitude, frequency, or location of the types of activities that will occur under the proposed flood control facilities or the maintenance of existing facilities identified in the Plan as activities "subject to a Memorandum of Understanding or agreement with California Department of Fish and Game." Because these actions will inherently be conducted in areas subject to the Protection of Species Associated with Riparian/Riverine Areas and Vernal Pools policy, which requires a Biological Equivalency or Superior Preservation determination for impacts to aquatic resources within the Plan Area, we anticipate our receiving and reviewing project information in the course of the Permittee's implementation of this policy. In addition, flood facilities and maintenance of existing facilities

will be subject to compliance with the MSHCP including the Conservation Measures summarized below and the Biological Equivalency or Superior Preservation Determination if such activities impact PQP Lands.

1. San Jacinto Flood Control Project

In addition to the Covered Activities related to flood control outlined above, the Riverside County Flood Control and Water Conservation District (County Flood) has proposed to implement unspecified flood control measures, possibly including channelization, along a stretch of the San Jacinto River that extends for greater than 10 miles between the Ramona Expressway and the mouth of Railroad Canyon (San Jacinto River Flood Control Project). The proposed project on this section of the San Jacinto River is expected to reduce peak flood velocity to 6,000 cubic feet per second during 100-year flood events at the Ramona Expressway.

According to the MSHCP and IA, the San Jacinto Flood Control Project will be subject to the Minor Amendment Process (IA 20.4.2) in order to be considered a permitted activity provided the following criteria are achieved (note: Mitigation Lands are defined in the MSHCP as a subset of the Additional Reserve Lands that are to be provided by Local and State Permittees):

- a. Conserve land (Mitigation Land) and provide hydrology for the continued survival of the following Covered Species: San Jacinto Valley crownscale, Davidson's saltscale, thread-leaved brodiaea, smooth tarplant, vernal barley, Coulter's goldfields, spreading navaretia, and Wright's trichocoronis. The Mitigation Land may include acreage located outside the Lakeview/Nuevo and Meade Valley Area Plans if the Wildlife Agencies determine that such acreage provides the same or greater conservation value and acreage to the MSHCP Conservation Area.
- b. Conserve the two thread-leaved brodiaea populations located downstream of Interstate 215 at Case Road and Railroad Canyon. One of these populations may be transplanted to a suitable receiver site, in accordance with a mitigation and monitoring program that includes success criteria and requirements to ensure that the population has been established.
- c. Establish a minimum 1,000-foot wide multi-species linkage between the Ramona Expressway and the mouth of Railroad Canyon, which includes the San Jacinto River Channel and other land acquired for the corridor. This linkage will be within those Mitigation Lands located adjacent to the San Jacinto River channel. The linkage width may be reduced with the concurrence of the Wildlife Agencies: (1) to accommodate existing facilities and operations at the Perris Valley Airport; (2) to accommodate Covered Activities; or (3) if a reduced width elsewhere will provide adequate linkage.

We anticipate that County Flood will conserve land for the species listed in the first criteria above within the Lakeview/Nuevo and Meade Valley Area Plans. If conservation lands for these species are not available within these Area Plans, the review and concurrence of the Wildlife Agencies will be required to determine if the conservation proposed by County Flood provides equivalent or superior conservation value for these species.

We anticipate that the two populations of thread-leaved brodiaea listed in the second criteria will be conserved, although one of these populations may be salvaged and translocated. If a population is salvaged and translocated, we anticipate that not all corms will be detected and collected, that some corms may be damaged during salvage, and that not all transplanted corms will survive. We anticipate that project proponents will minimize impacts to the species through implementation of appropriate transplantation techniques.

The conservation of a minimum 1,000-foot wide linkage between the Ramona Expressway and the mouth of Railroad Canyon, as proposed in the third criteria, will be necessary for the establishment of proposed constrained linkage 19 and proposed linkage 7. These linkages are anticipated to provide for the movement of common mammals such as the bobcat and birds such as the Bell's sage sparrow, coastal California gnatcatcher, and least Bell's vireo. In order to ensure that the proposed flood control project and the Covered Activities in this area do not act as an impediment to the movement of Covered Species along these linkages, and to reduce chances of vehicle strikes, it will be necessary to incorporate adequate wildlife underpasses and/or overpasses into project designs. Implementation of the Urban/Wildlands Interface (MSHCP Section 6.1.4) guidelines to address edge effects will ensure that the habitat and movement functions of the linkage are maintained.

In addition to the three criteria listed above, the San Jacinto River Flood Control Project will be subject to the same criteria as the other covered flood control activities, including the Construction Guidelines (MSHCP Section 7.5.3) and Best Management Practices (MSHCP Appendix C). Construction Guidelines and Best Management Practices include, but are not limited to, planning for and implementation of pollution and erosion control measures, minimizing the footprint of disturbance, conducting construction monitoring and reporting, and implementing fire, dust and trash control measures. We anticipate that implementation of these guidelines and practices will minimize impacts to sensitive species and habitats.

The San Jacinto River Flood Control Project is also subject to the requirements of the Riparian/Riverine Areas and Vernal Pools policy. Due to the nature of the project, it is our understanding that avoiding effects to this riverine area will not be feasible. The Riparian/Riverine Areas and Vernal Pools policy states that the functions and values of the habitat that will be lost, as related to Covered Species, will be mitigated. To ensure adequate replacement of lost habitat functions and values, the Permittee is required to make a determination of Biologically Equivalent or Superior Preservation, as described in the Plan (MSHCP Section 6, pp. 6-24 and 6-25). This analysis must demonstrate that a proposed action will provide equal or better preservation than avoidance of the riverine area.

The proposed San Jacinto River Flood Control Project may require adjustments to the Cell Criteria and/or Area Plan assumptions. These adjustments may be implemented through the Criteria Refinement process or a Minor Amendment. A Minor Amendment will be submitted to the Wildlife Agencies for review and concurrence. We anticipate that any adjustments resulting in impacts to habitat and Covered Species will be offset by the incorporation of measures into the project design that will minimize impacts to those species and that the appropriate hydrology for habitat and species that will not be directly impacted by the project will continue to be provided. We anticipate that Mitigation Lands conserved to offset project impacts will be

occupied by those Covered Species affected by the action and that these lands will provide conservation that is equivalent or superior to avoidance of the area.

There is potential for the proposed flood control project to result in indirect effects to PQP Lands and lands that are protected by existing conservation agreements. We anticipate that any alterations to the functions and values of these lands resulting from the proposed flood control plan will be mitigated through the conservation of lands with equivalent or superior value to the Covered Species affected by the action.

Species-specific objectives for San Jacinto Valley crownscale, thread-leaved brodiaea, Coulter's goldfields, spreading navarretia, and Wright's trichocoronis require that the floodplain of the San Jacinto River be included within the MSHCP Conservation Area. Objectives for these species also state that floodplain processes will be maintained along the river in order to allow for the distribution of the species to shift over time as hydrologic conditions and seed bank sources change. The species-specific objectives for all of these species state that the San Jacinto River Flood Control Project will be consistent with the objectives of conserving the floodplain and floodplain processes. The species account for vernal barley does not mention the proposed flood control project, but it includes an objective which states that the floodplain of the river will be conserved and floodplain processes will be maintained. A species-specific objective for smooth tarplant states that the middle segment of the San Jacinto River will be included within the MSHCP Conservation Area. We anticipate that the proposed flood control project will conserve sufficient habitat to support populations of Covered Species and will maintain the biological processes on which they depend, including hydrologic processes, such that these species will be able to persist within the flood control project area.

Habitat has been modeled for the Riverside fairy shrimp and vernal pool fairy shrimp within the area of this proposed flood control project. If ephemeral pools occupied by these species occur, they will be conserved according to the species-specific objectives. The hydrology of pools in this area may be dependent upon the river. We anticipate that protocol surveys for these species will be performed throughout the proposed project's impact area in areas that pool ephemerally. If these species occur in this area, under the Riparian/Riverine and Vernal Pools policy the project must consider the conservation of pools and affected Covered Species.

Numerous other species that are covered under the MSHCP have modeled habitat in this area. If the proposed flood control project alters habitat in this area so that it is no longer suitable for any of the species with modeled habitat in this area, we anticipate that any loss of functions and values of the habitat for these species will be mitigated such that the proposed project will provide equal or better preservation than avoidance of this riverine area.

Many of the Covered Species that occur in this area depend on a hydrologic regime that includes sporadic flooding in combination with slow drainage in alkaline soils and habitats. Flooding at irregular intervals allows habitat to be maintained in a successional state, restores disturbed alkali habitats, and may help to disperse seed. These processes form a dynamic matrix that allows these species to colonize favorable sites and retreat from less favorable sites in response to disturbance and variations in annual rainfall. Covered Species may also have traits that allow them to persist in this system, such as mucilaginous seeds that stick to the surface upon which

they are deposited, allowing the species to persist in the same favorable location, or floating seeds that allow the species to disperse along the highwater mark areas of this large, ephemeral, slow-moving river. If the proposed flood control project results in alterations to the river's floodplain and flow velocity such that these species cannot survive or reproduce, the project will not be consistent with the species specific objectives for these species. In order to achieve consistency between the proposed flood control project and the species-specific objectives, we anticipate that the Permittees will consider not only the direct effects of the proposed project on individuals, but also the effects of altered hydrology and flow velocity on all aspects of the Covered Species' biology.

The information provided in the MSHCP on the San Jacinto River Flood Control Project is not specific enough for us to determine if the project design will be consistent with species-specific conservation objectives and the criteria for coverage. We anticipate that the Permittees will work closely with our agency to ensure that we are in agreement regarding the consistency with the MSHCP. Upon review of project specific design and affects analysis through the Minor Amendment Process, the Service will either concur that the project has met the specified criteria supporting the minor amendment, or in the event the Service does not concur, the project would be subject to a major amendment in order to be considered a permitted activity.

Single-Family Homes/Mobile Homes on Existing Parcels within the Criteria Area

The impacts associated with single-family home construction are similar to that described above under Urbanization. The Plan anticipates that up to 675 acres of land within the Criteria Area could be affected annually over the 75-year life of the plan by the construction of a single-family home or mobile home on existing legal parcel (MSHCP Section 7, p. 7-17). The MSHCP assumes that roughly half of these acres (*i.e.*, 338 acres) potentially impacted by single family residential development will be within sensitive habitat areas that should be considered for inclusion in the MSHCP Conservation Area. This 50 percent estimate was based on an overall ratio of Additional Reserve Lands to Criteria Area. The Plan anticipates successful acquisition of 253 acres (about 75 percent of the 338 acres) per year for inclusion in the MSHCP Conservation Area. It is, therefore, also assumed that the remaining approximately 85 acres (25 percent) per year will be developed in accordance with the Single-Family Home Expedite Process (MSHCP Section 6, p. 6-18), a part of the Property Owner Initiated Habitat Evaluation and Acquisition Negotiation Process (HANS).

The expedited review process will be applied to proposals to construct or locate a single family home or mobile home on an existing legal lot within the Criteria Area. The location of a single family home or mobile home on an existing lot is typically determined by such factors as access; topography and terrain; zoning development standards including set-back, soil type(s), the presence of earthquake fault lines, leach fields, and oak trees on the site; and an evaluation of fire hazard in the immediate area. The expedited review process will assist in determining the appropriate location of a home or mobile home on an existing lot on the least environmentally sensitive portion of the lot. A habitat assessment may be required in order to determine the most appropriate location for the home (including firebreak) and access road placement. The habitat assessment will include vegetation mapping at a level of detail that will identify sensitive areas.

Upon completion of the 90-day review, the Permittee will determine the eventual location of all construction disturbances.

During the review process it may be determined that all or part of the subject property will benefit the assembly of the MSHCP Conservation Area. If this is the case, the Permittee may negotiate with the property owner(s) to acquire the entire lot or a portion thereof. If sale of the property to the Permittee is not negotiated, the Permittee will determine which incentives may apply in order to have a conservation easement placed over the portion of the property that will not be affected by the building footprint including access road(s) and firebreaks. If the Permittee fails to acquire all or a portions of the parcel, and no conservation easement will be placed on unaffected portions of the parcel, then the property owner may proceed with applying for the necessary permits to grade and/or otherwise prepare the site for development. In this situation, property owner compliance with the recommendations regarding all onsite disturbances that result from the Permittee's review of the proposed project will be required.

The Plan assumes that the failure to include the approximately 85 acres per year considered desirable for inclusion in the MSHCP Conservation Area that is within the Criteria Area will not reduce their ability to acquire the necessary acreage and configuration required as Additional Reserve Lands (MSHCP Section 7, p. 7-17). This assumption is based upon the estimate that adequate lands exist within the Criteria Area that could be acquired in lieu of areas subject to single-family residential development under the Single-Family Home Expedite Process. The Permittees will report annually on single-family home development to ensure consistency with the assumptions used in this analysis. The Plan anticipates that, if necessary, corrective action by the Permittees will be taken to avoid foreclosure of Conservation Area assembly options.

Approximately 85 acres of sensitive habitat areas each year over the life of the plan (for a total of 6,375 acres) within the Criteria Area are expected to be converted to single-family residential development. We cannot predict which parcels with sensitive resources will not be acquired for inclusion into the MSHCP Conservation Area. Even if the parcels were known, we currently have no information regarding the vegetation types or habitat sensitivity of the areas anticipated to be lost or affected by development. We are concerned particularly where multiple parcels may overlay or be adjacent to a sensitive resource, such as rare plants or vernal pools and their watershed, with each parcel having the potential to directly or indirectly impact that resource.

However, if a single-family residential project has met the necessary permit requirements and proceeds to construction, it is assumed that the Permittees either did not choose to obtain this parcel as it provided little conservation benefit to the MSHCP Conservation Area or that the property owner did not choose to sell the parcel and that the review process was applied. We anticipate that the review process will contribute to a minimization of direct and indirect impacts to sensitive resources on parcels not acquired for inclusion in the Conservation Area or not covered by a conservation easement. While we cannot assume appropriate management or meaningful connectivity of conservation easements, we anticipate that some number of property owners will agree to placing a conservation easement over undeveloped portions of their parcels. These easements will likely provide some conservation value and thus contribute to conservation in the Plan Area beyond the MSHCP Conservation Area. We further anticipate that an estimated 253 acres per year (for a total of 18,975 acres over the 75-year permit term) within the Criteria

Area will be placed into the MSHCP Conservation Area and that those acres will represent the most environmentally sensitive and desirable areas for inclusion.

Agricultural Land

The MSHCP identifies existing agricultural operations, expansion of existing agricultural operations, and new agricultural lands as Covered Activities. Impacts associated with these types of activities will depend on the size, location, and type of agriculture and operational procedures. In the absence of project specific information, we are providing a generalized analysis of the effects of agricultural land conversion and operations to wildlife species.

Direct mortality and habitat loss is anticipated to occur in the course of converting natural lands to agricultural use. Globally, land conversion for agriculture has caused significant losses of natural habitat (Vitousek *et al.* 1997) while increased agricultural intensity has also contributed to adverse affects to wildlife species (Matson *et al.* 1997). Agricultural land conversion can result in habitat fragmentation and isolation as discussed elsewhere in this opinion. Agricultural operations may foster increases in nuisance species populations such as cowbirds and crows that in turn can negatively affect other rare species through increased rates of parasitism, predation, and competition. For many species, agricultural lands offer little to no habitat value and may preclude species use of these areas altogether. However, wildlife taxa respond differentially to the intensity of land use changes, and partially developed areas can contribute to conservation of some native species (Blair 1996; Blair and Launer 1997). Certain species may use agricultural lands for foraging, burrowing, movement corridors, and even nesting. Animals most likely to use agricultural lands include highly mobile species that are able to exploit ephemeral resources such as birds and mammalian predators. Agricultural lands may serve as important buffers between natural habitats and highly developed urban areas or linkages between suitable habitat patches.

In some areas, the value of appropriately managed farmlands for wildlife has been recognized, and successful efforts have been made to incorporate the needs of wildlife conservation into agricultural practices (Bignal 1998; McCracken and Bignal 1998).

Other indirect effects of agriculture, especially intensely cultivated monocrop systems, include soil erosion, pollution of ground water, and overexploitation of water supplies. Conversion of land for agriculture can alter soil structure resulting in erosion (Vandermeer 1995). Soil erosion increases the runoff of water and agricultural chemicals into natural wetlands systems. These chemicals can act as pollutants and wetlands can be functionally lost due to such contaminations (Lemly *et al.* 2000). Increased input of nitrogen and phosphorous through fertilizers and manure can cause increased levels of these nutrients when they are transported to aquatic ecosystems (Carpenter *et al.* 1998). These nutrient inputs can result in eutrophication of lakes and streams, which causes increased growth of algae and aquatic weeds and subsequent fish kills due to oxygen shortages.

Diversion of water for agricultural uses has resulted in severe impacts to natural wetland systems throughout areas with irrigated agriculture including California (Lemly *et al.* 2000). Wetlands can be lost through drainage or direct conversion to agriculture. Reduced flows can alter hydrological patterns in drainages, which can have significant impacts to alluvial habitats. Also,

if irrigation water is not rapidly flushed through agricultural lands in arid environments, the water may eventually contain elevated concentrations of salts and other trace elements that may eventually contaminate downstream wetland habitats.

As described in Section 6.2. of the MSHCP and Section 11.3 of the IA, existing agricultural operations, expansion of existing agricultural operations, and new agricultural lands will be considered Covered Activities. Existing agricultural operations will be given take authorization through a Certificate of Inclusion and by registering in the County's "Existing Agricultural Operations Database" that will be established to verify existing agricultural operations. Information in the tracking database will be provided to the Wildlife Agencies annually. Completion of a Certificate of Inclusion or other written mechanism will ensure compliance with the Permit and IA.

Expansion of existing agricultural operations where discretionary authorization is required by the Permittees will be a Covered Activity under the MSHCP provided the requirements of the Plan are met including compliance with the Riparian/Riverine Areas and Vernal Pools policy, Narrow Endemic Plant Species policy, and Additional Survey Needs and Procedures (IA Section 11.3.5). Agricultural operation expansions within the Criteria Area will also be subject to compliance with the cell conservation Criteria. Implementation of these measures is anticipated to minimize impacts to Covered Species and their habitats and assist in reserve assembly.

The MSHCP, and associated IA provides for up to 10,000 acres of new agricultural lands within the Criteria Area during the term of the MSHCP that will not be subject to the Criteria. We anticipate that new and expanded agricultural operations will not be equally distributed throughout the Criteria Area since expansion of agricultural operations will be dictated by the location of existing operations and new agriculture is likely to be influenced by topography and water availability. Implementation of the tracking system (MSHCP Section 6.2 and Section 7.3.3), including the review of aerial photographs, will be implemented to determine agricultural trends within the Criteria Area. Annual review of MSHCP implementation and reserve assembly will provide a mechanism for addressing potential issues associated with reserve assembly that may be brought about by agricultural conversions within the Criteria Area. Although the MSHCP does not identify specific actions, it does state that corrective actions will be taken to direct reserve assembly in a manner that adjusts for agricultural activities and avoids the adverse foreclosure of reserve assembly.

Future Facilities

Although the MSHCP identifies future facilities, categorized as water/wastewater, electrical utility, and natural gas that may be proposed for construction within PQP Lands and the Criteria Area, we do not have site specific project information. The extent of potential impacts will depend on the nature of the facility, location, project design features, and whether or not impacts are temporary or permanent.

For future facilities proposed within PQP Lands, the project will be evaluated through an equivalency analysis prepared by the Permittees and provided to the Wildlife Agencies for review and concurrence prior to approval of facility implementation. This equivalency analysis

will compare the effects and benefits of a proposed project including specific mitigation and compensation of lost conservation values that are in addition to the Additional Reserve Lands. The direct and indirect effects to habitats, Covered Species, core areas, non-contiguous habitat blocks, linkages and constrained linkages, MSHCP Conservation Area configuration and management, ecotones, and other conditions affecting diversity will need to be sufficiently addressed in the analysis. Wildlife Agency review and approval of the equivalency analysis will ensure that future facilities within PQP Lands will be in compliance with the MSHCP. If the Wildlife Agencies do not concur with the equivalency analysis, the facility will not be considered a Covered Activity under the MSHCP.

Future Facilities that are proposed for construction within Criteria Area which have not yet been assembled as part of the Additional Reserve Lands are subject to compliance with the conservation requirements of the cell Criteria as identified in Section 3 of the MSHCP or the Permittees may initiate the Criteria Refinement Process (MSHCP Section 6.5). Future facilities will be subject to compliance with the Implementation Structure of the MSHCP including the Conservation Measures summarized below. Adherence to the Plan is anticipated to avoid and minimize impacts to Covered Species and ensure that the overall biological goals and objectives of the MSHCP, including the species-specific objectives, are achieved.

Waste Management Facilities

Operations, maintenance and expansion at existing active waste management facilities within PQP Lands and Criteria Area are proposed as Covered Activities if performed within the existing boundaries (ownership or lease areas) of these facilities. The Plan identifies 27 waste management facilities of which only 3 are active landfills: Badlands Landfill, Lamb Canyon Landfill, and El Sorbrante Landfill. According to the Plan, the Badlands Landfill is outside both the Criteria Area and PQP Lands while the facility at Lamb Canyon is within Criteria Area from which Proposed Core Area 3 (MSHCP Figure 7-2) will be assembled. Although portions of the El Sorbrante Landfill are included as PQP Lands within the MSHCP Conservation Area, activities at the El Sorbrante Landfill will be governed by its existing approved HCP. In addition to the landfills, the Robert E. Nelson transfer station is within Criteria Area identified for Delhi Sands flower-loving fly and Los Angeles pocket mouse conservation (MSHCP Section 3, p. 3-184), and the Idyllwild transfer station is located within PQP Lands in the San Bernardino National Forest.

In addition to the operations, maintenance and expansion at existing active waste management facilities, development of waste related activities such as energy production, transfer and recycling facilities, and state-mandated maintenance activities within the existing disturbed use areas at the inactive landfill sites is proposed. At this time, we do not have site specific information to determine if previously disturbed areas within these inactive facilities supports habitat for Covered Species; however, County Waste will maintain maps of such existing disturbed use areas in accordance with the Plan.

We do not have specific information regarding the extent of lands included within the boundaries of the active or inactive waste management facilities nor site specific information to assess potential impacts associated the proposed waste management facilities. However, these facilities

will be subject to compliance with the MSHCP including the Conservation Measures summarized below. Adherence to the Plan is anticipated to avoid and minimize impacts to Covered Species and ensure that the overall biological goals and objectives of the MSHCP, including the species-specific objectives, are achieved.

California State Parks Facilities and MSHCP Conservation Area Public Access and Recreation

Although the MSHCP identifies State Park recreational facilities and maintenance in addition to access and recreation activities (Conditionally Compatible Uses) within the MSHCP Conservation Area, we do not have site specific project information. In the absence of project specific information, we are providing a generalized analysis of the effects of recreation and maintenance to wildlife species. Specific recreation-oriented activities that may threaten biological resources in the Criteria and Conservation Area include: (1) passive recreational use on hiking trails, in campsites, and at developed facilities, such as hiking, swimming, and horseback riding; (2) construction and maintenance of recreational facilities and trails; and (3) construction and operation of an Off-Highway Park/State Vehicle Recreation Area. Recreation facilities and maintenance will be subject to the provisions of the MSHCP including the Conservation Measures summarized below.

Recreation

Developed recreation facilities, by design, focus use in specific areas. Therefore, areas in and adjacent to these sites generally exhibit signs of habitat degradation. Habitat degradation may include trampling of vegetation, direct removal of habitat during maintenance activities, invasion of non-native species, habitat losses due to escaped campfires, development of exploratory trails fanning out from developed sites, human-induced alteration to hydrological patterns, and soil compaction (Gutzwiller 1995, Cole and Landres 1995, Cole and Spildie 1998). Direct impacts of trampling and habitat destruction can also occur from associated recreational activities such as cross-country motorized vehicle use and trash dumping.

Recreational use can directly impact birds and other animals by bringing human activity into sensitive areas. Increased recreational access afforded by trails may cause native fauna to avoid potential foraging and breeding sites and alter patterns of parental care. Chronic disturbance during the breeding season may lead to higher predation and/or nest abandonment rates and thus reduced reproductive success. Some disturbance, injury, or loss of individuals could occur as a result of domestic pets that may accompany humans in recreational areas.

Stream and lake banks, riparian vegetation, and spawning areas are also disturbed whenever human use is concentrated (Johnson and Carothers 1982). Small hand-made dams constructed in streams to create swimming or wading areas could lead to the stranding of fish and elevated water temperatures. The deposition of trash, toxic chemicals, charcoal, and human waste into streams could result in both direct and indirect effects, particularly in key habitat areas.

Potential impacts could also occur from the interpretive centers and informational services by focusing attention on sensitive species. This attention could increase the likelihood of plant or habitat losses due to deliberate vandalism and/or collector activities. Some disturbance also

results from wildlife observation, particularly handling of frogs or toads and collection of tadpoles. Loss of individuals may occur as a result of being handled or removed from an area. However, beneficial effects of interpretive and informational services include a reduction of inadvertent losses due to increased awareness and a heightened stewardship ethic among recreational users.

Indirect trail effects include the attraction of the nest-parasitic brown-headed cowbird to horse and other trail livestock waste. Cowbird nest parasitism has been implicated in the decline of some riparian nesting species such as the federally endangered least Bell's vireo (Fish and Wildlife Service 1998a) and southwestern willow flycatcher (Fish and Wildlife Service 2001a). Indirect effects could also include the deposition of animal waste from horses or other trail livestock which can result in algal blooms in water bodies. These blooms can cause decreased oxygen content and increased water temperatures affecting egg and larval stages, suitability of breeding pools, and prey availability. Human concentrations at campgrounds or vacation areas may also lead to impaired water quality by elevating coliform bacteria and nutrients in streams (Aukerman and Springer 1976, Potter *et al.* 1984).

Typically, the magnitude of adverse effects associated with existing trail and recreational facility use is low. However, in localized areas where trails pass through or facilities are adjacent to particularly sensitive occurrences of biological resources, they can cause significant problems. We anticipate that the managers and planners for State Park and regional recreational facilities will seek to avoid and minimize impacts to sensitive habitats and species from use of the existing and future facilities within recreational areas. To avoid and minimize effects described above, we anticipate that the guidelines detailed in the Plan will be implemented, including Guidelines for Siting and Design of Trails and Facilities (MSHCP Section 7.4.2, p. 7-74) and Guidelines for Operations and Maintenance (MSHCP Section 7.4.2, p. 7-76). These guidelines include, but are not limited to, minimizing impacts from erosion, potential seasonal limits on trail use, restricting access to particular sensitive habitats, adequate fencing and signs, prohibiting camping and off-road vehicle use within the MSHCP Conservation Area, and prohibiting motorized vehicle access by the public .

Maintenance of Recreation Facilities

The direct effects of maintenance of facilities can involve occasional trampling or crushing of vegetation and species, particularly species that have highly immobile life stages. Direct effects of maintenance of recreational facilities and trails include: (1) crushing or striking individuals caught in the path of maintenance vehicles or other machinery and tools; (2) lethal effects associated with spills of oil, fuel, or other toxic substances into waterways; and (3) possible crushing and/or suffocation of eggs and fry from sediment transport caused by vehicles or other disturbance at stream crossings.

When located in occupied habitats, the maintenance of facilities can have adverse effects on species through the disturbance of vegetative cover and mineral soil which may cause habitat loss or degradation. The maintenance activity may destroy burrow systems and other fossorial habitats along with surface cover used for hiding and protection from predators. Disturbance and possible displacement of individuals may occur due to lights and recurring noise from

people and equipment. Predation on native species from domestic pets at recreational facilities may also occur. Maintenance of existing facilities and trails can also result in direct loss of individual plants or habitat due to removal of vegetative cover growing alongside the recreational facility site or trail as well as within the trail itself.

Indirect effects from maintenance include the introduction of non-native weeds into habitat from ground-disturbing activities. Compaction of soils, which may increase runoff and sedimentation of adjacent stream habitat, and pollution of water, due to runoff from paved surfaces of products such as gasoline, diesel, and oil, may also result in a loss of habitat and individuals.

A primary indirect effect resulting from maintenance is sedimentation of downstream areas. The effect of this sedimentation is reduced as the distance from a road or trail crossing increases. Generally, measurable effects of sedimentation diminish within a half mile of an impact area. The effects beyond this distance are not documented but will vary depending on the amount of sediment introduced into the stream, the amount of stream flow, gradient and other instream factors.

To avoid and minimize direct and indirect effects from maintenance on State Park and regional recreational facilities, we anticipate that the Guidelines for Operations and Maintenance (MSHCP Section 7.4.2, p. 7-76) regarding maintenance activities will be implemented within the MSHCP Conservation Area.

California State Parks Facilities

California State Park facilities within the MSHCP Conservation Area include the Lake Perris State Recreation Area (SRA), Chino Hills State Park, Mount San Jacinto State Park, San Timoteo State Park (proposed facility) and Anza-Borrego State Park. Recreational activities allowed within campgrounds and day-use areas include hiking, horseback riding, bicycling, camping, picnicking, swimming, and boating and are proposed as Covered Activities under the MSHCP. Approximately 100 acres (total) of future development could occur within the SRA, Chino Hills State Park, Mount San Jacinto State Park, and San Timoteo State Park that includes construction of roads, parking lots, campgrounds, visitor centers, trails, swimming areas, and administrative facilities (MSHCP Section 7.3.6, p. 7-57). Any alterations to PQP Lands, such as future development within State Park facilities, will require that direct and indirect effects be taken into account, and the impacted acres be replaced at a minimum 1:1 ratio and findings made that the replacement acreage is biologically equivalent or superior to the existing property with concurrence by the Wildlife Agencies (MSHCP Section 3.2.1).

We do not have site specific information for the habitats or species that may be affected by construction of these future facilities. However, the affected areas will be replaced at a minimum 1:1 ratio with biologically equivalent or superior areas as outlined in Section 3.2.1 of the MSHCP. In addition, the IA states that State Parks will: (1) comply with the policies for the Protection of Species Associated with Riparian/Riverine Areas and Vernal Pools (MSHCP Section 6.1.2); (2) comply with the policies for the Protection of Narrow Endemic Plant Species (MSHCP Section 6.1.3); (3) conduct surveys under the Additional Survey Needs and Procedures (MSHCP Section 6.3.2); (4) comply with the Urban/Wildlands Interface Guidelines (MSHCP

Section 6.1.4); and (5) comply with the siting and design criteria (MSHCP Section 7.0, pp. 7-74) and Best Management Practices (MSHCP Appendix C) of the Plan. We anticipate that additional construction guidelines in Section 7.5.3 of the MSHCP will be implemented. In addition, the State Parks' take authorization for Covered Activities is contingent on the preparation of unit management plans pertaining to each Covered Activity that must be reviewed and approved by the Wildlife Agencies. Therefore, we anticipate that the impacts to Covered Species will be reviewed by the Wildlife Agencies when more specific information is available, that impacts from these future improvements will be avoided and minimized, and that replacement lands for unavoidable impacts will be biologically equivalent or superior to those impacted.

1. Laborde Canyon Off-highway Vehicle Park/State Vehicle Recreation Area

California State Park System is considering the construction of a State Vehicle Recreation Area (SVRA) for off-highway vehicle (OHV) activity at Laborde Canyon. Off-highway vehicle use can have a significant negative impact on habitat and can reduce numbers, diversity, and biomass of species. The degree of impact depends upon amount and intensity of vehicle use, habitat type, and sensitivity of the species. Greater frequency of damage by vehicles reduced the density of both annual and perennial plants (Vollmer *et al.* 1976). Decreases in density and diversity of desert birds and mammals were detected where OHV use was extensive (Bury *et al.* 1977, Luckenbach 1978). Other negative effects include direct mortality and disturbance from noise (Boyle and Samson 1985).

The SRVA could utilize up to 1,200 acres inside the Criteria Area and up to 500 acres of access, staging area and support facilities outside the Criteria Area. Therefore, we anticipate that up to 1,200 acres of habitat within the Criteria Area and up to 500 acres outside the Criteria Area, will be lost and/or degraded through the construction and operation of the SRVA. However, the SRVA will consolidate OHV use in a defined area and may alleviate unauthorized OHV use in habitat areas within the Plan Area.

The MSHCP identifies project specific measures (MSHCP Section 7, pp. 7-56 to 7-57) that will need to be implemented in order for this activity to be considered as a Covered Activity. Permanent conservation of 3,000 acres (in the general vicinity of Laborde Canyon) and the 0.75 mile area westerly of the SVRA that links the south half of Section 25 T3S.R2W with Section 11 T3S.R2W as part of Additional Reserve Lands would contribute to the overall MSHCP Conservation Area and is anticipated to offset the loss of the initial 600 acres of impact within the Criteria Area. Additional losses over 600 acres inside the Criteria Area, would result in conservation of lands above the 3,000 acres (*i.e.*, 500 acres permanently conserved for each 100 acres affected by the SVRA; MSHCP Section 7.3.6, p. 7-56). Also, for each 100 acres used outside the Criteria Area for access, staging and support facilities for the SVRA, an additional 500 acres would be permanently conserved. Compliance with the MSHCP siting criteria and other conservation obligations is anticipated to minimize impacts to Covered Species and their habitats.

Regional Recreational Facilities

Community trails and regional trails, which are not associated with the State Park facilities, currently exist within the anticipated MSHCP Conservation Area. No impacts will be covered and no improvements will be allowed under the MSHCP on any of the existing community trails that are primarily used by equestrian users. Public access and recreation on existing and proposed regional trails will be Conditionally Compatible Uses and will include hiking, mountain biking, and equestrian use. Improvements to these regional trails and construction of additional regional trails, 14 trailheads, 5 interpretive centers, and 4 maintenance facilities will be Covered Activities under the MSHCP with these facilities located within the Conservation Area.

The MSHCP identifies impacts of 810 to 910 acres from regional trails, 95 to 120 acres from interpretive centers, 60 to 80 acres from trailheads and 35 to 45 acres from maintenance facilities, for a total anticipated impact of 1,000 to 1,155 acres in the Conservation Area. Most of the anticipated impacts will occur in chaparral, coastal sage scrub, grassland, and riparian scrub vegetation communities. We do not have site specific information for the habitats or species that may be affected by construction of these future facilities. However, as for State Park facilities discussed above, any alterations to these PQP Lands will require that direct and indirect effects be taken into account, and the impacted acres be replaced at a minimum 1:1 ratio and findings made that the replacement acreage is biologically equivalent or superior to the existing property (MSHCP, Section 3, p. 3-16). In addition, to avoid and minimize effects from construction of new regional recreational facilities and maintenance, the Guidelines for Siting and Design of Trails and Facilities (MSHCP Section 7.4.2, p. 7-74) and Guidelines for Operations and Maintenance (MSHCP Section 7.4.2, p. 7-76) will be implemented. These guidelines include, but are not limited to, locating facilities in the least sensitive areas of the MSHCP Conservation Area, conducting biological surveys prior to design and construction, minimizing lighting impacts, prohibiting or restricting certain activities, and access control.

Reserve Management, Monitoring, and Scientific Research

Section 7.4.1 of the MSHCP describes instances where incidental take of Covered Species could occur during management activities on Additional Reserve Lands and PQP Lands. Proposed take of Covered Species will be limited to those actions specifically described in the General Management Measures of the Plan, Adaptive Management, or Annual Work Plans approved by the Wildlife Agencies. In addition, these actions will be conducted by agents or employees of the Fish and Wildlife Service, the Department, RCA, or persons acting under the direct guidance or authority of these entities. Management activities are designed to benefit Covered Species by improving or protecting habitat conditions; however, they may cause minor or temporary impacts to habitat and potentially result in a limited loss of individuals. Examples of management techniques proposed in the MSHCP that may result in impacts to Covered Species include control of public access through fencing, fire management and controlled burns, weed management, and habitat enhancement.

In addition to management actions, monitoring and scientific research conducted by the Permittees through the RCA and RMOC may result in impacts to Covered Species or their

habitat. However, we anticipate that species monitoring and scientific research will provide biological data that will be used to improve management actions and ultimately benefit Covered Species. While these monitoring and research plans are designed to benefit Covered Species, they may result in some loss of individuals. As stated in Section 5.3 of the MSHCP, specific monitoring plans have not been developed at this time. Monitoring or research activities will be subject to review and approval by the Wildlife Agencies. Potential loss of individuals will be minimized by ensuring personnel have sufficient experience and are trained in the appropriately methodologies. Person's undertaking monitoring actions will complete training programs designed by the Monitoring Program Administrator and approved by the Wildlife Agencies. The names and certification of training for personnel conducting monitoring activities will be kept on file at the RCA.

Management activities overseen by the RMOC on non-federal PQP Lands will be considered a Covered Activity if the non-federal PQP Land owners or managers have entered into a management agreement with the Wildlife Agencies and the RCA for cooperation in habitat conservation and management as identified in Section 18.0 the IA. Monitoring activities conducted under the auspices of the RCA on non-federal PQP Land (with permission of access by the owner/manager of the non-federal PQP Land) will be considered a Covered Activity. RCA and RMOC oversight of the actions related to monitoring and management will ensure potential impacts to Covered Species and their habitat are minimized.

MSHCP Implementation and Conservation Measures

The overall Implementation Structure and policies for the MSHCP are identified in Section 6 of the Plan and are applicable to all Covered Activities and Permittees. This includes compliance with the cell conservation Criteria (with the exception of single family/mobile home on an existing legal lot and new agriculture). In order to provide a better understanding of the presence and distribution of certain species within the Plan Area and guide reserve assembly, several of the policies require species-specific focused surveys.

Avoidance and minimization guidelines for proposed facilities within the Criteria Area and PQP Lands will be implemented as described in section 7.5 of the Plan. Additional project-specific avoidance, minimization, and mitigation measures are required for proposed Covered Activities and are identified in section 7 of the MSHCP. In the event PQP Lands are altered by the Permittees, procedures and conservation measures to offset impacts are identified in Section 3.2.1 of the Plan as clarified in the MSHCP Errata and Proposed Permit Condition 17 (Appendix 2). Appendix C of the Plan provides a list of the best management practices that will be implemented during individual project construction to minimize impacts to species and their habitats.

Protection of Species Associated with Riparian/Riverine Areas and Vernal Pools

Avoidance of riparian, riverine, and vernal pool areas in accordance with the Protection of Species Associated with Riparian/Riverine Areas and Vernal Pools policy (MSHCP Section 6.1.2) throughout the MSHCP Plan Area will provide for protection and management of riparian/riverine areas and vernal pool habitats (including fairy shrimp habitat) and the 34

species (MSHCP Section 6, pp. 6-20 and 6-21) associated with these habitats. An additional 31 species (MSHCP Section 6, pp. 6-26 and 6-27) are anticipated to benefit from implementation of this policy. Deed restrictions, conservation easements, or other appropriate mechanism; long-term management; and implementation of appropriate measures as a component of the project design to address edge effects (*e.g.*, lighting, noise, urban runoff, exotic plant infestation, domestic pet invasion, unauthorized recreational use, etc.) will ensure the long-term conservation of the avoided areas and its associated functions and values. The local Permittee(s) will be responsible for assuring long-term management of the avoided areas within the Plan Area irrespective of their inclusion into the Additional Reserve Lands. However, we anticipate some of the avoided lands including lands outside the Criteria Area will be acquired to assemble the Additional Reserve Lands to achieve species-specific conservation objectives. In addition, the long-term conservation of riparian, riverine, and vernal pools/fairy shrimp habitat (including pool hydrology) within the Plan Area will ensure downstream functions and values relative to Covered Species and the MSHCP Conservation Area are maintained.

In those instances when an avoidance alternative is not feasible, a practicable alternative that minimizes direct and indirect effects to riparian/riverine areas, vernal pools/fairy shrimp habitat, and associated functions will be implemented and unavoidable impacts will be mitigated such that the conservation is equal or better than avoidance of the riparian, riverine, vernal pools, or fairy shrimp habitat. A Biologically Equivalent or Superior Preservation determination will ensure that lost functions and values relative to habitats, Covered Species, riparian linkages, and the function of the MSHCP Conservation Area are replaced or increased. The Wildlife Agencies will be notified and provided a 60-day review and response period prior to an approval of a Biologically Equivalent or Superior Preservation determination by the Permittee. We anticipate that this evaluation process will not only ensure replacement of the lost habitats within the Plan Area but that no adverse indirect impacts to Covered Species and their habitat will occur within the Conservation Area as a result of development outside the Conservation Area.

Areas identified through the survey requirements of the Riparian/Riverine Area and Vernal Pool policy that are important for the long-term conservation of the least Bell's vireo, southwestern willow flycatcher, western yellow-billed cuckoo, and fairy shrimp species (Riverside, Santa Rosa Plateau, and vernal pool fairy shrimp) will be included in the MSHCP Conservation Area by way of implementation of the species-specific objectives (MSHCP Section 9). Implementation of the species-specific objectives as part of this policy will result in the avoidance and conservation of 90 percent of those occupied areas within the Plan Area that provide for the long-term conservation of the species. For the southwestern willow flycatcher, the species-specific objectives require that 100 percent of occupied habitat be conserved. In addition, the Plan requires (MSHCP Species Account; B-259, B-478, and B-560) 100 meters of undeveloped landscape adjacent to the occupied areas be conserved for the long-term conservation of the least Bell's vireo, southwestern willow flycatcher, and western yellow-billed cuckoo. Conservation of these undeveloped upland lands will assist in maintaining riparian and riverine habitats. In order to provide for the long-term conservation of fairy shrimp species and meet the species-specific objectives, we anticipate that the watersheds of occupied pools will be avoided and conserved in conjunction with the pool basins.

For those occupied areas that are not necessary for inclusion into the Conservation Area, 90 or, in the case of the southwestern willow flycatcher 100 percent, avoidance and long-term management and protection of the occupied area will still be required unless a Biologically Equivalent or Superior Preservation Determination can demonstrate that a proposed alternative, including design features to minimize impacts and compensation measures (*e.g.*, restoration, enhancement), will provide equal or better Conservation than 90 or 100 percent avoidance of the occupied property. The Wildlife Agencies will be notified and provided a 60-day review and response period prior to an approval of a Biologically Equivalent or Superior Preservation Determination by the Permittee. We anticipate that this evaluation process will ensure that occupied habitats within the Plan Area are sufficiently replaced such that replaced habitat is equal or superior to the area of impact.

Implementation of the Riparian/Riverine Areas and Vernal Pool policy is anticipated to provide long-term conservation to unoccupied and occupied aquatic habitats throughout the Plan Area. Long-term conservation (land protection and management) of the survey species will be ensured through the process of avoiding 90 to 100 percent of occupied areas including upland buffers and watersheds of pool basins. In those instances where occupied habitat will be impacted, actions will be reviewed through the Biological Equivalent or Superior Determination process to ensure any lost functions and values related to species and their habitat are replaced.

Protection of Narrow Endemic Plant Species

Implementation of the Protection of Narrow Endemic Plant Species policy (MSHCP Section 6.1.3) that includes the 90% avoidance process will result in a maximum loss of 10 percent of those areas with long-term conservation value. An Equivalency Finding (MSHCP Section 6, p. 6-40) will be made by the Permittees to ensure that at a minimum, the 90 percent avoidance threshold has been met on the project site. We anticipate that many of the avoided lands will be acquired to assemble the Additional Reserve Lands and therefore would be conserved, particularly if important or significant populations of the narrow endemic plants species are found during the required surveys. Inclusion of the avoided areas into the Additional Reserve Lands would result in the protection and management of areas that provide for the long-term conservation of Covered Species, and/or contribute to the overall MSHCP Conservation Area design (*e.g.*, contributions to the maintenance of functional linkages, ecosystem function, or buffers for other conserved areas). Some avoided areas may become available for development but only after the species conservation goals including species-specific conservation objectives have been achieved (MSHCP Section 9.2 and the Species Accounts), therefore, the loss of these areas is not anticipated to affect the long-term conservation of Covered Species.

If the 90 percent avoidance threshold is not feasible, then a Determination of Biologically Equivalent or Superior Preservation will be made by the Permittee as outlined in the Plan (MSHCP Section 6, p. 6-41). This determination must demonstrate that although a proposed project will exceed the 10 percent loss, design features and compensation measures will result in an overall MSHCP Conservation Area design and configuration that is equivalent or superior to that which will occur if the 90 percent avoidance could be achieved. The proposed biologically equivalent or superior alternative will be evaluated with respect to the benefits it will provide to narrow endemic plants considering the effects on habitat with long-term conservation value,

populations, and linkages and function of the MSHCP Conservation Area. The Wildlife Agencies will be notified and provided a 60-day response period prior to an approval of a Biologically Equivalent or Superior Preservation Determination. We anticipate that this process will minimize impacts to narrow endemic plant species and their habitats for those projects that will exceed the 10 percent loss by providing equal or superior conservation.

Additional Survey Needs and Procedures

Implementation of the Additional Survey Needs and Procedures policy (MSHCP Section 6.3.2) is anticipated to provide information on the abundance and distribution of 13 plant and 7 animal species to ensure appropriate conservation occurs within the Conservation Area. For the plant species, the procedures under this policy are similar to those discussed above for the Protection of Narrow Endemic Plant Species including the requirement to conduct appropriate surveys within defined areas and the avoidance of 90 percent of those portions of the project site that provide for the long-term conservation of the species. This will result in a maximum loss of 10 percent of those areas with long-term conservation value. Avoided areas will be considered for acquisition and conservation within the Additional Reserve Lands. At such time as the conservation goal including the species-specific objectives are met, the avoided areas may be released for future development if they do not contribute to the long-term conservation of the species or overall MSHCP Conservation Area configuration. Although avoided areas may become available for development, this would not occur until such time that the species-specific conservation goals and objectives have been achieved (MSHCP Section 9.2 and the Species Accounts), therefore, the loss of these areas is not anticipated to affect the long-term conservation of Covered Species. The Additional Survey Needs and Procedures policy includes the process for the Equivalency Finding (MSHCP pp 6-70) to ensure the 90% avoidance threshold has been achieved. In instances where the avoidance threshold cannot be met, a Biologically Equivalent or Superior Preservation Determination (MSHCP pp. 6-71) will be made to ensure impacts to Covered Species are minimized and equivalent or superior conservation will occur.

Guidelines Pertaining to the Urban/Wildlands Interface

The Guidelines Pertaining to the Urban/Wildlands Interface policy (MSHCP Section 6.1.4) identify measures that the Permittees will implement in conjunction with urbanization which is likely to occur within proximity to the Conservation Area. Implementation of these measures is anticipated to minimize the indirect effects associated with future urbanization of the Plan Area such as urban drainage, toxics, lighting, noise, invasive non-native plant species, unauthorized access into the Conservation Area, and increased predation from domestic animals. Proposed developments will be required to incorporate measures including the National Pollution Discharge Elimination System requirements that will ensure water quality and quantity discharged into the MSHCP Conservation Area is not altered. Permittees will ensure that stormwater systems are designed to prevent the release of toxins, chemicals, petroleum products, exotic plant material or other elements that will degrade or harm biological resources or ecosystem processes within the MSHCP Conservation Area. Land uses that use chemical or generate bioproducts (*i.e.*, manure) will be required by the Permittees to incorporate measures that ensure such materials do not enter the MSHCP Conservation Area.

Lighting will be directed away or shielded from the MSHCP Conservation Area to avoid night lighting and increased ambient lighting. Land uses that generate noise that will affect the Conservation Area will incorporate setbacks, berms, or walls to minimize noise to the Conservation Area. Barriers will be required to be incorporated into individual project designs to minimize unauthorized access, domestic animal predation, and illegal trespass or dumping within the Conservation Area. Manufactured slopes associated with land development will not be permitted to extend into the Conservation Area, thereby avoiding intrusion into areas conserved for Covered Species.

To minimize the invasion of non-native plant species into the Conservation Area, Permittees will consider the invasive, non-native plant species listed on Table 6-2 of the MSHCP (Section 6, p. 6-44) when approving landscape plans for development projects adjacent to the Conservation Area. The Permittees will require revisions to the landscape plan, as appropriate, to avoid the use of invasive species for those portions of the developments that are adjacent to the Conservation Area.

Maintenance of Existing Habitat Conditions Prior to Reserve Assembly

The Permittees will, through their existing ordinances and permit review process, ensure that habitat is not cleared, grubbed, or graded without review for consistency with the MSHCP (MSHCP Section 6.1.5). Since reserve assembly will occur over a period of time, maintaining species' habitats will be particularly important for those lands that will ultimately become part of the Additional Reserve Lands including, but not limited to, the Criteria Area and 90 percent avoided areas (*e.g.* Protection of Narrow Endemic Plant Species, Additional Survey Needs and Procedures) that will not necessarily be conserved at the project implementation stage but may be later in time.

Fuels Management

The Permittees will ensure that new development adjacent to the MSHCP Conservation Area or other undeveloped lands will incorporate any fuel/brush management zones within the development footprint. This will minimize the threat of increased fire frequency and prevent fuel modification zones from encroaching into the MSHCP Conservation Area. As the Additional Reserve Lands are assembled adjacent to existing development, the reserve boundaries will be established to avoid including fuel management zones within the Additional Reserve Lands.

Guidelines for Public Access and Recreation in the MSHCP Conservation Area

Implementation of the specific policies and guidelines (MSHCP Section 7, p. 7-74 to 7-80) related to public access to the Conservation Area is anticipated to avoid and minimize potential impacts to Covered Species and their habitats.

Guidelines for the Siting and Design of Trails and Future Facilities

Trails and facilities will be located in the least sensitive areas (*e.g.* existing dirt roads) to minimize direct impacts to native vegetation. Biological surveys including vegetation mapping and species surveys will be conducted prior to design and construction of trails or facilities to assist in determining appropriate avoidance and minimization measures. Implementation of the guidelines will minimize habitat degradation by avoiding highly erosive soils; utilizing environmentally sensitive grading techniques, drainage management, water breaks, and vegetation buffers for trail and facility runoff absorption and filtration; discouraging and preventing intrusion into environmentally sensitive areas; and avoiding wildlife crossing points. The use of non-native invasive plant species for landscaping requirements around facilities will avoid infestations to surrounding native vegetation communities. New facilities will incorporate design features to minimize lighting into sensitive habitat areas. Trails and facilities will be accessed by existing or already planned roadways to minimize the need to develop additional areas specifically for access purposes.

Trail type, width, and intensity of trail use will be consistent with the protection of the resources being traversed. Trails will be sited along the edges of large sensitive areas to minimize disturbance to Covered Species and their habitats. Locating dog-friendly trails in areas of low habitat value or edges will minimize disturbance to Covered Species and their habitats from construction and use of trails designated for this purpose. Mountain bike trails will be limited to areas of grade no greater than 25 percent, with low susceptibility to erosion, and out of wetlands and other sensitive areas to minimize habitat degradation. Equestrian use will be limited to designated trails. Trailheads will be sighted to be consistent with resource protection goals.

Guidelines for Operation and Maintenance

To minimize the impacts associated with recreation and maintenance, the MSHCP Conservation Area will only permit passive uses (*i.e.* bird watching, hiking, equestrian use, biking, photography, picnicking) in designated areas. Activities such as camping, off-road vehicle use (with the exception of operations, maintenance, and emergency vehicles) and activities that require construction of new facilities and roads other than that identified in the MSHCP will be prohibited. Motorized vehicle access by the public to the MSHCP Conservation Area will be prohibited. Access to the MSHCP Conservation Area will be controlled through properly maintained fencing and signs. The MSHCP Conservation Area will be patrolled on a regular basis to ensure that visitors remain on designated trails and all other rules and guidelines to protect natural resources are observed. Signage will be placed in the appropriate areas to clearly identify access areas and prohibited areas.

Appropriate daily and seasonal limits on trail use will be established. Trails will be closed and passive recreational uses restricted, as necessary, to minimize disruption of nesting and other wildlife functions for Covered Species. Following heavy rains, the use of the designated equestrian trails will be prohibited to avoid trail damage and impacts to habitat. If mountain bike use becomes heavy or problematic, an access control system will be developed and permits may be required. At the discretion of the Reserve Manager, public access may be restricted within and adjacent to wetlands, vernal pools, restoration areas, and sensitive wildlife habitat. Where

implemented, these restrictions will minimize potential degradation of these areas. Fencing or other barriers will be used to restrict access to sensitive areas when protection of biologically sensitive resources are required. Trails, facilities, signs and barriers will be maintained to discourage and prevent intrusion into environmentally sensitive areas.

Litter and trash will be controlled to minimize attraction of predatory species such as crows. Closed garbage cans will be provided at trailheads and access points. Litter and trash will be collected on a regular basis. Wildlife undercrossings will be kept free of all debris, trash and other obstructions to maintain the function of these features.

Guidelines for Facilities within the Criteria Area and PQP Lands

Section 7.5 of the MSHCP sets out the guidelines that will be implemented by the Permittees (Appendix 2 Proposed Permit Condition 19) for proposed Covered Activities within the Criteria Area and PQP Lands. Incorporating the appropriate guidelines into individual projects is anticipated to avoid and minimize direct and indirect effects associated with the proposed Covered Activities. These guidelines are summarized below. Further details of the guidelines can be found in the MSHCP at the referenced page number(s).

Guidelines for Siting and Design of Planned Roads

Prior to design and construction of planned transportation facilities, appropriate biological surveys will be conducted including vegetation mapping and appropriate species surveys. Planned roadways will be located in the least environmentally sensitive location feasible, such as already disturbed and developed areas and existing roadways. Covered Species and wetlands will be avoided, if feasible. Roadways sited in already disturbed or developed areas will minimize direct impacts to Covered Species and their habitats. Using existing road alignments will incrementally increase fragmentation at any given location but will avoid fragmenting additional lands within the Criteria Area and PQP Lands. In addition, roadway design features will incorporate appropriate design features to minimize habitat fragmentation and loss of wildlife movement (see discussion below).

Narrow endemic plant species will be avoided, if feasible, otherwise mitigation will be required as described in the Protection of Narrow Endemic Plant Species policy. The timing of construction will consider seasonal requirements for breeding birds and migratory non-resident birds. The MSHCP states that clearing of habitat will be avoided during the active breeding season within the Criteria Area and PQP Lands defined for purposes of the MSHCP as March 1 to June 30 (MSHCP Section 7.5.3). However, to the extent Covered Activities will impact unlisted Covered bird species protected by the Migratory Bird Treaty Act (MBTA), Covered Activities must comply with the MBTA (see also Appendix 2 Proposed Permit Condition 5); therefore, we do not expect the loss of nesting individuals, eggs, or nestlings.

Guidelines for Construction of Wildlife Crossings

The MSHCP provides for a range of both general and specific guidelines and techniques to construct wildlife crossings (MSHCP Section 7.5.2). The appropriate guidelines and

combination of specific design features will depend on the location of the proposed roadway project relative to the function of the MSHCP Conservation Area as well as species-specific movement needs. Incorporating the appropriate wildlife crossing or combinations as such into roadway project designs will minimize the effects of habitat fragmentation.

Construction Guidelines

Implementation of the Construction Guidelines by the Permittees for Covered Activities within the Criteria Area or PQP Lands (MSHCP Section 7.5.3, p. 7-87) is anticipated to avoid and minimize potential impacts to species and their habitats. Implementation of the guidelines related to development of water and pollution control plans, sediment and erosion control measures, the siting of equipment, fueling and staging areas in non-sensitive habitats, construction personnel training, and dust control will avoid and/or minimize habitat degradation and potential impacts to Covered Species. The availability of fire-fighting equipment on the project site will enable quick response in the event construction related fires are induced. Clearly defining and marking the limits of construction should avoid direct impacts outside the project limits. Proper removal and handling of exotic species during construction will minimize further infestations. The timing of construction will consider seasonal requirements for breeding birds and migratory non-resident birds. To the extent Covered Activities will impact unlisted Covered bird species protected by the Migratory Bird Treaty Act (MBTA), Covered Activities must comply with the MBTA (see also Appendix 2 Proposed Permit Condition 5); therefore, we do not expect the loss of nesting individuals, eggs, or nestlings. The Permittees will ensure that the guidelines and best management practices are implemented by requiring ongoing monitoring and reporting during construction activities.

Best Management Practices

Best Management Practices are identified in Appendix C and will be implemented to minimize impacts associated with project construction. Many of these measure are similar to those identified in Section 7.5.3 Construction Guidelines (*e.g.* training session for construction employees, implementation of water and erosion control plans, stream diversion and sedimentation procedures, removal of exotic species that prey upon or displace target species, monitoring of the project site by a qualified biologist, etc.). Implementation of the Best Management Practices will minimize the temporary impacts to habitat by requiring these areas to be returned to pre-construction contours and re-vegetated with native species.

MSHCP Conservation Area Analysis

Within the 1.26 million-acre Plan Area, the MSHCP proposes to configure a 500,000-acre Conservation Area that is comprised of 347,000 acres of PQP Lands and 153,000 acres of Additional Reserve Lands. PQP Lands provide the foundation of the Conservation Area and are expected to be managed in a manner that contributes to the conservation of Covered Species (including lands in existing reserves). Although not all of the PQP Landowners/Managers have committed to the management structure of the MSHCP at this time, PQP Lands were included as the foundation of the conservation strategy based on present and anticipated conservation value. Because land use regulatory authority of PQP Land often may not reside with the Permittees,

they have committed to seek Memoranda of Understanding (MOU) from PQP Landowners to ensure that those PQP Lands that are necessary to form the Conservation Area are managed in conformance and compliance with the MSHCP (IA Section 18). The Permittees have committed to managing and monitoring 55,000 acres of existing Local Permittee owned PQP Lands.

Although the MSHCP identifies a process in the event a Permittee alters PQP Lands (MSHCP Section 3.2), there are no provisions in the Plan to address the potential for non-Permittee PQP Landowners to modify land uses within PQP Lands in a manner contrary to the conservation of Covered Species. Additionally, because many of the Covered Species are unlisted, the Wildlife Agencies may lack regulatory discretion regarding alteration of non-Permittee PQP Lands. Thus, potential exists for changes in land use to non-Permittee PQP Lands to occur that may impact the conservation value of the MSHCP Conservation Area.

The MSHCP (Figure 3-1) depicts the PQP Lands anticipated to contribute to the Conservation Area and provides a general breakdown of Federal, State and Local government land acreages that are anticipated to contribute towards the total 347,000 acres of PQP Land (MSHCP Section 4.2.). There are no formal statements in the MSHCP regarding the conservation value of the PQP Lands or the land uses that may be inconsistent with the conservation of Covered Species (*e.g.*, active use areas, detention basins, flood control/utility maintenance, roads, campgrounds). However, the precise acreage location, amount, and status (*e.g.*, conservation value, land uses) of PQP Lands in the Conservation Area will be provided to the Wildlife Agencies for review within five years of permit issuance. Ultimately, we anticipate that only those PQP Lands that provide for long-term conservation of Covered Species and are managed in conformance and compliance with the MSHCP will be counted toward the 347,000-acre PQP Land commitment to the Conservation Area.

The second major geographic component of the Conservation Area is 153,000 acres of Additional Reserve Lands that will be acquired by several means including acquisition of private lands by local, State and Federal governments, through private and public development contributions as part of the land use entitlement process, and as mitigation for local and regional infrastructure projects. The Wildlife Agencies have committed to contribute 50,000 acres towards this total and State and Local Permittees are responsible for the acquisition of 103,000 of the 153,000 acres. Assembly of the Additional Reserve Lands will primarily be from within the approximately 310,000-acre Criteria Area depicted on the MSHCP Plan Map (Figure 3-1, p. 3-17) as described in Section 3.2 of the MSHCP. However, the MSHCP does provide for the inclusion of lands into the Additional Reserve Lands from outside the Criteria Area in certain circumstances (MSHCP Section 6.1.2, 6.1.3, 6.3.2, and 6.5; species-specific objectives).

Because of the Plan's flexibility and reliance on the interpretation of written cell Criteria to assemble the Additional Reserve Lands, the configuration of the Additional Reserve Lands is not definitive. For instance, the Criteria for each cell or cell grouping usually incorporates a 10 percent range for potential conservation. Additionally, the Criteria Refinement Process allows for evaluation of alternative conservation proposals that are of equivalent or superior benefit to Covered Species and allows for corrections to minor discrepancies or inaccuracies in the MSHCP. Provided such proposals are found to be biologically equivalent, the Criteria

Refinement Process allows for acquisition of Additional Reserve Lands in areas within the Criteria Area that were not originally targeted for inclusion or, with concurrence of the Wildlife Agencies, land may be conserved from outside the Criteria Area. Application of the Criteria on a project by project basis is intended to be done in the context of the broad landscape scale as described for the MSHCP Conservation Area (MSHCP Section 3.2.2), cores and linkages (MSHCP Section 3.2.3), and Area Plans (MSHCP Section 3.3) so that the Additional Reserve Lands are assembled in a configuration that will provide for the long-term conservation of Covered Species.

Table 3.2 of the MSHCP indicates that application of the mid-point of the target conservation range for each cell or cell grouping should come close to meeting the Additional Reserve Land commitment (conservation in the mid-point of the target ranges will conserve 158,605 acres of land that include a portion of approximately 5,840 acres of land anticipated to be lost in the Criteria Area for planned roadways (Table 3-2 of the MSHCP has a footnote that states that “totals do not include acreage adjustments for planned roadways”; Page 7-31 states that “approximately 5,840 acres of roadways will be improved/constructed within the Criteria Area”). We anticipate that project-specific surveys and reserve design configuration considerations will be used to optimize the Additional Reserve Land configuration so that greater conservation is achieved in areas where species occurrences, sensitive habitats, or constraints to reserve design configuration warrant it (*e.g.*, to maximize the width of linkages and constrained linkages) and lesser conservation is achieved where there is less direct conservation benefit.

Habitat

To analyze the range and configuration of vegetation communities and target species habitats that could be conserved in the Conservation Area, we used the existing PQP Lands depicted in Figure 3-1 of the MSHCP and our reading and interpretation of the written conservation Criteria from within the MSHCP Criteria Area to obtain a rendition of the Additional Reserve Lands. Our conceptual reserve design (Figure 1) was used to examine whether the range of habitats within the Plan Area are likely to be conserved, and how well they will be represented across the range of environmental conditions where they are distributed. The bioregions identified within the MSHCP were used to assess whether habitats are likely to be conserved across the environmental gradient. The results of our assessment are provided in Table 4 and Appendix 8 which are discussed below. How well the MSHCP Conservation Area conserves target species and their individual habitat requirements is addressed in the species specific evaluations found later in this opinion.

Within the Plan Area, 14 broad vegetation or habitat categories were mapped in addition to agricultural and developed/disturbed land uses. This mapping distinguished 43 plant community sub-associations and open water within a broader set of vegetation/habitat categories. All of the broad vegetation or habitat categories within the Plan Area, including agriculture and developed/disturbed land uses, are represented within the MSHCP Conservation Area, and all but one of the vegetation sub-associations (semi-desert chaparral) are captured within the Conservation Area (Table 4).

In some instances, different mapping methods or scales have resulted in the identification of vegetation community sub-associations that are not always distinct from one another (*e.g.*, “chaparral” with “chamise chaparral” or “red shank chaparral”; “coastal sage scrub” with “Diegan sage scrub” or “Riversidean sage scrub”). Still, a number of the identified sub-associations are rare or threatened and, therefore, represent an important component of habitat diversity within the Plan Area. Thus, we considered the conservation of the individual plant community sub-associations when we considered conservation of the broader vegetation categories because not all sub-associations may be well represented within a well-conserved category. Similarly, although vegetation categories or sub-associations may be well represented in the overall MSHCP Conservation Area, it does not always follow that they are well represented across their environmental gradient or well represented in the Additional Reserve Lands.

The broad categories that will receive the greatest level of conservation (66 percent or greater) in the Plan Area include: water; playas and vernal pools; marshes; riparian scrub, riparian woodland and riparian forest; montane coniferous forest; woodlands and forest; Riversidean alluvial fan sage scrub; and chaparral. Receiving moderate conservation (33 percent to 65 percent) in the Plan Area are peninsular juniper woodland; coastal sage scrub; and desert scrub. The least well represented vegetation categories, potentially receiving conservation of less than one-third of the remaining acreage in the Plan Area, include grasslands, cismontane alkali marsh, and montane meadows. Finally, about 11 percent of the agricultural lands (16,966 acres) and 4 percent of developed or disturbed lands (11,503 acres) in the Plan Area could be located in the Conservation Area.

The water category is typically human created habitat, comprised of open water, reservoirs and ponds. As a majority of it is associated with PQP Lands (*e.g.*, Lake Mathews, Diamond Valley Lake), 88 percent of this habitat category will be conserved within the Plan Area. It is found within the Santa Ana Mountains, Riverside Lowlands, San Jacinto Foothills, San Jacinto Mountains and Desert Transition bioregions. Almost all of the water category in the Riverside Lowlands and 40 percent of that occurring in the San Jacinto Mountains will be conserved, primarily in association with existing PQP Lands. Elsewhere, a majority of water will be conserved in the San Jacinto Foothills due to conservation in the Additional Reserve Lands. The remaining 142 acres of mapped water in the Plan Area are within the Santa Ana Mountain and Desert Transitions bioregions (0.23 percent and 1 percent, respectively, of total water). These acres fall outside of PQP Lands and there is little (less than 2 acres) to no conservation of the water category in these bioregions.

The playas and vernal pools category, which receives 86 percent conservation within our conceptual MSHCP Conservation Area, is comprised of three mapped vegetation sub-associations including alkali playa, undifferentiated vernal pools, and southern interior basalt vernal pools. All of these vegetation sub-associations are of high sensitivity with restricted distributions. Alkali playas and undifferentiated vernal pools are found only within the Riverside Lowland Bioregion. In terms of area, alkali playas represent the vast majority within this habitat category (7,005 of 7,075 acres). Therefore, it follows that alkali playa conservation is the same as that for the broader habitat category (86 percent), with 48 percent of its conservation in the Additional Reserve Lands and 38 percent of its conservation in the PQP

Lands. Undifferentiated vernal pools cover the smallest amount of area within this habitat category (18.8 acres) and will receive a total conservation level of 92 percent, with 88 percent of its conservation occurring within PQP Lands and the remaining 4 percent conservation anticipated in the Additional Reserve Lands. A relatively small amount of additional conservation will be needed to capture the remaining 1.43 acres of vernal pools outside of the Conservation Area. Southern interior basalt vernal pools are also fairly restricted in the Plan Area with 61 percent (31.2 acres) of their area distributed in the Santa Ana Mountains Bioregion and the remaining 39 percent (20.2 acres) in the Riverside Lowlands Bioregion. Like the broader habitat category, this vegetation subassociation also receives an overall conservation level of 86 percent, with essentially all of its area in the Santa Ana Mountains conserved in PQP Lands, and the remaining 25 percent of its conservation (13.1 acres) occurring within Additional Reserve Lands in the Riverside Lowlands Bioregion.

The meadow and marsh habitat category receives 85 percent conservation within the Plan Area and is comprised of “coastal and valley freshwater marsh” and “marsh” vegetation sub-associations. This habitat category is found primarily within the Riverside Lowlands (370 acres; 81 percent) and San Jacinto Foothill bioregions (84 acres; 18 percent), with 0.5 acre of coastal and valley freshwater marsh within the Desert Transition Bioregion. Within the Riverside Lowlands Bioregion, 89 percent of coastal and valley freshwater marsh (270 acres) and 52 percent of marsh (35 acres) will be conserved through a combination of conservation within the Additional Reserve Lands and PQP Lands. Within the San Jacinto Foothills Bioregion, 100 percent of coastal and valley freshwater marsh (71 acres) and 90 percent of marsh (11 acres) will be conserved within the Additional Reserve Lands. The small area of coastal and freshwater marsh in the Desert Transition zone does not fall within the Conservation Area.

The riparian scrub, woodland and forest habitat category receives 77 percent conservation within the Plan Area and similar levels of conservation within each of the bioregions, with the exception of the Agua Tibia Mountains and Desert Transition bioregions where this habitat category receives 53 percent and 50 percent conservation, respectively. This habitat category is relatively diverse and is comprised of nine different vegetation sub-associations. Notable among these are montane riparian forest that consists of cottonwood, sycamore, willows and alders and is distributed among the San Bernardino Mountains (51 acres), San Jacinto Foothills (17 acres) and San Jacinto Mountains bioregions (218 acres). This vegetation sub-association will receive 76 percent conservation overall, primarily within PQP Lands as only 2 percent (4 of 286 acres) of the montane riparian forest conservation falls within Additional Reserve Lands. Forty-one percent (21 of 51 acres) of this vegetation association within the San Bernardino Mountains Bioregion is conserved.

Southern sycamore/alder riparian woodland is found within the Santa Ana Mountains (25 acres), Riverside Lowlands (30 acres), Agua Tibia Mountains (114 acres) and San Jacinto Foothills bioregions (18 acres). This sub-association is the least well conserved of the riparian vegetation sub-associations (69 acres, 37 percent) in the Plan Area. The overall level of conservation of this sub-association is primarily due to limited conservation (10 percent, or 12 of 114 acres) in the Agua Tibia Mountains, where none of it is captured in Additional Reserve Lands. Curiously, the best conserved of the riparian vegetation sub-associations are dominated by non-native species; arundo riparian forest (99 percent) and tamarisk scrub (100 percent). Arundo riparian forest is

mapped within the Riverside Lowlands Bioregion where 90 percent of its conservation (440 of 489 acres) will be achieved within PQP Lands and the remaining 9 percent (43 acres) fall within Additional Reserve Lands. Tamarisk scrub is primarily found within the San Jacinto Foothills where 270 acres will be conserved in Additional Reserve Lands. This suggests that there is a considerable need to improve the integrity of riparian habitats through management within the Conservation Area.

Montane coniferous forest will receive 75 percent conservation within the Plan Area, primarily as PQP Lands, and is mapped primarily in the San Jacinto Mountains (25,424 of 27,002 acres). Around 5 percent of this vegetation sub-association is found within the San Bernardino Mountains (1,482 acres), and less than 0.5 percent is in the Agua Tibia Mountains. Less than 0.1 percent (18 of 27,002 acres) of this habitat category is conserved within Additional Reserve Lands.

The woodlands and forest habitat category will receive 72 percent conservation within the Plan Area and is comprised of 5 vegetation sub-associations including black oak forest, broadleaved upland forest, coast live oak woodland, dense Engelmann oak woodland, and undifferentiated oak woodland. Most limited in distribution among these is Engelmann oak woodland whose distribution is primarily restricted to western Riverside and San Diego counties, with some occurrences documented in Orange and Los Angeles counties. Because the undifferentiated oak woodland sub-association could encompass areas of Engelmann oak woodland, coast live oak woodland, and broadleaved upland forest, the species composition of mapped areas cannot be confirmed without field verification. However, habitat mapping suggests that Engelmann oak woodland will receive 61 percent conservation within the Plan Area. Overall, 18 percent of dense Engelmann oak woodlands are captured within the Additional Reserve Lands.

Riversidean alluvial fan sage scrub will receive 70 percent conservation within the Plan Area and is fairly well represented across all bioregions. In terms of acreage, the greatest amount of this vegetation sub-association is found within the Riverside Lowlands (3,415 acres) and the San Jacinto Foothills (1,191 acres) where 62 percent and 91 percent conservation within each bioregion will be achieved, respectively. Around 44 percent of this habitat category within the Plan Area is captured within the Additional Reserve Lands.

The chaparral habitat category is comprised of four vegetation sub-associations including chamise chaparral, red shank chaparral, semi-desert chaparral and undifferentiated chaparral. Most of this habitat category was mapped as undifferentiated chaparral, which likely encompasses areas of the other chaparral sub-associations. Combined, this habitat category will receive 66 percent conservation within the Plan Area, with around 16 percent of it falling within Additional Reserve Lands. However, the semi-desert chaparral sub-association, which was only mapped on 15 acres in the Desert Transition Bioregion, likely will not be conserved and is the only vegetation sub-association that falls outside of the Conservation Area.

Peninsular juniper woodland will receive approximately 57 percent conservation within the Plan Area with around 26 percent of its conservation in PQP Lands and 31 percent in the Additional Reserve Lands. It is distributed within the Santa Ana Mountains (19 acres), Riverside Lowlands (914 acres), San Jacinto Foothills (2 acres), San Jacinto Mountains (15 acres) and Desert

Transition bioregions (118 acres). The majority of this vegetation sub-association is found within the Riverside Lowlands and Desert Transition bioregions where it will receive 57 percent and 65 percent conservation, respectively. None of the 19 acres of peninsular juniper woodland mapped within the Santa Ana Mountains Bioregion will be conserved.

Coastal sage scrub is comprised of three mapped vegetation sub-associations including Diegan coastal sage scrub, Riversidean sage scrub and undifferentiated sage scrub. A majority of coastal sage scrub within the Plan Area is mapped as Riversidean sage scrub (129,533 of 148,604 acres; 87 percent), which is the most xeric expression of coastal sage scrub south of Point Conception (Holland 1986). However, the MSHCP suggests that boundaries between Riversidean and Diegan sage scrub may have been poorly distinguished during habitat mapping. Additionally, more recent vegetation classification schemes (Sawyer and Keeler-Wolf 1995) recognize a greater number of sub-associations (or series) within coastal sage scrub that reflect the range of diversity in this vegetation category that should be captured during conservation planning. The MSHCP does not assess whether this diversity has been captured within the Conservation Area. Overall, coastal sage scrub receives 53 percent conservation within the Plan Area with 30 percent of its conservation falling within Additional Reserve Lands. The best conserved coastal sage scrub sub-association is Riversidean sage scrub, receiving 54 percent conservation. Diegan coastal sage scrub will receive 41 percent conservation, with 8 percent of this being captured within Additional Reserve Lands. The San Bernardino Mountains Bioregion receives the lowest percent of conservation of the broad coastal sage scrub habitat category with 21 percent conservation in PQP Lands and none in the Additional Reserve Lands; however, only 0.23 percent of the total coastal sage scrub in the Plan Area occurs in this bioregion.

The desert scrub habitat category is comprised of three vegetation sub-associations and is found primarily within the San Jacinto Foothills (2,221 acres), San Jacinto Mountains (1,369 acres) and Desert Transition bioregions (5,319 acres), with just 3 acres of big sagebrush scrub occurring in the Santa Ana Mountains. This habitat category will receive moderate conservation in the Plan Area (50 percent) with 38 percent of its conservation falling within Additional Reserve Lands. However, the sub-associations within this vegetation category receive uneven representation with 31 percent conservation of big sagebrush scrub, 57 percent conservation of Sonoran desert scrub and 97 percent conservation of semi-desert succulent scrub.

Grasslands are comprised of two vegetation sub-associations, valley and foothill grassland and non-native grasslands, with non-native grasslands representing 98 percent (129,755 acres) of the grasslands in the Plan Area. Grasslands are found within every bioregion and are an important habitat category for a number of target species including Stephens' kangaroo rat, burrowing owls, and raptors. Around 31 percent of grasslands (40,799 acres) within the Plan Area fall within the MSHCP Conservation Area, including 14 percent within the Additional Reserve Lands. Notably, 99 percent of native valley and foothill grasslands (2,705 acres) will be conserved in the Plan Area with 85 percent of that conservation anticipated in Additional Reserve Lands. However, the broader grasslands category as a whole is not well represented in the MSHCP Conservation Area.

Cismontane alkali marsh is characterized by the State Resources Agency as a "very threatened" plant community and is restricted to 150 acres in the Plan Area. It is found within the Riverside

Lowlands and Desert Transition bioregions, with a majority of it being found within the Desert Transition Bioregion (134 of 150 acres). Eighteen percent of cismontane alkali marsh within the Plan Area will be conserved with 17 percent of that conservation achieved in the Additional Reserve Lands.

The meadow vegetation category is comprised of two sub-associations, montane meadow and wet montane meadow. This habitat category occurs within the San Bernardino Mountains (58 acres), Agua Tibia Mountains (11 acres) and San Jacinto Mountains bioregions (403 acres), with most of its area occurring within the San Jacinto Mountains. Eighteen percent of this vegetation category, all within PQP Lands, is being conserved in the Plan Area.

As expected, agricultural lands and developed or disturbed lands are not well represented in the MSHCP Conservation Area (11 percent and 4 percent, respectively) relative to their occurrence within the Plan Area. However, in gross acreage, our analysis showed approximately 28,470 acres of these lands to be included within the MSHCP Conservation Area, including 7,816 acres projected to occur within the Additional Reserve Lands. As previously discussed, all land proposed as PQP Land will be reviewed during the PQP Land Status Review to ensure it possesses conservation value. Agricultural and developed or disturbed lands captured within the Additional Reserve Lands may be necessary to complete important linkages or other elements of the reserve design configuration. We anticipate that project-specific reviews during the implementation phase of the MSHCP will be used to exclude developed or agricultural acreage from the Additional Reserve Lands unless such lands are needed to minimize edge conditions, complete linkages, or otherwise optimize the configuration of the Additional Reserve Lands.

In summary, all of the broad vegetation categories and all but one of the vegetation sub-associations are captured within the MSHCP Conservation Area. The proportion of the vegetation categories and sub-associations conserved in the Plan Area tends to be dictated to the greatest degree by the level of conservation afforded in PQP Lands since 69 percent of the MSHCP Conservation Area falls within PQP Lands. Thus, conservation of habitat diversity in the Plan Area will rely upon the involvement of PQP Landowners as well as the ultimate assembly of the Additional Reserve Lands.

Configuration

To configure the Conservation Area, the MSHCP relies upon existing cores and other blocks of land in public or quasi-public ownership and provides Criteria that are aimed at the conservation of additional cores, non-contiguous habitat blocks, and linkages (MSHCP Section 3.2.3 of the MSHCP). The cores are large blocks of habitat that will comprise the foundation of the reserve system. Ideally, cores are safeguarded from land uses that compete with species and habitat conservation and are large enough to buffer species populations from adjoining land uses that degrade habitat integrity (*i.e.*, edge effects). The cores are intended to protect large habitat blocks that support large populations of target species and the natural processes on which they depend. Large habitat areas help provide for species persistence over time because large populations are less vulnerable to inbreeding, chance demographic events, and environmental disturbances. Large areas with intact natural processes are also best suited to recover from environmental disturbances without management intervention. Thus, cores should be large

enough to accommodate the scale of natural disturbance regimes such that only a relatively small part of the core is disturbed at any one time (Noss and Cooperider 1994). The viability of populations of target species and integrity of habitat areas within core areas relies upon there being a source of colonists to re-colonize disturbed areas (Noss and Cooperider 1994). Large core areas are also necessary to conserve certain focal species with large area requirements, such as top carnivores, that provide important ecosystem functions. Even the largest cores may be individually insufficient to support viable populations of certain broad ranging species such as mountain lion, which likely requires a series of interconnected core areas to persist (Noss and Cooperider 1994).

The MSHCP also proposes to conserve non-contiguous habitat blocks, which, as the name suggests, are relatively isolated habitat areas that are proposed for conservation. These areas may be vulnerable to loss of biodiversity over time due to their small size, high edge to interior ratio, and isolation. Most of the proposed non-contiguous habitat blocks are intended to conserve species or habitats such as vernal pools, endemic plants, and the Delhi sands flower loving fly. Non-contiguous habitat blocks may also contribute to overall reserve design by operating as stepping stones for species dispersal between core areas. However, completely isolated habitat blocks are only likely to serve as stepping stones for aerial dispersers or highly mobile terrestrial species that can negotiate the urban matrix. Due to their relative isolation and vulnerability to edge influences, active management will be necessary within non-contiguous habitat blocks to maintain their species populations and/or habitat integrity.

Connectivity among cores and non-contiguous habitat blocks is proposed to be maintained through identified linkages. In general, linkages have two primary reserve design functions, 1) they serve as habitat for target species and 2) they serve a conduit function to convey species between cores and/or non-contiguous habitat blocks (Noss and Cooperider 1994). Where linkages are likely to serve as an extension of core areas and/or may possess the only suitable habitat for those species, they should be wide enough and contain an adequate amount of interior habitat to minimize edge effects and mortality risks for those species (Noss and Cooperider 1994). To optimize their conduit function, linkages should possess habitat that suits the preferences of the species moving through them and may need to contain suitable habitat to support the life history requirements of target species if their length is greater than the normal dispersal distance for that species (Noss and Cooperider 1994). Linkages that support resident populations of a species are more likely to be effective at supporting long distance dispersal for those species (Noss and Cooperider 1994).

For species conserved within identified core or non-contiguous habitat block areas, linkages improve species persistence and stability within conserved areas by allowing immigration and emigration to dampen population oscillations and maintain genetic diversity. Linkages are also important for allowing wildlife dispersal to refugia when catastrophic wildfires, floods or other environmental disturbances occur. Over longer time periods, linkages may be important to allow for shifts in species distributions in response to climate change (Noss and Cooperider 1994).

The MSHCP proposes to assemble linkages that maintain habitat values as well as linkages that provide physical connections but may be incapable of supporting the habitat preferences or life history requirements of species moving through them. These latter connections are commonly

referred to elsewhere as “corridors.” The MSHCP uses the term “linkage” broadly, to jointly refer to both of these types of connections. Whether a connection constitutes a linkage or a corridor can only be answered relative to the species of interest. In general, corridors should only be designed for species whose normal dispersal distance exceeds their length. Bottlenecks within linkages, such as highway underpasses, may or may not undermine their effectiveness depending on the species intended to move through them, the context of the bottleneck, and the suitability of surrounding areas for supporting resident species populations (Noss and Cooperider 1994). This highlights the need for the MSHCP to provide for “functional connectivity” rather than simple physical connectivity. Determinants of functional connectivity include: mobility or dispersal characteristics of the target species; other behavioral factors, life history requirements and mortality risks for individual species; distance between patches of suitable habitat; barriers to movement (*e.g.*, roads, fences, streams); and interference from humans, predators, etc. (Noss and Cooperider 1994). Connections that encounter roadways, agricultural land or other land uses that may impair their function for wildlife movement are referred to by the MSHCP as “constrained linkages.”

To maintain connectivity, the MSHCP Conservation Area proposes to incorporate 19 linkages and 29 constrained linkages. One of the linkages and 5 of the constrained linkages fall within existing PQP Land, with the remaining 42 reserve connections proposed to be assembled as part of the Additional Reserve Lands. Notably, 60 percent of the linkages are described as “constrained linkages” indicating that their design may be particularly narrow, encounter a road or highway crossing(s), incorporate disturbed, developed or agricultural land uses, involve the use of culverts or be restricted to a modified stream channel, and/or are adjoined by land uses that will likely impair their suitability for supporting movement of some or all of the target species. Given the narrowness of many of the linkages, their high edge to interior ratios, and the constraints that many of them face such as developed land uses and roads, functional connectivity between habitat areas will necessitate using the high end of the conservation Criteria ranges targeted for cells or cell groupings (*e.g.*, Proposed Constrained Linkages 1, 2, 14 and 19). Additionally, large linkage distances between several core areas (*e.g.*, Alberhill to Antelope Valley, Lake Mathews to Lake Perris, Santa Rosa Ecological Preserve to Santa Margarita Ecological Preserve) will necessitate conservation of suitable and diverse live-in habitat within the linkages in order to preserve functional connectivity among core areas for a number of target species. Maximizing linkage areas will also be critical to the conservation of target species with limited distributions that are restricted to or occur within linkage areas. Guidelines Pertaining to Urban/Wildlands Interface (MSHCP Section 6.1.4) for the management of edge factors such as urban runoff, toxics, lighting, noise, and invasive species will also be of great importance to the maintenance of functional connectivity within linkages.

Because of the isolation of several of the proposed habitat areas and the large number of constrained linkages there is likely to be a gradient of connectivity maintained for different suites of species within the Plan Area. Avian species with strong dispersal capabilities and urban tolerant species will likely remain connected among the various habitat conservation areas. Large mammal species, such as mountain lion and bobcat, will likely be connected among many of the habitat areas through linkages but could become functionally isolated if constrained linkages fail to address behavioral factors limiting movement (*e.g.*, roadway undercrossing dimensions) or high mortality factors are created or allowed to persist between core areas (*e.g.*,

expansion of I-15). Arthropods, small mammals, and herpetofauna are likely to be functionally isolated within isolated cores and non-contiguous habitat blocks and, due to their generally shorter dispersal distances, could be functionally isolated within habitat areas that are connected by linkages that cross highways or do not provide for suitable live-in or movement habitat. In some cases, constrained linkages traversed by two lane roadways may be sufficient to isolate populations of small mammals (Mader 1984, Mader, Schell & Kornacker 1990). How plant species respond to reduced connectivity among habitat areas will be determined by their mode of dispersal and pollination mechanisms. Plant species that rely upon specialist pollinators are likely to be most detrimentally affected by reduced habitat connectivity.

The largest habitat blocks identified in the MSHCP Conservation Area include 13 core areas that are in PQP Lands (“existing cores”) and 7 additional core areas proposed within the Additional Reserve Lands (“proposed cores”). To augment the size and improve the configuration of the core areas, the Criteria also target habitat for inclusion into the Additional Reserve Lands that will adjoin five of the existing cores (“proposed extension of existing cores”). The largest blocks of habitat identified as core reserves include the San Jacinto Mountains in the San Bernardino National Forest along with the adjoining Potrero Area of Critical Environmental Concern and portions of the Santa Ana Mountains in the Cleveland National Forest. These lands are large intact habitat blocks and together they comprise 44 percent of the MSHCP Conservation Area and 64 percent of the PQP Lands. In total, eight of the existing cores and three of the proposed cores are proposed to exceed 10,000 acres in size (Table 5). In general, the Guidelines Pertaining to Urban/Wildlands Interface for the management of edge factors such as urban runoff, toxics, lighting, noise, and invasive species gain increasing relative importance for conservation of target species within the cores as they become smaller and more disjunct.

Largest among the proposed cores are the Vail Lake/Sage and Wilson Valley core and the Badlands/Potrero and DeAnza Cycle Park core (50,000 and 29,940 acres, respectively). Combined with the Cactus Valley and Upper San Jacinto River core areas, many of the core areas in the eastern half of the planning area abut one another, creating large interconnected core networks that maintain connectivity without narrow linkages. One exception to this is the San Bernardino Mountains core area that is isolated from other cores within the Plan Area. However, this core area does abut the National Forest within San Bernardino County outside of the Plan Area. Thus, effective core size in the eastern half of the Plan Area is often larger than is reflected in data tables, which should help to maintain viable populations of target species and conserve ecological processes in these areas.

In contrast, the cores in the western half of the Plan Area (Riverside Lowlands and Santa Ana Mountain bioregions) are relatively disconnected and rely upon linkages or constrained linkages to maintain connectivity among them. Most notable among these is the Cleveland National Forest/Santa Ana Mountains, the largest of the core areas in the western half of the Plan Area. The Cleveland National Forest is proposed to be connected to the Santa Ana River/Prado Basin by constrained linkages that pass under SR-91. Elsewhere it is connected to the Alberhill and Lake Mathews/Estelle Mountain Area cores by linkages that pass under I-15 and is connected to the Santa Rosa Ecological Preserve by Proposed Linkage 9.

Table 5. Size of Existing and Proposed Core Areas

Core	Status	Core Area (acres)	Extension of Core Area (acres)	Total of Core + Extension (acres)
San Bernardino National Forest and the Potrero Area of Critical Environmental Concern	Existing	149,750		149,750
Santa Ana Mountains, Cleveland National Forest	Existing	71,490		71,490
Vail Lake, Sage and Wilson Valley Areas	Proposed	50,000		50,000
Badlands/Potrero and DeAnza Cycle Park	Proposed	29,940		29,940
Diamond Valley Lake, Lake Skinner and Johnson Ranch	Existing	24,360	4690	29,050
Beauty Mountain Management Area and Anza Borrego Desert State Park	Existing	24,750		24,750
Lake Mathews/Estelle Mountain Area	Existing	15,610	8100	23,710
Lake Perris State Recreation Area and San Jacinto Wildlife Area	Existing	17,470	3330	20,800
East Cactus Valley	Proposed	11,890		11,890
Santa Ana River, Prado Basin and Environs	Existing	10,740	270	11,010
Agua Tibia Mountains	Existing	10,460		10,460
San Bernardino Mountains	Existing	9,610		9,610
Santa Rosa Plateau Ecological Reserve	Existing	8,360		8,360
Alberhill Area	Proposed	7,470		7,470
Antelope Valley	Proposed	5,050		5,050
Santa Margarita Ecological Reserve	Existing	4,500		4,500
Lake Elsinore	Existing	3,010	1290	4,300
Silverado Ranch	Proposed	4,290		4,290
Upper San Jacinto River	Proposed	3,220		3,220
Sycamore Canyon Park	Existing	2,500		2,500

The southwesterly connection between the Santa Ana Mountains and the Palomar Mountains in San Diego County is of particular concern. This connection has been highlighted for its importance in maintaining a viable mountain lion population within the Santa Ana Mountains (Penrod 2000, Beier 1993). Trending to the southwest from the Cleveland National Forest within the Santa Ana Mountains are the Santa Rosa Ecological Preserve and Santa Margarita Ecological Preserve core areas. Connectivity between the Santa Rosa Ecological Preserve and the Cleveland National Forest is provided by Proposed Linkage 9, which has a favorable interior to edge ratio, but could be susceptible to fragmentation or construction of barriers as a result of rural mountainous development. An indirect connection between the Cleveland National Forest and the Santa Margarita Ecological Reserve is proposed to be maintained through Proposed

Linkage 10 and Proposed Constrained Linkage 13, which connect the Santa Rosa Plateau with the Santa Margarita Ecological Reserve. Proposed Linkage 10 is lengthy at 5.5 miles with 45 percent (685 of 1,520 acres) of its habitat modeled as suitable for mountain lion. Proposed Constrained Linkage 13 consists of Murrieta Creek, which has compromised habitat values due to surrounding urban and agricultural uses and flood control maintenance activities. No habitat within this 1,400-acre connection is modeled as suitable for mountain lion. Other linkages between the Santa Rosa Plateau and areas to the south outside of the Plan Area (Proposed Constrained Linkages 9-12) are proposed, but all are narrow, have high edge to interior ratios, and are vulnerable to fragmentation or construction of barriers.

However, the greatest constraint to mountain lion movement is presented in the southwest corner of the Plan Area where Proposed Linkage 10 meets Proposed Constrained Linkage 14 at the bottleneck presented by the existing I-15. Proposed Constrained Linkage 14 has two forks. To the east it follows Temecula Creek and to the southeast it follows Pechanga Creek where it meets an isolated BLM parcel on the border of Riverside and San Diego counties identified as Existing Linkage A. Best among these is the southeast connection along Pechanga Creek as the eastern connection adjoins SR-79 and becomes extremely constrained where Temecula Creek becomes a maintained channel. Ultimately, functional connectivity for mountain lion and other terrestrial species between the Santa Ana Mountains and the ranges to the east will rely upon addressing the barrier presented by I-15 through the creation of suitable undercrossings or overcrossings and managing mortality risks away from those crossings. For the I-15 roadway improvements, the MSHCP has identified “future guidelines for construction shall include provisions for wildlife crossings south of Temecula Creek to facilitate wildlife movement between Santa Ana Mountains and San Diego County (MSHCP Table 7-4). The MSHCP likely will not achieve functional connectivity for mountain lion unless construction of an overcrossing or undercrossing at the I-15 is implemented.

The Santa Ana River/Prado Basin core area is isolated from all other cores in the Plan Area other than the proposed Constrained Linkages 1 and 2 that are intended to connect it to the Santa Ana Mountains. Proposed Constrained Linkage 1 is primarily an upland habitat connection intended to facilitate movement of Cooper’s hawk, coastal California gnatcatcher, bobcat and mountain lion. It is constrained at its northern terminus by urban development and SR-91. Proposed Constrained Linkage 2 provides a riparian connection from the Cleveland National Forest to the Prado Basin and is intended to facilitate movement of coast range newt, western pond turtle, bobcat and mountain lion. It is constrained along much of its length by agricultural uses and urban development and, like Proposed Constrained Linkage 1, is intersected by SR-91. Our conceptual reserve design did not show a complete connection of either linkage to the Santa Ana Mountains when developed land uses and roads were excluded from the Additional Reserve Lands. Additionally, although Proposed Constrained Linkage 2 is intended to provide movement opportunities for coast range newt and mountain lion, no suitable habitat was modeled for either species within this linkage. Functional terrestrial movement of wildlife from the Santa Ana Mountains to the Prado Basin/Santa Ana River will rely on design considerations being implemented during SR-91 widening to minimize mortality risks in this area.

The Lake Elsinore core area, although on the same side of I-15 and in close proximity to the Cleveland National Forest, does not maintain a direct terrestrial connection to the Forest due to

existing urban development. Our conceptual reserve design suggests that this core will rely on an extremely narrow constrained linkage that intersects SR-74 to connect to the Alberhill core in the north and another narrow constrained linkage that intersects I-15 to connect with Proposed Linkage 8 to the east. Functionally, the Lake Elsinore core area is likely to operate as a stepping stone for aerial dispersers and urban tolerant species, with limited terrestrial movement opportunities to and from this core for less vagile species.

Another major core in the western portion of the Plan Area is the Lake Mathews/Estelle Mountain core, which abuts the Alberhill core area to the south. To its east, the Lake Matthew/Estelle Mountain core is connected to the Alberhill core by Proposed Linkage 3. However, our conceptual reserve design suggests that existing constraints could cause gaps in terrestrial continuity within this linkage. No connections are proposed between this area and the Sycamore Canyon Park core to the northeast, which is the most isolated of all cores in the Plan Area (10.8 miles from the nearest neighboring core). The Lake Mathews/Estelle Mountain core is surrounded by SR-91 to the north, I-15 to the west, SR-74 to the south and I-215 to the east.

Much of the adjoining Alberhill core is surrounded by the same roadways. However, portions of the Alberhill core extend to the west of I-15 and to the south of SR-74. The configuration of our conceptual reserve design suggests that the portion of Alberhill west of I-15 that is connected to the Cleveland National Forest will function more like a linkage or a constrained linkage than a core area due to its high perimeter to area ratio and the need for wildlife to cross I-15 to gain access to the remainder of Alberhill. Similarly, our conceptual reserve design suggests that some terrestrial discontinuity with that portion of Alberhill south of SR-74 is probable. Wildlife moving to and from the Lake Mathews/Estelle Mountain and Alberhill core areas will face bottlenecks crossing major roadways (4, 6, or 8 lane facilities) in all directions.

Wildlife moving from Lake Mathews/Estelle Mountain and Alberhill core areas to the east will be required to move through a lengthy constrained linkage along the lower San Jacinto River (Proposed Constrained Linkage 19) to reach the Lake Perris/San Jacinto Wildlife Area. Wildlife heading southeast will be required to traverse a long fragmented linkage (Proposed Linkage 8) with another bottleneck at I-215 to reach the Antelope Valley area. As no design remedies are proposed by the MSHCP for the existing undercrossing at I-215, this east-west connection is likely to be nonfunctional for many terrestrial dispersing species. Functional east-west connectivity for target species within the Plan Area will require managing mortality factors associated with roadway crossings and, due to the length of these linkages, maintenance of suitable live-in and dispersal habitat within them. Presently, there is little to no vegetation that will provide cover for dispersing wildlife along the lower San Jacinto River.

The proposed Antelope Valley/French Valley core area may be functionally isolated. All linkages proposed to connect to the Antelope Valley/French Valley core are interrupted by I-215 to the west and SR-79 to the east. Proposed Constrained Linkage 16 is intended to connect the Antelope Valley/French Valley to Proposed Linkage 8 in the west, which ultimately is connected to the Lake Mathews/Estelle Mountain and Alberhill core areas. As discussed above, making this east-west linkage functional in its current configuration and location will require management of road crossings and provision for or enhancement of live-in and dispersal habitat. Proposed Linkages 17 and 18 and existing Constrained Linkages A and E are expected to

facilitate connectivity and dispersal from the Antelope Valley/French Valley core to the proposed extension of the existing Diamond Valley Lake/Lake Skinner/Johnson Ranch core. Use of any of these existing or proposed constrained linkages requires successful crossing of SR-79 and other numerous existing transportation facilities that are proposed for future widening (e.g., Leon Road, Washington Street). The major Covered Activities potentially affecting Antelope Valley/French Valley core include the construction and/or expansion of Meniffee Road, Briggs Road, Whitewood Road, Clinton Keith Road, Los Alamos Road, and Auld Road. Our conceptual reserve design configuration of the proposed Antelope Valley/French Valley core reveals a fragmented archipelago of habitat patches vulnerable to edge effects and isolation due to non-viable constrained linkages. The configuration of our conceptual reserve design suggests that the portion of the Antelope Valley/French Valley core east of SR-79 will function more like a linkage or a constrained linkage than a core area due to its high perimeter to area ratio and the need for wildlife to cross SR-79 to gain access to the remainder of the Antelope Valley/French Valley core. The proposed Antelope Valley/French Valley core has the highest perimeter to area ratio of all the core areas proposed in the MSHCP.

Relative to core areas in the eastern portion of the Plan Area, the viability of populations and ability of cores to recover from environmental disturbance in the Riverside Lowlands and Santa Ana Mountain bioregions will rely to a greater degree upon land management, minimization of edge effects, and the ability to maintain functional connectivity across identified linkages.

In addition to the core areas, the MSHCP describes seven proposed and three existing non-contiguous habitat blocks within the Conservation Area (Table 6). Of the ten identified non-contiguous habitat blocks, six will be completely isolated from other habitat areas (Jurupa

Table 6. Size of Existing and Proposed Non-contiguous Habitat Blocks

Non-Contiguous Habitat Block	Status	Acres
Lakeview Mountains	Proposed	7,150
Box Springs Mountains	Existing	2,650
Vernal Pools west of Hemet	Proposed	1,260
Jurupa Mountains	Proposed	1230
Motte Rimrock Reserve	Proposed	1150
Bogart County Park	Existing	660
BLM Land north of Cahuilla Indian Reservation	Existing	660
Vernal Pools east of Lakeview Mountains	Proposed	330
Proposed Non Contiguous Habitat Block 1: Delhi Sands flower loving fly soil blocks*	Proposed	290
Proposed Non Contiguous Habitat Block 3 : Delhi Sands flower loving fly soil block*	Proposed	185
* Proposal to include within Conservation Area renegotiated subsequent to finalization of MSHCP documents. Therefore, these two non-contiguous habitat blocks were not captured within our CRD.		

Mountains, Proposed Non-Contiguous Habitat Block 1, Proposed Non-Contiguous Habitat Block 3, Motte Rimrock Reserve, Vernal Pools west of Hemet Reserve-comprised of two discontinuous habitat blocks, Vernal Pools east of Lakeview Mountains); two will be connected to other habitat areas by means of constrained linkages (Lakeview Mountains, Bogart County

Park); and two will be connected to other habitat areas by unconstrained linkages (BLM Land north of Cahuilla Indian Reservation, Box Springs Mountains). The Lakeview Mountains and Box Springs Mountains habitat areas are similar in size to the smaller identified core areas.

Relative to the core areas, effective conservation of target species and habitats within the non-contiguous habitat blocks will rely to an even greater degree upon land management, minimization of edge effects, and, where proposed, maintenance of functional connectivity across identified linkages.

Road crossings within cores and non-contiguous habitat blocks and across linkages represent an obstacle to achieving functional terrestrial connectivity among the habitat areas. Many of the core and non-contiguous habitat areas in the Plan Area will experience further fragmentation from roadways due to planned roadways, highways, or road widening projects that intersect or adjoin most of the habitat areas (Table 7). As discussed, roadways can have multiple adverse effects on conservation of rare and threatened species including providing ignition sources for wildfires.

Highways can be significant mortality sinks for many animals (*e.g.*, 32 percent of 27 mountain lion deaths in the Santa Ana Mountains were due to motor vehicle collisions; Beier and Barrett 1993). For many of the linkages that encounter highways or roadways, the MSHCP suggests that “an adequate wildlife underpass or overpass may need to be implemented to insure movement of species...and to reduce the chance of mortality from vehicle collision” (MSCHP Section 3.2.3, p. 3-74). The Plan also states that “To assist the Local Permittees in meeting the conservation goals of the Plan, Local Permittees proposing infrastructure projects which have the potential to affect habitat connectivity within the Criteria Area shall consult with the RCA at the pre-design stage regarding the size, location and configuration of wildlife crossings pursuant to the guidelines in Section 7.5.2” (Section 6.6, p. 6-83) and for State Permittees (*e.g.*, Caltrans), the Wildlife Agencies shall jointly review proposed projects within the Criteria Area (Section 6.6, p. 6-84). Section 7.5.2 of the MSHCP lists specific wildlife movement design features that are applicable when projects have the potential to affect habitat connectivity within the Criteria Area. It is our expectation that these design considerations will be implemented to meet the conservation goals of the plan and to maintain consistency with the Conservation Criteria and discussions of Cores and Linkages (Appendix 2 Proposed Permit Condition 19).

Table 7. Road Projects Proposed Within Existing and Proposed Habitat Areas

Core	Planned Rd. or Rd. Widening Project	Competing uses and/or ecological processes necessary to maintain habitat suitability
San Bernardino National Forest and the Potrero Area of Critical Environmental Concern	SR-243, SR-74, Bautista Canyon Rd.	Off road vehicles, recreation and hunting
Santa Ana Mountains, Cleveland National Forest	SR-74	
Vail Lake, Sage and Wilson Valley Areas	SR-79, SR-371, Pauba Rd.	
Badlands/Potrero and DeAnza Cycle Park	SR-60, Lambs Canyon Rd., San Timoteo Canyon Rd., Gilman Springs Rd.	
Diamond Valley Lake, Lake Skinner and Johnson Ranch	Rawson Rd., Borel Rd., Buck Rd., Butterfield Stage Rd.	Runoff of fertilizers, pesticides and herbicides from adjoining agricultural land uses.

Core	Planned Rd. or Rd. Widening Project	Competing uses and/or ecological processes necessary to maintain habitat suitability
Beauty Mountain Management Area and Anza Borrego Desert State Park	None	Hunting, collection, recreation, off-road vehicle use, poaching
Lake Mathews/Estelle Mountain Area	Hemet to Corona/Lake Elsinore CETAP	
Lake Perris State Recreation Area and San Jacinto Wildlife Area	Gilman Springs Rd., Ramona Expressway, Bridge Street, CETAP to Corona/Lake Elsinore, Nuevo Rd., Ethanac Rd., San Jacinto Rd.	Flood control, maintenance of floodplain processes
East Cactus Valley	None	
Santa Ana River, Prado Basin and Environs	SR-71, River Rd., Hammer Rd., I-15, Schleisman Rd., Van Buren Blvd., Mission Market	Water conservation, flood control
Agua Tibia Mountains	SR-79	
San Bernardino Mountains	None	
Santa Rosa Plateau Ecological Reserve	Clinton Keith Rd.	Hydrological processes
Alberhill Area	I-15, Hemet to Corona CETAP Corridor	Fire
Antelope Valley	Menifee Rd., Briggs Rd., Whitewood Rd., Clinton Keith Rd., Los Alamos Auld Rd.	Fire, invasion of exotic grasses
Santa Margarita Ecological Reserve	I-15	Floodplain processes
Lake Elsinore	None	
Silverado Ranch	Lang Rd., Ramsey Rd., Tule Creek Rd.	
Upper San Jacinto River	Ramona Expressway, SR-74, Soboba Rd.	Maintenance of fluvial processes
Sycamore Canyon Park	Alessandro Blvd.	Fire
Lakeview Mountains	Bridge Street, Hemet to Corona CETAP	Fire
Box Springs Mountains	Pigeon Pass Road, San Bernardino to Moreno Valley CETAP	Fire
Vernal Pools west of Hemet	Hwy. 79 Realignment	Protection of watershed for vernal pools
Jurupa Mountains	None	Fire
Motte Rimrock Reserve	None	Fire
Bogart County Park	None	
BLM Land north of Cahuilla Indian Reservation	Cary Road widening	
Vernal Pools east of Lakeview Mountains	Hwy. 79 Realignment	Protection of watershed for vernal pools

Conservation within several of the identified core areas may be further compromised by competing land uses or actions that may interfere with natural processes. Most notably, water conservation in the Santa Ana River/Prado Basin and flood control projects on the San Jacinto River could impact conservation of species reliant upon habitat conditions that are maintained by flood regimes and hydrological processes. Cooperative land management and MSHCP participation of PQP Landowners in the Santa Ana River/Prado Basin, in particular, will be essential to the conservation of a number of identified target species.

The Cedar fire, which burned in excess of 200,000 acres in San Diego County and 80,589 acres of the San Diego Multiple Species Conservation Plan Preserve in the fall of 2003, demonstrates that the scale of one of the more common forms of natural disturbance in the Plan Area can match, if not exceed, the size of most of the conserved habitat areas. While fires of this magnitude represent a tiny percentage of those in recorded history (Keeley and Fotheringham 2001), contemporary fire history demonstrates that stand-replacing crown fires driven by Santa Ana winds in southern California shrublands can easily burn tens of thousands of acres each

decade. As an example, more than 40 percent of the fire management units identified within the 37,000-acre Orange County Central Coastal Natural Community Conservation Plan Reserve System have burned since 1993 (Wills and Montague 2002).

Additionally, as fire frequency has been shown to be closely correlated with human population size (Keeley and Fotheringham 2001), it is reasonable to expect that fires will become more frequent within the MSHCP Conservation Area as road fragmentation and population size increases. Areas that burn too frequently may enter a positive feedback loop where frequent fire leads to habitat type conversion from mature shrubs and woodlands that require high ignition temperatures, to grasses and flashier fuels that are more easily ignited, resulting in more frequent ignitions and shorter fire return intervals (Jon Keeley, pers. comm.). This appears to be what has happened within the Box Springs Mountains where anthropogenic ignitions have resulted in recurrent fires and an increased predominance of grasses. Species that use more mature vegetation communities (*i.e.*, later seral stages) will likely be adversely affected in the Plan Area by shorter fire return intervals. Control of anthropogenic ignition sources, active land management within cores and non-contiguous habitat blocks, and maintenance of connectivity among habitat areas will be essential for ameliorating the effects of fragmentation within the Plan Area (*i.e.*, provide sources for re-colonization of disturbed areas).

In conclusion, configuration of the MSHCP Conservation Area relies upon the existing PQP Lands and interpretation of the Criteria and Cores and Linkages discussions to assemble the Additional Reserve Land in a meaningful way for the long-term conservation of Covered Species and their habitats. Our configuration of the conceptual reserve design reveals that active participation of the PQP Landowners will be important in facilitating the long-term conservation of species and habitat within the Plan Area. Additionally, permitted uses such as planned roadways and flood control improvements will likely compete with conservation objectives of maintaining functional east-west connectivity across the Plan Area and maintenance of target species that are dependent upon natural floodplain processes. Based on existing constraints and our interpretation of the Criteria, the western portion of the Plan Area is likely to be functionally isolated from the Desert Transition, San Jacinto Foothill, San Jacinto Mountain and San Bernardino Mountain bioregions for a number of target species. How well the habitat areas are guarded from the effects of increased fragmentation associated with planned uses within the Plan Area will rely on the provisions of the MSHCP for active management within the habitat areas, implementation of the Guidelines Pertaining to Urban/Wildlands Interface for the management of edge factors, and implementing wildlife movement design features associated with roadways. The overall benefit of the MSHCP is the ability to provide meaningful conservation by way of establishing large, interconnected blocks of natural areas to sustain species and their habitats. Although the MSHCP Conservation Area will function at varying levels dependent on individual species needs, Plan implementation will establish new core habitat areas, extend existing core habitat areas, and minimize habitat fragmentation within the Plan Area.

Reserve Management and Monitoring

As described above in the Description of the Proposed Action, the goal of the management program within the MSHCP Conservation Area will be to establish self-sustaining reserve areas through an adaptive management strategy designed to maintain the flexibility necessary to

incorporate new information into the management practices. Initial baseline data will be collected in existing PQP Lands within the first five years of Plan implementation and within the first four years of acquiring Additional Reserve Lands. In addition, reserve managers, in coordination with the RCA and RMOC, will conduct or oversee scientific research within the reserves that will provide information to be incorporated into adaptive management strategies. Overall, reserve management will be designed to benefit Covered Species by providing the specific habitat requirements necessary for each species. Monitoring and scientific research efforts will allow reserve managers to continually improve the effectiveness of their management practices by providing information regarding the distribution and habitat requirements of Covered Species.

The MSHCP (Section 5.2) proposes general management measures that will be implemented to address the processes, threats and disturbances that currently affect natural ecosystems. These general management measures are broad restoration and management techniques that do not require species-specific or location-specific information to be effective. In general, reserve managers will aim to control natural and anthropogenic disturbance regimes for the benefit of species and their habitats. Management measures to address disturbance from unauthorized access include appropriate fencing, gates, and signage; trash removal; and trespass control in response to illegal dumping, off-road vehicle use, and vandalism. Other actions proposed to maintain or improve habitat conditions include monitoring natural regeneration, control or elimination of invasive exotic species, fire control, prescribed fire, and habitat restoration or creation. Each of these management measures may be refined through adaptive management based on monitoring information that will be used to determine existing habitat conditions.

In addition to the general management measures, species-specific management activities based on known core locations and primary habitat types are identified in the MSHCP (Volume II Species Accounts, Table 5-2, and Table 9-2) to address the known threats to individual species. These management activities generally provide guidance for habitat maintenance and restoration where Covered Species are known to be present and will be implemented in addition to general ongoing management actions. Unless otherwise specified in species-specific conservation objectives, species presence and habitat use will be verified at 75 percent of the locations identified for each species as measured at a minimum of once every eight years. Species declines below this or other species-specific thresholds as specified in the species-specific objectives will trigger additional management actions.

CUMULATIVE EFFECTS

The Service must consider both the effects of the proposed action and the cumulative effects of other activities in determining whether the action is likely to jeopardize the continued existence of a listed species or result in the destruction or adverse modification of critical habitat. Cumulative effects are defined as the effects of future State, local government, or private actions that are reasonably certain to occur in the action area. Future Federal actions are not considered cumulative to the proposed action because they require separate consultation pursuant to section 7 of the Act.

It is expected that the majority of lawful, non-Federal actions within the MSHCP permit area for the life of the permit will fall under the purview of the proposed permit and are therefore considered as effects of the proposed action rather than cumulative effects. Other actions by non-Federal and non-Permittees are likely to occur over the life of the Permit, however, the scope and affects of such activities are indeterminable at this time.

INCIDENTAL TAKE

Section 9 of the Act and Federal regulations pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or attempt to engage in any such conduct. Harm is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2) of the Act, taking that is incidental to and not intended as part of the proposed action is not considered to be prohibited taking under the Act provided that such taking is in compliance with this Incidental Take Statement.

The proposed MSHCP and its associated documents clearly identify the anticipated impacts to affected species likely to result from the proposed taking and the measures that are necessary and appropriate to minimize those impacts. All conservation measures described in the proposed MSHCP, together with the terms and conditions described in any associated implementing agreement and any section 10(a)(1)(B) permit or permits issued with respect to the proposed MSHCP, are hereby incorporated by reference as reasonable and prudent measures and terms and conditions within this Incidental Take Statement pursuant to 50 Federal Register 402.14 (I). Such terms and conditions are non-discretionary and must be undertaken for the exemptions under section 10(a)(1)(B) and Section 7(o)(2) of the Act to apply. If the Permittees fail to adhere to these terms and conditions, the protective coverage of the section 10(a)(1)(B) permit and section 7(o)(2) may lapse. Based on the proposed MSHCP and the analysis of the effects of the proposed action provided in this opinion, the Service anticipates that the take specified below under the Species by Species Evaluations may occur as a result of the proposed action.

The incidental take statement provided in this conference opinion for unlisted animals that are Covered Species Adequately Conserved does not become effective until the unlisted Covered Species Adequately Conserved are listed and this conference opinion is adopted as the biological opinion issued through formal consultation. The Act does not prohibit the take of listed plant species, consequently, section 7(b)(4) and 7(o)(2) of the Act do not apply to the listed plants. Nevertheless, the Fish and Wildlife Service must review the effects of its own actions on listed plants, even when those listed plants are found on private lands. In approving the MSHCP and issuing an incidental take statement during the intra-Service section 7 consultation, the Fish and Wildlife Service must determine that the permit will not “jeopardize the continued existence” of any listed plant. In the interest of conserving listed and other plant species covered, the MSHCP includes measures to protect listed and non-listed plant species within the Plan Area.

SPECIES BY SPECIES EVALUATIONS

In order to facilitate our species by species analysis for Covered Species associated with vernal pool and alkali playas, we are providing the following generalized discussion.

Vernal Pool and Alkali Playas

The Plan Area is occupied by numerous species that depend on vernal pools and alkali playas, including their surrounding watersheds, as habitat. Species reliant upon or associated with these habitat types that are addressed by the MSHCP include Riverside fairy shrimp, Santa Rosa Plateau fairy shrimp, vernal pool fairy shrimp, California Orcutt grass, Coulter's goldfields, Davidson's saltscale, little mousetail, Orcutt's brodiaea, Parish's brittle-scale, prostrate navarretia, San Diego button-celery, San Jacinto Valley crownscale, smooth tarplant, spreading navarretia, thread-leaved brodiaea, vernal barley, and Wright's trichocoronis. The effects of the MSHCP on each of these species are assessed in the individual species evaluations below.

Vernal pools are a type of ephemeral wetland that occurs within a range that extends from southern Oregon through California into northern Baja California, Mexico (Fish and Wildlife Service 1998b). They require a unique combination of climatic, topographic, geologic, and evolutionary factors for their formation and continued existence. Vernal pools form in regions with Mediterranean climates where shallow depressions fill with water during fall and winter rains and then dry up when the water evaporates in the spring (Collie and Lathrop 1976; Holland 1976, 1978; Holland and Jain 1977, 1988; Thorne 1984). Downward percolation of water within the pools is prevented by the presence of an impervious subsurface layer consisting of claypan, hardpan, or volcanic stratum (Holland 1976, 1988). Seasonal inundation makes vernal pools too wet for adjacent upland plant species adapted to drier soil conditions, while rapid drying during late spring makes pool basins unsuitable for typical marsh or aquatic species that require a more permanent source of water. Upland vegetation communities associated with vernal pools include needlegrass grassland, annual grassland, coastal sage scrub, maritime succulent scrub and chaparral (Fish and Wildlife Service 1998b).

Threats to vernal pools can be divided into three major categories: 1) direct destruction of vernal pools as a result of construction, vehicle traffic, domestic animal grazing, dumping, and deep plowing; 2) indirect threats which degrade or destroy vernal pools over time including altered hydrology (e.g., damming, draining), invasion of alien species, habitat fragmentation, and associated deleterious effects resulting from adjoining urban land uses; and 3) potentially catastrophic long-term threats including the effect of isolation on genetic diversity and locally adapted genotypes, air and water pollution, drastic climatic variations, and changes in nutrient availability (Bauder 1986, U. S. Fish and Wildlife Service 1993a).

Losses of vernal pool habitat throughout Southern California are considered nearly total (Fish and Wildlife Service 1998b). Vernal pool habitat is ranked by the California Department of Fish and Game's Natural Diversity Data Base in priority class G1-S1, which is reserved for habitats which occur on less than 2,000 acres globally. Vernal pool habitat continues to be impacted by numerous threats throughout the rapidly developing southern California area threatening the long-term survival and recovery of plant and animal species endemic to this unique habitat.

Conservation efforts for vernal pool species should address the major causes of decline for the species; habitat loss and degradation resulting from both direct and indirect impacts to vernal pools, and long-term threats resulting from the greatly reduced distribution of the species. Existing vernal pools and their associated watersheds should be secured from further loss and degradation in a configuration that maintains habitat function and species viability (U. S. Fish and Wildlife Service 1998b).

Based on our analysis, 42,349 acres of modeled habitat, with the potential to harbor vernal pools and alkali playa and their associated species, occur within the Plan Area. Approximately 8,831 acres (21 percent) of this modeled habitat is within existing PQP Lands. Those vernal pools that are currently known to occur within the Plan Area are summarized in Table 8. However, surveys for vernal pools and their associated species are lacking for much of the Plan Area, therefore, this should not be considered a complete listing.

Based on our analysis of the Conceptual Reserve Design, approximately 7,686 acres (18 percent) of the modeled habitat are within the Additional Reserve Lands and approximately 8,831 acres (21 percent) are within existing PQP Lands. Thus, the MSHCP Conservation Area will include 16,517 acres (39 percent) of modeled habitat for vernal pool and alkali playa habitats associated species.

The remaining 25,832 acres (61 percent) of modeled habitat outside the MSHCP Conservation Area would be vulnerable to loss. However, we anticipate that impacts to vernal pools, alkali playas and their associated watersheds would be avoided and minimized through implementation of the Riparian/Riverine Areas and Vernal Pools policy throughout the Plan Area, in conjunction with the species specific objectives. In addition, many vernal pool and alkali playa species are included on the MSHCP Narrow Endemic Plant Species and Criteria Area Survey Plant Species lists and will benefit from implementation of the surveys and avoidance requirements under the Protection of Narrow Endemic Plant Species and Additional Survey Needs and Procedures. These include San Diego Ambrosia, spreading navarretia, California Orcutt grass, Wright's trichocoronis, San Jacinto Valley crownscale, Parish's brittlescale, Davidson's saltscale, thread-leaved brodiaea, Coulter's goldfields, little mousetail, prostrate navarretia, and smooth tarplant. These policies are summarized above under the Conservation Measures section of this biological opinion.

Vernal pools and alkali playa habitats may be subjected to indirect effects both inside and outside of the Conservation Area as described in the Generalized Effects section of this opinion and include altered hydrology from adjacent development (loss of watershed area), urban runoff (water quality), increased human accessibility and associated habitat degradation, and the introduction of exotic plant species.

Table 8. Status of Known Vernal Pools within the MSHCP Plan Area.

Vernal Pool Name	Location	Acres excluding watershed	Species Present	Status	Threats, Comments
Skunk Hollow Pool	North of Temecula	33	Riverside fairy shrimp, vernal pool fairy shrimp, California Orcutt grass, spreading navarretia, Munz's onion	Conserved in perpetuity in Barry Jones Mitigation Bank	Non-native invasive plants, and possible incremental effect to watershed including increase in siltation and increase in pollution from road run-off due to proposed adjacent pipeline and road construction.
Field Pool	North of Temecula	3	Riverside fairy shrimp	Conserved in perpetuity in Barry Jones Mitigation Bank	Non-native invasive plants, and possible incremental effect to watershed including increase in siltation and increase in pollution from road run-off due to proposed adjacent pipeline and road construction.
Johnson Ranch Created Pools	North of Temecula	2.08	Riverside fairy shrimp	Conserved in perpetuity	Non-native invasive plants
Madison Pool	Murrieta	Unknown	Spreading navarretia	Private	Unknown
Clay Complex	Murrieta	Unknown	Unknown	Private	Mowing, location of proposed City of Murrieta treatment wetland
Auld Pool	North of Temecula	Unknown	Western spadefoot toad, unidentified fairy shrimp	Private	Unknown
Palomar Pool	Menifee	Unknown	Unknown	Private	May be synonymous with Garbani Pool
Wickerd Pool	Menifee	3	Spreading navarretia, California Orcutt grass	Private	Pipeline maintenance, road impacts
Antelope Pool	Murrieta	0.1	Unknown	Private	Unknown
Keller Pool	Murrieta	0.06	Unknown	Private	Unknown
Garbani Pool	Menifee	Unknown	Unidentified fairy shrimp	Private	May be synonymous with Palomar Pool
Scott Pool	Menifee	0.36	Riverside fairy shrimp, California Orcutt grass, spreading navarretia	Private	Housing developments, proposed road improvements, agriculture, pipeline maintenance, dumping in watershed
Clayton Ranch Pool	North of Murietta	0.36	Riverside fairy shrimp, spreading navarretia	Private	Housing development
Clayton Ranch Proposed Pools	North of Murietta	0.02	To be created	conservation easement pending	Pools to be created and Riverside fairy shrimp cysts and spreading navarretia introduced

Vernal Pool Name	Location	Acres excluding watershed	Species Present	Status	Threats, Comments
Schleuniger Pool	North of Murietta	0.27	Riverside fairy shrimp	conservation easement pending	Housing development, roads and culverts. Proposed restoration including possible introduction of spreading navarretia
George Complex	North of Murietta	4-5 pools, Unknown	Unknown	Private	Housing development
Bundy Canyon Complex	East of Wildomar and south of Sedco Hills	3-4 pools, Unknown	Unknown	Private	Unknown
Pechanga Pool	South of Temecula	Unknown	Riverside fairy shrimp	Private, Tribal lands	Agriculture
Australia Pool	Lake Elsinore Back Basin	0.937 acre pool within 20+ pool complex	Riverside fairy shrimp, smooth tarplant	Private or City	Off road vehicles
Wildlife Pools	Lake Elsinore Back Basin	2 pool complex, each pool approx. 0.5 acres	Unknown	CDFG	Unknown
Skylark Pool	Lake Elsinore Back Basin	0.75	Unknown	Private	Unknown
Lakeshore Pool	Lake Elsinore Back Basin	Unknown	Unknown	Private	Unknown
Alberhill Pools	Alberhill	Unknown	Negative results for listed shrimp during a single wet season survey	Private	Clay mining
Eastridge Pool	Edgemont	Unknown	Unknown	Private	Unknown
March Air Reserve Base Complex	March Air Reserve Base	8-pool complex, Unknown	Riverside fairy shrimp	Federal	Recreation, mowing
Banning Complex	Banning	Unknown	Riverside fairy shrimp	Private	Off-road vehicles
Stoney Mountain Ranch Complex	Hemet	Pool complex, Unknown	smooth tarplant, little mousetail; negative survey results for 3 MSHCP fairy shrimp species	Private or City	Proposed road improvements Possible impact to watershed from adjacent housing development

Vernal Pool Name	Location	Acres excluding watershed	Species Present	Status	Threats, Comments
Salt Creek Vernal Pool Complex	Hemet	Pool complex, Unknown	Vernal pool fairy shrimp, spreading navarretia, thread-leaved brodiaea, California Orcutt grass, Parish's brittlescale, Coulter's goldfields, little mousetail, smooth tarplant, San Jacinto Valley Crownscale, Davidson's saltscale	Private; a portion of the complex is within the 45.42-acre Upper Salt Creek Wetlands Preserve	Discing and dry land farming, sheep grazing, alterations in hydrology, road improvements
Mesa de Colorado, Mesa de Burro and Mesa de la Punta	Santa Rosa Plateau	Pool complexes, total 53+ acres	Vernal pool fairy shrimp, Santa Rosa Plateau fairy shrimp, spreading navarretia, San Diego button-celery, California Orcutt grass	CDFG, conserved in perpetuity	Urban runoff, non-native invasive plants

We anticipate that indirect effects to vernal pools will be minimized through implementation of the Guidelines Pertaining to the Urban/Wildlands Interface. This policy states that measures will be incorporated into individual projects to ensure that the quantity and quality of runoff discharged into the MSHCP Conservation Area is not altered in an adverse way when compared with existing conditions. The MSHCP will also implement measures to ensure that toxic chemicals and other pollutants that have the potential to adversely affect wildlife species, habitat, or water quality will not be discharged into the Conservation Area. The policy requires that Permittees avoid the use of invasive plant species in landscape plans adjacent to the MSHCP Conservation Area. In order to prevent unauthorized public access, domestic animal predation, illegal trespass, and dumping, the policy requires the incorporation of barriers in project design adjacent to the Conservation Area.

The potential effects of the MSHCP on documented vernal pools within the Plan Area are summarized in Table 9 on the following page.

Table 9. Potential Direct Effects of the MSHCP on Known Vernal Pools

Vernal Pool Name	Plan Area Land Designation	NEPSSA	CASSA	Effects
Skunk Hollow Pool	Preexisting Conservation Agreement	In NEPSSA 4	Out of CASSA	<p>We do not anticipate any direct effects to this pool from the proposed action.</p> <p>The alignment for Butterfield Stage Road is proposed within the watershed of the Skunk Hollow Pool. Although this road is a component of the circulation element, Butterfield Stage Road will be constructed consistent with the preexisting Assessment District 161 Habitat Conservation Plan (AD 161HCP) that requires design features to avoid and minimize impacts to this pool in consultation with the Fish and Wildlife Service.</p>
Field Pool	PQP	Out of NEPSSA	Out of CASSA	<p>We do not anticipate any direct effects to this pool from the proposed action.</p> <p>As stated above for the Skunk Hollow Pools, the Field pool, as mapped by Eriksen 1988, is also located in the vicinity of the proposed roadway alignment for Butterfield Stage Road and will be subject to the preexisting requirements of the AD 161HCP.</p>
Johnson Ranch Created Pools	PQP	Out of NEPSSA	Out of CASSA	<p>We do not anticipate any direct effects to this pool from the proposed action.</p>
Madison Pool	Outside of the MSHCP Conservation Area	Out of NEPSSA	Out of CASSA	<p>We anticipate that impacts to this pool will be avoided or minimized and conservation achieved through implementation of the Protection of Species Associated with Riparian/Riverine Areas and Vernal Pools policy.</p>
Clay Complex	Within the Criteria Area	Out of NEPSSA	Out of CASSA	<p>We anticipate that impacts to this pool will be avoided or minimized and conservation achieved through implementation of the Protection of Species Associated with Riparian/Riverine Areas and Vernal Pools policy.</p>
Auld Pool	Outside of the MSHCP Conservation Area	In NEPSSA 4	Out of CASSA	<p>We anticipate that impacts to this pool will be avoided or minimized and conservation achieved through implementation of the Protection of Species Associated with Riparian/Riverine Areas and Vernal Pools policy. In addition to the survey requirements of the Riparian/Riverine Areas and Vernal Pools policy, this pool will be subject to the NEPSSA 4 species survey requirements. Species in NEPSSA 4 associated with vernal pool type habitats include Munz's onion and California Orcutt grass. We anticipate that impacts to 90% of those portions of the property that provide long-term conservation value for these species will be avoided and/or conserved as defined by the Protection of Narrow Endemic Plant Species policy and species-specific objectives.</p>
Palomar Pool	Outside of the MSHCP Conservation Area	Out of NEPSSA	Out of CASSA	<p>We anticipate that impacts to this pool will be avoided or minimized and conservation achieved through implementation of the Protection of Species Associated with Riparian/Riverine Areas and Vernal Pools policy.</p>
Wickerd Pool	Outside of the MSHCP Conservation Area	In NEPSSA 4	Out of CASSA	<p>We anticipate that impacts to this pool will be avoided or minimized and conservation achieved through implementation of the Protection of Species Associated with Riparian/Riverine Areas and Vernal Pools policy. This pool is known to be occupied by California Orcutt grass and is within the NEPSSA 4 survey area; therefore, 90% of those portions of the property that provide long-term conservation value for this species are anticipated to be avoided and/or conserved as defined by the Protection of Narrow Endemic Plant Species policy and species-specific objectives.</p>

Vernal Pool Name	Plan Area Land Designation	NEPSSA	CASSA	Effects
Antelope Pool	Outside of the MSHCP Conservation Area	In NEPSSA 4	Out of CASSA	We anticipate that impacts to this pool will be avoided or minimized and conservation achieved through implementation of the Protection of Species Associated with Riparian/Riverine Areas and Vernal Pools policy. In addition to the survey requirements of the Riparian/Riverine Areas and Vernal Pools policy, this pool will be subject to the NEPSSA 4 species survey requirements. Species in NEPSSA 4 associated with vernal pool type habitats include Munz's onion and California Orcutt grass. We anticipate that impacts to 90% of those portions of the property that provide long-term conservation value for these species will be avoided and/or conserved as defined by the Protection of Narrow Endemic Plant Species policy and species-specific objectives.
Keller Pool	Outside of the MSHCP Conservation Area	In NEPSSA 4	Out of CASSA	We anticipate that impacts to this pool will be avoided or minimized and conservation achieved through implementation of the Protection of Species Associated with Riparian/Riverine Areas and Vernal Pools policy. In addition to the survey requirements of the Riparian/Riverine Areas and Vernal Pools policy, this pool will be subject to the NEPSSA 4 species survey requirements. Species in NEPSSA 4 associated with vernal pool type habitats include Munz's onion and California Orcutt grass. We anticipate that impacts to 90% of those portions of the property that provide long-term conservation value for these species will be avoided and/or conserved as defined by the Protection of Narrow Endemic Plant Species policy and species-specific objectives.
Garbani Pool	Outside of the MSHCP Conservation Area	Out of NEPSSA	Out of CASSA	We anticipate that impacts to this pool will be avoided or minimized and conservation achieved through implementation of the Protection of Species Associated with Riparian/Riverine Areas and Vernal Pools policy.
Scott Pool	Outside of the MSHCP Conservation Area	In NEPSSA 4	Out of CASSA	We anticipate that impacts to this pool will be avoided or minimized and conservation achieved through implementation of the Protection of Species Associated with Riparian/Riverine Areas and Vernal Pools policy. This pool is known to be occupied by California Orcutt grass and is within NEPSSA 4 survey area; therefore, 90% of those portions of the property that provide long-term conservation value for this species are anticipated to be avoided and/or conserved as defined by the Protection of Narrow Endemic Plant Species policy and species-specific objectives.
Clayton Ranch Pool	Outside of the MSHCP Conservation Area	Out of NEPSSA	Out of CASSA	In accordance with the biological opinion (FWS-MSHCP-2415.5) for the Clayton Ranch Development Project, Riverside fairy shrimp cysts were salvaged from this pool in October of 2003. Subsequently, spreading navarretia was discovered along the edge of the pool on the project site. We anticipate that formal section 7 consultation will be re-initiated by the U. S. Army Corps of Engineers to address this issue.
Clayton Ranch Proposed Pools	Outside of the MSHCP Conservation Area	Out of NEPSSA	Out of CASSA	Although outside the MSHCP Conservation Area, these pools will be conserved and managed in perpetuity in accordance with biological opinion (FWS-MSHCP-2415.5) for the Clayton Ranch Development Project. We do not anticipate any direct effects to these pools from the proposed action.
Schleuniger Pool	Within the Criteria Area	Out of NEPSSA	Out of CASSA	The Schleuniger Pool and 0.73 acres of its 9.53-acre watershed will be conserved and managed in perpetuity in accordance with biological opinion (FWS-MSHCP-2415.5) for the Clayton Ranch Development Project. This pool including the watershed are captured within the Additional Reserve Lands by way of the cell Criteria and is proposed to be conserved under species-specific objective 1 for the Riverside fairy shrimp. However, the proposed La Estrella Road expansion, a component of the circulation element, may impact the Schleuniger Pool and may conflict with the cell conservation Criteria. Therefore, we anticipate that during the final design and engineering of this road, avoidance measures will be implemented or the project will be subject to the Criteria Refinement Process and the Protection of Species Associated with Riparian/Riverine Areas and Vernal Pools policy.

Vernal Pool Name	Plan Area Land Designation	NEPSSA	CASSA	Effects
George Complex	Outside of the MSHCP Conservation Area	Out of NEPSSA	Out of CASSA	We anticipate that impacts to this pool will be avoided or minimized and conservation achieved through implementation of the Protection of Species Associated with Riparian/Riverine Areas and Vernal Pools policy.
Bundy Canyon Complex	Within the Criteria Area	Out of NEPSSA	Out of CASSA	We anticipate that impacts to this pool will be avoided or minimized and conservation achieved through implementation of the Protection of Species Associated with Riparian/Riverine Areas and Vernal Pools policy.
Pechanga Pool	Outside of the MSHCP Conservation Area within Tribal Lands	Out of NEPSSA	Out of CASSA	We anticipate that impacts to this pool will be avoided or minimized and conservation achieved through implementation of the Protection of Species Associated with Riparian/Riverine Areas and Vernal Pools policy.
Australia Pool	Within Criteria Area	In NEPSSA 2	In CASSA 2	We anticipate that this pool and associated watershed will be conserved within the Additional Reserve Lands by way of the cell conservation Criteria and species-specific objective 1 for the Riverside fairy shrimp.
Wildlife Pools	Within Criteria Area	In NEPSSA 2	In CASSA 2	We anticipate that impacts to this pool will be avoided or minimized and conservation achieved through implementation of the Protection of Species Associated with Riparian/Riverine Areas and Vernal Pools policy. In addition to the survey requirements of the Riparian/Riverine Areas and Vernal Pools policy, this pool will be subject to the NEPSSA 2 and CASSA 2 species survey requirements. Species in NEPSSA 2 and CASSA 2 associated with vernal pool type habitats include Munz's onion, San Diego Ambrosia, California Orcutt grass, Wright's trichocoronis, San Jacinto Valley Crownscale, Parish's brittlescale, Davidson's saltscale, smooth tarplant, and little mousetail. We anticipate that impacts to 90% of those portions of the property that provide long-term conservation value for these species will be avoided and/or conserved as defined by the Protection of Narrow Endemic Plant Species policy, Additional Survey Needs and Procedures policy, and species specific objectives.
Skylark Pool	Within Criteria Area	In NEPSSA 2	In CASSA 2	We anticipate that impacts to this pool will be avoided or minimized and conservation achieved through implementation of the Protection of Species Associated with Riparian/Riverine Areas and Vernal Pools policy. In addition to the survey requirements of the Riparian/Riverine Areas and Vernal Pools policy, this pool will be subject to the NEPSSA 2 and CASSA 2 species survey requirements. Species in NEPSSA 2 and CASSA 2 associated with vernal pool type habitats include Munz's onion, San Diego Ambrosia, California Orcutt grass, Wright's trichocoronis, San Jacinto Valley Crownscale, Parish's brittlescale, Davidson's saltscale, smooth tarplant, and little mousetail. We anticipate that impacts to 90% of those portions of the property that provide long-term conservation value for these species will be avoided and/or conserved as defined by the Protection of Narrow Endemic Plant Species policy, Additional Survey Needs and Procedures policy, and species-specific objectives.
Lakeshore Pool	Within Criteria Area	In NEPSSA 2	In CASSA 2	We anticipate that impacts to this pool will be avoided or minimized and conservation achieved through implementation of the Protection of Species Associated with Riparian/Riverine Areas and Vernal Pools policy. In addition to the survey requirements of the Riparian/Riverine Areas and Vernal Pools policy, this pool will be subject to the NEPSSA 2 and CASSA 2 species survey requirements. Species in NEPSSA 2 and CASSA 2 associated with vernal pool type habitats include Munz's onion, San Diego Ambrosia, California Orcutt grass, Wright's trichocoronis, San Jacinto Valley Crownscale, Parish's brittlescale, Davidson's saltscale, smooth tarplant, and little mousetail. We anticipate that impacts to 90% of those portions of the property that provide long-term conservation value for these species will be avoided and/or conserved as defined by the Protection of Narrow Endemic Plant Species policy, Additional Survey Needs and Procedures policy, and species-specific objectives.

Vernal Pool Name	Plan Area Land Designation	NEPSSA	CASSA	Effects
Alberhill Pools	Within Criteria Area	In NEPSSA 1	In CASSA 1	We anticipate that impacts to this pool will be avoided or minimized and conservation achieved through implementation of the Protection of Species Associated with Riparian/Riverine Areas and Vernal Pools policy. In addition to the survey requirements of the Riparian/Riverine Areas and Vernal Pools policy, this pool will be subject to the NEPSSA 1 and CASSA 1 species survey requirements. Species in NEPPSA 1 and CASSA 1 associated with vernal pool type habitats include Munz's onion, San Diego Ambrosia, smooth tarplant, or little mousetail. We anticipate that impacts to 90% of those portions of the property that provide long-term conservation value for these species will be avoided and/or conserved as defined by the Protection of Narrow Endemic Plant Species policy, Additional Survey Needs and Procedures policy and species specific objectives.
Eastridge Pool	Outside of the MSHCP Conservation Area	Out of NEPSSA	Out of CASSA	We anticipate that impacts to this pool will be avoided or minimized and conservation achieved through implementation of the Protection of Species Associated with Riparian/Riverine Areas and Vernal Pools policy.
March Air Reserve Base Complex	Outside of the MSHCP Conservation Area	Out of NEPSSA	Out of CASSA	We anticipate that impacts to this pool will be avoided or minimized and conservation achieved through implementation of the Protection of Species Associated with Riparian/Riverine Areas and Vernal Pools policy.
Banning Complex	Outside of the MSHCP Conservation Area	In NEPSSA 8	Out of CASSA	We anticipate that impacts to this pool will be avoided or minimized and conservation achieved through implementation of the Protection of Species Associated with Riparian/Riverine Areas and Vernal Pools policy.
Stoney Mountain Ranch Complex	Within Criteria Area	In NEPSSA 3	In CASSA 3	This pool complex including the watershed is captured within the Additional Reserve Lands by way of the cell Criteria; however, the proposed SR 79 realignment project has the potential to impact this complex. We anticipate that during the design and engineering phase of this road, the Criteria Area will be avoided, the Criteria will be achieved, or the project will be subject to the project-specific biologically equivalent or superior determination process identified in the MSHCP and summarized above under Generalized Effects: SR 79 Realignment in order to be considered a Covered Activity.

Vernal Pool Name	Plan Area Land Designation	NEPSSA	CASSA	Effects
Salt Creek Vernal Pool Complex	Within Criteria Area	In NEPSSA 3	In CASSA 3	<p>This pool complex including the watershed is captured within the Additional Reserve Lands by way of the cell Criteria; however, the proposed SR 79 and components of the circulation element have the potential to impact this complex. We anticipate that during the design and engineering phase of SR 79, the Criteria Area will be avoided, the Criteria will be achieved, or the project will be subject to the project-specific biologically equivalent or superior determination process identified in the MSHCP and summarized above under Generalized Effects: SR 79 Realignment in order to be considered a Covered Activity.</p> <p>Components of the circulation element, Stowe Road extension, and the expansion of Florida Avenue/State Route 74 will potentially impact this complex. We anticipate that during the design and engineering of these roads avoidance measures will be implemented, the Criteria will be achieved, or the project will be subject to the Criteria Refinement Process. In addition, the projects will be subject to the avoidance and minimization measures through implementation of the Riparian/Riverine Areas and Vernal Pools policy, Narrow Endemic Plant policy and Additional Survey Needs and Procedures policy. The Salt Creek Vernal Pool Complex is currently known to be occupied by spreading navarretia, California Orcutt grass, Wright’s trichocoronis, San Jacinto Valley Crownscale, Parish’s brittlescale, Davidson’s saltscale, thread-leaved brodiaea, smooth tarplant, Coulter’s goldfields, and little mousetail; therefore, impacts to 90% of those portions of the property that provide long-term conservation value for these species will avoided and/or conserved as defined by the Protection of Narrow Endemic Plant Species policy, Additional Survey Needs and Procedures policy, and species-specific objectives.</p>
Vernal Pools on Mesa de Colorado, Mesa de Burro and Mesa de la Punta	PQP/within the Criteria area	In NEPSSA 9	Out of CASSA	<p>All of the known pools and their watersheds on these mesas are located within existing PQP Lands or are captured within the Additional Reserve Lands by way of the cell Criteria; therefore, we anticipate that they will be conserved. We anticipate that impacts to pools outside these areas will be avoided or minimized and conservation achieved through implementation of the Protection of Species Associated with Riparian/Riverine Areas and Vernal Pools policy.</p>

SPECIES BY SPECIES EVALUATIONS - LISTED

AMPHIBIANS**Arroyo Toad** (*Bufo californicus*)Status of the Species*Listing Status*

The arroyo toad was federally listed as endangered on December 16, 1994 (59 Federal Register 64859), and the Recovery Plan for this species was finalized in September 1999 (Fish and Wildlife Service 1999a). Critical habitat was designated on February 7, 2001 (66 Federal Register 9414); however, this designation was vacated by a Federal Court on October 30, 2003, due to an economic analysis that was not sufficiently broad (*See Building Ind. Legal Defense Found. v. Norton*, 231 F. Supp. 100 (D.D.C. 2002)). The court required the Fish and Wildlife Service to complete a new designation by July 2004. The arroyo toad is considered a Species of Special Concern by the California Department of Fish and Game (Jennings and Hayes 1994).

Species Description

The arroyo toad is a small (adults: snout-urostyle [body] length 55-81 millimeters (2.2-3.3 inches), dark-spotted toad of the family Bufonidae. Usually, adult males are 55-65 millimeters (2.2-2.6 inches) snout-urostyle length, and adult females are from 55-75 millimeters (2.6-3.0 inches) snout-urostyle length (Stebbins 1985, Sweet 1992). The arroyo toad initially was described by Camp (1915) as a subspecies of the Great Plains toad (*B. cognatus*); however, Myers (1930) found that the arroyo toad differed in several important respects from the Great Plains toad and elevated it to specific status as *B. californicus*, a treatment that was followed by Pickwell (1947) and Wright and Wright (1949). Over the next 20 years, the arroyo toad also was considered a subspecies of *B. compactilis* (Linsdale 1940) and *B. woodhousii* (Shannon 1949). Since 1951, this toad has been considered a subspecies of the southwestern toad, *B. microscaphus californicus* (Stebbins 1951, 1966, 1985), with its closest relatives (*B. m. microscaphus*) found in the lower Colorado River Basin (Price and Sullivan 1988). Sweet (1992) and Gergus (1994) indicated that Myers' (1930) recommendation that arroyo toad should be considered a full species is probably warranted. Gergus (1998) further examined the taxonomic status of *B. microscaphus* and concluded, based on allozyme frequencies, that the arroyo toad should be given specific status as *B. californicus*.

Adult arroyo toads have a light-olive green or gray to tan dorsum (back) with dark spots and warty skin (Stebbins 1951, 1985). The venter (underside) is white or buff and without dark blotches or spots (Holland and Goodman 1998a). A light-colored, V-shaped stripe crosses the head and eyelids, and the anterior portion of the oval parotoid glands (just behind the eyes) are pale (Stebbins 1951). There is usually a light area on each side of the sacral (pelvic) hump and in the middle of the back. The arroyo toad generally lacks a mid-dorsal stripe (Stebbins 1951, 1985). However, if a mid-dorsal stripe is present, it is present only on part of the dorsum (Holland and Goodman 1998a).

Juvenile arroyo toads have a white-gray-tan dorsum with small dark spots and gray reticulations (Sweet 1992). The venter is white. The large parotoid glands are not evident on young juveniles, but the V-shaped light mark that crosses the eyelids is prominently visible (Sanders 1950).

Larval arroyo toads have considerable variation in color depending on their age. By 2 to 3 weeks after hatching, at 9-10 millimeters (0.35-0.39 inch), the dark colored larvae have faint gold crossbars on the upper surface of the base of the tail (Sweet 1992). Within a few days of this, the larvae become uniformly tan dorsally with the exception of some irregular dark crossbars (Stebbins 1951). Ventrally, the larvae are opaque white (Sweet 1992). Larvae usually metamorphose at 28-40 millimeters (1.10-1.58 inches) in length.

The arroyo toad lays small darkly-pigmented eggs, 1.4-2.2 millimeters (0.055-0.087 inch) in diameter, in two parallel gelatinous strings, 3.0-10.7 meters (10-35 feet) long (Sweet 1992). Females lay 2,000-10,000 (mean = 4,715) eggs in shallow water (mean = 3.5 centimeters [1.4 inches] deep) (Sweet 1992).

Habitat Affinities

The arroyo toad has specialized breeding habitat requirements. Specifically, it requires shallow, slow-moving streams and riparian areas with a natural flood disturbance regime. This specialization makes their life history and ecological traits different from the typical pattern associated with other species in the genus *Bufo* in the western United States, which often use ponds and other standing water rather than stream and river systems (Sweet 1992).

The following discussion is adapted from Sweet (1992), Jennings and Hayes (1994), and Campbell *et al.* (1996). Adult toads are those that have reached sexual maturity and are capable of reproducing, juveniles are recently metamorphosed toads in their first year, and subadults are after-hatching year toads that are not sexually mature.

In the northern portion of the range, arroyo toads are found in foothill canyons and intermountain valleys where medium- to large-sized rivers are bordered closely by low hills, riverbed gradients are low, and the surface stream flows frequently pool or are intermittent for at least a few months of the year (Miller and Miller 1936; Stebbins 1951; Sweet 1992). In southern California (central portion of the arroyo toad's range), they also occur on the coastal plain and on a few desert slopes.

For breeding, adult arroyo toads use open sites such as overflow pools, old flood channels, and pools with shallow margins on streams that, in the northern portion of the range, are third to sixth order (Sweet 1992). In the central portion of the range, toads are generally found on second to sixth order streams (Holland and Goodman 1998a). Heavily shaded pools are generally unsuitable for larval and juvenile arroyo toads because of lower water and soil temperatures and poor algal mat development (Sweet 1992). Episodic flooding is critical to keep the low stream terraces relatively vegetation free and the soils friable enough for juvenile and adult toads to create burrows (Jennings and Hayes 1994). Shallow pools (less than 30 centimeters [12 inches] deep) with clear water are favored by adults for breeding (Sweet 1992,

1993). Breeding sites generally have flow rates less than five centimeters per second (0.2 foot per second) and bottoms composed of sand or well-sorted fine gravel, although a significant component of large gravel or cobble may be present (Sweet 1992).

Areas that are used by juveniles consist primarily of sand or fine gravel bars with varying amounts of large gravel or cobble with adjacent stable sandy terraces and oak flats. Areas that are damp and have some (less than 10 percent) vegetation cover such as American brooklime are favored by juvenile toads because they possess the refuge and thermal characteristics required for juvenile survival and rapid growth (Sweet 1992). Bare sand and gravel bars may support large numbers of juvenile toads, but survivorship can be reduced due to high levels of predation (Sweet 1992). The adjacent sandy terraces may be sparsely to heavily vegetated with brush and trees such as mulefat, California sycamore, cottonwoods, coast live oak, and willow. The understory of stream terraces may consist of scattered short grasses, herbs, and leaf litter, with patches of bare or disturbed soil, or have no vegetation at all. For foraging, subadult and adult arroyo toads often are found around the drip lines of oak trees. These areas lack vegetation, yet have appropriate levels of prey (Sweet 1992). When active at night, toads often can be observed near ant trails feeding on passing ants and other prey.

Adult and sub-adult arroyo toads spend most of their adult life on upland sandy terraces. Arroyo toads typically burrow underground during periods of inactivity and thus tend to utilize upland habitats that have sandy, friable (readily crumbled) soils. Although the upland habitat use patterns of this species are poorly understood, activity probably is concentrated in the alluvial flats (areas created when sediments from the stream are deposited) and sandy terraces found in valley bottoms of currently active drainages (Fish and Wildlife Service 1999a; Griffin *et al.* 1999; Ramirez 2000, Holland and Sisk 2000). Arroyo toads have been observed in a variety of vegetation communities including alluvial scrub, coastal sage scrub, chaparral, grassland, oak woodland and agricultural fields, during both the breeding and non-breeding seasons (Holland 1995; Griffin *et al.* 1999; Fish and Wildlife Service 2001b).

Subadult and adult toads may range widely into the surrounding uplands. Individual toads have been observed as far as 2 kilometers (1.2 miles) from the streams where they breed but are most commonly found within 0.5 kilometers (0.3 miles) of those streams (Fish and Wildlife Service 1999a; Griffin *et al.* 1999; Holland and Sisk 2001). The distance toads are found from the breeding sites depends on the topography and the extent of suitable habitat.

Life History

Adult arroyo toads begin breeding in late March in the northern portion of the range (Sweet 1992) and as early as January in the coastal areas of southern California (Holland and Goodman 1998a). Breeding may continue into early July depending on when individual females reach reproductive condition and when the males stop calling (Sweet 1992). Males usually begin calling when water temperatures reach 14 degrees Celsius (57° Fahrenheit) and may breed with several females during the course of the season (Sweet 1992). The receptive females seek out calling males based on the size of the male and the sound of his call (Sweet 1992, 1993). The males usually call at the edge of pools in shallow water less than five centimeters (2 inches) deep and are particularly susceptible to predation at this time (Sweet 1992). Amplexus (embracing of

the female by the male) and egg-laying generally occur at the site where the male was calling. Female arroyo toads apparently release their entire clutch of 2,000-10,000 eggs as a single breeding effort and probably are unable to produce a second clutch during the mating season. If conditions are unsuitable, females may not obtain sufficient resources for egg production and will forgo breeding during that year. The eggs are laid on substrates of sand, gravel, cobble, or mud generally located away from vegetation in the shallow margins of the pool (Sweet 1992).

Embryos usually hatch in 4 to 6 days at water temperatures of 12 to 16° Celsius (54 to 59 degrees Fahrenheit). Larvae may take 8 to 14 days to become free-swimming, depending on the water temperature (Sweet 1992). Larvae are solitary, excellent swimmers and, once mobile, distribute themselves randomly or evenly along the shallow bottom of the breeding pool. Mature larvae swim in short bursts, often remaining motionless for 1 to 4 minutes between movements (Sweet 1992).

The larval period for arroyo toads lasts about 65 to 85 days, depending on water temperatures (Sweet 1992). Larvae do not consume macroscopic vegetation. They are highly specialized foragers that feed by inserting their heads in the substrate and ingesting loose organic material such as detritus, interstitial algae, bacteria, and diatoms (Sweet 1992, Jennings and Hayes 1994). For several days before metamorphosis, arroyo toad larvae cease feeding and aggregate in shallow water along the edges of gravel or sand bars, often under or along stranded algal mats. Metamorphosis may occur at any time between April and the beginning of September, depending on the time of breeding, weather, and water quality. Peak metamorphosis occurs from the end of June to mid-July in the northern part of the toad's range (Sweet 1992, 1993) and slightly earlier in southern California. Most newly metamorphosed individuals are 12-15 millimeters (0.5-0.6 inch) in length, but they may be as small as 10-11 millimeters (0.4 inch) in poor quality habitats, or as large as 17 millimeters (0.7 inch) in high quality habitat. If conditions permit, juvenile arroyo toads remain along the margins of the breeding pools for up to 6 months (Sweet 1992).

Juvenile arroyo toads remain in the saturated substrate at the edges of breeding pools for 1 to 3 weeks. They often are exposed on the barren sand because they lack sufficient size to burrow into the substrate. During this period, many toads are lost due to predation unless they can find some cover such as cobble, algal mats, or pieces of debris to hide under (Sweet 1992). The juvenile toads are diurnal for the first 4 to 5 weeks (Cunningham 1962) and subsist largely on ants. On this diet, and with the high substrate temperatures, the juvenile toads grow rapidly.

Upon reaching a length of 16-17 millimeters (0.6-0.7 inch) they begin to create shallow burrows in loose sand and may move farther away from the pool onto sand and gravel bars with some vegetation (Sweet 1992). Upon reaching lengths of 17-23 millimeters (0.7-0.9 inch), juvenile toads are able to dig burrows 2-5 centimeters (0.8-2.0 inches) deep and completely bury themselves in the sand (Sweet 1992). At this time, juvenile toads change to a nocturnal activity pattern and spend the daylight hours in their burrows (Cunningham 1962). At night, they forage for nocturnal ants and beetles. If the substrate is not friable enough, juvenile toads often disperse farther away from the breeding pool into nearby stands of willows and mulefat thickets. Suitable sandy habitat can be highly localized resulting in dense concentrations of juvenile toads. Such sites generally are well-shaded (Sweet 1992).

Upon reaching a size of 28-30 millimeters (1.1-1.2 inch) in about 8 to 9 weeks, juvenile arroyo toads begin to shift their behavior and disperse away from streamside habitat into nearby willows (Sweet 1992), although they may remain streamside until they reach sizes greater than 35 millimeters (1.4 inches) (D.C. Holland, *in litt.* 1997). The timing of dispersal, which may be delayed until October or November, is affected by local drying conditions and the presence of suitable microhabitat for burrowing. Juvenile toads may take refuge underground within the riparian zone and disperse farther away following the dampening of stream terraces by fall and winter rains (Sweet 1992). Nocturnal activity is normal for adults and larger juveniles, but they occasionally may be observed during the day. Juvenile toads reach 30-40 millimeters (1.2-1.6 inches) and occasionally 50 millimeters (2.0 inches) by the fall of their natal year and do not begin growing again until the following spring (Sweet 1992). Male arroyo toads usually reach adulthood in 2 years. Females become sexually mature in 2 to 3 years, when they attain lengths greater than 54 millimeters (2.1 inches) (Sweet 1992, 1993). However, males may reach adulthood at one year if conditions are favorable (Sweet 1993). Females generally average larger sizes than males. Data on longevity are largely unavailable, although age-size distributions indicate that many individuals live only about five years (Sweet 1992, 1993). Longevity may vary with local conditions.

Little is known of the seasonal and annual movements or physiological ecology of adults, but recent data suggest that many subadults and some adult males move along streams as much as 0.8 kilometer (0.5 mile) and over 1.0 kilometer (0.6 mile) in a few cases (Sweet 1993). In San Diego County, adult arroyo toads regularly are found within 0.5 kilometer (0.3 mile) and up to 2.0 kilometers (1.2 miles) perpendicularly from streams (Holland and Sisk 2001). Extended movement away from streams may be facilitated by microclimates wherein lower temperature and high humidity on foggy days in the spring and summer creates moist substrates in upland habitats where adult arroyo toads can subsist (Holland and Sisk 2001).

Status and Distribution

The historical range of the arroyo toad extended from the upper Salinas River system on Fort Hunter Liggett Military Reservation, Monterey County (U.S. Army Reserve Command 1996), south through the Santa Ynez, Santa Clara, and Los Angeles River basins (Myers 1930; Sanders 1950; Stebbins 1951; Sweet 1992) and the coastal drainages of Orange, Riverside, and San Diego counties to the Arroyo San Simeon system, about 16 kilometers (10 miles) southeast of San Quintin, Baja California (Tevis 1944; Gergus *et al.* 1997). Apparent gaps in distribution, such as those in San Luis Obispo County, California, and northwestern Baja California may be due to misidentification of specimens or to inadequate surveys. Recent surveys in Baja California have found that arroyo toads occupy at least 16 drainages in Mexico from the U.S. border in San Diego County to the southern extent of their range near El Rosario, Mexico (Mahrdrdt *et al.* 2002).

Although the arroyo toad occurs principally along coastal drainages, it also has been recorded at several locations on the desert slopes of the Transverse Mountain range, south of the Santa Clara River, Los Angeles County (Patten and Myers 1992; Jennings and Hayes 1994). The elevation range for the arroyo toad extends from near sea level to about 2,440 meters (8,000 feet) in Baja California (Welsh 1988; Beaman *et al.* 1995). Currently, most arroyo toad populations in the

northern and central parts of the range are restricted to elevations of 300 to 1,400 meters (1,000 to 4,600 feet), although they were historically known to extend into the lower portions of most river basins (Fish and Wildlife Service 1999a). The lower elevation limit may be a result of development and widespread habitat loss in the lower basins (Fish and Wildlife Service 2001b) and the upper elevation limits may be due to an inability of arroyo toads to withstand cooler temperature regimes, especially during the larval stage (Sweet 1992). Differences in elevation limits in different parts of the species' range may be due to climate and also to geological features or other habitat characteristics.

Since the early part of the century, arroyo toads have been found in at least 22 river basins in California. They have been extirpated from an estimated 75 percent of their former range in the United States, and they now occur primarily in small, isolated areas in the middle to upper reaches of streams. Population numbers and densities are generally not known because insufficient data are available on the species' normal population dynamics and on habitat characteristics that correlate with density. For example, densities can range from fewer than 25 to over 200 adults over different 3 to 3.5-kilometer (about 2-mile) stretches of the same stream (Peter H. Bloom, Western Foundation of Vertebrate Zoology, Camarillo, CA; *in litt.* 1998).

Although arroyo toads may be found along relatively long stretches of some creeks and rivers, suitable breeding or upland habitat may not occur throughout the entire distance. The proportion of suitable habitat may change during the year and from year to year depending on climatic conditions, fires, or other natural or human-related events. Because of this, it is difficult to estimate the exact distribution of arroyo toads or the extent of suitable habitat in any particular system at a given time. Some events or activities clearly have resulted in permanent losses of habitat, while others have caused degradation or temporary habitat losses.

The distribution of arroyo toads fits the definition of metapopulations in some parts of the range, but not in others. This suggests that the application of metapopulation theory to the conservation of arroyo toads will not be appropriate in all situations. A metapopulation is defined as a population of subpopulations in somewhat geographically isolated patches, interconnected through patterns of gene flow, extinction, and recolonization (Soulé 1987). For example, toads in the San Antonio River, Monterey County are so far distant (160 kilometers [100 miles]) from any other known arroyo toads that they effectively constitute a separate population; however, the same may not be true of toads in several river basins, particularly in Orange and San Diego counties. In some areas, what were once subpopulations of larger metapopulations of arroyo toads are now effectively isolated from each other by dams and reservoirs, urbanization, or other human caused changes. Some changes may be reversible, allowing currently isolated populations to once again become part of greater metapopulations. In other cases, the changes have been so extensive that reconnection is not an option.

Threats

The distribution of the arroyo toad appears to be restricted naturally as the result of specific habitat requirements for breeding and development. These natural restrictions, coupled with the small sizes of many arroyo toad populations, make them particularly vulnerable to the negative effects of human-induced changes to their habitats (Jennings and Hayes 1994). The following

discussion of the reasons for arroyo toad declines and current threats to populations is adapted from Sweet (1992, 1993) and Campbell *et al.* (1996).

There are several human-related activities that affect the hydrology of arroyo toad stream habitats and destroy or severely modify the dynamic nature of the riparian systems upon which arroyo toads depend for reproduction, development, and survival. Arroyo toad breeding habitat is created and maintained by the fluctuating hydrological, geological, and ecological processes operating in riparian ecosystems and the adjacent uplands within a Mediterranean climate. These riparian/wash habitats, as well as adjacent upland habitats, are essential for this species' survival. Periodic and unpredictable flooding that reworks stream channels and channel sediments and alters pool location and form, coupled with upper terrace stabilization by vegetation, is required to keep a stream segment suitable for all life stages of the arroyo toad.

Urban development and agriculture can eliminate and degrade upland habitat (*e.g.*, Griffin and Case 2001) and adjacent arroyo toad breeding habitat. Like many amphibians, arroyo toads appear to be particularly vulnerable to road mortality (Holland and Goodman 1998a), perhaps because they use roads for foraging and dispersal activities. Development adjacent to streams can lead to changes in runoff patterns and siltation, resulting in channelized streambeds that are unsuitable for arroyo toad breeding. Runoff from urban development and agriculture is also higher in contaminants, such as fertilizers and pesticides, which can lead to amphibian mortality and impaired development (Schneeweis and Schneeweis 1997).

Alterations in stream hydrology and geomorphology as a result of mining, reservoirs, and flood control activities can result in the destruction and degradation of arroyo toad habitat. Direct loss of aquatic and upland habitats including arroyo toad breeding pools can result from dredging and reservoir inundation. Flood control and mining activities often result in the increase of downstream siltation resulting in adult and larval mortality. Conversely, the construction of dams and reservoirs typically constrict the downstream flows and sediments necessary to sustain the wide, sandy channels used as breeding habitat by the arroyo toad. Flood control activities that utilize rip-rap and concrete along streambanks reduce available burrowing areas and may restrict movement into the adjacent uplands.

Grazing livestock can directly and indirectly impact arroyo toads and their habitats (Sweet 1992, 1993). Livestock can trample egg clutches, larvae, and metamorphs in breeding pools, and juveniles and adult toads may be crushed as livestock walk through alluvial terraces. Livestock grazing along stream courses can alter sand bars and terrace habitats rendering them unsuitable for juvenile arroyo toad. Grazing may change the stream morphology by altering erosion and flow processes (Campbell *et al.* 1996) thereby, increasing sedimentation, degrading water quality downstream, and negatively affecting arroyo toad reproduction.

Recreational activities that occur in arroyo toad habitat such as off-highway vehicle use, camping, fishing, hunting, hiking, waterplay, and horseback riding have the potential to disrupt breeding activities, degrade breeding pools and terraces, and result in the direct mortality of larval and adult toads. The threats from many of these activities depend on the intensity and timing.

In addition to recreational activities, introduced predators such as non-native fish, bullfrogs, African clawed frogs, and crayfish (Sweet 1993; Jennings and Hayes 1994) threaten arroyo toad populations. Habitat alternations that have increased water permanence and decreased periodic flooding, have facilitated the successful establishment of these non-native predators (Sweet 1992; Jennings and Hayes 1994). Argentine ants continue to expand their distribution replacing native ant species which are one of the arroyo toad's primary food sources. The invasion of non-native vegetation, such as arundo and tamarisk, can reduce the suitability of arroyo toad habitat for breeding, foraging, and burrowing (Holland and Goodman 1998a).

Because arroyo toad habitats have been, and continue to be, affected by human activities, small isolated populations are more at risk due to natural disturbances such as extended droughts, fires, and rare large floods. Drought can result in the temporary loss of breeding pools and reduce forage availability that may affect egg production by female toads. Large floods are rare but can affect arroyo toads by excessive scouring and sedimentation, washing out adult habitat on upper alluvial benches, altering the quality of breeding pools and juvenile arroyo toad habitat. Unseasonable floods can wipe out an entire watershed's reproductive effort by scouring eggs or larvae out of breeding pools or depositing silt in downstream breeding pools. Fires can kill metamorphosed and adult toads and cause excessive siltation in breeding ponds.

Conservation Needs

To conserve the arroyo toad, its genetic and phenotypic variation in each recovery unit must be secured by conserving, maintaining, and restoring the riparian and upland habitats used by arroyo toads for breeding, foraging, and wintering habitat. Arroyo toads are found in a variety of ecologically and geographically distinct areas. In order to preserve this diversity, the Recovery Plan for the arroyo toad identifies three recovery units—Northern, Southern, and Desert—that reflect distinct ecological and geographic regions within the range of the species. To meet the conservation needs of the arroyo toad for each recovery unit, the minimum number of self-sustaining metapopulations or populations to be managed are as follows: Northern Recovery Unit—7 populations or metapopulations; Southern Recovery Unit—10 populations or metapopulations; Desert Recovery Unit—3 populations or metapopulations. If populations are rediscovered in historically-occupied drainages, or if new populations are found through survey efforts, the conservation needs of the arroyo toad may need to be re-examined.

Conservation of areas in western Riverside County with the following characteristics is essential to the survival and recovery of the arroyo toad: 1) areas that support a substantial core population of arroyo toads; 2) areas that support at least a small toad population and possesses favorable habitat conditions for population expansion and persistence; 3) suitable habitat situated in a location that appears to be crucial for maintaining the viability of a larger metapopulation; 4) occupied habitat on the periphery of the arroyo toad's geographic range; and 5) occupied habitat in atypical or underrepresented ecological environments (*e.g.*, high elevation or desert-edge populations).

Areas supporting core populations or that have the potential to support large populations are essential because they represent the foundation for continued persistence of the species. Furthermore, some habitat areas that would not be considered essential if geographically isolated

are in fact essential when situated in locations where they facilitate continued connectivity between surrounding populations or play a significant role in maintaining metapopulation viability (*e.g.*, by providing additional areas of occupancy that provide resilience to periodic extirpations of adjacent habitat patches). Populations on the periphery of the species range or in atypical ecological environments are important for maintaining the genetic diversity of the species which could be essential to evolutionary adaptation to changing climatic and environmental conditions.

The Plan Area is almost entirely contained in the Southern recovery unit described in recovery plan for the arroyo toad. According to the recovery plan, the following areas within western Riverside County are important to the arroyo toad's survival and recovery (Fish and Wildlife Service 1999a).

It is essential that at least one existing population on non-Federal lands in San Juan Creek and the Santa Margarita River is protected and managed in order to provide for the conservation needs of the arroyo toad in western Riverside County. The recovery plan also called for the protection of additional populations within the Southern recovery unit, particularly any found in the Santa Ana/San Jacinto River basin.

Based on the number of observations and the high quality habitat in Bautista Creek, it is likely to support a substantial core population of arroyo toads that have the capability for population expansion and long-term persistence. As such, the protection of arroyo toads in Bautista Creek along with arroyo toads in the upper San Jacinto River and Indian Creek is essential to the survival and recovery of arroyo toads.

The broad, flat alluvial valleys found in the upper Santa Margarita Basin contain high-quality habitat for arroyo toads. This area is essential to the survival and recovery of arroyo toads because there are documented occurrences in Temecula, Wilson, and Arroyo Seco creeks, and habitat conditions are favorable for population expansion and long-term persistence (Fish and Wildlife Service 2001b).

Environmental Baseline

Arroyo toads were historically known from several drainages within western Riverside County including Temescal Wash northwest of Lake Elsinore, south of Vail Lake, the San Jacinto River, and the Santa Margarita River Basin below 2,000 feet (609 meters) elevation. Currently, the known distribution of arroyo toads within the Plan Area includes the San Jacinto River Basin (San Jacinto River, and Bautista Creek), San Juan River Basin (San Juan Creek), San Mateo River Basin (San Mateo River, Tenaja Creek, Los Alamos Creek, and at Stewart Ranch), and the Santa Margarita River Basin (Temecula Creek, Arroyo Seco Creek, Wilson Creek, Sandia Canyon, and on the Santa Rosa Plateau in a tributary of Cole Creek). Most of the arroyo toad populations in Riverside County (*i.e.*, those from the San Juan Creek Basin, San Mateo Creek Basin, and Santa Margarita River Basin) are concentrated along the southern boundary of Riverside County in waters that flow southwest towards the coast. The toad populations in the San Jacinto River Basin are in the eastern central portion of the Plan Area in waters that flow northwest from the San Bernardino National Forest.

San Jacinto River Basin

Once thought to be extirpated in the San Jacinto River (Jennings and Hayes 1994), surveys conducted on the San Bernardino Forest in the summer of 2000 confirmed the existence of arroyo toads in the San Jacinto River (Brock Ortega, Dudek and Associates, *pers. comm.* 2000), and surveys conducted in 2000 and 2001 confirmed the presence of arroyo toads in Bautista Creek (U.S. Geological Survey 2000, 2002a). The population of arroyo toads in Bautista Canyon appears to be relatively substantial based on toad detectability in 2001 (U.S. Geological Survey 2002a). It is assumed that arroyo toads within the two drainages are functional connected (*i.e.*, not isolated), although that connectivity is likely diminished from historical levels due to upland habitat development and stream channelization in lower Bautista Creek.

San Juan Creek Basin

Recent surveys have documented arroyo toads from approximately Upper San Juan Campground in Riverside County to the lower highway bridge near San Juan Capistrano in Orange County (Peter H. Bloom, Western Foundation of Vertebrate Zoology, Camarillo, CA, and John Stephenson, Cleveland National Forest; *pers. comm.*, Fish and Wildlife Service unpublished data 2003).

San Mateo Creek Basin

In western Riverside County, arroyo toads are known from the mainstem of San Mateo Creek, and they have also been documented in three tributaries. In 1991, more than 20 arroyo toad tadpoles were found in Tenaja Creek (K. Winter, USFS; (NDDDB). In 1993, an arroyo toad was heard calling on Stewart Ranch, in an unnamed tributary to San Mateo Creek (J. Stephenson, Fish and Wildlife Service). In 1999, one subadult and one adult female arroyo toad were observed in Los Alamos Canyon (E. Ervin and B. Yang, U.S. Geological Survey). The overall amount of known arroyo toad stream habitat within the drainage is over 41.8 kilometers (26 miles) (Dan C. Holland, Fallbrook, CA, *pers. comm.*), and the population extends southwest to the mouth of San Mateo Creek in San Diego County.

Santa Margarita River Basin

In western Riverside County, arroyo toads in the Santa Margarita River Basin are known from the Santa Rosa Plateau (adjacent to a tributary to Cole Canyon), Sandia Creek, Arroyo Seco Creek, Temecula Creek, and Wilson Creek. Suitable habitat also occurs within 6 kilometers (3.7 miles) of Wilson Creek from Lancaster Valley down to Vail Lake and within 11 kilometers (6.8 miles) of Arroyo Seco Creek from Crosley Homestead down to Vail Lake (Fish and Wildlife Service 2001b). Approximately 25 kilometers (15.5 miles) of Temecula Creek are suitable for arroyo toads from Dodge Valley downstream to Vail Lake (Fish and Wildlife Service 2001b).

In addition to known locations, herpetological researchers with the U.S. Geological Survey indicate that the following areas may still support potential breeding habitat for toads (C. Brown, U.S. Geological Survey, *pers. comm.*, September 2003): The Santa Ana River in the vicinity of the City of Riverside, Banning Canyon, from within the San Bernardino National Forest to the Morongo Indian Reservation, San Jacinto River north of City of Lakeview to the Railroad Canyon Reservoir, and Temescal Wash from Lake Elsinore to the east side of the City of Corona.

The Plan Area supports approximately 20,259 acres of modeled habitat for the arroyo toad. Approximately 3,793 acres (19 percent) of the modeled habitat occurs within PQP Lands. Modeled habitat includes stream reaches known to be occupied, stream reaches that contain suitable breeding habitat, and stream reaches in close proximity to suitable breeding habitat that are important to facilitate movement between breeding sites (as determined by Fish and Wildlife Service and U.S. Geological Survey experts based on stream gradient, historical observations, recent observations, field reconnaissance, and aerial photography). Modeled habitat also covers adjacent uplands (alluvial terraces and valley bottom lands) up to 80 feet (25 meters) above stream channels or 0.9 miles (1.5 kilometers) away from the stream channel, whichever is less. The modeled habitat is limited to areas south of an arc from Lake Land Village in the west to Soboa Hot Springs in the east based on known occurrences and suitable habitat for the species. Due to constraints with GIS layers, we were unable to exclude urban areas along Temecula Creek; therefore, habitat acreage is overestimated in this region.

The elevation and distance criteria for the model were adopted from our critical habitat listing rule for the arroyo toad (Fish and Wildlife Service 2001b), which used the same modeling procedure to identify alluvial terraces and valley bottomlands adjacent to the previously identified essential stream reaches. Lacking spatially explicit data on geomorphology, elevation above the stream channel was used as an indicator of the extent of alluvial habitat. After some experimentation, we determined that areas up to 80 feet (25 meters) in elevation above the stream channel were most likely to contain the upland habitat elements that are essential to arroyo toads. In extremely flat areas, we recognized that there is likely a distance from the stream channel beyond which arroyo toads seldom travel, so we truncated the upland habitat delineation at a distance of 0.9 miles (1.5 kilometers) if the 80-foot (25 meters) elevation limit had not yet been reached. This distance is based on reported observations of arroyo toads at least 0.7 miles (1.2 kilometers) from the upland/riparian ecotone (Holland and Sisk 2000). This GIS-based modeling technique was effective at capturing alluvial areas associated with river valleys. Thus, the width of the upland component of toad habitat varies based on topography. The habitat widens in broad alluvial valleys and narrows in places where streams run through constricted canyons or between surrounding hills.

Over the past few years, the Fish and Wildlife Service has issued four landscape-scale multi-species programmatic biological opinions to the Forest Service that address adverse effects to the arroyo toad: (1) the Land and Resource Management Plan BO (1-6-00-F-773.2), (2) The Forest Service Riparian Species BO (1-6-99-F-21), (3) The Cleveland National Forest Service Grazing Opinion (1-6-01-F-1694), and (4) the San Bernardino National Forest Service Grazing Opinion (FWS-SB-1464.2). As part of these consultations, the Forest Service has undertaken a variety of actions to protect arroyo toads including: seasonal closures of recreation sites, closure of access roads into occupied breeding sites, closure of portions of grazing allotments, installation of educational signing, and installation of temporary fencing or other barriers to protect breeding sites. The continued implementation of these measures should help offset at least some of the threats to arroyo toads in Bautista Creek and in the San Juan and San Mateo Basins.

Effects of the Action

Direct Effects

The Plan Area includes approximately 20,259 acres of modeled habitat for arroyo toad. Approximately 10,564 acres (52 percent) of this modeled habitat is outside the MSHCP Conservation Area; of that, approximately 2,659 acres (13 percent of total modeled habitat) occur within the survey area for arroyo toad (Section 6, Figure 6.3, pp. 6-66).

The arroyo toad is considered an Additional Survey Needs and Procedures species. Until such time that the Additional Reserve Lands are assembled and conservation objectives for this species are met, surveys for arroyo toad will be conducted as part of the project review process for public and private projects where suitable habitat is present for the species within the survey area for arroyo toad (*i.e.*, Upper San Jacinto River, Bautista Creek, the Upper Santa Margarita River Basin in the vicinity of Vail Lake, and in San Juan Creek). Populations detected as a result of survey efforts will be avoided according to the procedures outlined in the Additional Survey Needs and Procedures (Section 6.3.2 of the Plan; *i.e.*, 90 percent of portions of property with long-term conservation value will be avoided until the species conservation objectives are met). For those locations found to contain large numbers of individuals or otherwise determined to be important to the overall conservation of the species, the Plan allows flexibility to acquire these locations for inclusion into the Additional Reserve Lands (Section 6, pp. 6-70).

Within the 2,659 acres of modeled habitat that is outside the MSHCP Conservation Area, but within the survey area for arroyo toad (13 percent of total modeled habitat), we anticipate that up to 10 percent of the area with long-term conservation value for the species (as discussed above) will be lost to individual projects, including all individual toads within this impact area of the project footprint.

Arroyo toad will be subject to impacts associated with proposed residential, commercial, urban, and agricultural development within 7,905 acres (39 percent) of modeled habitat that are outside of the MSHCP Conservation Area and outside of the survey area for the arroyo toad. Although upland habitat and breeding habitat were not modeled separately, the vast majority of modeled habitat outside the MSHCP Conservation Area is upland habitat. There is modeled upland habitat outside the MSHCP Conservation Area in the vicinity of all of the known populations in the Plan Area except Tenaja Canyon. Thus, any individual arroyo toads or populations persisting in modeled habitat outside the MSHCP Conservation Area and the survey area for the arroyo toad are anticipated to be impacted over the 75-year permit term as a result of the proposed development.

Because the arroyo toad is not widely distributed within the Plan Area, specific conservation objectives are provided in the MSHCP (Section 9, pp. 9-41) to ensure that suitable habitat and known populations of the arroyo toad will persist. The Plan states that the MSHCP Conservation Area will include 1,602 acres of suitable breeding habitat and Core Areas for at least portions of San Juan Creek, Los Alamos Creek, San Jacinto River, Indian Creek, Bautista Creek, Wilson Creek, Temecula Creek, Arroyo Seco, and Vail Lake. In addition, we anticipate that implementation of the Riparian/Riverine Area and Vernal Pools policy will assist in providing

some protection to this species' habitats by avoiding and/or minimizing direct impacts to riparian and riverine habitats.

The MSHCP Conservation Area will include 9,695 acres (48 percent) of modeled arroyo toad habitat in the Plan Area, including the majority of each known population in the Plan Area and 39 of the 42 (93 percent) arroyo toad observations in our dataset. Approximately 3,793 acres (19 percent) of modeled habitat will remain within PQP Lands and 5,902 acres (29 percent) will be conserved within the Additional Reserve Lands. Most of the modeled habitat in the Plan Area in San Juan Creek Basin and the San Mateo Creek Basin is in Cleveland National Forest in the southwest corner of the Plan Area. A substantial amount of modeled habitat in the Santa Margarita River basin along the southern boundary of the Plan Area and in the San Jacinto River Basin in the eastern central portion of the Plan Area will be conserved within Additional Reserve Lands. Although upland habitat and breeding habitat were not modeled separately, the great majority of modeled habitat that could be used for breeding (*i.e.*, the habitat in the stream channel itself) will be conserved, while impacts are restricted primarily to the uplands. Large areas of upland habitat will be added to the MSHCP Conservation Area in several important areas, including the area surrounding upper Temecula Creek and its tributaries and the upland habitat surrounding Bautista Creek and the San Jacinto River. In addition, conserved habitat for arroyo toad will be connected to other existing areas of conserved habitat through preservation of creeks and rivers and associated riparian habitat in every case where a potential connection exists. Within the MSHCP Conservation Area, breeding populations will be maintained at a minimum of 80 percent of the conserved breeding locations as measured by the presence/absence of juvenile toads, tadpoles, or egg masses across any five consecutive years.

Large areas of breeding and upland habitat will be conserved around populations along the upper reaches of Temecula Creek.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands including surveys for the arroyo toad. Cooperative management and monitoring are anticipated on PQP Lands. Within the MSHCP Conservation Area, Reserve Managers will maintain breeding populations at a minimum of 80 percent of the conserved breeding locations as measured by the presence/absence of juvenile toads, tadpoles, or egg masses across any five consecutive years. Distributional surveys for the arroyo toad will be conducted at least every eight years to verify occupancy at a minimum of 80 percent of the known locations. If a decline in the distribution of arroyo toad is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP.

Other management actions described in Section 5 of the MSHCP will help maintain habitat and populations of arroyo toad within core areas, including the commitment to maintain ecological processes to preserve arroyo toad habitat at occupied locations and suitable new areas within the MSHCP Conservation Area. The ecological processes and breeding populations will be maintained as a result of management measures addressing alteration of hydrology and flood control, non-native plant species, farming, mining, grazing, recreation, and predation (Section 5, Table 5.2). Implementation of these management actions will help to avoid and minimize adverse effects to arroyo toad.

Management actions to benefit the arroyo toad (*e.g.*, hydrological maintenance, exotic vegetation removal, habitat manipulation) or other Covered Species may result in impacts, including death, to a small number of individual arroyo toads. It is anticipated that any impacts to arroyo toads from management actions will be minimized by adherence to appropriate survey protocols and other guidelines described in Section 7.4 of the MSHCP.

Indirect Effects

The arroyo toad could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These include the indirect effects described in the “General Effects” section of this biological opinion. The arroyo toad is particularly susceptible to impacts associated with flood control, road development, and urban runoff. The management actions described in Section 9 of the MSHCP and those described in the Riparian/Riverine Areas and Vernal Pools policy and the Guidelines Pertaining to Urban/Wildlands Interface will help minimize indirect effects on arroyo toad. Adverse effects of these actions within the Conservation Area will be minimized through the development of an MOU with the Forest Service to conserve core arroyo toad populations on their land within western Riverside County.

Conclusion

We anticipate the proposed action will affect the arroyo toad as described in the analysis above, including the loss of up to 39 percent of its modeled habitat in the Plan Area. An additional 13 percent of arroyo toad modeled habitat outside the MSHCP Conservation Area will be subject to surveys within the arroyo toad survey area. Once the conservation objectives for arroyo toad have been met, avoided areas, which have not been otherwise conserved, may be impacted. We anticipate that occurrences determined to be important to the overall conservation of the species will be considered for inclusion in the Additional Reserve Lands and that at least some of the avoided areas may be maintained as open space habitat. Implementation of the avoidance, minimization and mitigation measures identified in the Plan will further reduce impacts to this species. This species is anticipated to persist within the remaining 48 percent of its modeled habitat within both the PQP Lands and the Additional Reserve Lands. These lands include large, contiguous habitat blocks that support the majority of known arroyo toad populations and likely breeding habitat in the Plan Area. Large areas of upland habitat will be conserved around several important populations. In all possible cases, conserved habitat for the arroyo toad is connected to other areas of conserved habitat through preservation of creeks and rivers and associated riparian habitat. We anticipate that arroyo toad populations and habitat will be monitored and managed cooperatively for the toad’s benefit.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service’s biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the arroyo toad. We reached this conclusion because 48 percent of the arroyo toad modeled habitat, including the majority of each known toad population in western Riverside County, will be protected or will remain within the MSHCP Conservation Area. In addition, required surveys for arroyo toad may result in newly discovered occurrences being included in the MSHCP Conservation Area. Implementation of the Plan will not preclude the conservation needs of the

arroyo toad in the Southern recovery unit as identified in the recovery plan. Thus, impacts to this species and its modeled habitat, when viewed in conjunction with the protection and management of the MSHCP Conservation Area, are not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Amount or Extent of Take

We anticipate the take of all arroyo toads within up to 10,564 acres of habitat outside of the MSHCP Conservation Area. A small, but undeterminable, number of arroyo toads are anticipated to be taken as a result of management actions. Take will be in the form of harm, death, and injury. This level of anticipated take is not likely to result in jeopardy to the arroyo toad.

California red-legged frog (*Rana aurora draytonii*)

Status of the Species

Listing Status

The Service listed the California red-legged frog (*Rana aurora draytonii*) as threatened on May 23, 1996 (61 Federal Register 25813). Critical habitat was designated on March 13, 2001 (66 Federal Register 14625). A recovery plan for the California red-legged frog was published on May 28, 2002 (Fish and Wildlife Service 2002a). This species is also designated as a California State Species of Special Concern by the California Department of Fish and Game.

Critical habitat for the California red-legged frog was designated on March 13, 2001 (66 Federal Register 14625), and included 1,674,582 hectares (4,140,440 acres) of essential habitat throughout the species range in the United States (California). Critical habitat was designated for 31 units in 28 counties, including Unit 30 in Riverside County consisting of portions of the watersheds comprising the Santa Rosa Plateau and the Santa Ana Mountains. In 2002, critical habitat for the California red-legged frog was vacated in all units except Unit 5 and Unit 31.

Species Description

The California red-legged frog is the largest native frog in the western United States, ranging from 4 to 13 centimeters in length. One of the distinguishing features of this species includes the red colored abdomen and hind legs of adults. *Rana aurora draytonii* is one of two subspecies of the red-legged frog (*Rana aurora*) found on the Pacific coast (61 Federal Register 25813).

Habitat Associations

The California red-legged frog occupies a variety of habitats including aquatic, riparian and upland. Breeding adults are often associated with deep (greater than 0.7 meter [2 feet]), still or slow moving water and dense, shrubby riparian or emergent vegetation (Hayes and Jennings 1988). However, frogs have been observed in shallow sections of streams that do not have riparian canopies. Larvae, tadpoles, and metamorphs have been collected from streams, deep

pools, backwaters within streams and creeks, ponds, marshes, sag ponds, dune ponds, and lagoons. Additionally, California red-legged frogs have been known to breed in artificial impoundments such as stock ponds. It is assumed that these ponds must have proper management of hydroperiod, pond structure, vegetative cover, and control of non-native predators; however, some stock ponds support frogs despite a lack of emergent vegetation cover and the presence of non-native predators (N. Scott and G. Rathbun *in litt.* 1998). Water temperature and water salinity are also important factors for California red-legged frog habitat. In general, water temperature should not exceed 21 degrees Celsius (70° Fahrenheit) and salinity levels should be below 4.5 parts per thousand to ensure survival of the embryonic stages (Fish and Wildlife Service 2002a).

California red-legged frogs often disperse from their breeding habitat to forage and seek summer habitat if water is not available. Summer habitat may include space under boulders or rocks and organic debris (*e.g.*, downed trees or logs), industrial debris, and agricultural features, such as drains, watering troughs, abandoned sheds, or hay-ricks. California red-legged frogs also use small mammal burrows and moist leaf litter (Jennings and Hayes 1994). In addition, incised stream channels with portions narrower than 18 inches and deeper than 10 inches may also provide habitat (Fish and Wildlife Service 2002a), as well as large cracks in the bottom of dried ponds. These cracks may provide refugia for frogs that are avoiding predation and solar exposure (J. Alvarez *in litt.* 2000). Overall, California red-legged frog populations are most likely to persist where multiple breeding areas are embedded within a matrix of habitats used for foraging and dispersal.

Life History

California red-legged juvenile frogs are active both diurnally and nocturnally, whereas adult frogs are largely nocturnal (Hayes and Tennant 1985). Feeding activity likely occurs along the shoreline and on the surface of the water (Hayes and Tennant 1985). The diet of California red-legged frogs is highly variable. Larvae probably eat algae (Jennings *et al. in litt.* 1992), whereas invertebrates are the most common food items of adult frogs (Hayes and Tennant 1985). Vertebrates, such as Pacific tree frogs (*Hyla regilla*) and California mice (*Peromyscus californicus*), represented over half of the prey mass eaten by larger frogs, although invertebrates were the most numerous food items.

California red-legged frogs breed from November through April with earlier breeding records occurring in southern localities (Storer 1925). California red-legged frogs are often prolific breeders, laying their eggs during or shortly after large rainfall events in late winter and early spring (Hayes and Miyamoto 1984). Males appear at breeding sites from 2 to 4 weeks before females (Storer 1925). At these sites, males frequently call in small groups of two to seven individuals, although in some instances they may call individually (Jennings *et al. in litt.* 1992). A breeding pair in amplexus will move to an oviposition site, and the eggs are fertilized while being attached to vertical emergent vegetation, such as bulrushes or cattails near the surface (Jennings *et al. in litt.* 1992; Hayes and Miyamoto 1984) in quiet waters (Storer 1925). Larvae undergo metamorphosis 3.5 to 7 months after hatching (Storer 1925; Wright and Wright 1949; Jennings and Hayes 1990). Of the various life stages, larvae probably experience the highest mortality rates, with less than 1 percent of eggs laid reaching metamorphosis (Jennings *et al. in*

litt. 1992). Sexual maturity normally is reached at 3 to 4 years of age (Storer 1925; Jennings and Hayes 1985), and California red-legged frogs may live up to 8 to 10 years (Jennings *et al. in litt.* 1992).

California red-legged frogs found in coastal drainages are rarely inactive (Jennings *et al. in litt.* 1992), whereas those found in interior sites may hibernate (Storer 1925). This species disperses upstream, downstream and adjacent from their breeding habitat to forage and seek estivation habitat. Dispersal distances are considered to be dependent on habitat availability and environmental conditions (N. Scott and G. Rathbun *in litt.* 1998). The California red-legged frog is rarely encountered far from water (Jennings *et al. in litt.* 1992). However, California red-legged frogs will sometimes disperse in response to receding water which often occurs during the driest time of the year. This species may occur within streams at distances exceeding 2 miles from breeding sites and has been found up to 98 feet from water in adjacent dense riparian vegetation for up to 77 days (Rathbun *et al.* 1993). During periods of wet weather, starting with the first fall rains, some individuals may make overland excursions through upland habitats. Most of these overland movements occur at night. Evidence from marked and radio-tagged frogs on the San Luis Obispo County coast suggests that frog movements, via upland habitats, of about 1.6 kilometers (1 mile) are possible over the course of a wet season. Frogs have been observed to make long-distance movements that are straight-line, point to point migrations rather than using riparian corridors between habitats (Scott, N. and G. Rathbun *in litt.* 1998). The manner in which California red-legged frogs use upland habitats is not well understood. Studies are currently examining the amount of time California red-legged frogs spend in upland habitats, patterns of use, and whether there is differential use of uplands by juveniles, sub-adults, and adults.

Status and Distribution

The California red-legged frog is endemic to California and Baja California, Mexico. According to Jennings and Hayes (1985), the historic range of the California red-legged frog extends through Pacific slope drainages from the vicinity of Redding (Shasta County) (Storer 1925) inland and to Point Reyes (Marin County), California (coastally), and southward to the Santo Domingo River drainage in Baja California, Mexico. It has also occupied habitat in a few desert slope drainages in southern California (Jennings and Hayes 1994). The California red-legged frog was historically known to occur in 46 counties, but the taxon is now extirpated from 24 of those counties (a 52 percent reduction in county occurrences). In 7 of the 22 occupied counties (32 percent), California red-legged frogs are known from a single occurrence.

California red-legged frogs are currently known to occur in 243 drainages in 22 counties, primarily in the central coastal region of California. The species is known from sea level to approximately 1,500 meters, although almost all of the known populations have been documented below 1,050 meters (Fish and Wildlife Service 2002a). A large number of California red-legged frogs are only found in coastal fog belt localities, and most inland populations appear to be extirpated (Jennings 1991). In southern California, California red-legged frogs are known from only 5 locations south of the Tehachapi Mountains, compared to over 80 historic locality records for this region (a reduction of 94 percent).

The Southern Transverse and Peninsular Ranges recovery unit that encompasses southern California contains only two populations of California red-legged frogs. One population occurs in the Plan Area and the other is located on the Ahmanson Ranch in the Santa Monica Bay-Ventura Coastal Streams Core Area. The Ahmanson Ranch population is estimated at 84+ individuals (Doug Krofta, Fish and Wildlife Service, pers. comm. 2003).

Threats

The California red-legged frog has sustained a 70 percent reduction in its geographic range in California as a result of several factors acting singly or in combination (Jennings *et al. in litt.* 1992). Habitat loss and alteration, overexploitation, and introduction of exotic predators were significant factors in the California red-legged frog's decline in the early to mid 1900s. It is estimated that California red-legged frogs were extirpated from the Central Valley floor before 1960. Remaining aggregations (assemblages of one or more individuals, but not necessarily a viable population) of California red-legged frogs in the Sierran foothills became fragmented and were later eliminated by reservoir construction, continued expansion of exotic predators, grazing, and prolonged drought. The pattern of disappearance of California red-legged frogs in southern California is similar to that in the Central Valley, except that urbanization and associated roadway, reservoir and stream channelization projects were the primary factors causing population declines (61 Federal Register 25813).

Within the Plan Area, the California red-legged frog is threatened by urbanization and associated projects, habitat fragmentation, agriculture, livestock, mining, recreation, non-native predators (bullfrogs, crayfish, and non-native fish species), and disease (Fish and Wildlife Service 2002a). Urban and suburban developments contribute to habitat fragmentation and create barriers to frog dispersal. Wetlands adjacent to undeveloped areas are more likely to have larger populations of native amphibians than those within highly urbanized watersheds (Richter and Azous 1997, cited in Fish and Wildlife Service 2002a). Urbanization may result in additional water sources into wetlands and stream courses due to irrigation and home use activities. Such inputs may change the hydroperiod and result in the proliferation of nonnative predators (Moore M. and M. Westphal *in litt.* 1997; cited in Fish and Wildlife Service 2002a).

In addition to the modification of the hydroperiod, development within the watershed can also affect water and habitat quality. As watersheds are developed, the amount of impervious surface increases, resulting in an increase of sediments containing organic matter, pesticides, fertilizers, heavy metals such as hydrocarbons and other debris into streams and wetlands (Environmental Protection Agency 1993, cited in Fish and Wildlife Service 2002a). The decrease in water quality can have profound impacts on native amphibians and other wetland vertebrates. Other modifications to the watershed include channelization of creeks, which can reduce or eliminate breeding sites.

Agricultural practices pose a threat due to loss or modification of California red-legged frog habitat. Such practices typically include the use of fertilizers and pesticides including herbicides and fungicides. An important factor in the decline of the California red-legged frog may be exposure to wind-borne agrochemicals (Davidson *et al.* 2001). Effects include deformities,

abnormal immune system functions, disease, injury, and death (Schneeweiss and Schneeweiss 1997).

Livestock grazing is another form of habitat alteration that may be contributing to the decline of California red-legged frog populations by decreasing suitability of riparian and aquatic habitat (Fish and Wildlife Service 2002a). Unmanaged cattle trample and eat emergent and riparian vegetation, often eliminating or severely reducing plant cover (Gunderson 1968; Duff 1979, cited in Fish and Wildlife Service 2002a). Loss of riparian vegetation results in increased water temperatures (Van Velson 1979, cited in Fish and Wildlife Service 2002a), which decreases suitability for California red-legged frogs and increases the suitability for reproduction of bullfrog and non-native warm-water fishes. Loss of stream-side vegetation also reduces habitat for insects and small mammals, which are important dietary components for aquatic and riparian associated species, including the red-legged frog (Cordone and Kelley 1961, cited in Fish and Wildlife Service 2002a).

Sand and gravel mining practices can alter natural channel morphology in downstream reaches by interrupting the supply of sand and gravel, which is needed for localized shallow, braided channels (Collins and Dunne 1990). Continued instream gravel mining activities without adequate safeguards may preclude favorable habitat conditions for the California red-legged frog (Fish and Wildlife Service 2002a).

Routine road maintenance, trail development, and facilities construction associated with parks and other public lands, in or adjacent to California red-legged frog habitat can degrade habitat quality (61 Federal Register 25813). Heavy use of public recreational areas around aquatic areas can also degrade habitat for the California red-legged frog and can result in the trampling of vegetation, frog eggs, and larvae. Additionally, unmanaged off-road vehicles can damage riparian vegetation, increase siltation in pools, compact soils, disturb the water in stream channels, and crush frogs.

Pathogens have been implicated in the decline of other frog species (Bradford 1991), but there has not been an extensive examination of how disease may adversely affect California red-legged frog populations (Fish and Wildlife Service 2002a). Chytrid fungus has been found in a number of amphibian populations that are known to be declining. Most individuals that are infected as tadpoles die when they metamorphose (Fish and Wildlife Service 2002a). Chytrid fungus has recently been found on California red-legged frog tadpoles in Los Angeles County and Santa Cruz County. Although these occurrences on the California red-legged frog are not in the Plan Area, chytrids are widespread in the environment where they act as decomposers of keratin, chitin, cellulose, and other plant material (Fish and Wildlife Service 2002a).

Several researchers have noted the decline and eventual extirpation of California red-legged frogs once bullfrogs become established at the same site (Moyle 1976; Barry, *S. in litt.* 1992; Hunt, *L. in litt.* 1993; Fisher and Schaffer 1996, cited in Fish and Wildlife Service 2002a). Bullfrogs prey on California red-legged frogs (Twedt 1993, cited in Fish and Wildlife Service 2002a) and may outcompete the California red-legged frog because of their large size, generalized food habits, extended breeding season, and the unpalatability of their larvae to predatory fish (Fish and Wildlife Service 2002a).

Conservation Needs

The following conservation needs are derived from the recovery plan for the California red-legged frog (Fish and Wildlife Service 2002a) and are applicable at a landscape level. Habitat needed by the California red-legged frog for reproduction, development, and survival is dependent on the dynamic nature of aquatic systems. Therefore, conservation will be achieved when breeding habitats are created and maintained naturally by fluctuating hydrological, geological, and ecological processes. In regulated bodies of water where natural processes are interrupted, water management regimes and land use practices appropriate to maintain habitat suitability must be executed into the future. Habitat protection and restoration must be achieved by controlling non-native predators, managing flows in ways that are beneficial for frogs, controlling erosion and sedimentation, replanting wetland vegetation, and increasing connectivity of habitat between known breeding areas.

The recovery plan for the California red-legged frog outlines the following recovery criteria for the California red-legged frog: 1) suitable habitats within all core areas are protected and/or managed for the California red-legged frog in perpetuity, and the ecological integrity (*e.g.*, water quality, uplands condition, hydrology) of these areas is not threatened by adverse anthropogenic habitat modification (including indirect effects of upstream/downstream land uses); 2) existing populations, throughout the range, are stable (*i.e.*, reproductive rates allow for long term viability without human intervention); 3) populations are geographically distributed in a manner that allows for the continued existence of viable metapopulations despite fluctuations in the status of individual subpopulations; 4) the subspecies is successfully reestablished in portions of its range such that at least one reestablished population is stable/increasing in each core area; and 5) the amount of additional habitat needed for population connectivity, recolonization, and dispersal has been determined, protected, and managed for the California red-legged frog.

The California red-legged frog requires aquatic and upland areas where suitable breeding and non-breeding habitat is interspersed throughout the landscape and is interconnected by continuous dispersal habitat (66 Federal Register 14626). Aquatic habitat is essential for providing space, food, and cover, necessary to sustain all life stages of California red-legged frogs. Aquatic habitat may consist of virtually all low-gradient freshwater bodies, including natural and man-made ponds, backwaters within streams and creeks, marshes, and lagoons, except deep water habitat (*e.g.*, deep lakes and reservoirs 20 hectares [50 acres] or larger in size). These aquatic habitats should be free of nonnative predators. The species needs permanent water sources including, but not limited to ponds, perennial creeks (or permanent pools within intermittent creeks), seeps, and springs. Aquatic habitat used for breeding must have a minimum water depth of 0.5 meters (20 inches) and maintain water during the entire tadpole rearing season (at least March through July).

Associated upland and riparian habitat is essential to maintain California red-legged frog populations associated with essential aquatic habitat. The associated uplands and riparian habitat provide food and shelter sites for California red-legged frogs and assist in maintaining the integrity of aquatic sites by protecting them from disturbance and supporting the normal functions of the aquatic habitat. Essential upland habitat consists of all upland areas within 300 feet, or no further than the watershed boundary, of the edge of the ordinary high-water mark.

Connectivity between aquatic habitats is also necessary in that breeding sites should be connected to one or more additional breeding sites (within 2 kilometers [1.25 miles] of each other) via upland, riparian, or wetland habitat free of barriers. At least one of the connected breeding sites should be a permanent water source. Barriers include heavily traveled roads that possess no bridges or culverts, moderate to high density urban or industrial developments, and large reservoirs over 20 hectares (50 acres) in size, while agricultural lands such as row crops, orchards, vineyards, and pastures do not constitute barriers.

Environmental Baseline

Within the Plan Area, historical or suspected locations for the California red-legged frog included the vicinity of Temescal, Vail Lake, Kolb Creek, Murrieta Creek, Santa Ana River, Santa Ana Mountains, Anza, Glen Ivy, Pedley, and the City of Riverside. Today, the only known population of the California red-legged frog within the Plan Area consists of two males that occur within the Santa Rosa Plateau Ecological Reserve located at the southern end of the Santa Ana Mountains (Fish and Wildlife Service 2002a). This population is the only known extant population in the United States south of Ventura County.

The Santa Rosa Plateau Ecological Reserve is cooperatively managed by the Riverside County Regional Park and Open-Space District, the California Department of Fish and Game, the Service, the Metropolitan Water District of Southern California, and The Nature Conservancy. The Santa Rosa Plateau Ecological Reserve and adjacent watershed lands contain riparian habitat that is essential to the maintenance of the California redlegged frog population and the reestablishment of the subspecies in southern California. Current management activities for the California red-legged frog on the Santa Rosa Plateau include surveys, habitat restoration, and annual removal of exotics (particularly bullfrogs). Additional efforts to recover this species are currently underway, including a joint project by the Service, the Los Angeles Zoo, The Nature Conservancy, and the Mexican government to augment and reestablish the population on the Santa Rosa Plateau.

The Plan Area is located within the Southern Transverse and Peninsular Ranges recovery unit for the California red-legged frog (Fish and Wildlife Service 2002a). This is one of eight recovery Units considered essential to the recovery of this subspecies. Within this recovery unit, the following three Core Areas are identified: 1) Santa Rosa Plateau, 2) San Luis Rey, and 3) Santa Ana Mountain. These Core Areas all occur along the western border of Riverside County, and while a large portion of the Santa Rosa Plateau Core Area occurs within the Plan Area, the San Luis Rey and Santa Ana Mountain Core Areas only have very small portions within the Plan Area.

There are 49,054 acres of modeled habitat for the California red-legged frog within the Plan Area. These modeled acres are located entirely within the "RLFR" Amphibian Survey Area that largely occurs within the Santa Ana Mountains Bioregion, but there is also a small amount of modeled habitat within the Riverside Lowlands Bioregion. The primary vegetation types used to model breeding habitat for this species were playas/vernal pools, riparian/scrub/woodland/forest, riversidean alluvial fan sage scrub, and openwater. Based on this analysis, a total of 807 acres of primary habitat is located in the Plan Area, of which approximately 803 acres occur within the

Santa Ana Mountains Bioregion and 4 acres of primary modeled habitat occur within the Riverside Lowlands Bioregion. Of the 807 acres of primary modeled habitat, 730 acres (90 percent) occur on PQP Lands.

The secondary vegetation types used to model upland habitat for this species were agricultural land, chaparral, coastal sage scrub, grasslands, and woodland/forests. Based on this analysis, a total of 48,247 acres of secondary modeled habitat is located in the Plan Area, of which 48,203 acres occur within the Santa Ana Mountains Bioregion and 44 acres occur within the Riverside Lowlands Bioregion. Of the 48,247 acres of secondary modeled habitat, 38,091 acres (79 percent) occur on PQP Lands. In summary, there are a total of 49,054 acres of modeled habitat for the California red-legged frog within the Plan Area, of which 38,821 acres (79 percent) occur on PQP Lands.

Effects of the Action

Direct Effects

The Plan Area includes 49,054 acres of modeled habitat for the California red-legged frog, of which 807 acres are primary (breeding) modeled habitat, and 48,247 acres are secondary (upland) modeled habitat. California red-legged frogs will be subject to impacts associated with development and other proposed Covered Activities over the 75-year permit term within 43 acres (5 percent) of primary modeled habitat and 9,009 acres (19 percent) of secondary modeled habitat. There are no known occurrences of California red-legged frogs outside the MSHCP Conservation Area. It is anticipated that modeled habitat outside the MSHCP Conservation Area will be lost or degraded due to grading activities, construction, water diversion/flood control projects, fill of aquatic habitat, recreation, and other urban and agricultural activities.

The California red-legged frog is considered an Additional Survey Needs and Procedures species. Until such time that the Additional Reserve Lands are assembled and conservation objectives for this species are met, surveys for the California red-legged frog will be conducted as part of the project review process for public and private projects where suitable habitat is present for the species within the survey area for the California red-legged frog (“RLFR” Amphibian Survey Area). Populations detected as a result of survey efforts will be avoided according to the procedures outlined in the Additional Survey Needs and Procedures (Section 6.3.2 of the Plan; *i.e.*, 90 percent of portions of property with long-term conservation value will be avoided until the species conservation objectives are met). For those locations found to contain large numbers of individuals or otherwise determined to be important to the overall conservation of the species, the Plan allows flexibility to acquire these locations for inclusion into the Additional Reserve Lands (Section 6, pp. 6-70). In addition, we anticipate that implementation of the Riparian/ Riverine Areas and Vernal Pools policy will assist in providing some protection to this species’ habitat by avoiding and/or minimizing direct impacts to riparian and riverine habitats.

Outside of the MSHCP Conservation Area, an estimated 9,052 acres of California red-legged frog modeled habitat could be impacted or lost. Development and modification of these acres may result in the loss of suitable and/or historically occupied habitat. Habitat fragmentation and

degradation would result from urban development, water diversion/flood control projects, fill of aquatic habitat, construction projects, sand and gravel mining practices, recreation, and other urban and agricultural activities. We do not anticipate, however, the loss of additional California red-legged frog populations outside the MSHCP Conservation Area. Should frogs be located during required surveys in the "RLFR" Amphibian Survey Area, 90% of those portions of the property that provide long-term conservation will be avoided until it is demonstrated that conservation goals for the California red-legged frog are met.

To offset the loss of California red-legged frog modeled habitat within the Plan Area, implementation of the MSHCP will conserve and manage areas containing modeled habitat for the California red-legged frog. In total, the MSHCP Conservation Area will include 40,003 acres (82 percent) of the total modeled habitat for the California red-legged frog. The MSHCP Conservation Area will include 95 percent of the total primary modeled habitat for the California red-legged frog. A total of 765 acres of primary modeled habitat will remain in the Plan Area including 35 acres of Additional Reserve Lands and 730 acres of PQP Lands. The MSHCP Conservation Area will also include 81 percent of the total secondary modeled habitat for the California red-legged frog. A total of 39,238 acres of secondary modeled habitat will be conserved or remain in the Plan Area including 1,147 acres of Additional Reserve Lands and 38,091 acres of PQP Lands.

The MSHCP proposes the Santa Rosa Plateau Core Area (9,028 acres) and the southern Santa Ana Mountains Core Areas (30,964 acres) to support the California red-legged frog within the MSHCP Conservation Area. These Core Areas and the intervening lands that connect them provide the foundation for the conservation and management of the California red-legged frog in the Plan Area. As identified in the recovery plan, these Core Areas are essential to the recovery of the California red-legged frog in southern California.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands including surveys for the California red-legged frog. Cooperative management and monitoring are anticipated on PQP Lands. Within the MSHCP Conservation Area, Reserve Managers will determine if successful reproduction is occurring as measured by the presence/absence of tadpoles, egg masses, or juvenile frogs once a year for the first five years after permit issuance and then as determined by the RMOC, but not less frequently than every eight years. Surveys for the California red-legged frog will be conducted at least every eight years to verify occupancy at a minimum of 75 percent of the known locations. If a decline in the distribution of the California red-legged frog is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP. Reserve Managers will maintain and/or restore ecological processes within occupied habitat and suitable new areas within the MSHCP Conservation Area. The ecological processes and breeding population(s) will be maintained as a result of management measures with regard to alteration of hydrology and flood control, non-native plant species, mining, human collection, and predation. At a minimum, these areas will include the Santa Rosa Plateau, San Mateo Wilderness area of the Cleveland National Forest, Squaw Mountain, Avenacola Mesa, Redonda Mesa, Alamos Canyon, and surrounding areas (Section 5, Table 5.2).

Indirect Impacts

The California red-legged frog could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These include the indirect effects described in the “General Effects” section of this biological opinion. The California red-legged frog is susceptible to changes in hydrological processes (*e.g.*, hydroperiodicity) and water quality; therefore, it is likely to be vulnerable to indirect effects associated with changes in the hydrological regime of its aquatic habitat. As watersheds are developed, the amount of impervious surface increases, resulting in an increase of sediments containing organic matter, pesticides, fertilizers, heavy metals such as hydrocarbons and other debris into streams and wetlands (Environmental Protection Agency 1993, cited in Fish and Wildlife Service 2002a). A decrease in water quality can have negative impacts on the recovery of California red-legged frog populations. Implementation of the Riparian/Riverine Areas and Vernal Pools policy will help to reduce these indirect effects to this species.

Conclusion

We anticipate that the proposed action will directly and indirectly affect the California red-legged frog as described in the analyses above, including the loss of 5 percent of modeled breeding habitat and 18 percent of modeled upland habitat in the Plan Area. Implementation of the avoidance, minimization, and mitigation measures identified in the Plan will reduce the impacts to this species. We anticipate that this species will persist in the remaining 95 percent of modeled breeding habitat and 82 percent of modeled upland habitat within both the existing PQP Lands and the Additional Reserve Lands. Together these lands form a system of large, contiguous habitat blocks that are inter-connected within the Plan Area. We anticipate that these areas will be monitored and managed cooperatively to benefit this species.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service’s biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the California red-legged frog. We reached this conclusion because 95 percent of the modeled breeding habitat and 82 percent of modeled upland habitat for the California red-legged frog and the only known population of this species in Riverside County will be conserved or remain within the MSHCP Conservation Area. Thus, the impacts to this species and its associated modeled habitat, when viewed in conjunction with the protection and management of the MSHCP Conservation Area, is not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range. Critical habitat has been vacated for this species; therefore, none will be affected.

Amount or Extent of Take

We anticipate that up to 9,052 acres of breeding and upland habitat within the Plan Area will become unsuitable for the California red-legged frog as a result of the proposed action. With implementation of the survey requirements for this species and the Riparian/Riverine Areas and Vernal Pools policy, we anticipate that zero (0) California red-legged frogs will be taken as a

result of the proposed action. This level of take is not likely to result in jeopardy to the California red-legged frog.

Mountain yellow-legged frog (*Rana muscosa*)

Status of the Species

Listing Status

The Service listed the southern California distinct vertebrate population segment of the mountain yellow-legged frog (*Rana muscosa*) as endangered on July 2, 2002 (67 Federal Register 44382). This species is also designated as a California State Species of Special Concern by the California Department of Fish and Game. Critical habitat for this species has not been designated.

Species Description

The mountain yellow-legged frog is in the family of true frogs, Ranidae, which consists of frogs that are more closely tied to water bodies for breeding and foraging than other frog or toad species. This species is a moderately sized frog with variable skin pattern and body color, usually a mix of brown and yellow (Jennings and Hayes 1994, Zweifel 1955).

Habitat Associations

Historically found throughout the Sierra Nevada, mountain yellow-legged frogs were abundant in high elevation lakes (Bradford *et al.* 1993), ponds, meadows with permanent pools, and to a lesser extent, streams above 2,000 meters (Grinnell and Storer 1924, Zweifel 1955, Bradford *et al.* 1994). This species is a highly aquatic frog that occupies rocky and shaded streams with cool waters originating from springs and snow melt. Pope (1999) suggested that mountain yellow-legged frogs may have strong site fidelity for wintering and summer habitats. Water depth, persistence, and configuration (*i.e.*, gently sloping shorelines and margins) appear to be important for mountain yellow-legged frogs, allowing for shelter from predators along shores or in deeper waters and habitat for breeding, foraging, egg-laying, thermoregulation and overwintering (Jennings and Hayes 1994). However, mountain yellow-legged frogs appear to be absent from the smallest creeks, probably because these have insufficient depth for adequate refuge and overwintering (Jennings and Hayes 1994).

Mountain yellow-legged frogs appear to prefer sloping banks with rocks or vegetation in close proximity to the water's edge. They are seldom found more than two to three jumps from the water (Stebbins 1985). Some form of shelter/refuge is required so that they may hide beneath or beside rocks, clumps of grass, banks, debris, etc. (Mullaly 1959). Occasionally, this species will rest exposed on the bottom of a creek, bury themselves in bottom sediments, or may enter rodent burrows during dry periods (Zeiner *et al.* 1988). Tadpoles are generally restricted to permanent still water deeper than one meter (Bradford 1989) where they use the rocky bottoms (Zeiner *et al.* 1988). Low sloping shorelines are probably essential for oviposition and important for thermoregulation of larvae and post-metamorphs. In addition, this kind of shoreline configuration probably provides a refuge from predation if fishes occur in adjacent deeper water

(Jennings and Hayes 1994). This species seems to be most successful where predatory fishes are absent (Bradford 1989; Bradford *et al.* 1993).

In southern California, mountain yellow-legged frog populations may occur in streams and small pools in chaparral (Zweifel 1955), ponderosa pine, montane hardwood-conifer, and montane riparian habitat types (Zeiner *et al.* 1988) and have historically been absent from glacial or artificial lakes (Mullaly 1959). Stagnant pools with a scum of floating algae appear to be avoided. However, large, clear pools up to three feet deep are especially favored. In the fall, they often concentrate in shrunken streams in which only a trickle of water flows and where the pools are only a few inches deep and one or two feet across (Mullaly 1959).

Life History

All age classes of the mountain yellow-legged frog are active during the day (Bradford 1984, 1989, Bradford *et al.* 1993) and become inactive after nightfall (Mullaly 1959). Larvae forage on algae and diatoms at the pond or stream substrate (Zeiner *et al.* 1988). The juveniles and adults forage primarily on small streamside insects such as beetles, flies, ants, bees, and similar small insects (Jennings and Hayes 1994).

The mountain yellow-legged frog spends the coldest winter months in hibernation. Adults and larvae hibernate in refugia under the water's surface, sometimes covered by five or more inches of ice (Mullaly 1959). This species may also estivate in rodent burrows or moist areas if perennial water resources dry up (Mullaly 1959). The mountain yellow-legged frog emerges from overwintering sites in early spring and breeding soon follows.

Reproduction does not take place until lakes and streams are free of ice (Zeiner *et al.* 1988), and after high waters subside (Stebbins 1985). Breeding at higher elevations usually occurs from June to August; however, at lower elevations and in southern California, breeding takes place between March and May (Mullaly 1959, Stebbins 1985, Zeiner *et al.* 1988). Egg masses are normally deposited in shallow waters where they may be attached to rocks, gravel, vegetation, or similar substrates (U.S. Forest Service 2002a). As larvae develop, they tend to gravitate towards warmer waters to elevate body temperatures (Bradford 1984), which may facilitate larval and metamorphic development by allowing for a higher metabolic rate. Even with this behavior, "larvae apparently must overwinter at least two times for six to nine month intervals before attaining metamorphosis because the active season is short and the aquatic habitat maintains warm temperatures for only brief intervals" (U.S. Forest Service 2002a). Time to develop from fertilization to metamorphosis appears to be variable, ranging up to 3.5 years (Vredenburg *et al.* in press, Zweifel 1955), with reproductive maturity reached from 3 to 4 years following metamorphosis (Zweifel 1955).

Though significant migrations have not been noted (Zeiner *et al.* 1988), mountain yellow-legged frogs are known to move from ponds to nearby streams after the spring thaw (Bradford *et al.* 1993). Jennings and Hayes (1994) indicate that data on movement ecology and recolonization capabilities are lacking. Although mountain yellow-legged frogs have been reported to not cross even short distances of dry ground (Mullally and Cunningham 1956), overland movements of up to 400 meters have been documented in the Sierra Mountains (Vredenburg *et al.* in press).

Little is known of mountain yellow-legged frog intraspecific interactions and behavior (Zeiner *et al.* 1988) and adult longevity, but the species is presumed to be long-lived due to adult survivorship (Matthews and Pope 1999; Pope 1999).

Status and Distribution

The mountain yellow-legged frog is a near-endemic species to California (primarily restricted to California and a small area of Nevada), historically ranging in distribution from northern Plumas County in northern California to northern San Diego County in southern California. Within the range of the species, there are two major clades separated by a biogeographic break between the central and southern portions of the Sierra Nevada. These two clades can be further divided into four subgroups, the northern Sierra Nevada, central Sierra Nevada, southern Sierra Nevada, and southern California (Macey *et al.* 2001). Southern California populations of mountain yellow-legged frogs were historically documented from approximately 166 localities in creeks and drainages in the mountains of southern California (Jennings and Hayes 1994).

The decline of mountain yellow-legged frogs from more than 99 percent of their previously documented range in southern California (Jennings and Hayes 1994) may be part of a well-known larger pattern of native ranid frog extirpations in the western United States (Hayes and Jennings 1986; Drost and Fellers 1996). Nowhere have the declines been more pronounced than in southern California, where, in addition to declines in mountain yellow-legged frogs, the California red-legged frog (*Rana aurora draytonii*) has been reduced to a few small remnant populations (61 Federal Register 25813; 66 Federal Register 14626), and the foothill yellow-legged frog (*Rana boylei*) may be extirpated (Jennings and Hayes 1994).

Currently, the mountain yellow-legged frog is known from only eight locations in southern California (Backlin *et al.* 2002; Lisa Mizuno, U.S. Forest Service biologist, pers. comm. 2003). Surveys in 2000 and 2001 by the U.S. Geological Survey found mountain yellow-legged frogs in five small streams in the San Gabriel Mountains, one stream (east fork of City Creek) in the San Bernardino Mountains, and two streams (Fuller Mill Creek and a tributary of Dark Canyon) in the upper reaches of the San Jacinto River system in the San Jacinto Mountains (Backlin *et al.* 2002; U.S. Forest Service 2002a; Lisa Mizuno, U.S. Forest Service biologist, pers. comm. 2003). The current southern California population estimate is approximately +193 adult frogs (Table 1).

The recent Old Fire in October of 2003 burned the entire watershed of City Creek in the San Bernardino Mountains. The fire was followed by floods and mudslides in December. There was a severe loss of riparian vegetation and the pools were filled with mud and debris. It is unknown if any individuals survived. Adverse impacts to this population can be expected into the future as sedimentation of City Creek results in habitat destruction and degradation. Therefore, it is likely that the remaining adult population is lower than estimated in Table 1.

Table 1. 2001-2002 adult population estimates for streams in southern California in which mountain yellow-legged frogs were found. Source: Backlin, pers. comm. 2003, Sunada *et al.* 2002 for Fuller Mill Creek, Lisa Mizuno, U.S. Forest Service biologist, pers. comm. 2003 for Dark Canyon.

Mountain Range	Site	Population Estimate	95% C.I.
San Gabriel	Bear Gulch	41	30-80
San Gabriel	Little Rock Creek	8	7-9
San Gabriel	Big Rock Creek (South Fork)	46	17-108
San Gabriel	Vincent Gulch	12	2-14
San Gabriel	Devil's Canyon	6	5-15
San Bernardino	City Creek (East Fork)	52	30-199
San Jacinto	Fuller Mill Creek	≥7*	NA
San Jacinto	Dark Canyon (tributary)	≥21*	NA

* adults observed, no population estimate was made

Threats

The mechanisms causing the declines of western ranid frogs are not well-understood and are certain to vary somewhat among species. The two most common and well-supported hypotheses for widespread extirpation of western ranid frogs are: (1) past habitat destruction related to activities such as logging, mining, and habitat conversions for water development, irrigated agriculture, and commercial development (Hayes and Jennings 1986; 61 Federal Register 25813) and (2) non-native predators and competitors such as introduced trout and bullfrogs (Hayes and Jennings 1986; Bradford 1989; Knapp 1996; Kupferberg 1997).

Introduced fishes are the most likely explanation for the severe decline in mountain yellow-legged frogs (Bradford 1991; Bradford *et al.* 1993; Grinnell and Storer 1924). Rainbow trout have been regularly stocked within the San Jacinto River system by the California Department of Fish and Game to provide recreational fishing opportunities. Studies of interactions between trout and mountain yellow-legged frogs in the Sierra Nevada have documented that stocked trout can be very detrimental to these frogs (Bradford *et al.* 1993; Knapp and Matthews 2000). In June of 2000, the California Department of Fish and Game committed to suspend trout stocking in southern California stream reaches known to be occupied by mountain yellow-legged frogs, including Fuller Mill Creek and Dark Canyon (Pickard 2000). However, trout still remain in most of these areas, and they will continue to be stocked in other suitable habitat areas, potentially hampering the ability of mountain yellow-legged frogs to reestablish these sites.

Recreational activities threaten mountain yellow-legged frog habitat in the Plan Area, including hiking, mountain climbing, camping, swimming, stocking of trout for fishing, and other human-related impacts including release of toxic or hazardous materials into stream reaches inhabited by the frogs (Jennings 1995; Backlin *et al.* 2002; U.S. Forest Service 2002a). In areas occupied by frogs, human use in and along streams can disrupt the development, survivorship, and

recruitment of eggs, larvae, and adult frogs (Jennings 1995; Stewart *in litt.* 1995) and can change the character of a stream, its bank, and associated vegetation in ways that make whole sections of a stream less suitable for the species.

Both of the known mountain yellow-legged frog populations are small within the Plan Area. Small populations have a higher probability of extinction than larger populations because their low abundance renders them susceptible to stochastic (random, naturally occurring) events such as inbreeding, loss of genetic variation, demographic problems like skewed variability in age and sex ratios, and catastrophes such as floods, fires, droughts, or disease epidemics (Lande 1988; Saccheri *et al.* 1998). For example, mountain yellow-legged frog larvae may die when aquatic habitat becomes ephemeral in drought years or when oxygen is depleted during the winter months (Bradford 1993).

Wildfire has developed into a significant threat in the Plan Area as fire suppression strategies have allowed vegetation and fuel levels to increase. These high fuel levels could lead to intense fires that remove a large proportion of vegetative cover. Such large-scale fires could result in a lack of stream shade and increased sedimentation within stream channels due to destabilized stream banks. An example of this type of threat is currently being seen with the City Creek population in the San Bernardino Mountains.

Development and spring water extraction within private lands also pose a threat to the mountain yellow-legged frog in historically occupied areas within the Plan Area. Development can result in the degradation of habitat through increased trail use, increased pollution (including the introduction of pesticides and herbicides), increased turbidity, and introduction of non-native vegetation, predators, and competitors. Spring water extraction can also lead to habitat degradation as water levels decrease in creeks leaving unsuitable habitat conditions.

Other environmental factors that may adversely affect mountain yellow-legged frogs and other amphibian populations include pesticides (Sparling *et al.* 2001), certain pathogens (Blaustein *et al.* 1994; Fellers *et al.* 2001), ultraviolet-B (beyond the visible spectrum) radiation (Blaustein *et al.* 2001; Belden and Blaustein 2002), or a combination of the above factors (Kiesecker and Blaustein 1995; Blaustein *et al.* 2001; Kiesecker *et al.* 2001). However, these factors, interactions, and their effects on the decline of amphibian populations are not well understood (Wake 1998; Fellers *et al.* 2001).

Conservation Needs

The conservation needs for this species are important for maintaining viable populations of mountain yellow-legged frogs within the Plan Area. Habitat needed by the mountain yellow-legged frog for reproduction, development, and survival is dependent on the dynamic nature of aquatic systems. Therefore, conservation will be achieved when breeding habitats are maintained naturally by fluctuating hydrological, geological, and ecological processes. Given the current limited distribution of mountain yellow-legged frogs in the Plan Area, occupied habitat must be protected from recreational use, development, ground-water extraction, and pollution. A sufficient amount of suitable habitat is also needed to allow for the recovery of the species in the Plan Area. Habitat restoration is also needed to recover populations within the

Plan Area, with particular emphasis on controlling non-native predators, eliminating non-native predatory fish, and controlling erosion and sedimentation. In addition, measures should also be established to minimize the likelihood of pathogen contamination of pristine populations. Research is also needed to determine the status of the mountain yellow-legged frog in previously unsurveyed but suitable habitat.

Environmental Baseline

Within the Plan Area, mountain yellow-legged frogs have been recently observed (*i.e.*, within the last seven years) only in upper reaches and tributaries of the North Fork of the San Jacinto River. Specific locations include: Dark Canyon, Hall Canyon, Fuller Mill Creek, and the North Fork above Highway 74 (Backlin *et al.* 2002; Jennings 1999). As of 2004, only two known populations of mountain yellow-legged frogs exist in the Plan Area. There is a small population of 7+ adults in Fuller Mill Creek (Sunada *et al.* 2002) and a recently discovered population of 21+ adults in a tributary to Dark Canyon (Kim Boss, U.S. Forest Service biologist, pers. comm. 2003). The population in Fuller Mill Creek is on both private and Forest Service land, while the population in the Dark Canyon tributary is on Forest Service land. Within in the Plan Area, these two populations are threatened most by the presence of trout, recreation within and adjacent to the stream channel, wildfire, hazardous spills from adjacent highways, and drought (67 Federal Register 44382; U.S. Forest Service 2002a).

Issued to the Forest Service on February 27, 2001, a recent biological opinion (1-6-00-F-773.2) outlines measures that the Forest Service will implement to reduce impacts to the mountain yellow-legged frog associated with their maintenance and recreational activities. On Forest Service lands within the San Jacinto Mountains, maintenance and use of developed recreation sites may be contributing to the inability of mountain yellow-legged frogs to recolonize areas where they historically occurred. In response to these threats, the Forest Service agreed to the following general management strategies for the mountain yellow-legged frog: 1) identify and analyze developed recreation sites and other high concentrations of public use in key and occupied habitats, 2) avoid or minimize negative impacts when key or occupied habitat is detected in a recreation area, and 3) design new recreational facilities or expansion of existing facilities to concentrate public use away from key habitats.

Specific management actions at Fuller Mill Creek have been identified. The Forest Service will remove picnic tables and barbeque pits located adjacent to the creek, store equipment and materials at least 250 feet away from the creek, install interpretive signs, and conduct surveys during the breeding season. The Forest Service has also acquired 97 hectares (240 acres) of habitat from private holdings in the Fuller Mill Creek drainage thereby facilitating protection and management of this population. The Forest Service also has an agreement with the California Department of Fish and Game to not stock Fuller Mill Creek with trout while both agencies conduct assessments on the issue of fish-frog interactions.

Specific management actions at Dark Canyon have also been identified. The Forest Service completed the removal of camp sites adjacent to the creek in May of 2001 and installed interpretive signs in July of 2001. The Forest Service will also eliminate unauthorized trails used to access the creek from the Dark Canyon Campground, institute training for camp

permittees, store equipment and materials at least 250 feet away from the creek, and conduct surveys during the breeding season. The Forest Service also has an agreement with the California Department of Fish and Game to not stock Dark Canyon with trout while both agencies conduct assessments on the issue of fish-frog interactions.

For purposes of our analysis, modeled habitat for the mountain yellow-legged frog within the San Bernardino Mountains and San Jacinto Mountains Bioregions includes all portions of streams and habitat within 100 meters of the streams, between 370 to 2,290 meters in elevation, and within riparian scrub/woodland/ forest, montane coniferous forest, woodlands and forest, and chaparral habitats. Modeled habitat within the Plan Area totals approximately 30,927 acres; of which, approximately 21,001 acres (68 percent) of modeled habitat occur on PQP Lands. The population at Dark Canyon is found on PQP Land, whereas the population in Fuller Mill Creek is on both private and PQP Lands.

Effects of the Action

Direct Effects

The Plan Area includes 30,927 acres of modeled habitat for the mountain yellow-legged frog. This species will be subject to impacts associated with development and other proposed Covered Activities over the 75-year permit term within 8,094 acres (26 percent) of modeled habitat. It is anticipated that modeled habitat outside the MSHCP Conservation Area will be lost or degraded due to grading activities, construction, water diversion/flood control projects, fill of aquatic habitat, recreation, and other urban and agricultural activities.

The mountain yellow-legged frog is considered an Additional Survey Needs and Procedures species. Until such time that the Additional Reserve Lands are assembled and conservation objectives for this species are met, surveys for the mountain yellow-legged frog will be conducted as part of the project review process for public and private projects where suitable habitat is present for the species within the survey area for the mountain yellow-legged frog (“MYLF” Amphibian Survey Area). Populations detected as a result of survey efforts will be avoided according to the procedures outlined in the Additional Survey Needs and Procedures (Section 6.3.2 of the Plan; *i.e.*, 90 percent of portions of property with long-term conservation value will be avoided until the species conservation objectives are met). For those locations found to contain large numbers of individuals or otherwise determined to be important to the overall conservation of the species, the Plan allows flexibility to acquire these locations for inclusion into the Additional Reserve Lands (Section 6, pp. 6-70). In addition, we anticipate that implementation of the Riparian/Riverine Areas and Vernal Pools policy (Chapter 6) will assist in providing some protection to this species’ habitat by avoiding and/or minimizing direct impacts to riparian, riverine, and vernal pool habitats.

The MSHCP proposes the San Jacinto Mountains Bioregion Core Area (Core Area K: 149,750 acres) to support the mountain yellow-legged frog within the MSHCP Conservation Area. This Core Area primarily occurs within the San Bernardino National Forest. This area includes the current known populations as well as suitable and historically occupied mountain yellow-legged

frog habitat. This Core Area is essential to the long-term conservation and protection of the mountain yellow-legged frog in the Plan Area.

Outside of the MSHCP Conservation Area, an estimated 8,094 acres (26 percent) of mountain yellow-legged frog modeled habitat could be impacted or lost. Development and modification of these acres may result in the loss of suitable and/or historically occupied habitat. Habitat fragmentation and degradation would result from urban development, water diversion/flood control projects, fill of aquatic habitat, construction projects, sand and gravel mining practices, recreation, and other urban and agricultural activities. We do not anticipate, however, the loss of additional mountain yellow-legged frog populations outside the MSHCP Conservation Area. Should frogs be located during required surveys in the “MYLF” Amphibian Survey Area, 90 percent of those portions of the property that provide long-term conservation will be avoided until it is demonstrated that conservation goals for the mountain yellow-legged frog are met. A total of 2,694 acres of modeled habitat occur outside of the “MYLF” Amphibian Survey Area, of which, 1,521 acres occur within PQP or Additional Reserve Land and will receive protection and management. Only the remaining 1,173 acres of modeled habitat will occur outside both the “MYLF” Amphibian Survey Area and the MSHCP Conservation Area.

To offset the loss of mountain yellow-legged frog modeled habitat within the Plan Area, implementation of the MSHCP will conserve and manage areas containing modeled habitat for the mountain yellow-legged frog. In total, the MSHCP Conservation Area will include 22,834 acres (74 percent) of the total modeled habitat for the mountain yellow-legged frog. The MSHCP Conservation Area includes a total of 1,832 acres (6 percent) of Additional Reserve Lands and 21,001 acres (68 percent) of PQP Lands. Of the Additional Reserve Lands, 1,714 acres (94 percent) occurs within the San Jacinto Mountains Bioregion and 118 acres (6 percent) occurs within the San Bernardino Mountains Bioregion.

The protection of known mountain yellow-frog populations is essential to the conservation and recovery of the species in the Plan Area. Of the two known populations within the Plan Area, the Dark Canyon population occurs entirely on PQP Lands that will be cooperatively managed. The Fuller Mill Creek population will receive a similar level of protection as it falls both within PQP and the “MYLF” Amphibian Survey Area. With the implementation of the habitat protection measures within the Survey Area, we expect that the portion of the Fuller Mill Creek population that occurs on private land will be avoided or conserved over the long-term.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands including surveys for the mountain yellow-legged frog. Cooperative management and monitoring are anticipated on PQP Lands. Within the MSHCP Conservation Area, Reserve Managers will determine if successful reproduction is occurring as measured by the presence/absence of tadpoles, egg masses, or juvenile frogs once a year for the first five years after permit issuance and then as determined by the RMOC, but not less frequently than every eight years. Surveys for the mountain yellow-legged frog will be conducted at least every eight years to verify occupancy at a minimum of 75 percent of the known locations. If a decline in the distribution of the mountain yellow-legged frog is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP. Other management activities listed in Section

5 will be conducted to benefit the mountain yellow-legged frog within the MSHCP Conservation Area. Within occupied habitat and suitable new areas, Reserve Managers will maintain ecological and hydrological processes, with particular emphasis on removing non-native predatory fish and bullfrogs. At a minimum, these areas will include areas above 370 meters at the North Fork of the San Jacinto River (including Dark Canyon), Fuller Mill Creek, and Hall Canyon above Lake Fulmor (Section 5, Table 5.2).

Indirect Effects

The mountain yellow-legged frog could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These include the indirect effects described in the “General Effects” section of this biological opinion. The mountain yellow-legged frog is susceptible to changes in hydrological processes (*e.g.*, hydroperiodicity) and water quality; therefore, it is likely to be vulnerable to indirect effects associated with changes in the hydrological regime of its aquatic habitat. As watersheds are developed, the amount of impervious surface increases, resulting in an increase of sediments containing organic matter, pesticides, fertilizers, heavy metals such as hydrocarbons and other debris into streams and wetlands (Environmental Protection Agency 1993, cited in Fish and Wildlife Service 2002b). A decrease in water quality can have negative impacts on the recovery of mountain yellow-legged frog populations. Implementation of the Riparian/Riverine Areas and Vernal Pools policy will help to reduce these indirect effects to this species.

Conclusion

We anticipate that the proposed action will directly and indirectly affect the mountain yellow-legged frog as described in the analyses above, including the loss 8,094 acres (26 percent) of modeled habitat in the Plan Area. Implementation of the avoidance, minimization, and mitigation measures identified in the Plan will reduce the impacts to this species. We anticipate that this species will persist in the remaining 74 percent of modeled habitat within both the existing PQP Lands and the Additional Reserve Lands. Together these lands form a system of large, contiguous habitat blocks that are inter-connected within the Plan Area. We anticipate that these areas will be monitored and managed cooperatively to benefit this species.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service’s biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the mountain yellow-legged frog. We reached this conclusion because 74 percent of the modeled habitat and the two known populations of mountain yellow-legged frogs will remain or be conserved within the MSHCP Conservation Area. Thus, the impacts to this species and its associated modeled habitat, when viewed in conjunction with the protection and management of the MSHCP Conservation Area, are not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range. Critical habitat has not been designated for this species; therefore, none will be affected.

Amount or Extent of Take

We anticipate that up to 8,094 acres of mountain yellow-legged frog habitat within the Plan Area will become unsuitable for the mountain yellow-legged frog as a result of the proposed action. With implementation of the survey requirements for this species and the Riparian/Riverine Areas and Vernal Pools policy, we anticipate that zero (0) mountain yellow-legged frogs will be taken as a result of the proposed action. This level of take is not likely to result in jeopardy to the mountain yellow-legged frog.

BIRDS

Bald eagle (*Haliaeetus leucocephalus*)

Status of the Species

Listing Status

In the late 1960s and early 1970s, it was discovered that bald eagles (*Haliaeetus leucocephalus*) ingesting prey containing the pesticide dichloro-diphenyl-trichlorethane (DDT) and its metabolites experienced significantly reduced reproductive success (64 Federal Register 36455). In response on March 11, 1967, bald eagles south of the 48th parallel were listed as endangered under the Endangered Species Act of 1966 (32 Federal Register 4001). A nationwide bald eagle survey, completed in 1974, revealed that eagle populations were declining within the continental United States or the lower 48 states. Hence, under the Endangered Species Act of 1973, as amended, on February 14, 1978, the bald eagle was listed as endangered in the lower 48 states with the exception of Michigan, Minnesota, Wisconsin, Washington, and Oregon where it was listed as threatened, and sub-specific designations for northern and southern bald eagles were dropped (43 Federal Register 6233). As a result of the significant increase in numbers of nesting pairs, increased productivity and expanded distribution, the bald eagle was reclassified as threatened within the lower 48 states in 1995 (64 Federal Register 36453). The bald eagle receives Federal protection under the Migratory Bird Treaty Act of 1918, as amended, and the Bald Eagle Protection Act of 1940, as amended. The bald eagle is a State-endangered species and is considered a Fully Protected Species by the California Department of Fish and Game.

Species Description

The bald eagle is a large, mostly dark-brown raptor. Adult bald eagles have a white heads and tails, which are developed at about four to six years of age. Juvenile bald eagles are mostly brown and can be confused with golden eagles. Females can weigh from 8 to 14 pounds, and males from 8 to 10 pounds. Bald eagles usually have a wingspan of 6 to 7 feet. The bald eagle is the second largest raptor in California, next to the California condor. The bald eagle is the only North American representative of the fish or sea eagles and is endemic to North America (Fish and Wildlife Service 1986a).

Habitat Associations

The bald eagle is a bird of aquatic ecosystems and frequents estuaries, large lakes, reservoirs, marinas, rivers, swamps and seacoast habitats (AOU 1998; 64 Federal Register 36454). Day-roost sites often are snags. Night roosting often occurs within 0.5 miles of water on steep north or northwest facing slopes with green trees. Within southern California, they are most often recorded at large inland bodies of water in mixed conifer forests (Garrett and Dunn 1981).

The breeding range of eagles formerly included most of the continent; however, eagles now breed primarily in Alaska, Canada, and in the Pacific Northwest and Great Lake states, Florida, and the Chesapeake Bay (Fish and Wildlife Service 1986a). Nests are most often constructed in large trees near water; however, there are records of nests constructed on cliffs along the California coast (Fish and Wildlife Service 1986a) and, rarely, on the ground (50 Federal Register 36454). Adults tend to use the same breeding areas year after year, although alternate nest sites are common (50 Federal Register 36454).

Life History

Fish is a major components of the bald eagle diet, but waterfowl and carrion are also eaten (64 Federal Register 36454). The bald eagle typically swoops from hunting perches or soaring flight to pluck fish from water. Winter feeding usually occurs immediately after dawn and in late afternoon (Zeiner *et al.* 1990a). In New Mexico, wintering bald eagles spent 95.3 percent of their time perched and 4.7 percent in flight; of the time spent in flight, 13.0 percent was spent foraging (Zwank *et al.* 1996). Eagles are long-lived with recorded life spans exceeding 12 to 28 years in the wild and 36 years in captivity (64 Federal Register 36454).

Bald eagles breed in areas near water, with nests often in large snags or old-growth trees (Brown 1999). It nests most frequently in stands with less than 40 percent canopy, but there is usually some foliage shading the nest (Call 1978). It often chooses the largest tree in a stand on which to build its stick platform nest. The nest is typically located 16-61 meters (50-200 feet) above ground, usually below the tree crown. Individuals have been known to use the same nest for up to 35 years (Brown 1999). Bald eagle pairs begin courtship about one month prior to egg-laying with the nesting season lasting about 6 months and incubation approximately 35 days (64 Federal Register 36454). The bald eagle is monogamous and breeds first at 4-5 years of age (Zeiner *et al.* 1990a). It is presumed that once mated, a long-term pair bond is established. However, documentation of pair bonding behavior is limited (64 Federal Register 36454).

The clutch size of the bald eagle is usually two, but can vary from one to three, and eggs are laid once annually (Brown 1999). The bald eagle breeds from February through July, with a peak in activity from March to June. Incubation of the eggs usually lasts 34-36 days. The semi-altricial young hatch asynchronously (Ehrlich *et al.* 1988) and young fledge at about 11-12 weeks. Eaglets fledge at about 11-12 weeks of age, but parental care may extend for another 4-11 weeks. Upon leaving the nest site, most juvenile eagles migrate a few hundred miles to wintering areas (64 Federal Register 36453). Juvenile eagles require four to five years to reach maturity (64 Federal Register 36453).

On the Columbia River, home range of resident pairs of bald eagles averaged 22 square kilometers for both breeding and non-breeding periods (Garrett *et al.* 1993). Bald eagles defend their breeding territory throughout the breeding season. Minimum distances between bald eagle nests were 1 kilometer (0.6 miles) in Alaska, and 17 kilometers (10 miles) in Washington (Zeiner *et al.* 1990a).

Status and Distribution

The bald eagle ranges throughout much of North America (64 Federal Register 36454). In the late 1960s and early 1970s, certain organochlorine pesticides were found to accumulate in the fatty tissues of adult bald eagles and impair the calcium release necessary for normal eggshell formation resulting in reproductive failure (64 Federal Register 36455). In addition, pesticide ingestion also caused direct mortality of birds (Fish and Wildlife Service 1986a). The use of DDT in the United States was banned in 1972 (64 Federal Register 36455). A Recovery Plan was developed in 1986 focusing on the seven states within the Pacific recovery area: Washington, Oregon, California, Montana, Wyoming, Idaho, and Nevada (Fish and Wildlife Service 1986a). Bald eagle populations have increased dramatically since the implementation of the regional Recovery Plan. Most population goals have been met or exceeded. Estimates in 1994 report about 4,450 breeding areas with 1.16 young each. This indicates a 462 percent increase from 1974 estimations. From 1990-1994, the population increased by 47 percent. Estimates in 1998 show about 5,748 breeding areas with all but two states having nesting pairs. An eagle population needs about a 0.7 young/pair rate to be sustainable (Sprunt *et al.* 1973). Because the rate averages one young/pair in the Pacific region (64 Federal Register 36453), the population is anticipated to grow.

Since 1989, the bald eagle nesting population has averaged an approximate 8 percent increase per year (Fish and Wildlife Service 1999b). The national average for fledglings per occupied breeding area is greater than one; therefore, the bald eagle population continues to increase in overall size and maintain a healthy reproductive rate. Certain geographically restricted areas, such as southern California, the Columbia River, the Great Lakes, and parts of Maine, still have contamination threats. However, bald eagle recovery goals have generally been met or exceeded for the species on a range-wide basis (64 Federal Register 36453).

Bald eagles breed from Alaska east to Newfoundland, south to Texas and Florida, and to Baja California and Sonora, Mexico (Fish and Wildlife Service 1999b). The species winters in the large majority of the breeding range, but generally withdraws from central Alaska and the central and the northern portions of Canada (AOU 1998). Within mainland southern California, the species primarily winters at larger bodies of water in the lowlands and mountains (Garrett and Dunn 1981). It is fairly common as a local winter migrant at a few inland waters in southern California, including Big Bear Lake, Cachuma Lake, Lake Mathews, Nacimiento Reservoir, San Antonio Reservoir, and along the Colorado River (Zeiner *et al.* 1990a).

Threats

Human disturbance can cause bald eagles to abandon nests, decrease feeding activities, or flush (Thelander 1973). The Recovery Plan identified habitat losses and human disturbances, such as

urban and recreational development, logging, and mineral exploration/extraction, as significant long-term and cumulative obstacles to recovery of the bald eagle when these threats occur in suitable breeding, wintering, and foraging habitats. Shooting is the most frequently recorded cause of mortality, and secondary lead poisoning is also a significant problem where eagles feed on crippled/dead waterfowl during hunting seasons. Environmental contaminants, poisons from vertebrate pest control programs, and electrocutions/collisions with utility lines are also identified as significant threats to eagle recovery (Fish and Wildlife Service 1986a).

Overall, successful captive breeding efforts, the banning of certain organochlorine pesticides (*e.g.*, DDT), and other recovery efforts have resulted in significant increases in eagle numbers within the continental United States (64 Federal Register 36453). However, contamination is still a threat in certain areas, such as along the Great Lakes, Maine, the Columbia River, and in southern California (64 Federal Register 36453).

The Forest Service has identified two primary threats to eagles in Southern California: 1) disturbance to winter foraging, perching, and potential nesting areas from recreational activities such as boating, fishing, hiking, *etc.* ; and 2) loss of foraging and perch/nest habitat to development (mostly residential). Additional threats are posed by electrical/communication transmission lines as electrocution of eagles has been documented (U.S. Forest Service 2002b).

Conservation Needs

The Forest Service has identified protection of winter habitat and public education as two primary conservation needs (U.S. Forest Service 2002b). The protection and maintenance of existing use areas and suitable wintering habitat from development-related threats listed above is necessary for eagles to persist within the Plan Area.

Environmental Baseline

Currently, the bald eagle is primarily a migrant and wintering species within western Riverside County. Within the Plan Area and southern California as a whole, bald eagles are typically found only from November to March in the vicinity of large inland bodies of water (*e.g.*, Garrett and Dunn 1981). According to the Forest Service (U.S. Forest Service 2002b), eagles in southern California use a variety of habitat types for wintering activities. While most tend to use mixed conifer forest adjacent to lakes, some use chaparral and oak/sycamore groves. The primary limiting factor for suitable habitat appears to be food availability for bald eagles. In general, day use areas are within one-half mile of lakes, rivers, or the ocean where fish and waterfowl provide the forage base. Eagles generally use dead-topped trees (snags) for daytime perching. Night roost sites are important due to their special microclimates that provide shelter from the elements. Typically, night roosts are within two miles of water, with the majority within one half mile of water, and are located on steep slopes where they use groves of green trees for roosting. Bald eagles exhibit annual site fidelity to night roost groves and often use them communally.

The largest wintering population of bald eagles in southern California is at Big Bear Lake in San Bernardino County, where 20 to 30 eagles usually congregate from November to March

(Stephenson and Calcarone 1999). Nesting activity has been documented by the Forest Service (U.S. Forest Service 2002b), but actual breeding has been confirmed in only a few locations (e.g., Nacimiento, San Antonio, and Cachuma Lakes) within public lands in southern California (U.S. Forest Service 2002b; Stephenson and Calcarone 1999). Within the Plan Area, few sightings of eagles have been reported. A pair of bald eagles recently fledged a pair of eaglets at Lake Hemet (A. Poopatanapong, U.S. Forest Service, pers. comm., August 6, 2003). This is the first documented hatching of eaglets in southern California since the 1930s.

Although focused surveys for eagles have not been conducted within the Plan Area, birds have been detected in recent years at the Prado Basin, Lake Skinner, Lake Mathews, Lake Hemet, Vail Lake, and Lake Perris. For instance, up to 20 bald eagles have been recorded at Lake Mathews in the relatively recent past (Garrett and Dunn 1981), and 4 birds were detected during the winter of 2002-2003 within the Prado Basin (Pat Tennant, Orange County Water District, pers. comm., July 29, 2003). There are also records from Lake Elsinore (where the species may have bred in the past) (Garrett and Dunn 1981) and scattered observations from a variety of Plan Area locations that consist of grassland, chaparral, open water, and suburban landscapes. Seventeen records from the University of California, Riverside database are relatively recent (within the past 10 years), and of these recent records, 8 are of high precision.

Our dataset includes 12 records for the bald eagle within the Plan Area. Four of these records occur on PQP Lands. Modeled habitat for the bald eagle includes riparian woodlands within 1,641 feet (500 meters) of open water, as well as marshes, lakes, and reservoirs in all Bioregions of the Plan Area. Based on this analysis, there are 17,124 acres of modeled habitat for the bald eagle within the Plan Area. Approximately 13,255 acres (77 percent) of modeled habitat occur within PQP Lands. Due to the absence of large trees or snags within certain habitat types, the modeled habitat likely overestimates the extent of suitable perching or nesting habitats for the bald eagle within the Plan Area.

Effects of the Action

Direct Effects

There are 17,124 acres of modeled nesting and foraging habitat for the bald eagle within the Plan Area. The loss of 1,801 acres (11 percent) of this modeled habitat is anticipated over the 75-year permit term, which encompasses 8 of the 12 (67 percent) observations of bald eagle in our dataset, including the only known nest site near Lake Hemet. An 11 percent loss of bald eagle modeled habitat distributed over the Plan Area is not anticipated to result in direct mortality of adult birds. However, loss of foraging and nesting habitats to development will cause eagles to disperse in search of other open water habitats and experience increased competition for the remaining suitable habitat. Birds forced to disperse may also experience decreased fitness due to increased energy and time spent locating new habitats. Loss of additional perch and nesting trees may preclude the establishment of nesting sites. Thus, loss of nesting and foraging habitat may impact population numbers of the bald eagle within the Plan Area over the long term by reducing the number of areas suitable for use as foraging and nesting sites.

The bald eagle is a Fully Protected Species in the State of California; therefore, the Plan anticipates no impact to bald eagles or active nests during the breeding season either inside or outside of the Criteria Area. The nest site at Lake Hemet is on land owned by the Lake Hemet Municipal Water District. The District would need to apply to the RCA and Wildlife Agencies for inclusion as a Special Participating Entity under the Plan to cover any activities that may harm the bald eagles that nest at Lake Hemet. This eagle nest was not known during the time species-specific conservation objectives were being developed under the Plan, and the potential conservation of land surrounding this new nest site was not addressed. Should the District request a certificate of inclusion for take coverage under the MSHCP, protection of the nest site will need to be addressed.

The Plan Area includes 11,576 acres of open water modeled habitat at the following lakes: Diamond Valley, Elsinore, Hemet, Mathews, Mystic, Skinner, and Vail; and within the Prado Basin and the Santa Ana River. It also includes 5,548 acres of modeled habitat surrounding these bodies of water in the Riverside Lowlands, San Jacinto Mountains, Santa Ana Mountains, and San Jacinto Foothills Bioregions. Bald eagles occur within the Plan Area in Existing Cores A (Santa Ana River/Prado Basin), E (Lake Elsinore), H (Lake Perris State Recreation Area/San Jacinto Wildlife Area), and K (San Bernardino National Forest). Covered Activities are proposed only within Cores A and H; all the proposed activities are construction of new roads and/or improvements to existing roadways.

To offset the loss of bald eagle habitat within the Plan Area, the MSHCP will conserve and manage 2,067 acres (12 percent) of modeled habitat for this species within the Additional Reserve Lands. Another 13,255 acres (77 percent) of modeled habitat for the bald eagle will remain in PQP Lands. Four of the 12 bald eagle observations in our dataset were recorded from PQP Lands. In total, 89 percent of the modeled habitat for the bald eagle will be conserved or remain in the Plan Area. This modeled habitat includes 33 percent of the bald eagle observations in our dataset.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands, including surveys for the bald eagle. Cooperative management and monitoring are anticipated on PQP Lands. Surveys for the bald eagle will be conducted at least every eight years to verify occupancy at a minimum of 75 percent of the known or future-identified locations. If a decline in the distribution of the bald eagle is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP. Reserve Managers will manage known or future occurrences of the bald eagle for hunting, recreational activities, and pesticide use. A 100-meter buffer will be established around the open water bodies included in the MSHCP Conservation Area, including at Lake Perris where the buffer will be consistent with recreational activities. Existing and future-identified nesting and foraging habitats will be managed within the MSHCP Conservation Area (Section 5, Table 5.2).

Indirect Effects

The bald eagle could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These impacts include the indirect effects described

in the “General Effects” section of this biological opinion. In particular, maintaining the hydrological processes and water quality standards (*e.g.*, controlling sedimentation and other pollutants) of open water and wetland habitats will be important in conserving bald eagle habitat within the MSHCP Conservation Area. Implementation of the Riparian/Riverine Area and Vernal Pools policy and the Urban/Wildlands Interface policy will help minimize the indirect effects of the Covered Activities on foraging and breeding habitat for the bald eagle.

Conclusion

We anticipate the proposed action will directly and indirectly affect the bald eagle as described in the analyses above, including the loss of 11 percent of its modeled habitat in the Plan Area. Implementation of the policies, guidelines, and conservation objectives identified in the Plan will significantly reduce impacts to this species. We anticipate that this species will be able to persist in the remaining 89 percent of the modeled habitat within both the existing PQP Lands and Additional Reserve Lands. Together these lands form a system of large, contiguous habitat blocks that are interconnected within the Plan Area. We anticipate that these lands will be monitored and managed cooperatively to benefit this species.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is our biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the bald eagle. We reached this conclusion based on the widespread distribution of the species in North America and because the species typically only winters and has limited breeding in the Plan Area. While habitat for the one known, successful nesting location within the Plan Area is not included in the MSHCP Conservation Area, no take of bald eagles, including eggs and young, is anticipated by the Plan. We anticipate that the managers at Lake Hemet will implement avoidance measures such that the active eagle nest is not taken. Thus, the impacts to this species and its modeled habitat, when viewed in conjunction with the protection and management of the MSHCP Conservation Area, is not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Amount or Extent of Take

The loss of up to 1,801 acres of foraging and nesting habitat for the bald eagle in the Plan Area is not likely to result in direct mortality of adult birds; however, for some individuals, reproduction may be impaired or life expectancy shortened. Because of the large area covered, it will be difficult to quantify the number of birds impacted over the 75-year permit term. Therefore, the Service is quantifying incidental take as the number of acres of modeled habitat that will be impacted in the Plan Area as a result of the proposed action. We do not anticipate that active eagle nests will be harmed, including the new nest site at Lake Hemet.

Therefore, we anticipate that up to 1,801 acres of foraging and nesting habitat within the Plan Area will become unsuitable for the bald eagle as a result of the proposed action. We anticipate that zero (0) eagle nests will be taken as a result of the proposed action. This level of take is not likely to result in jeopardy to the bald eagle.

Coastal California gnatcatcher (*Polioptila californica californica*)Status of the Species*Listing Status*

The coastal California gnatcatcher was listed as threatened by the Fish and Wildlife Service on March 30, 1993 (58 Federal Register 16742). As part of the listing, the Fish and Wildlife Service issued a special rule pursuant to section 4(d) of the Act defining the conditions under which take of the gnatcatcher would not be a violation of section 9 (58 Federal Register 65088). Critical habitat was designated for the gnatcatcher on October 24, 2000 (65 Federal Register 63679).

Species Description

The coastal California gnatcatcher (gnatcatcher), a subspecies of the California gnatcatcher, is a small, long-tailed member of the old-world warbler and gnatcatcher family (Sylviidae) (American Ornithologists' Union 1998).

Habitat Affinities

The gnatcatcher typically occurs in or near coastal sage scrub, which is composed of relatively low-growing, dry-season deciduous, and succulent plants. Characteristic plants of this community include California sagebrush, California buckwheat, laurel sumac, lemonadeberry, bush penstemon, *Salvia* spp., *Encelia* spp., and *Opuntia* spp. (Atwood 1990; Beyers and Wirtz 1997; Braden *et al.* 1997a; Weaver 1998). Coastal sage scrub is patchily distributed throughout the range of the gnatcatcher, but the gnatcatcher is not uniformly distributed within the structurally and floristically variable coastal sage scrub community. Rather, the subspecies tends to occur most frequently within California sagebrush dominated stands on mesas, gently sloping areas, and along the lower slopes of the coast ranges (Atwood 1990). The gnatcatcher occurs in high frequencies and densities in scrub with an open or broken canopy while it is absent from scrub dominated by tall shrubs and occurs in low frequencies and densities in low scrub with a closed canopy (Weaver 1998).

Aside from coastal sage scrub, gnatcatchers also use chaparral, grassland, and riparian habitats where they occur adjacent to sage scrub (Campbell *et al.* 1998). This use appears to be most frequent during late summer, autumn, and winter, with smaller numbers of birds using such areas during the breeding season. These non-sage scrub habitats are used for dispersal and foraging (Atwood *et al.* 1998; Campbell *et al.* 1998), but data on dispersal use are largely anecdotal (Campbell *et al.* 1998). Although existing quantitative data may reveal relatively little about gnatcatcher use of these other habitats, these areas may be critical during certain times of year for dispersal or as foraging areas during drought conditions (Campbell *et al.* 1998 as cited in Dudek 2003). Several studies have also suggested that gnatcatchers avoid nesting on very steep slopes (greater than 40 percent) (Bontrager 1991; Mock and Bolger 1992; Ogden 1992). However, steep slopes may still be suitable for foraging and dispersal. In addition, breeding territories have been documented in non-sage scrub habitats (Dudek 2003). Campbell *et al.*

(1998 as cited in Dudek 2003) discuss likely hypotheses explaining why these habitats are used by gnatcatchers, including food source availability, dispersal areas for juveniles, temperature extremes, fire avoidance, and lowered predation rate for fledglings. Linkages of habitat along linear features such as highways and power-line corridors may be of significant value in linking populations of the gnatcatcher (Famolaro and Newman 1998).

Fire is a natural component of coastal sage scrub ecology (Holland and Keil 1995), but frequent fires may alter species composition of the community by breaking the reproductive cycles of some species, like California sagebrush and California buckwheat (Zedler et al. 1983; Malanson and Westman 1985; Holland and Keil 1995). Frequent fires may lead to the conversion of coastal sage scrub into grasslands (Callaway and Davis 1993). Due to loss of shrub cover, recently burned areas are used infrequently by gnatcatchers, and 4 to 5 years may be the minimum period of vegetation recovery necessary before gnatcatchers establish territories within completely burned areas (Wirtz *et al.* 1997; Atwood and Bontrager 2001). The period of habitat recovery necessary before gnatcatchers reoccupy burned areas depends on fire intensity, existence of unburned refugia within or adjacent to the burn perimeter, seasonal timing of the burn, soil type, post-fire rainfall patterns, topography, and pre-fire habitat conditions (Atwood *et al.* 2000).

Critical Habitat

Critical habitat for the gnatcatcher includes 207,868 hectares (513,650 acres) of federal, state, local, and private land in Los Angeles, Orange, Riverside, San Bernardino, and San Diego counties (Fish and Wildlife Service 2000a). The primary constituent elements for the coastal California gnatcatcher are those habitat components that provide for foraging, nesting, rearing of young, intraspecific communication, roosting, dispersal, genetic exchange, or sheltering (Atwood 1990). Primary constituent elements are provided in undeveloped areas that support, through natural successional processes (*e.g.*, post-fire recovery), various types of sage scrub or chaparral, grassland, and riparian habitats where they may be utilized for biological needs such as breeding, foraging, or dispersal (Atwood *et al.* 1998; Campbell *et al.* 1998). Primary constituent elements associated with the biological needs of dispersal are also found in undeveloped areas that provide connectivity or linkage between larger core areas, including open space and ruderal (weedy areas that contain introduced plant species) disturbed areas that may receive only periodic use. Probable dispersing individuals have been documented in vegetation dominated by such species as *Brassica* spp. (wild mustard), annual grasses, *Salsola tragus* (Russian thistle), *Baccharis salicifolia* (mule fat), *Salix* spp. (willow), and *Tamarix* spp. (salt cedar) (Campbell *et al.* 1998). Some of these species may also be used seasonally by territorial birds as coastal sage scrub desiccates during the summer drought (Campbell *et al.* 1998).

Life History

The gnatcatcher is insectivorous and feeds primarily on leaf- and plant-hoppers and spiders (Burger *et al.* 1999). Gnatcatchers are nonmigratory and exhibit strong site tenacity (Atwood 1990). Gnatcatcher pairs strongly defend territories in the breeding season against conspecifics and predators, while some gnatcatcher pairs will also defend territories throughout the year (Preston *et al.* 1998). Breeding season territories range in size from less than 2.5 acres to greater

than 25 acres (Atwood *et al.* 1998b; Preston *et al.* 1998), with mean territory size generally being larger for inland populations than coastal populations. In the non-breeding season, the area used by individual gnatcatchers may be almost twice as large as that used during the breeding season (Preston *et al.* 1998).

The abundance of gnatcatchers at a given locale can fluctuate extensively on an annual basis (Atwood *et al.* 1998a; Erickson and Miner 1998; Preston *et al.* 1998); population declines or increases of greater than 50 percent between successive years have been reported regularly. Population fluctuations appear to be influenced by precipitation (Atwood *et al.* 1998a; Erickson and Miner 1998; Patten and Rotenberry 1999), with over-winter survivorship being negatively affected and subsequent productivity being positively affected by high winter precipitation. This dynamic relationship between winter precipitation, survivorship and productivity has been noted for other resident bird species in coastal southern California (Kus and Beck 2001).

The gnatcatcher breeding season extends from late-February through early-August with the peak of nesting attempts occurring from mid-March through mid-May (Grishaver *et al.* 1998). Nests are constructed over a 4 to 10 day period and are most often placed in perennial species of coastal sage scrub about 3 feet above the ground (Atwood 1990). Gnatcatchers do not show any significant preference or avoidance of any coastal sage scrub species for use in the placement of nests (Grishaver *et al.* 1998). Gnatcatchers typically lay clutches of three to five eggs (Galvin 1998; Grishaver *et al.* 1998), and clutch sizes may be influenced by the amount of precipitation immediately preceding nest initiation (Patten and Rotenberry 1999). The egg incubation period is 14 days, and the nestling period is 10 to 15 days (Grishaver *et al.* 1998). Both sexes participate in all phases of the nesting cycle, and gnatcatcher pairs may produce two or more broods in one nesting season. Predation is the most common cause of nest failure, accounting for up to 66 percent of nest failures in some areas (Braden *et al.* 1997b; Grishaver *et al.* 1998). Over 30 percent of all nests may be parasitized by the brown-headed cowbird in the absence of cowbird trapping, but the negative effects of parasitism may be minimal compared to the much larger effects of predation (Braden *et al.* 1997b). Potential nest predators are numerous and include snakes, raccoons, and corvids (Grishaver *et al.* 1998).

Juveniles stay within their natal territories up to 5 weeks after fledging from the nest (Grishaver *et al.* 1998), with juveniles subsequently dispersing to find their own foraging and nesting territories. Dispersal probably occurs in random directions from the natal site (Galvin 1998). Juveniles have been observed to disperse up to 6 miles from their natal territory and are capable of dispersing long distances (up to 14 miles or 22 kilometers)(Bailey and Mock 1998) across fragmented and highly disturbed sage scrub habitat. Dispersing gnatcatchers are apparently able to traverse highly human-modified landscapes (Bailey and Mock 1998).

Status and Distribution

The gnatcatcher is endemic to cismontane southern California and northwestern Baja California, Mexico (American Ornithologists' Union (AOU) 1983, 1989; Atwood 1980, 1988, 1990). The gnatcatcher is found on the coastal slopes of southern California, from southern Ventura southward through Los Angeles, Orange, Riverside, San Bernardino and San Diego counties into Baja California, Mexico to approximately 30 degrees North latitude near El Rosario (AOU 1957;

Atwood 1980, 1990; Jones and Ramirez 1995). An evaluation of the historic range of the coastal California gnatcatcher indicates that about 41 percent of its latitudinal distribution is within the United States and 59 percent is within Baja California, Mexico (Atwood 1990). In the United States, gnatcatchers were considered locally common in the mid-1940's but had declined substantially by the 1960's (Atwood 1980). The Fish and Wildlife Service estimated in 1993 that approximately 2,562 pairs of gnatcatchers remained in the United States. Of these, 30 pairs (1.2 percent) occurred in Los Angeles County, 757 pairs (29.5 percent) occurred in Orange County, 261 pairs (10.2 percent) occurred in Riverside County, and 1,514 pairs (59.1 percent) occurred in San Diego County. In October 1996, the Fish and Wildlife Service estimated the total number of gnatcatchers in the United States at 2,899 pairs (Fish and Wildlife Service 1996a). Because the amount of coastal sage scrub available to the gnatcatcher decreased from 1993 to 1996, this increase in estimated abundance from 1993 to 1996 most likely reflected increased sampling effort and stochastic effects rather than an upward trend in the gnatcatcher population. In an assessment of the gnatcatcher population in 1999, the Fish and Wildlife Service determined that there was insufficient quantitative data to determine whether the overall gnatcatcher population has increased or decreased since 1996. However, as in 1996, the amount of coastal sage scrub available to the gnatcatcher has continued to decline.

In October 2003, significant areas of gnatcatcher habitat throughout southern California were burned in wildfires. These fires burned coastal sage scrub habitat in three major geographical areas occupied by gnatcatcher: 1) the Moorpark area of Ventura County; 2) the northern portion of the San Bernardino Valley, including the gnatcatcher-occupied Etiwanda Fan and Lytle and Cajon Washes; and 3) eastern San Diego County, including Otay, Lake Jennings, Miramar, Ramona, and Escondido. Together, the fires of October 2003, burned approximately 64,235 acres of designated critical habitat. The effects of these fires on gnatcatcher populations is unknown, though individuals and in some cases populations were likely displaced due to habitat loss. Isolated populations, such as those in Ventura County and portions of San Bernardino County, are especially at risk as surviving individuals may not successfully disperse back to these locations once the habitat has recovered. The total impact of these fires on the species will not be known for many years until the vegetation recovers and affected areas are assessed as to their habitat quality and gnatcatcher occupation.

Threats

Although observed declines in numbers and distribution of the gnatcatcher resulted from numerous factors, habitat destruction, fragmentation, and degradation are the principal reasons for the listing of the gnatcatcher as threatened (Fish and Wildlife Service 1993b). Up to 90 percent of coastal sage scrub has been lost as a result of development and land conversion (Barbour and Major 1977; Westman 1981a, 1981b), and coastal sage scrub is considered to be one of the most depleted habitat types in the United States (Kirkpatrick and Hutchinson 1977; Axelrod 1978; Klopatek *et al.* 1979; Westman 1987; O'Leary 1990). Additionally, agricultural use, urbanization, increased fire frequency, air pollution, and the introduction of non-native plants have had an adverse impact on coastal sage scrub. Nest-parasitism by the brown-headed cowbird (Unitt 1984) and nest predation also threaten the recovery of the gnatcatcher (Atwood 1980; Unitt 1984).

The extent of loss of coastal sage scrub in Riverside County has been substantial with the Fish and Wildlife Service providing estimates of 50 percent, and 63 to 71 percent from 1930 to 1990 in the final rule listing the gnatcatcher (58 Federal Register 16741). Using Vegetation Type Map (VTM) survey data, Minnich and Dezzani (1998) reported a widespread decline in coastal sage scrub in Riverside-Perris Plain principally by the displacement of deciduous shrubs by exotic annuals. The authors attributed this decline, which occurred chiefly to the northern and eastern portion of the plain, to anthropogenic nitrogen deposition and the extensive distribution of granitic substrates, which has resulted in a reduction of the fire return interval. The increased rate of wildfire essentially type converts coastal sage scrub to an alien grassland. Minnich and Dezzani (1998) noted that coastal sage scrub susceptible to type conversion, if conserved (especially like that adjacent to existing public lands near Lake Matthews, Lake Perris, and Lake Skinner), would result in grassland preserves with little coastal sage scrub flora or fauna. In sum, these human-induced landscape conversions and ongoing change, including the effects associated with grazing, have magnified the impacts of the continuing loss of coastal sage scrub by urban development within much of the action area.

The fragmentation and degradation of habitat have likely reduced the ability of large predators to move freely through habitat blocks within the action area and thus increased the number of mesopredators (*e.g.*, domestic cats, skunks) of the gnatcatcher and other avian species in the region (see, for instance, Crooks and Soulé 1999). Based on studies within the Plan Area, Braden *et al.* (1997a) concluded that gnatcatchers nesting in areas containing a high proportion of degraded habitat may have lower productivity (*e.g.*, hatching success) than gnatcatchers in areas of high quality mature sage scrub.

Noise and vibration, environmental contaminants, fires of anthropogenic origin and brood parasitism by cowbirds pose additional threats to the species. Although relatively little research has been conducted in western Riverside County relating to the potential magnitude of these threats to the gnatcatcher and its coastal sage scrub habitat, Braden *et al.* (1997b) did report that 32 percent of all gnatcatcher nests within their study plot located within the MSHCP Plan Area were parasitized by brown-headed cowbirds. Braden (1992) had previously reported, based on studies in western Riverside County, that parasitism rates apparently were highest in the vicinity of dairy farms and agricultural areas (*i.e.*, prime cowbird foraging locales).

Conservation Needs

The long-term conservation of the gnatcatcher requires the conservation and adaptive management of interlinked habitat blocks or core populations. The conservation of core populations will require securing large patches of suitable habitat to minimize edge effects to allow for effective management of coastal sage scrub with the appropriate structure for the gnatcatcher. Given that the species exists in discrete subpopulations connected by occasional colonization (Crooks *et al.* 2001) and that the metapopulation model appears appropriate for the species (Akçakaya and Atwood 1997), core populations should be interconnected via corridors of open habitat or other land uses (*e.g.*, ag land, golf courses) that do not effectively preclude movement of dispersing juveniles between habitat patches or “islands”. While juvenile gnatcatchers are capable of dispersing long distances [up to 22 kilometers (14 miles)] as modeled by Bailey and Mock (1998) across fragmented and highly disturbed sage scrub habitat, such as

found along highway and utility corridors or remnant mosaics of habitat adjacent to developed lands, generally the species disperses short distances through contiguous undisturbed habitat (Bailey and Mock 1998; Famolaro and Newman 1998; and Galvin 1998). Populations likely will experience increased juvenile mortality in fragmented habitats where dispersal distances are greater than average (Atwood *et al.* 1998). Such mortality would be particularly likely if dispersal was across non- or sub-optimal habitats (Soulé 1991). As summarized by Galvin (1998):

“data indicate that gnatcatchers can and do disperse long distances across unfavorable habitat but that the frequency of these events is low. More typically, gnatcatchers disperse short distances through contiguous coastal sage scrub. As coastal sage scrub becomes more fragmented and gnatcatcher populations more isolated, short-distances dispersal may not be sufficient to maintain genetic diversity and interpopulation movement.”

Further, the threats mentioned above need to be addressed within conserved habitat. In particular, fire frequency should be controlled to a degree that optimizes habitat conditions for the gnatcatcher. Nonetheless, Akçakaya and Atwood (1997) noted in their gnatcatcher metapopulation model study that the model results were not sensitive to, among other parameters (i.e., neighborhood distance, initial abundances, correlation among population fluctuations), dispersal distance and the number of fires. The authors reported that their model was most sensitive to density dependent effects, probability of weather-related catastrophes, adult survival, and adult fecundity.

Environmental Baseline

The existing recent data relating to the status and distribution of the species within western Riverside County are largely derived from widely scattered presence/absence surveys. Of the 1,346 Plan Area location points of gnatcatchers in our dataset, 144 points are on PQP Lands.

For the purposes of our analysis, we prepared a gnatcatcher model based on two vegetation communities, coastal sage scrub and Riversidean alluvial fan sage scrub, in the Riverside Lowlands and San Jacinto Foothills bioregions. This model was based on known locations of gnatcatchers that occur in sage scrub habitats primarily in the western portion of the Plan Area. The model used vegetation data gathered in the mid-1990's that may have changed given the fires have occurred. As discussed above, fire can type convert areas of sage scrub into grassland, as in the Badlands. Further, based on negative survey results, not all sage scrub is occupied by gnatcatchers. In Riverside County, as in the rest of their range in the United States, gnatcatchers appear to decline in density as habitats become drier as you move east. Thus, modeled habitat likely overestimates the amount of suitable habitat for gnatcatchers within the Plan Area. Based on this analysis, the Plan Area supports approximately 133,801 acres of modeled habitat for the gnatcatcher. Approximately 27,334 acres (20 percent) of the modeled habitat occur within PQP Lands.

As was indicated above, critical habitat for the gnatcatcher has been designated (65 Federal Register 63680). Within this designation, Unit 10 encompasses approximately 80,915 ha

(199,940 ac) within the Plan Area. As a result of several lawsuits challenging the methodology used to conduct the economic analysis in our final rule designating critical habitat, the Court for the Central District of California granted the Fish and Wildlife Service's request for a remand of the gnatcatcher critical habitat designation so that we might reconsider the economic impact associated with the designation. The Court also ruled that while the Fish and Wildlife Service completes a new proposed rule, the critical habitat designated should remain in place until a new, final regulation becomes effective. The Fish and Wildlife Service's subsequent proposed critical habitat closely parallels the designated critical habitat in terms of the locations and sizes of specific areas designated within Unit 10 (see 68 Federal Register 20243) with approximately 71,505 ha (176,720 ac) within the Plan Area (65 Federal Register 63686). The amount of proposed critical habitat within Unit 10 represents 34 percent of the total designated critical habitat (176,720 ha or 513,650 acres) for the species. As described in the proposed rule:

“Lands proposed include important linkages from San Diego County core populations along the Santa Margarita River and Warm Springs Creek, and core populations within the Lake Skinner/Diamond Valley region and the Lake Elsinore/Lake Mathews region. Also proposed are core populations that occur along the I-15 corridor, in the Lake Perris area, in the Alessandro Heights area, in the Box Spring Mountains, and along the foothills of the Santa Ana Mountains connecting into the Chino-Puente Hills. These areas also provide connectivity among core populations within Riverside County and to populations in San Diego, San Bernardino, Orange, and Los Angeles counties. Unit 10 encompasses some of the Core Reserves established under the Stephens' Kangaroo Rat HCP. The Lake Mathews/Estelle Mountain, Steele Peak, Lake Perris /San Jacinto Core Reserves, the Potrero Area of Critical Environmental Concern, and the Southwestern Riverside County Multi-Species Reserve provide high quality habitat for the coastal California gnatcatcher. Lands proposed as critical habitat within Unit 10 are generally encompassed by the Criteria Area (from which the future preserve area will be delineated) designated as part of the MSHCP. Areas proposed outside of the Criteria Area are consistent with those designated in the previous final designation of critical habitat (65 Federal Register 63680). Lands designated outside of Criteria Areas include the Alessandro Heights, which is essential for maintaining linkages with populations in southern San Bernardino County, and the eastern slope of the Santa Ana Mountains, which is an essential linkage to the Puente-Chino Hills and central Orange County (Units 7 and 9). This unit incorporates habitat in the vicinity of Aguanga that is one of three locations in the range of the species, and the only location in the United States, where the California gnatcatcher cooccurs with its sister species, the Black-tailed gnatcatcher (*Polioptila melanura*; Weaver 1998; Atwood 1988). Maintaining these areas of sympatry (overlapping occupation) are important for reinforcing reproductive isolating mechanisms such as habitat preferences and vocalizations that prevent hybridization between the two species (Weaver 1998; Atwood 1988). This unit also incorporates high-quality coastal sage scrub south and east of Diamond Valley Reservoir that has been shown to be resistant to type conversion to nonnative grassland, probably due to the prevalence of gabbro-basalt soils in this area (Minnich and Dezzani 1998). The coastal sage scrub in this region

therefore has the highest probability of resisting type conversion in the future, and therefore has the greatest potential to maintain diverse, high quality coastal sage scrub vegetation through time. This unit also encompasses contiguous habitats in southern San Bernardino County, including core populations in the Jurupa Hills, and the Blue Mountain/Reche Canyon region. The Santa Ana River appears to be an important movement corridor in this area, connecting the Jurupa and La Loma Hills to populations in the Box Springs Mountains, as well as to the few pairs known from the Pedley Hills and Norco Hills. Though a few coastal California gnatcatchers have been observed from the upper Santa Ana River wash in the vicinity of Highland, we do not yet have evidence that this area constitutes a core population.”

Since its listing in 1993, several Federal actions have affected this species within the Plan Area (See Appendix 5). The Federal actions have included 64 section 7 consultations, including internal consultations required for the issuance of incidental take permits, for activities associated with urban development. These consultations have resulted in the take of coastal California gnatcatchers, the loss of over 6,370 acres of occupied and/or suitable habitat, and the conservation of 10,465 acres of occupied and/or suitable habitat.

In early May 2004, two fires occurred in the Plan Area. The Eagle Fire in the Vail Lake area burned approximately 5,000 acres, some of which is gnatcatcher critical habitat, although we have little information regarding the number of gnatcatchers in the area. The Cerrito Fire south of Lake Mathews and north of Lake Elsinore burned approximately 10,500 acres in an area that contains several gnatcatcher observations.

Effects of the Action

Direct effects

The Plan Area includes 133,801 acres of modeled nesting and foraging habitat for the coastal California gnatcatcher. Coastal California gnatcatchers will be subject to impacts associated with development and other proposed Covered Activities over the 75-year permit term within 62,613 acres (47 percent) of this modeled habitat, which encompasses 775 of the 1,345 (58 percent) coastal California gnatcatcher point locations in our dataset. We anticipate that most of the breeding and foraging habitat for gnatcatcher in these areas will be lost as a result of development. Some birds may be able to disperse to adjacent habitats, particularly rural mountainous areas where development impacts are anticipated to occur at a slower rate and at lower densities. However, displaced birds that are unable to locate suitable habitat will experience increased rates of predation or otherwise die or be injured due to loss of their foraging, breeding, and sheltering habitat.

To offset impacts to the coastal California gnatcatcher in the Plan Area, 43,854 acres (33 percent) of modeled habitat will be conserved within the anticipated Additional Reserve Lands with management prescriptions that will benefit the coastal California gnatcatcher. Though distributional information for the gnatcatcher in the Plan Area is incomplete (especially in the eastern portion of the Plan Area), conservation of the species is based on maintaining large

blocks of breeding habitat with adequate linkages. The anticipated Additional Reserve Lands include 273 (20 percent) of the point locations in our dataset, with another 153 (11 percent) point locations likely to be conserved by the criteria refinement process. An additional 27,334 acres (20 percent) of modeled habitat for the coastal California gnatcatcher will remain in PQP Lands, which likely will be managed for the gnatcatcher. PQP Lands contain 144 (11 percent) of the point locations for the coastal California gnatcatcher in our dataset. In total, 53 percent of the modeled habitat for the coastal California gnatcatcher will be conserved or remain in the Plan Area. This modeled habitat includes 570 of the 1,345 (42 percent) of the coastal California gnatcatcher point locations in our dataset.

For construction projects within the Criteria Area, habitat clearing, grubbing, grading, and associated construction actions will be timed to avoid the active breeding season, defined for purposes of the MSHCP as March 1 to August 15. This measure will reduce the impact of planned development on the gnatcatcher reproduction within 16,971 acres of modeled habitat within the Criteria Area outside of Additional Reserve Lands. Gnatcatchers nest in shrubs, and breeding occurs through mid-August with the incubation period lasting 14 days on average.

According to Plan, at least 13 of the identified 16 core gnatcatcher areas and interconnecting linkages are to be included in the MSHCP Conservation Area. This conservation includes large blocks of habitat in the southeastern portion of the Plan Area, such as Wilson Valley, Vail Lake, Hogbacks, and Lake Skinner, which total 84,410 acres within the MSHCP Conservation Area. Significant portions of these acres include are sage scrub habitats with sizeable gnatcatcher populations. Also included are an interconnected series of core areas east of Lake Elsinore including Railroad Canyon, Sedco Hills, a portion of Quail Valley, Wasson Canyon, and the North Peak/Meadowbrook area, which total 15,730 acres within the MSHCP Conservation Area. The northern core areas conserved by the Plan include Lake Mathews and Estelle Mountain totaling 23,710 acres within the MSHCP Conservation Area. These three geographical regions include the habitats with the highest densities of gnatcatchers within the Plan Area and include the majority of the range of the species within the Plan Area, except for populations north of Lake Mathews. Excluded gnatcatcher areas in the Plan include: 1) the Norco Hills, which is highly fragmented and outside proposed and designated critical habitat; 2) the Rancho California area east of Temecula, which contains highly fragmented small patches of high quality habitat in an urbanizing matrix and is outside proposed and designated critical habitat; 3) a portion of the Quail Valley area, which is east of the main concentration of gnatcatcher locations along the Interstate 15 corridor and is largely outside proposed and designated critical habitat; and 4) the Alessandro Heights linkage, which is within proposed and designated critical habitat and is discussed below in detail.

Management and Monitoring for the gnatcatcher is proposed in the Plan. Reserve Managers will evaluate the condition of the sage scrub within the core area and maintain a program to enhance and/or create coastal sage scrub within the core area to keep the percent cover of coastal sage scrub vegetation within 10 percent of the baseline value within 77,070 acres of suitable habitat in Riverside Lowland and San Jacinto Foothill Bioregions (the first objective in Table 9-2 and the gnatcatcher Species Account). Reserve Managers will maintain occupancy of at least 80 percent of the occupied gnatcatcher habitat, as determined using existing information and baseline surveys, within each core area. The Plan will maintain continued use and successful

reproduction within the core areas. This will be deemed successful if, once every 3 years, successful reproduction occurs at 75 percent of the core areas. Successful reproduction is defined as a nest that fledged at least one known young.

The Plan includes conducting baseline surveys as necessary (i.e., where not existing information exists) to determine the number of acres occupied by gnatcatchers within each core area. Particular management emphasis will be given to fire and fire suppression activities, farming, grazing, domestic animals, habitat fragmentation and transition, and competition with non-native species.

Significant corridors and linkages are identified to be conserved by the Plan. Two corridors of habitat link the populations at Diamond Valley Lake and Lake Skinner with the rest of the populations to the north and west. The northern linkage, extending southwest from Diamond Valley Lake, consists of interrupted patches of buckwheat dominated coastal sage scrub, interspersed with non-native grassland and some agriculture. Though these patches contain suitable breeding habitat, it is unknown whether breeding pairs of gnatcatchers occur on these fairly small and isolated patches. If the patches are occupied by breeding pairs, then it is likely that dispersing juveniles cross through this linkage regularly, as the habitat patches are close enough together to facilitate movement. If no breeding occurs, then dispersal through this entire linkage is likely a rare event, given the length (approximately 5 miles) and short width of the linkage.

The linkage from AD 161 east to Lake Skinner continues for approximately 4 miles and is substantially wider than the northern linkage to Diamond Valley Lake; however, it consists of a much lower percentage of coastal sage scrub and relies, to a large degree, on the future restoration of Johnson Ranch, which is a large property in the linkage that was used for agriculture.

Whether these linkages function for dispersing gnatcatchers is somewhat speculative and depends to a large degree on the future management and habitat quality of the linkages themselves. However, due to the robust populations found on either side of these linkages, it will likely not be necessary to have substantial numbers of gnatcatchers dispersing through these areas on an annual basis. Instead, what is desired is sufficient dispersal to maintain genetic exchange between these two large populations, which is generally conceived as one individual successfully dispersing and breeding per generation (Wright 1931; Slatkin 1987; Mills and Allendorf 1996). For the gnatcatcher, sufficient dispersal likely would be one individual every 1 to 3 years. Given recent survey data within these linkages, this level of movement likely occurs (USFWS, unpublished data). However, if management reduces the level of habitat disturbance in the area and the extent of coastal sage scrub expands, the level of dispersal likely will increase.

The two linkages described above converge east of the Interstate 215 freeway at the previously permitted AD 161 HCP. The bulk of gnatcatcher populations within the Plan Area can grossly be divided in two by the I-215 freeway. The southeastern cluster of populations are centered around an area extending from Wilson Valley through Lake Skinner to Diamond Valley Reservoir. The northwestern cluster of populations are centered in an area extending from Lake

Elsinore and Alberhill north to Lake Mathews. Gnatcatcher dispersal between these two population clusters likely occurs at one location: the vicinity of Clinton Keith Road at the I-215 based on our gnatcatcher model and known gnatcatcher locations. This area consists of a series of low hills that trend from northwest to southeast and contain chaparral and coastal sage scrub. Gnatcatchers have been documented on both sides of the freeway in this location, where crossings likely occur with some regularity given the long distance dispersal documented across urban landscapes (Bailey and Mock 1998), including across interstate freeways (Varanus Biological Services/Campbell BioConsulting 2003). This occupied corridor is not conserved within the MSHCP Conservation Area. A small drainage crossing the I-215 through agricultural fields and low density residential housing approximately halfway between Scott Road and Clinton Keith Road is within the Criteria Area. This drainage is designated Proposed Constrained Linkage 16 and is described in the Plan as constrained by existing urban development and agricultural use, and is completely surrounded by a city-designated planned land use. This connection is devoid of coastal sage scrub for nearly 2 miles, and the coastal sage scrub that is present after that point east of the I-215 consists of small, apparently unoccupied, patches. According to the MSHCP, "treatment and management of edge conditions along this linkage will be necessary to ensure that it provides habitat and movement functions for species using the linkage." Though reducing connectivity across the I-215 likely will reduce movement of gnatcatchers between these two population clusters in western Riverside County, we expect that this corridor across will be managed to create a functional linkage for gnatcatchers.

Alessandro Heights is an archipelago linkage or non-contiguous corridor of intermittently or potentially occupied habitat that the Plan does not propose to conserve. This fragmented linkage consist of 8,131 acres of gnatcatcher critical habitat, of which about 3,307 acres (40 percent) is coastal sage scrub. The habitat islands are situated between the Lake Mathews area and its large gnatcatcher population to the southwest and the Reche Canyon-Sycamore Canyon area, which is within the Sycamore Canyon Wilderness Park managed by the County, to the northeast.

The two largest critical habitat subunits, both of which are not proposed for conservation in the Plan, contain respectively approximately 800 acres of coastal sage scrub and 9 point locations, and 340 acres of coastal sage scrub and no known point locations. The long-term viability of these subunits as occupied habitat, however, is open to question. First, Crooks *et al.* 2001 reported in a study of habitat islands in San Diego County that the estimated fragment size of 292 acres (118 hectares) resulted in a probability of gnatcatcher occurrence of 95 percent after 100 years of isolation. Given the larger mean territory size for inland versus coastal gnatcatchers, the estimated fragment size likely would need to be greater than 292 acres in Riverside County for a similar probability of long-term occurrence. Second, these habitat islands of coastal sage scrub occur atop Mesozoic granitic parent material (Rogers 1965), which Minnich and Dezzani (1998) reported is not resistant to type conversion to alien grassland. Aside from geological substrate, these patches of coastal sage scrub are surrounded by existing urban development that leads to increased anthropogenic nitrogen deposition and increased fire frequency, and thus accelerated type conversion. As noted in the Fish and Wildlife Service's recovery plan for the Quino checkerspot butterfly, soils in the most polluted regions near the city of Riverside have more than 80 parts per million (weight) extractable nitrogen, a value more than four times that detected in natural, unpolluted soils. Allen (2004) reported that all of these factors exacerbated the invasion of alien annual plants, making the restoration of this habitat

questionable with no solution “at hand.” So extensive has been the type conversion to an alien grassland in this area, Minnich and Scott (1997) concluded that “patches within the City of Riverside, appear almost complete converted to exotic species and may provide a model of the change that will occur in [the remaining] isolated patches.”

Though the rural hillside and rural residential land use designated by the City of Riverside (City) in the Alessandro Heights linkage will allow for the further fragmentation and reduction in size of these habitat islands, the higher elevation portions of these islands (where largely coastal sage scrub can be found today) likely will be set aside or left undeveloped as a result of the City’s hillside/arroyo grading regulations (Section 17.28.020 of City of Riverside Municipal Code). Similarly with the County of Riverside’s land use zoning within their portion of the linkage, the County noted in their General Plan that the “application of Rural Residential, Rural Mountainous, Very Low Density Residential, and Estate Density Residential within the Rural Community Foundation Component, and open space designations throughout much of the [Lake Mathews/Woodcrest Area] Plan area serves to maintain the character of this wonderfully unique area of the County.” In a statistical summary of the Lake Mathews/Woodcrest Area Plan area, the County estimated that, of the 51,303 acres in the plan area, 15,524 acres (30 percent) will end up in open space, while only 4,663 acres (9 percent) would be intensively developed (e.g., medium to high density residential, commercial, industrial). The extent with which this archipelago now functions as a linkage with occupied islands in light of the existing and ongoing development, and type conversion of coastal sage scrub is unknown. Similarly, the extent with which the remaining undeveloped and open space areas will continue to serve this function cannot be measurably determined. However, in keeping with Galvin (1998), gnatcatchers likely will continue to disperse across unfavorable habitat (i.e., rural and suburbanized landscape), albeit at undeterminable greater distances and lower frequency. The Fish and Wildlife Service drew a similar conclusion in the our proposed critical habitat rule (68 Federal Register 20243) noting that the core gnatcatcher populations within Unit 9, the East Los Angeles County-Matrix NCCP Subregion of Orange County unit, remain connected with the archipelago Unit 12 and its Bonelli Regional Park core population within the eastern Los Angeles County despite being separated by approximately 5 miles and a freeway. In light of the likely continued dispersal and the questionable viability of these islands for long-term occupancy, the non-inclusion of the Alessandro Heights archipelago linkage in the Plan does not jeopardize the continued existence of the species or preclude the ecological role of that designated critical habitat in both the survival and recovery of the species.

The Jurupa Hills are northwest of the Blue Mountain/Reche canyon area. These hills are connected to the Reche Canyon linkage (Linkage 4) by an archipelago of habitat including the La Loma Hills and Blue Mountain. The few surveys conducted in these areas have reported gnatcatchers using each of these “stepping stones.” The Jurupa Hills have rarely been surveyed for gnatcatchers, but pairs have been observed throughout the hills, especially along the northern slopes. Densities are unknown, but as many as 5 pairs have been recorded on 100 acres (40 hectares) (Davis *et al.* 1998). Davis and others (1998) noted that “ground and aerial surveys reveal an interrupted corridor linking the Jurupa Hills with the sage scrub along the Santa Ana River to the east.” The Jurupa Hills are considered non-contiguous core area 2 in the MSHCP, and the gnatcatcher is a focal planning species for this area. Gnatcatcher populations are also found on both sides of the Santa Ana River, which is appears to be an important movement

corridor in this area, connecting the Jurupa and La Loma Hills to populations in the Box Springs Mountains, and the few pairs known from the Pedley Hills and Norco Hills.

As found in other gnatcatcher populations, Riverside County populations likely fluctuate yearly based on annual rainfall, breeding success, adult mortality and other factors (Atwood *et al.* 1998; Erickson and Miner 1998). These fluctuations can be relatively extreme, resulting in population sizes that double or halve through an annual cycle (Atwood and Bontrager 2001). Robust populations can persist through these cycles; however, the extreme fluctuations exhibited by gnatcatchers makes smaller populations more susceptible to extirpation (Leigh 1975, 1981). The gnatcatcher populations in the northern portion of the Plan Area given the occurrence on granitic substrates, from the Jurupa Hills to Sycamore Canyon, are likely relatively small now due to ongoing habitat disturbance and degradation. The precarious status of these populations makes these populations more susceptible to extirpation.

Indirect Effects

In Southern California, effects of fragmentation have been shown to decrease the number of resident bird species, decrease the diversity of small rodents, and decrease the diversity and cover of native plant species (Soulé *et al.* 1988; Bolger *et al.* 1991; Alberts *et al.* 1993; Bolger *et al.* 1997). These alterations to the species assemblage, especially the reduction in native plant species diversity and cover, will decrease the quality of the habitat for gnatcatchers over time. This will occur as the arthropod abundance and diversity declines in correlation with the decline in their native plant hosts, decreasing the food supply of the insectivorous gnatcatchers.

The fragmentation of natural habitats in the project area will also negatively affect the quality of remaining habitat by facilitating the invasion of natural communities by exotic plant and animal species. As discussed above, invasive, alien plants may include weedy annual plants such as red brome (*Bromus madritensis ssp. rubens*) and black mustard (*Brassica nigra*) or shrubby perennials, like fennel (*Foeniculum vulgare*) and artichoke thistle (*Cynara cardunculus*). These plants alter the species composition and structure of the habitat, which may make it less suitable to the gnatcatcher and more susceptible to fire.

Invasive ant species such as the Argentine ant (*Linepithema humile*) are known to be abundant in residential areas and invade habitat edges (Suarez *et al.* 1998). This species alters the native arthropod community, significantly reducing their diversity and abundance (Bolger *et al.* 2000). Any reduction in arthropod numbers related to invasion by Argentine ants as a result of the increased urbanization anticipated in the Plan is likely to reduce food resources for arthropod predators, including the gnatcatcher.

Brown-headed cowbirds have been shown to significantly reduce breeding success of gnatcatchers in Riverside County (Braden 1997b). Increased numbers of residential developments in the Plan Area, combined with the large areas of turf grass associated with parks and school grounds will result in greater foraging opportunities for cowbirds. This may increase the numbers of adult cowbirds attempting to breed in the Plan Area. This may lead to decreased breeding success of the gnatcatcher within the Plan Area. Though cowbird trapping will be done in riparian areas, the extensive upland areas that gnatcatchers require are infeasible to effectively

trap. Therefore, ongoing nest parasitism is expected to occur, especially in upland areas adjacent to cowbird foraging locales, such as livestock and equestrian centers, and fast food restaurants.

As discussed above, throughout southern California, but especially in western Riverside and San Bernardino counties, coastal sage scrub is being type converted to nonnative grassland and other ruderal (weedy) habitats (Allen *et al.* 2000; Allen *et al.* 1996; Minnich and Dezzani 1998; Allen 2004). Minnich and Dezzani (1998) resampled VTM survey plots 60 years earlier and found that only 40.1 percent of the coastal sage scrub originally mapped was still extant, while 41.9 percent of this mapped plant community was now open coastal sage scrub mixed with a continuous layer of exotic annual grasses. The remaining 18 percent of plots were entirely converted to exotic annual grassland. This type conversion from shrublands to grasslands was due to a combination of factors including invasion of alien plants (e.g., annual grasses), increased fire frequency, and nitrogen deposition due to air pollution (Minnich and Dezzani 1998). Thus, even in reserve areas not threatened by habitat destruction due to development, a continuous loss of suitable habitat available to the California gnatcatcher is ongoing. However, the Plan will maintain a program to enhance and/or create coastal sage scrub within the core areas to keep the percent cover of coastal sage scrub vegetation within ten percent of the baseline value.

Critical Habitat Effects

Build out of the MSHCP likely will impact 23,720 acres (9,586 hectares) of proposed critical habitat or 13 percent of the 176,720 acres (71,505 hectares) of proposed critical habitat for the coastal California gnatcatcher within Unit 10, or 5 percent of the 495,795 acres (200,595 hectares) proposed critical habitat range wide. The relative impacts are similar for the 199,940 acres (80,915 hectares) of designated critical habitat within Unit 10. Offsetting the impacts to proposed and designated critical habitat for the coastal California gnatcatcher within Unit 10, build out of the MSHCP will result in the conservation and management of 153,000 acres (61,919 hectares) of critical habitat within the MSHCP Conservation Area (68 Federal Register 20242). Because gnatcatchers likely will continue to disperse across unfavorable habitat within constrained linkages in the Plan area, including the Alessandro Heights archipelago linkage at undeterminable greater distances and at a lower frequency, build out of the MSHCP will not preclude the ecological role of proposed and designated critical habitat in both the survival and recovery of the species. Moreover, the effects of the proposed action on proposed and designated critical habitat for the coastal California gnatcatcher, together with the offsetting land conservation and adaptive management prescriptions, do not appreciably diminish the value of the primary constituent elements essential to the species' conservation.

Conclusion

We anticipate the proposed action will directly and indirectly affect the coastal California gnatcatcher as described in the analyses above, including the loss of 47 percent of its modeled breeding and foraging habitat within the Plan Area. Implementation of the avoidance, minimization, and mitigation measures identified in the Plan will reduce the impacts to this species. We anticipate that this species will persist in most of the remaining 71,188 acres (53 percent) of the total modeled habitat within the existing PQP Lands and the Additional Reserve

Lands. Moreover, the MSHCP Conservation Area, which forms a system of large, contiguous habitat blocks that are interconnected within the Plan Area, will be monitored and managed cooperatively to benefit this species.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Fish and Wildlife Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the coastal California gnatcatcher and is not likely to destroy or adversely modify its proposed and designated critical habitat. We reached this conclusion based on the low level of impacts (13 percent of proposed critical habitat within the Plan Area) that are more than offset by conservation of 43,854 acres of modeled habitat within the anticipated Additional Reserve Lands with management prescriptions that will benefit the coastal California gnatcatcher. These lands and an additional 27,334 acres of PQP Lands will be adaptively managed for the gnatcatcher. The impacts associated with loss of this species' modeled habitat when viewed in conjunction with the protection and management of the MSHCP Conservation Area is not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range. As described above regarding critical habitat, the effects of the proposed action (*i.e.*, impacts to proposed and designated critical habitat together with the offsetting land conservation and management prescriptions) do not appreciably diminish the value of the primary constituent elements essential to the species' conservation nor do the effects preclude the ecological role of that designated critical habitat in both the survival and recovery of the species.

Amount or Extent of Take

We anticipate the take of coastal California gnatcatcher up to 62,613 acres of its modeled breeding and foraging habitat outside of the MSHCP Conservation Area. A small, but undeterminable, number of coastal California gnatcatchers are anticipated to be taken as a result of management actions. Take will be in the form of harm, death, and injury. This level of anticipated take is not likely to result in jeopardy to the coastal California gnatcatcher.

Least Bell's Vireo (*Vireo bellii pusillus*)

Status of the species

Listing Status

The least Bell's vireo was federally listed as endangered on May 2, 1986 (51 Federal Register 16474) and State-listed as endangered in California on October 2, 1980. A draft recovery plan was prepared for this species in March 1998 (Fish and Wildlife Service 1998a). Critical habitat was designated on February 2, 1994 (59 Federal Register 4845).

Species Description

The least Bell's vireo is a small migratory songbird that is olive-gray above and mostly white on its underparts, with a tinge of gray on the upper breast and yellow on the flanks (Coues 1866,

Fish and Wildlife Service 1998a). The vireo has indistinct white spectacles and two faint wing bars, with males and females having identical plumage. Male vireos are easily distinguished by their song, a rapid series of harsh, slurred notes that increase in intensity as the song progresses (Grinnell and Storer 1924; Pitelka and Koestner 1942; Barlow 1962; Beck 1996), but females rarely sing and therefore cannot generally be identified by song. Phrases of the vireo song are alternatively slurred upward and downward, and exhibit a “question-and-answer” quality (Grinnell and Storer 1924; Beck 1996).

The least Bell’s Vireo is in the family Vireonidae and is one of four subspecies of Bell’s vireo (*Vireo bellii*) that have been recognized (AOU 1957). Although all subspecies are similar in behavior and life history, they are isolated from one another throughout the year on both the breeding and wintering grounds (Hamilton 1962).

Habitat Affinities

Vireos are obligate riparian breeders, typically inhabiting structurally diverse woodlands along watercourses that feature dense cover within 3 to 6 feet of the ground and a dense, stratified canopy (Goldwasser 1981; Salata 1983; Gray and Greaves 1984; Fish and Wildlife Service 1998a). The understory within this riparian habitat is typically dominated by mule fat, California wild rose, poison oak, sandbar willow, young individuals of other willow species, and several perennial species (Fish and Wildlife Service 1998a). Important canopy species include mature arroyo willows and black willows, and occasional cottonwoods, western sycamore, or coast live oak. Vireos primarily forage and nest in riparian habitat, but may also use adjoining upland scrub habitat (Salata 1983; Kus and Miner 1989).

Critical Habitat

Critical habitat for the least Bell’s vireo includes 10 areas encompassing about 15,200 hectares (38,000 acres) in Santa Barbara, Ventura, Los Angeles, San Bernardino, Riverside, and San Diego counties. Within the Plan Area critical habitat is restricted to all riverine and floodplain habitats with appropriate riparian vegetation in the Prado Basin below the elevation of 543 feet and upstream along the Santa Ana River through the Norco Bluffs area to the vicinity of the Van Buren Boulevard crossing. Primary constituent elements that support feeding, nesting, roosting and sheltering are essential to the conservation of the least Bell’s vireo. These primary constituent elements can be described as riparian woodland vegetation that generally contains both canopy and shrub layers and some associated upland habitats.

Life History

The least Bell’s vireo exhibits year-round diurnal activity and is known to be a nocturnal migrant (Brown 1993).

Vireos primarily feed on invertebrates, especially lepidopteran larvae, within willow stands or associated riparian vegetation (Miner 1989; Brown 1993). Vireos occasionally forage in non-riparian vegetation such as coastal sage scrub, chaparral, and oak woodlands, although foraging in these other habitats usually occurs within 100 feet of the edge of riparian vegetation (Salata

1983; Gray and Greaves 1984; Kus and Miner 1987). Vireo feeding behavior largely consists of gleaning prey from leaves or woody surfaces while perched or hovering, and less frequently by capturing prey by aerial pursuit (Salata 1983; Miner 1989). Vireos concentrate most of their foraging between 0 to 20 feet (Salata 1983; Miner 1989).

Vireos arrive in southern California breeding areas by mid-March to early April, with males arriving before females and older birds arriving before first-year breeders (Fish and Wildlife Service 1998a). Vireos generally remain on the breeding grounds until late September, although some post-breeding migration may begin as early as late July (Fish and Wildlife Service 1998a). Male vireos establish and defend breeding territories through singing and physically chasing intruders (Barlow 1962; Beck 1996; Fish and Wildlife Service 1998a). Although territories typically range in size from 0.5 to 7.5 acres (Fish and Wildlife Service 1998a), no relationship appears to exist between territory size and various measures of territory quality (Newman 1992). Nest building commences a few days after pair formation, with the female selecting a nest-site location and both sexes constructing the nest (Pitelka and Koestner 1942; Barlow 1962; Fish and Wildlife Service 1998a). Nests are typically suspended in forked branches within three feet above the ground with no clear preference for any particular plant species as the nest host (Nolan 1960; Barlow 1962; Gray and Greaves 1984; Fish and Wildlife Service 1998a). Typically 3 or 4 eggs are laid on successive days shortly after nest construction (Fish and Wildlife Service 1998a). The eggs are incubated by both parents for about 14 days with the young remaining in the nest for another 10-12 days (Pitelka and Koestner 1942; Nolan 1960; Barlow 1962). Each nest appears to be used only once with new nests constructed for each nesting attempt (Greaves 1987). Vireos may attempt up to five nests within a breeding season, but are typically limited to one or two successful nests within a given breeding season (Fish and Wildlife Service 1998a).

Multiple long-term monitoring studies indicate that approximately 59 percent of nests successfully produce fledglings, although on average only 1.8 chicks fledge per nest (Fish and Wildlife Service 1998a). Although vireo nests appear to be more accessible to terrestrial predators because of their relatively low placement (Franzreb 1989), western scrub-jays have been documented to account for the majority of documented depredation events (Peterson 2002); depredation by jays and other avian predators may have selected for relatively low nest placement (Ferree 2002). Predation rates can exceed 60 percent of the vireo nests in a given area within a year (Kus 1999), but typical nest predation rates average around 30 percent (Franzreb 1989), which is comparable to predation rates for other North American passerines (Martin and Clobert 1996; Grishaver *et al.* 1998; Ferree 2002). Nest parasitism by cowbirds is another major source of failure for vireo nests (Franzreb 1989; Fish and Wildlife Service 1998a; Kus 1999, 2002; Sharp 2002); nests that are parasitized are either abandoned or fledge cowbird chicks rather than vireos. It is believed that cowbirds did not historically occur within the vireo's range, and therefore vireos have not evolved adequate defenses to avoid loss of productivity due to parasitism (Franzreb 1989; Kus 2002). Parasitism of vireo nests may exceed 42 percent in some locations (Kus 1999), but extensive cowbird trapping and focused nest monitoring can substantially reduce parasitism or its effects (Franzreb 1989; Fish and Wildlife Service 1998a; Kus 2002).

Some individual vireos have been documented to live at least seven years (Brown 1993, Fish and Wildlife Service 1998a), but the average lifespan for this species is substantially lower. First

year survivorship has been estimated to average approximately 25 percent (Greaves and Labinger 1997; Fish and Wildlife Service 1998a), typical for small passerines, with annual survivorship in subsequent years estimated to be approximately 47 percent (Fish and Wildlife Service 1998a). Annual survival of females appears to be slightly lower than that for males, presumably due to the higher energetic costs of egg production by females (Fish and Wildlife Service 1998a).

Fledgling vireos expand their dispersal distances from about 35 feet the first day to approximately 200 feet several weeks after fledging (Hensley 1950; Nolan 1960). This distance has been shown to increase to at least 1 mile prior to their first fall migration (Gray and Greaves 1984). Banding records indicate that while most first-year breeding vireos return to their natal drainage after winter migration, some disperse considerable distances to other breeding locations (Greaves and Labinger 1997; Fish and Wildlife Service 1998a; Kus and Beck 1998). Movement by vireos between drainages within San Diego County is not uncommon (Kus and Beck 1998). Additionally, several vireos banded as nestlings in San Diego County have been resighted as breeding adults in Ventura County, and the opposite movement from Ventura to San Diego has also been observed (Greaves and Labinger 1997). The maximum dispersal distance currently documented is approximately 130 miles (Fish and Wildlife Service 1998a), but this is probably an underestimate due to the limited number of vireos that are banded and insufficient resighting efforts. Although movement between sites by older birds may occur, site fidelity by vireos after the first breeding season is generally high and most dispersal between sites occurs between the time that vireos fledge from their nest and their first breeding season (Fish and Wildlife Service 1998a).

Status and Distribution

Least Bell's vireos are one of four subspecies of Bell's vireos, two of which occur in California. Subspecies *pusillus* was once common and was the major breeding subspecies in California. The least Bell's vireo historically occupied willow riparian habitats from Tehama County in northern California southward to northwestern Baja California, Mexico, and as far east as Owens Valley, Death Valley, and the Mojave River (Grinnell and Miller 1944; Fish and Wildlife Service 1998a). Except for a few outlying pairs, the least Bell's vireo is currently restricted to southern California south of the Tehachapi Mountains and northwestern Baja California (Wilbur 1980; Garrett and Dunn 1981; Franzreb 1989; U.S. Geological Survey 2002b). The largest current concentration of least Bell's vireos is in San Diego County along the Santa Margarita River on Camp Pendleton (Griffiths Wildlife Biology (GWB) 2001; U.S. Geological Survey 2002b). Although originally considered to be abundant locally, regional declines of this subspecies were noticeable by the 1940's (Grinnell and Miller 1944), and the least Bell's vireo was believed to have been extirpated from California's Central Valley by the early 1980's (Franzreb 1989). The vireo was federally listed as endangered in 1986 in response to its dramatic decline and widespread loss of its riparian habitat (51 Federal Register 16474).

The estimated population of vireos has increased from approximately 300 pairs in 1986 to over 1,500 pairs in 2001 (U.S. Geological Survey 2002b); this population increase is primarily attributable to the management of local cowbird populations and habitat conservation (Kus 1998, Fish and Wildlife Service 1998a). Populations at some locations appear to have peaked in 1998,

during the most recent El Niño event, and limited regional population declines have occurred since that year (GWB 2001; U.S. Geological Survey 2002b). Despite some declines, other areas continue to have increasing populations and the overall population appears to be stable or moderately increasing (Pike *et al.* 2002; Hoffman and Zembal 2002; U.S. Geological Survey 2002b).

Threats

Causes for decline of the least Bell's vireo include destruction of habitat, river channelization, water diversions, lowered water tables, gravel mining, agricultural development, and cowbird parasitism. Vireos are known to be sensitive to many forms of disturbance including noise, night lighting, and consistent human presence in an area. Excessive noise can cause vireos to abandon an area. Greaves (1989) hypothesized that the lack of breeding vireos in apparently suitable habitat was due to human disturbances (*e.g.*, bulldozers, off-road vehicles, and hiking trails). He further suggested that buffer zones between natural areas and surrounding degraded and disturbed areas could be used to increase the suitability of some vireo habitat.

Vireos nesting in areas containing a high proportion of degraded habitat have lower productivity (*e.g.*, hatching success) than those in areas of high quality riparian woodland (Pike and Hays 1992), and widespread habitat losses have fragmented most remaining populations into small, disjunct, widely dispersed subpopulations (Franzreb 1989). As much as 90 percent of the original extent of riparian woodland in California has been eliminated, and most of the remaining 10 percent is in a degraded condition (Smith 1977; Dahl 1990). Kus *et al.* (2003:19) have concluded that “[o]ur evaluation of riparian condition in southern California indicates that the landscape available . . . to all riparian species, is highly disturbed, calling into question just how much suitable habitat exists. A variety of land use practices and human activities, as well as the spread of invasive plants, have altered the condition of the majority of riparian woodlands . . .” in southern California.

Habitat fragmentation negatively affects abundance and distribution of neotropical migratory songbirds, in part by increasing incidence of nest predation and parasitism (Whitcomb *et al.* 1981; Small and Hunter 1988; Yahner and DeLong 1992; Sharp 2002; Peterson 2002). The following activities continue to destroy or degrade habitat for vireos: 1) removal of riparian vegetation; 2) thinning of riparian growth, especially near ground level; 3) removal or destruction of adjacent upland habitats used for foraging; 4) increases in human-associated or human-induced disturbances; and 5) channelization, water impoundment or extraction, and water diversion.

Environmental contaminants may pose an additional threat to the species within the Plan Area (and beyond). Vireo monitors and researchers within the Prado Basin and adjacent riparian habitats have detected numerous apparently well-incubated clutches of vireos that failed to produce a single viable nestling. During the early part of the 1988 breeding season, entire clutches failed to hatch in three cases, and all vireo nestling young failed to survive in two other instances (Hays 1989). Abnormalities that often are attributable to toxic levels of various pollutants have been detected in vertebrate and invertebrate specimens collected within the Prado Basin. Specifically, in 1997, a vireo nestling with a deformed upper mandible was

observed in a nest (Pike and Hays 2000). Perhaps most importantly, preliminary data derived from the toxicological testing of abandoned vireo eggs from the Prado Basin have revealed the presence of dichlorodiphenylethylene (DDE), a metabolite of DDT, in concentrations that could cause eggshell thinning (Service, unpublished data).

Conservation Needs

The conservation of the species depends on the management of existing population centers and the maintenance and enhancement of existing habitats, existing or potentially-restorable habitat corridors, and the ecosystems in which they are found. The Orange County Water District, Santa Ana Watershed Association of Resource Conservation Districts, County of Riverside, Service, and other agencies are actively engaged in management programs designed to reduce the rate of cowbird parasitism on vireo nests throughout the western portions of the Plan Area (*e.g.*, Pike and Hays 2000; Pike *et al.* 2001, 2002; Hoffman 2001; Hoffman and Zembal 2002). Similarly, riparian habitat revegetation efforts and exotic plant species removal programs have been underway in the Prado Basin and County of Riverside properties for the past 18 years and in much of the remainder of the Santa Ana River Watershed for the past four years. Given the extraordinary increase in vireo numbers within the Prado Basin, it would appear that the management measures employed there (*e.g.*, habitat creation and restoration, cowbird management) would benefit the species throughout the Plan Area if monitoring and management measures were appropriately expanded.

The Draft Recovery Plan for the vireo (Fish and Wildlife Service 1998a) calls for the protection and management of riparian and adjacent upland habitat in each identified population/metapopulation site (including the Santa Ana River/Prado Basin) and a reduction of threats to the extent that: 1) the species no longer needs significant human intervention to survive; or 2) if human intervention is necessary, “. . . perpetual endowments are secured for cowbird trapping and exotic plant (*Arundo*) control in riparian habitat occupied by least Bell’s vireos.” In addition, proven management strategies suggest the need for a complete inventory of the species and its habitat in all Plan Area drainages that accommodate the species.

Environmental Baseline

Habitat for the least Bell’s vireo within the Plan Area consists primarily of riparian vegetation communities within all Bioregions except for the San Bernardino and San Jacinto Mountains. Grinnell and Miller (1944) indicate that *pusillus* (formerly) occurred near Bishop at 4,100 feet (1,250 meters). However, Small (1994) states that a typical upper elevation limit for the vireo is 1,500 feet (457 meters). The Forest Service concluded that, out of 123 vireo occurrences reported in RAREFIND, 95 percent were below 3,000 feet (914 meters). After evaluating our vireo dataset for the Plan Area, it appeared that all of the known locations were below approximately 2,800 feet (853 meters). So, in consideration of the data mentioned above, we set an upper elevation limit for modeling vireo habitat at 3,000 feet. We recognize that some number of vireo locations may occur above 3,000 feet, but we expect this number to be very low. Approximately 192 acres of the selected vegetation types occur above 3,000 feet in the Plan Area. Therefore, the habitat model for the least Bell’s vireo was created by capturing *Arundo*/riparian forest, mule fat scrub, lowland riparian forest and riparian scrub, southern

cottonwood/willow riparian forest and southern willow scrub riparian scrub up to 3,000 feet in elevation.

Based on this analysis, the Plan Area supports approximately 12,518 acres of modeled habitat for the least Bell's vireo. Approximately 6,683 acres (53 percent) of the modeled habitat occur within PQP Lands, including the Prado Basin. Our dataset includes approximately 690 point locations for the least Bell's vireo within the Plan Area, including 580 point locations (84 percent) from the Prado Basin and Santa Ana River. Because not all riparian habitat has the appropriate, non-degraded understories, canopies, configurations, and other microhabitat parameters needed by the least Bell's vireo, modeled habitat likely overestimates the amount of suitable habitat for least Bell's vireo within the Plan Area.

As a direct result of 17 years of intensive management efforts within the Prado Basin portion of the Plan Area, yearly surveys since 1986 have revealed that the population of least Bell's vireo has increased significantly from the 19 pairs, reported at the time of its listing, to a reported minimum of 336 pairs during the 2001 breeding season (Pike *et al.* 2001). The corresponding data obtained in the Prado Basin and adjacent riparian habitats during the 2002 breeding season indicated that the number of pairs decreased to 312 (Pike *U.S. Forest Service* 2002); however, preliminary data suggest that record numbers of vireo territories (approximately 460) and breeding pairs were present within the Prado Basin study area during the 2003 breeding season (Dharm Pellegrini, Orange County Water District, pers. comm., 2003). Of the 336 territorial male vireos that were detected within the Prado Basin study area in 1999, 224 of these were found to be paired (Pike and Hays 1999). Two hundred and seventy (270) pairs were recorded in 1998, 195 pairs were detected in 1996, and 164 pairs were located in 1995 (Pike and Hays 1998).

A minimum of 714 known fledged young was detected within the Prado Basin study area during the 2001 breeding season, which was a 10 percent increase over the corresponding total (649) in 1999 (Pike *et al.* 2001). Nesting success in recent years has been relatively high; the calculated figures for 1999 (57 percent) and 2000 (71 percent) both exceeded the corresponding data for 1997 (50 percent) and 1998 (41 percent) (Pike and Hays 1999, 2000). By contrast, the average number of fledglings per breeding pair from 1999 to 2001 (2.2) remained well below the corresponding average (3.1) for the breeding seasons from 1988 to 1991. Moreover, in recent years, significantly fewer pairs have elected to renest after successfully fledging young on their first attempt (Pike and Hays 1999, 2000; Pike *et al.* 2001). The reasons for these disparities remain unknown.

Although monitoring efforts in the remainder of the Plan Area largely have been sparse and irregular even in the recent past, the Santa Ana Watershed Association of Resource Conservation Districts (SAWA) has recently begun to census and monitor select populations within the western portion of the Plan Area adjacent to the Prado Basin. During the 2002 breeding season, SAWA biologists detected 12 vireo pairs on the Santa Ana River from Van Buren Boulevard westward to Hidden Valley, 21 pairs in the Hidden Valley area, 4 pairs from Hidden Valley westward to River Road, 6 pairs in Temescal Canyon, and 18 pairs from Prado Dam downstream to the Green River Golf Course (Hoffman and Zembal 2002). Elsewhere in the Plan Area, the available survey data from the 2001 breeding season indicate that there were three confirmed vireo territories each at Lake Perris and March Air Force Base and San Timoteo Canyon; and

one territory near Spanish Hills (Fish and Wildlife Service and U.S. Geological Survey, unpublished data). A composite of all data available for the 2001 breeding season for those locations mentioned above indicated that there were 520 vireo territories detected within the Plan Area. More recently, during the 2003 breeding season, nine vireo territories were documented at an additional location in Mockingbird Canyon (Melody Aimar, SAWA, pers. comm., 2003). Also in 2003, seven vireo territories were documented in the Riverside County reach of San Timoteo Creek (Talula Wiater, SAWA, pers. comm., 2003) indicating a recent increase in the number of territories there. In all, the number of vireo territories mentioned above represents approximately 26 percent of the entire known United States total of 2,018 territories.

Other areas that now or may eventually contain important vireo populations are Lake Skinner/Diamond Valley, Lake Mathews-Estelle Mountain, San Jacinto Wildlife Area, Lake Perris, Sycamore Canyon Regional Park, Vail Lake/Wilson Valley, Potrero Valley, Temecula Creek, Alberhill Creek, and Murrieta Creek.

Within the Plan Area, primary constituent elements of designated critical habitat (i.e., floodplains with appurtenant riparian vegetation) are used for breeding, sheltering, foraging, and juvenile dispersal. The Prado Dam/Santa Ana River critical habitat unit, which lies almost entirely within the Plan Area, includes the Prado Basin up to an elevation of 543 feet and that reach of the Santa Ana River extending from the basin upstream (east) to a point approximately 3.0 miles upstream from (east of) the Van Buren Boulevard crossing of the river (59 Federal Register 4859). The Prado Basin/Santa Ana River critical habitat unit is the only designated critical habitat within the Plan Area and one of ten such areas within the range of the species (see 59 Federal Register 4856).

Effects of the Action

Direct Effects

The Plan Area includes 12,518 acres of modeled habitat and approximately 690 point locations for the least Bell's vireo. Least Bell's vireo will be subject to impacts associated with development and other proposed Covered Activities over the 75-year permit term within up to approximately 2,804 acres of this modeled habitat that occurs outside the MSHCP Conservation Area. In particular, there are four modeled habitat areas outside the MSHCP Conservation Area that we consider to be potentially important to the vireo: 1) several individual drainages north and east of Lake Mathews, west of Trautwein Road, and south of the 91 Freeway including Mockingbird Canyon, a Core Area for vireo as identified in the Plan; 2) the Canyon Lake area; 3) occupied habitat along Coldwater Canyon just west of I-15; and 4) occupied habitat on the Santa Ana River along the Green River Golf Club at the Riverside/Orange County border downstream from Prado Dam. These and other areas of modeled habitat outside the MSHCP Conservation Area will be subject to impacts from Covered Activities.

Covered Activities that are anticipated to impact modeled vireo habitat outside the MSHCP Conservation Area include public and private development, agriculture, roadway and freeway projects and associated maintenance, flood control facilities, and future facilities necessary to support planned development such as water/wastewater facilities, electrical utility facilities, and

natural gas facilities. Loss of foraging and nesting habitats from these activities will cause least Bell's vireo to disperse in search of other riparian habitats and experience increased competition for the remaining suitable habitat. Birds forced to disperse may also experience decreased fitness due to increased energy and time spent locating new habitats, and they may be subjected to increased rates of predation and injury. If clearing of habitat occurs near the initiation of the breeding season, the search for and establishment of a new breeding site may result in an overall reduction in reproductive output. Thus, loss of breeding and foraging habitat may impact overall population numbers of the vireo within the Plan Area over the long term by reducing the number of areas suitable for use as foraging and nesting sites.

For projects within the Criteria Area but outside of the Additional Reserve Lands, the Construction Guidelines (Section 7.5.3, pp. 7-87) require that habitat clearing occur outside the active breeding bird season of resident and migratory species, defined for the purpose of the MSHCP as March 1 - June 30. Approximately 878 acres of modeled habitat for the least Bell's vireo falls within the Criteria Area, but outside of the Additional Reserve Lands, and these areas will be subject to the breeding season restriction. However, least Bell's vireo are known to continue nesting into July; thus, clearing activities after June 30 within the Criteria Area could impact active nests, including eggs and nestlings. In addition, no breeding season restrictions will be implemented in 1,926 acres of modeled habitat for the vireo that are outside the Criteria Area. Impacts anticipated from habitat clearing and associated construction actions during the breeding season of the least Bell's vireo include destruction of active nests, including eggs and nestlings, and disruption of normal breeding activities.

To offset impacts to the vireo in the Plan Area, 3,030 acres (24 percent) of modeled habitat will be conserved within the Additional Reserve Lands with management prescriptions that will benefit the least Bell's vireo. The Additional Reserve Lands include 50 (7 percent) of the point locations in our dataset. An additional 6,683 acres (53 percent) of modeled habitat for the least Bell's vireo will remain in PQP Lands. PQP Lands, primarily the Prado Basin and Santa Ana River, contain the majority (84 percent) of the point locations for the least Bell's vireo in our dataset. In total, 77 percent of the modeled habitat for the least Bell's vireo will be conserved or remain in the Plan Area. This modeled habitat includes 91 percent of the least Bell's vireo point locations in our dataset. More importantly, 8 out of the 9 Core Areas identified in the Plan for least Bell's vireo will be included in the MSHCP Conservation Area. Further, the Riparian/Riverine Areas and Vernal Pools policy will contribute to additional riparian habitat conservation as discussed below.

The significance of the Prado Basin/Santa Ana River vireo population that contains a vast majority of the point locations and the largest block of contiguous modeled habitat for the least Bell's vireo in the Plan Area cannot be overstated. It is identified in the Plan as a vireo Core Area and will remain in open space primarily on PQP Lands. However, other populations and areas of modeled habitat that occur in the Santa Margarita River watershed and other areas of existing habitat are also important for expanding the range of the vireo and promoting recovery of the species. Other Core Areas that will be conserved or remain in open space include Temescal Wash (including Alberhill Creek), Murrietta Creek, Temecula Creek, Lake Skinner (including Rawson Canyon), Vail Lake, Wilson Creek, and San Timoteo Canyon. Each Core Area will include at least 328 feet (100 meters) of undeveloped landscape adjacent to the riparian

woodland and scrub habitat where it occurs within the Criteria Area. In addition, other areas of modeled habitat will be conserved in many smaller drainages throughout the MSHCP Conservation Area that may currently be occupied or become occupied by the vireo in the future.

Linkages between the Core Areas identified above and other potentially important sites for the vireo have been identified and included where feasible in the MSHCP Conservation Area. The Prado Basin is linked along the Santa Ana River to San Bernardino and Orange counties and is linked to the south by the Temescal Wash to Lake Mathews and Lake Elsinore. Modeled habitat within the Vail Lake area is linked to the Lake Skinner-Diamond Valley Lake area via Rawson Canyon. The Vail Lake area is also linked to the Santa Rosa Plateau and then to the Santa Margarita River by modeled habitat in Temecula Creek and Murrietta Creek. The Badlands area may provide a linkage to Potrero Creek, Lake Perris, San Jacinto Wildlife Area and continuing north into San Bernardino County.

We expect that these Core Areas, linkages and other vireo habitats within the MSHCP Conservation Area will be conserved or remain in open space and will meet the vireo conservation objectives stated in the Plan. Provisions in the Plan that will help ensure meeting conservation objectives for the vireo include successful creation of the criteria-driven Additional Reserve Lands and implementation of the Riparian/Riverine Areas and Vernal Pools policy and related Biologically Equivalent or Superior Preservation determination process as discussed in the project description and Conservation Measures sections of this biological opinion.

We anticipate additional areas within the Plan Area, including those in Mockingbird Canyon, that are occupied by the least Bell's vireo and/or are deemed to have long term conservation value for the vireo will be largely avoided and protected. This additional protection will be met through implementation of the Riparian/Riverine Areas and Vernal Pools policy as described in the Conservation Measures section of this biological opinion. Wetland mapping assembled as part of that policy will be reviewed as part of the project review process and if riparian scrub and/or woodland is identified on the wetland maps and cannot be avoided, focused surveys for the least Bell's vireo will be conducted by a qualified biologist. If survey results are positive, 90 percent of the occupied portions of the property that provide for long-term conservation value for the least Bell's vireo will be avoided and conserved (long term protection and management). This will involve including 328 feet (100 meters) of undeveloped landscape adjacent to the habitat conserved. We anticipate that these areas will be considered for inclusion in the MSHCP Conservation Area.

For those areas occupied by the vireo that will not be included into the MSHCP Conservation Area, 90 percent avoidance and long-term protection and management will also be required unless a Biologically Equivalent or Superior Preservation Determination can demonstrate that a proposed alternative, including design features to minimize impacts and compensation measures (*e.g.*, restoration, enhancement), will provide equal or better Conservation than 90 percent avoidance of the area. The Wildlife Agencies will be notified and provided a 60-day review and response period prior to an approval of a Biologically Equivalent or Superior Preservation Determination by the Permittee. We anticipate that this evaluation process will provide for protection, restoration, enhancement or replacement of vireo habitats within the Plan Area and

ensure that planned development outside of the MSHCP Conservation Area does not conflict with the long-term conservation value of vireo habitats within the MSHCP Conservation Area.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands as described in Section 5 of the Plan. Cooperative management and monitoring are anticipated on PQP Lands including the Corps and the Orange County Water District in the Prado Basin for the benefit of the least Bell's vireo. Surveys for the vireo will be conducted at least every three years to verify the continued use of, and successful reproduction at, 75 percent of the known vireo occupied habitat (including any nesting locations identified in the MSHCP Conservation Area in the future). If a decline in the distribution or reproduction of the least Bell's vireo is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP. Reserve managers will manage the known and future occurrences of the vireo with regard to flood control measures, altered hydrology, competition with non-native species, parasitism by cowbirds, mining, grazing, and habitat fragmentation.

Management actions to benefit the least Bell's vireo or other Covered Species (*e.g.*, exotic vegetation removal, mowing, habitat manipulation) may result in impacts, including death, to a small number of individual least Bell's vireos. It is anticipated that any impacts to the least Bell's vireo from management actions will be minimized by adherence to appropriate survey protocols and other guidelines described in Section 7.4 of the MSHCP.

Least Bell's Vireo Critical Habitat

Vireo critical habitat is wholly contained within the MSHCP Conservation Area. Most of the critical habitat is within PQP Lands in the Prado Basin and Santa Ana River and the remainder of private inholdings are contained within Additional Reserve Lands. We expect the Riparian/Riverine Areas and Vernal Pools policy will greatly minimize any impacts from Covered Activities to vireo critical habitat.

Indirect Effects

The least Bell's vireo could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These impacts include the indirect effects described in the "General Effects" section of this biological opinion. In particular, maintaining the hydrological processes and water quality standards (*e.g.*, controlling sedimentation and other pollutants) of wetland habitats will be important to sustaining least Bell's vireo in the MSHCP Conservation Area. Implementation of the Riparian/Riverine Area and Vernal Pools policy and the Urban/Wildlands Interface policy will help minimize the indirect effects of the Covered Activities on foraging and breeding habitat for the least Bell's vireo.

Many of the vireo Core Areas identified above are bisected by roadways. Road widening is proposed for several of these roads as described in Section 7.3.5 in the MSHCP. Existing and proposed roads and road widening projects contribute to habitat fragmentation. The detrimental effects of fragmentation are described in the "General Indirect Effects" section above. The guidelines and recommendations described in Section 7 of the MSHCP and the measures to

reduce effects of fragmentation above will help minimize the impact of road construction on habitat connectivity.

Section 7.4 identifies allowable uses within the MSHCP Conservation Area. These uses include emergency repairs and police services and public access activities and associated infrastructure such as trails and kiosks. Typically, riparian areas are attractive locations for siting trails and public access for equestrians, mountain bikers and hikers. Similarly, riparian areas often become the only remaining wildlife corridor through urban areas and may require the construction of a wildlife crossing at roads and other barriers. However, the guidelines for the siting and design of trails and facilities and for construction in Section 7 are anticipated to minimize any of the potential impacts discussed in the generalized effects section above.

An annual loss of 85 acres of habitat desirable for inclusion in the Additional Reserve Lands is projected in the Plan due to development of single family homes. We expect that the location of most homes will typically be out of the least Bell's vireo modeled habitat areas because of flooding concerns; however, access roads to these homes may contribute to fragmentation and edge effects. The guidelines and recommendations described in Section 7 of the MSHCP and the measures to reduce effects of fragmentation above will help minimize the impact of road construction on habitat connectivity.

Conclusion

We anticipate the proposed action will directly and indirectly affect the least Bell's vireo as described in the analyses above, including loss of up to 23 percent of the modeled habitat for this species in the Plan Area. Implementation of the avoidance, minimization, and mitigation measures identified in the Plan will reduce the impacts to this species. In particular, we expect impacts from Covered Activities to be greatly minimized with implementation of the Riparian/Riverine Areas and Vernal Pools policy (*i.e.*, we anticipate only a 10 percent loss of vireo habitats determined to have long-term conservation value for the species).

We anticipate that the least Bell's vireo will be able to persist in the remaining 77 percent of the modeled habitat within both the existing PQP Lands and Additional Reserve Lands. Together these lands form a system of large, contiguous habitat blocks that are interconnected within the Plan Area. We anticipate that these lands will be monitored and managed cooperatively to benefit this species.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the least Bell's vireo or to adversely modify its critical habitat. We reached this conclusion because most of the Core Areas for vireo in the Plan Area as well as additional vireo locations spread throughout the Plan Area will persist. Thus, the impacts to this species and its modeled habitat, when viewed in conjunction with the protection and management of the MSHCP Conservation Area, is not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Amount or Extent of Take

Because of the large area covered and because occupation of modeled habitat by vireos is expected to fluctuate, it will be difficult to quantify the number of birds impacted over the 75-year permit term. Therefore, the Service is quantifying incidental take as the number of acres of modeled habitat that will be impacted in the Plan Area as a result of the proposed action.

We anticipate that up to 2,804 acres of breeding and foraging habitat within the Plan Area will become unsuitable for the least Bell's vireo as a result of the proposed action. We anticipate that all nests, including eggs and nestlings, within up to 1,926 acres of habitat outside the Criteria Area will be taken and a small, but undeterminable, number of active nests, including eggs and nestlings, within up to 878 acres of habitat within the Criteria Area, but outside of the Additional Reserve Lands, will be taken as a result of the proposed action. Additionally, a small, but undeterminable, number of least Bell's vireos are anticipated to be taken as a result of management actions. Take will be in the form of harm, death, and injury. This level of take is not likely to result in jeopardy to the least Bell's vireo.

Southwestern willow flycatcher (*Empidonax traillii extimus*)

Status of the Species

Listing Status

The southwestern willow flycatcher (flycatcher) was federally listed as endangered on February 27, 1995 (60 Federal Register 10694). A final recovery plan for the southwestern willow flycatcher was signed by the Fish and Wildlife Service's Region 2 Director on August 30, 2002 (Fish and Wildlife Service 2002c). The California Department of Fish and Game listed this species as endangered on December 3, 1990.

Critical habitat was designated on July 22, 1997 (62 Federal Register 39129). A correction notice was published in the Federal Register on August 20, 1997, to clarify the lateral extent of the designation (62 Federal Register 44228). However, on May 11, 2001, the 10th circuit court of appeals set aside designated critical habitat in those states under the 10th circuit's jurisdiction (New Mexico). The Service decided to set aside critical habitat designated for the southwestern willow flycatcher in all other states (California, and Arizona) until it can reassess the economic analysis. On May 2, 2002, the Service sent out a scoping letter to more than 800 interested parties requesting information in order to develop a critical habitat proposal.

Species Description

The southwestern willow flycatcher, a relatively small, insectivorous (passerine) songbird, is approximately 15 centimeters (5.75 inches) in length. Both sexes of the flycatcher have a grayish-green back and wings, whitish throats, light gray-olive breasts, and pale, yellowish bellies. The song is a sneezy "fitz-bew" or "fitz-a-bew" and the typical call is a breathy "whit" (e.g., Unitt 1987). The southwestern willow flycatcher is a recognized subspecies of the willow flycatcher. Although previously considered conspecific with the alder flycatcher, the willow

flycatcher is distinguishable from that species by morphology (Aldrich 1951), song type, habitat use, structure and placement of nests (Aldrich 1953), eggs (Walkinshaw 1966), and genetics (Seutin and Simon 1988). The southwestern willow flycatcher is one of five subspecies of the willow flycatcher currently recognized (Hubbard 1987; Unitt 1987; Browning 1993). The willow flycatcher subspecies are distinguished primarily by differences in color and morphology. Unitt (1987) and Browning (1993) concluded that the southwestern willow flycatcher is paler than other willow flycatcher subspecies. Preliminary data also suggest that the song dialect of the southwestern willow flycatcher is distinguishable from other willow flycatchers (Sedgwick 2000).

Habitat Affinities

The southwestern willow flycatcher is restricted to riparian woodlands along streams and rivers with mature, dense stands of willows, cottonwoods, or smaller spring fed areas with willows or alders. Riparian habitat provides both breeding and foraging habitat for the species. The flycatcher nests in thickets of trees and shrubs with dense foliage from approximately 0 to 13 feet above ground. The nest site plant community is typically structurally homogeneous, dense, and near surface water or saturated soil (Brown 1988, Sedgwick and Knopf 1992, Sogge *et al.* 1993). Historically, the willow flycatcher nested primarily in willows and mule fat with a scattered overstory of cottonwood (Grinnell and Miller 1944). Following more recent changes in riparian plant communities in the region, the species still nests in willows, where available, but it is also known to nest in thickets dominated by tamarisk and Russian olive (Brown 1988). Fragmented riparian zones, with large distances between willow patches and individual willow plants, are not selected for nesting or singing (Sedgwick and Knopf 1992). Foraging takes place within and above dense riparian vegetation in addition to areas adjacent to nest sites which may be more open (Fish and Wildlife Service 1995a). Migrating willow flycatchers use habitats similar to breeding flycatchers, but they will also use desert washes, oases, and open canyon woodlands near watercourses (Small 1994).

Life History

Males typically arrive in southern California from May through mid-June and establish a territory by singing and interacting aggressively with other flycatchers (Fish and Wildlife Service 2002c). Females arrive approximately one week later. Territory size varies greatly probably due to differences in population density, habitat quality, and nesting stage. Breeding territories generally range from 0.25 to 5.7 acres, with most in the range of 0.5 to 1.2 acres (Sogge 1995; Whitfield and Enos 1996; Skaggs 1996; Sogge *et al.* 1997). Willow flycatchers are generally gone from breeding grounds in southern California by late August and are exceedingly scarce in the United States after mid-October (Garrett and Dunn 1981). They winter in Mexico, Central America, and northern South America (Fish and Wildlife Service 2002c).

Southwestern willow flycatchers typically raise one brood per year. The clutch size is usually 3 to 4 eggs, and incubation lasts 12 to 13 days (Fish and Wildlife Service 2002c). Nestlings fledge 12 to 15 days after hatching and then remain in the general nest area for another 14 to 15 days (minimum) before dispersing (Fish and Wildlife Service 2002c). They breed annually beginning at one year of age (Sedgwick 2000). Banding studies have documented survivorship up to 11

years of age (Sedgwick 2000), although a life span of 1 to 3 years is most likely (Fish and Wildlife Service 2002c). In Oregon and southern California, over half of male and female breeding adults returned to the same general area (within 25 meters in Oregon) and bred again in subsequent years (Sedgwick 2000).

The willow flycatcher is an insectivore that primarily hovers to glean insects from the foliage and occasionally captures insects on the ground (Sedgwick 2000). Common food items include wasps and bees (Hymenoptera), beetles (Coleoptera), flies (Diptera), butterflies and moths (Lepidoptera) and true bugs (Hemiptera) (Beal 1912).

Status and Distribution

The breeding range of the southwestern willow flycatcher includes southern California, southern Nevada, Arizona, New Mexico, western Texas, southwestern Colorado, and extreme northwestern Mexico (Hubbard 1987; Unitt 1987; Browning 1993). Once considered to be widespread common breeders in southern California, the southwestern willow flycatcher has declined precipitously throughout its range during the last 50 years (Unitt 1987). Current numbers remain significantly reduced from historical levels. A report compiling the most recent survey data collected between 1993 and 2000 identified 209 breeding sites over the range of the species (Sogge *et al.* 2001). In California, this report identified 224 southwestern willow flycatcher territories within 65 breeding sites (Sogge *et al.* 2001). The drainages in California that support permanent breeding populations include the Kern, Santa Ana, Santa Margarita, and San Luis Rey rivers.

More recently, Kus *et al.* (2003) documented that 90 percent of the southwestern willow flycatcher populations in California between 1999-2001 consisted of five territories or less. Although these smaller populations are likely more susceptible to stochastic events, some do persist, and all are important to the recovery of the species. The Santa Margarita and San Luis Rey River populations, and to a lesser extent the Prado Basin population, likely act as source populations for outlying southwestern willow flycatcher breeding territories in coastal southern California and thus contribute to the potential expansion of this species' range.

Threats

The primary threats to flycatchers within the Plan Area include habitat loss and degradation due to the authorized and unauthorized modification of hydrological and fluvial processes, sand mining, flood control activities (mowing, channelization), ground water withdrawal, recreational activities, agriculture grazing, infestations of exotic plant species (*i.e.*, giant reed), widespread cowbird parasitism, loss of native habitat buffers, and edge effects from upland development (*e.g.*, Kus *et al.* 2003).

Changes in riparian plant communities have resulted in the degradation and elimination of nesting habitat for the southwestern willow flycatcher which has reduced the range, distribution, and population size of the species (Fish and Wildlife Service 1995a). Loss and modification of southwestern riparian habitats has occurred from urban and agricultural development, water diversion and impoundment, channelization, livestock grazing, off-road vehicle and other

recreational uses, and hydrological changes resulting from these and other land uses. Widespread invasion by the exotic tamarisk and giant reed along southwestern waterways has resulted in a reduction of native riparian vegetation, such as cottonwood and willow plant communities (Fish and Wildlife Service 1995a). It is estimated that 90 percent of historic riparian habitat has been lost in California due to widespread habitat destruction, and most of the remaining 10 percent is in a degraded condition (Smith 1977; Dahl 1990).

Given the limited exotic species abatement programs and the uncertain future prospects for coordinated, comprehensive eradication efforts within the Plan Area, the invasive spread of giant reed and other non-native plants pose serious threats to the function and survival of southwestern riparian habitats and the species that live therein (including the southwestern willow flycatcher). Similarly, the brown-headed cowbird, which thrives in altered landscapes including parks, agricultural lands, and other open areas, continues to pose a real or potential threat to the southwestern willow flycatcher in the Plan Area, aside from a few locations where exotic species management occurs. The direct and indirect effects of habitat fragmentation and isolation (*e.g.*, increased depredation, dispersal difficulties) are also likely to impact flycatcher populations throughout the Plan Area, including the Prado Basin.

Although the unauthorized destruction of habitat within the Plan Area has largely been curtailed; it has not ceased. From 1998-2000, lessees within the Prado Basin mowed or cleared more than three acres of suitable flycatcher riparian habitat within the Basin, adjacent to the Plan Area, as part of projects unrelated to the authorized Santa Ana River flood control and water conservation projects. Although the Prado Basin is effectively managed for a large array of riparian and wetland guild species, it is primarily operated as a flood control basin and for the purpose of water conservation. Operations and maintenance work conducted within the Basin in late 1998 resulted in the clearing of less than one acre of riparian habitat suitable for the flycatcher. During autumn 1999, approximately two acres of flycatcher habitat were destroyed or degraded in conjunction with the construction of roads on Orange County Water District property in the western portion of the Basin. Most recently, fill associated with the construction of seven ponds in the lower Basin was discharged without authorization. Staff in the Corps Operations and Regulatory branches are currently working with us to address these issues.

The Federal Highway Administration, Central Federal Lands Highway Division, together with the San Bernardino National Forest, California Department of Transportation, and the Riverside County Transportation Department propose to reconstruct and pave an 8.2-mile (13.2 kilometers) portion of California Forest Highway 224 that runs through Bautista Canyon. This is currently a dirt road with limited traffic and runs immediately adjacent to the willow riparian area where a southwestern willow flycatcher had a breeding territory in 2001. Completion of this project is expected to increase the volume and speed of traffic through Bautista Canyon adjacent to the southwestern willow flycatcher location and may result in destruction of recently occupied southwestern willow flycatcher habitat.

Cowbird parasitism of willow flycatchers is frequent, particularly in the lowland populations, and is thought to have a major impact on nesting success (Gaines 1977a). The use of cowbird control as a management tool for several populations of southwestern willow flycatchers in southern California has done little to increase numbers of breeding pairs (Sedgwick 2000).

While cowbird control may help stabilize existing populations, recovery of the species will require restoration and maintenance of riparian habitat. Though cowbird trapping and removal efforts have been responsible, at least in part, for dramatically increased numbers of the least Bell's vireo in the Prado Basin, similar results have not been demonstrated for the sympatric flycatcher. The lack of a clear cause and effect relationship between the intensity of management efforts and yearly population status of flycatchers within the Prado Basin area may reflect the low abundance of species in the Plan Area (and beyond) or, alternatively, that some other factor(s) is limiting the population. Under any circumstances, however, the cowbird trapping program within the Basin has increased the reproductive potential of flycatcher pairs therein.

Conservation Needs

Studies conducted in the Prado Basin and contiguous reaches of the Santa Ana River have produced some data regarding the reproduction and recruitment of the species within the Plan Area. The corresponding data from other locales inside the Plan Area are limited or entirely lacking. Range-wide data regarding the dispersal of the species are limited, and virtually no information is available on the dynamics of the dispersal of birds within California populations (Fish and Wildlife Service 2002c). Thus, in the absence of more definitive data, it would seem reasonable to assume (not conclude) that the conservation of the species depends on the conservation and management of the existing population center and the successful maintenance or possible enhancement of: 1) existing suitable occupied and unoccupied habitats, 2) existing or potentially restorable habitat corridors, and 3) the ecosystems in which these habitats and habitat corridors are found. Kus *et al.* (2003:18) concluded that habitat availability continues to limit populations, particularly where populations have increased and then stabilized and that management actions can only be effective in enhancing productivity if there is sufficient suitable habitat available for occupation.

The Final Recovery Plan for the southwestern willow flycatcher (Fish and Wildlife Service 2002c) requires an increase in the Santa Ana Management Unit population from 21 to 50 territories and protection from identified threats as precursors to consider before downlisting the species to threatened.

Environmental Baseline

Once common throughout its range within southern California (*e.g.*, Grinnell and Miller 1944, Garrett and Dunn 1981), the only known southwestern willow flycatcher breeding population extant within the Plan Area resides within the Prado Basin (Fish and Wildlife Service and U.S. Geological Survey, unpublished data). Surveys by the Santa Ana Watershed Association of Resource Conservation District (SAWA) biologists from 2001 to 2003 in Temescal Wash, the Santa Ana River mainstem from the Orange/Riverside County Line to Van Buren Avenue, and Mockingbird Canyon have not resulted in the detection of breeding flycatcher home ranges outside of the Basin (Hoffman 2001; Hoffman and Zembal 2002; Fish and Wildlife Service, unpublished data). Based on surveys conducted in 2001 by Chet McGaugh in Buatista Canyon, a southwestern willow flycatcher was observed on May 17, June 20, and July 2 in willow riparian habitat. It was concluded that this likely represents a southwestern willow flycatcher

territory. Recent surveys elsewhere in the Plan Area have been few and sporadic; none have resulted in the detection of a flycatcher home range (Fish and Wildlife Service and U.S. Geological Survey, unpublished data).

Because of the relatively secretive nature of the species and the lack of a comprehensive Plan Area survey effort, the status and distribution of the species within western Riverside County may not be entirely known. Although it is highly likely that no major population centers have been missed within the Plan Area, the demographics of the species would suggest that even small populations or individual breeding pairs are important components of the overall breeding population. The Prado Basin population is one of 7 known permanent southwestern willow flycatcher breeding sites existing in California. Despite 17 consecutive years of brown-headed cowbird abatement and habitat conservation and restoration efforts within the Prado Basin, the flycatcher population has not significantly increased in size and was recently close to extirpation.

Nine flycatcher males and five females were detected within the Prado Basin during the 2003 breeding season (Dharm Pellegrini, Orange County Water District, pers. comm., 2003). By comparison, although seven flycatcher home ranges were present in the Prado Basin in 2001 (Pike *et al.* 2001) and five flycatcher home ranges were detected during the 1999 breeding season, only one pair of flycatchers was detected during the 2000 breeding season (Pike and Hays 2000).

Although flycatcher home ranges have been detected throughout much of the surveyed portions of the Prado Basin during the last 17 years, successful breeding, prior to 1996, had been detected only in North Basin and West Basin (Chino Creek). However, from 1996-1998 and 2000-2001, the only successful breeding occurred in the South Basin (*e.g.*, Pike *et al.* 2001). During 2003, a total of five young fledged from flycatcher nests in the Basin (Dharm Pellegrini, Orange County Water District, pers. comm., 2003). When successful, the entire Prado Basin population typically produces a maximum of four fledged young per year (*e.g.*, Pike *et al.* 2002). The average total number of fledged young detected within the entire Prado Basin yearly from 1989 to 2000 was less than two individuals (Pike and Hays 2000).

Our dataset includes 23 other southwestern willow flycatcher point locations, reported throughout the Plan Area in 19 geographic locations. It appears that 8 out of 19 of these geographic locations occur in areas not modeled as habitat. Point locations that do fall within modeled habitat include Box Springs Mountain, San Timoteo Creek, lower Bautista Canyon, the Cleveland National Forest, Lake Skinner, Temecula Creek, the Canyon Lake area, and the Santa Ana River.

Approximately 13,049 acres of modeled southwestern willow flycatcher habitat consisting of riparian scrub/woodland/forest (excluding tamarisk scrub and mule fat) occur within the Plan Area. Approximately 7,102 acres (54 percent) of this modeled habitat occurs within PQP Lands. Because of the strict habitat requirements of the flycatcher, only subsets of the above-identified broad vegetation community types comprise suitable habitat for the species. Due to the absence of data and information pertaining to the amount of riparian habitat with: 1) appropriate species compositions, understories, canopies, and configurations; 2) sufficient nearby moist soil or running water; or 3) sufficient patch size, the amount of suitable flycatcher habitat within the

Plan Area remains unknown. Based on a recent study of the distribution, abundance, and conservation potential of the southwestern willow flycatcher, Kus *et al.* (2003:19) concluded that the riparian condition in southern California indicates that the landscape available to all riparian species is highly disturbed and the amount of available habitat is questionable. The spread of invasive plants, a variety of land use practices, and human activities have altered the condition of the majority of riparian woodlands to an extent that their current suitability for flycatchers is unknown.

Effects of the Action

Direct Effects

The Plan Area includes 13,049 acres of modeled habitat for the southwestern willow flycatcher. The flycatcher will be subject to impacts associated with development and other proposed Covered Activities over the 75-year permit term within 3,027 acres (23 percent) of this modeled habitat, which encompasses 8 of the 30 (27 percent) flycatcher point locations in our dataset. However, the eight point locations outside of the MSHCP Conservation Area are in locations not expected to provide for the long-term conservation of the flycatcher and were likely transient individuals.

Covered Activities that are anticipated to impact modeled flycatcher habitat outside the MSHCP Conservation Area include public and private development, agriculture, roadway and freeway projects and associated maintenance, flood control facilities, and future facilities necessary to support planned development such as water/wastewater facilities, electrical utility facilities, and natural gas facilities.

Although breeding territories for the flycatcher are not currently documented outside of the MSHCP Conservation Area, we expect that if the overall numbers of this bird increases in southern California or rangewide over the 75-year permit term, the Plan Area will also experience an increase in flycatcher numbers. However, an increase in flycatcher numbers could be limited by the loss of modeled habitat outside of the MSHCP Conservation Area over the long-term by reducing the number of areas suitable for use as foraging and nesting sites.

If any habitat outside of the MSHCP Conservation Area becomes occupied by breeding flycatchers, some loss of nesting and foraging habitats to Covered Activities is expected to occur over the 75-year permit term and cause the flycatcher to disperse in search of other riparian habitats and experience increased competition for the remaining suitable habitat. Birds forced to disperse may also experience decreased fitness due to increased energy and time spent locating new habitats, and they may be subjected to increased rates of predation and injury. If clearing of habitat occurs near the initiation of the breeding season, the search for and establishment of a new breeding site may result in an overall reduction in reproductive output.

To offset impacts to the flycatcher in the Plan Area, 2,920 acres (29 percent) of modeled habitat will be conserved within the Additional Reserve Lands with management prescriptions that will benefit the southwestern willow flycatcher. The Additional Reserve Lands include 4 of the 20 (13 percent) point locations in our dataset. An additional 7,102 acres (71 percent) of modeled

habitat for the southwestern willow flycatcher will remain in PQP Lands. In total, 10,022 acres (77 percent) of the modeled habitat for the southwestern willow flycatcher will be conserved or remain in the Plan Area.

The only confirmed breeding territories in the Plan Area occur within PQP Lands in the Prado Basin. Similarly, the flycatcher territory documented in Bautista Canyon is located on PQP Lands (U.S. Forest Service). All of the other 11 locations from our dataset that occur within modeled habitat are located within the MSHCP Conservation Area. The significance of the Prado Basin/Santa Ana River flycatcher population that contains the only currently known breeding pairs and the largest block of contiguous modeled habitat in the Plan Area cannot be overstated. It is identified in the Plan as a flycatcher Core Area and will remain in open space. However, other populations and areas of modeled habitat that occur throughout the Plan Area are also important for expanding the range of the flycatcher and promoting recovery of the species.

Other Core Areas that will be conserved or remain in open space, as identified in the Plan, include Temescal Wash (including Alberhill Creek), Murrieta Creek, Temecula Creek, Vail Lake, and San Timoteo Canyon (Section 9, pp. 9-81). Each Core Area will include at least 328 feet (100 meters) of undeveloped landscape adjacent to the riparian woodland and scrub habitat where it occurs within the Criteria Area. Other important areas containing modeled habitat within the MSHCP Conservation Area include the Santa Rosa Plateau Reserve, Box Springs Mountain, Lake Skinner, Lake Mathews, Lake Perris area, Sycamore Canyon Regional Park, Potrero Creek, Wilson Creek, Bautista Creek, and lower San Jacinto River. Much of this habitat likely remains unoccupied by the southwestern willow flycatcher; however, these areas represent opportunities for increasing the number of breeding locations and are necessary to ultimately maintain 10 successful breeding pairs in two of the above Core Areas and 5 successful breeding pairs in four additional Core Areas.

Linkages between the Core Areas identified above have been included, where feasible, into the MSHCP Conservation Area. The Prado Basin Core Area is linked along the Santa Ana River to San Bernardino and Orange counties and is linked to the south by the Temescal Wash to Lake Mathews and Lake Elsinore. Riparian habitat within the Vail Lake area is linked to the Lake Skinner-Diamond Valley Lake area via Tualota Creek. The Vail Lake area is also linked to the Santa Rosa Plateau and then to the Santa Margarita River by the riparian habitat in Temecula Creek and Murrieta Creek. The Badlands area may provide a linkage to Potrero Creek, Lake Perris, and the San Jacinto Wildlife Area.

We expect that these Core Areas, linkages and other flycatcher habitats within the MSHCP Conservation Area will be conserved or remain in open space and will meet the conservation objectives stated in the Plan. Provisions in the Plan that will help to ensure fulfillment of the conservation objectives for the flycatcher include protection and management of the Additional Reserve Lands, implementation of the Riparian/Riverine Areas and Vernal Pools policy, and the related Biologically Equivalent or Superior Preservation determination process, as discussed in the project description and Conservation Measures sections of this biological opinion.

We anticipate that areas within the Plan Area that are occupied by the southwestern willow flycatcher or are deemed to have long term conservation value will be avoided and conserved

(long term protection and management). This additional protection will be met through implementation of the Riparian/Riverine Areas and Vernal Pools policy as described in the “Conservation Measures” section of this biological opinion. Wetland mapping assembled as part of that policy will be reviewed as part of the project review process and if riparian scrub and/or woodland are identified on the wetland maps, focused surveys for the southwestern willow flycatcher will be conducted by a qualified biologist. If survey results are positive, 100 percent of the occupied portions of the property that provide for long-term conservation value for the southwestern willow flycatcher will be avoided and conserved (long term protection and management). This protection will include 328 feet (100 meters) of undeveloped landscape adjacent to conserved habitat. We anticipate that these areas will be considered for inclusion in the MSHCP Conservation Area.

For those areas occupied by the flycatcher that will not be included into the MSHCP Conservation Area, 100 percent avoidance and long-term protection and management will also be required unless a Biologically Equivalent or Superior Preservation Determination can demonstrate that a proposed alternative, including design features to minimize impacts and compensation measures (*e.g.*, restoration, enhancement), will provide equal or better Conservation than 100 percent avoidance of the area. The Wildlife Agencies will be notified and provided a 60-day review and response period prior to an approval of a Biologically Equivalent or Superior Preservation Determination by the Permittee. We anticipate that this evaluation process will provide for protection, restoration, enhancement or replacement of flycatcher habitats within the Plan Area and ensure that planned development outside of the MSHCP Conservation Area does not conflict with the long-term conservation value of flycatcher habitats within the MSHCP Conservation Area.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands, including surveys for the southwestern willow flycatcher. Cooperative management and monitoring are anticipated on PQP Lands, including the Corps and the Orange County Water District in the Prado Basin for the benefit of the flycatcher. Surveys for the flycatcher will be conducted at least every three years to verify the continued use of, and successful reproduction at, 75 percent of the known flycatcher Core Areas (including any nesting locations identified in the MSHCP Conservation Area in the future). If a decline in the distribution or reproductive status of the flycatcher is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP.

Other management measures listed in Section 5 of the Plan will help to reduce impacts to the southwestern willow flycatcher, such as a species-specific management plan or general management plan element that clearly identifies conservation measures to ensure that the species has sufficient habitat and is not impacted by fire, environmental contaminants, fragmentation-induced phenomena such as mesopredator release, and the direct and indirect impacts associated with cattle grazing and non-native plants and animals. Reserve managers will manage the riparian habitats within the current documented locations of the flycatcher at the Prado Basin, Santa Ana River, Temecula Creek, Vail Lake, Box Springs Mountain, Alberhill Creek, Santa Rosa Plateau Nature Reserve, Lake Skinner, Bautista Creek, and Potrero Creek. Reserve managers will maintain or improve the potential flycatcher habitat (including potential Core and

satellite areas and habitat linkages) in and along Temescal Wash, Wasson Canyon, Murrieta Creek, Wilson Valley, Bautista Creek, Tocalota Creek, and San Timoteo Canyon. Management emphasis will be given to maintaining or improving hydrological processes within the drainages that support the potential habitat and by selectively restoring, rehabilitating or revegetating all such areas that are currently fragmented or otherwise degraded (*e.g.*, exotic plants and animals). Reserve managers will also manage this species for cowbird parasitism. Reserve managers will buffer known and future nest sites from disturbance within a 328-foot (100-meter) buffer (Section 5, Table 5.2). It is anticipated that any impacts to flycatcher habitat from management actions will be minimized by adherence to appropriate survey protocols and other guidelines described in Section 7.4 of the Plan.

Indirect Effects

The southwestern willow flycatcher could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These impacts include the indirect effects described in the “General Effects” section of this biological opinion. In particular, maintaining the hydrological processes and water quality standards (*e.g.*, controlling sedimentation and other pollutants) of wetland habitats will be important to sustaining the flycatcher in the MSHCP Conservation Area. Implementation of the Riparian/Riverine Area and Vernal Pools policy and the Urban/Wildlands Interface policy will help minimize the indirect effects of the Covered Activities on foraging and breeding habitat for the flycatcher.

Many of the flycatcher Core Areas identified above are bisected by roadways. Road widening is proposed for several of these roads as described in Section 7.3.5 in the MSHCP. Existing and proposed roads and road widening projects contribute to habitat fragmentation. The detrimental effects of fragmentation are described in the “General Effects” section above. The guidelines and recommendations described in Section 7 of the MSHCP and the “Measures to Reduce Effects of Fragmentation” above will help minimize the impact of road construction on habitat connectivity.

Section 7.4 identifies allowable uses within the MSHCP Conservation Area. These uses include emergency repairs and police services and public access activities and associated infrastructures, such as trails and kiosks. Typically, riparian areas are attractive locations for siting trails and public access for equestrians, mountain bikers, and hikers. Similarly, riparian areas often become the only remaining wildlife corridor through urban areas and may require the construction of a wildlife crossing at roads and other barriers. However, the guidelines (Section 7) for the siting and design of trails, facilities, and construction are anticipated to greatly minimize any of the potential impacts discussed in the generalized effects section above.

An annual loss of 85 acres of habitat desirable for inclusion into the Additional Reserve System is projected in the Plan due to development of single family homes. We expect that the location of most homes will typically be out of flycatcher modeled habitat areas because of flooding concerns; however, access roads to these homes may contribute to fragmentation and edge effects. The guidelines and recommendations described in Section 7 of the MSHCP and the measures to reduce effects of fragmentation above will help minimize the impact of road construction on habitat connectivity.

Conclusion

We anticipate the proposed action will affect the southwestern willow flycatcher as described in the analyses above, including the loss of up to 23 percent of the modeled habitat for this species in the Plan Area. Implementation of the avoidance, minimization, and mitigation measures identified in the Plan will reduce the impacts to this species. In particular, we expect impacts from Covered Activities to be greatly minimized with implementation of the Riparian/Riverine Areas and Vernal Pools policy (*i.e.*, we anticipate no loss of occupied flycatcher habitats or areas otherwise determined to have long-term conservation value for the species).

We expect the flycatcher population in the Prado Basin and other important habitat areas mentioned above will persist and that the conservation objectives for the flycatcher as stated in the Plan will be met for the remaining 77 percent of the modeled habitat within both the existing PQP Lands and the Additional Reserve Lands. Together these lands form a system of large habitat blocks that are interconnected within the Plan Area. We anticipate that these areas will be monitored and managed cooperatively to benefit this species.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the southwestern willow flycatcher. We reached this conclusion based on the low level of impact anticipated to individuals of this species and because the impacts associated with loss of this species' modeled habitat, when viewed in conjunction with the protection and management of the MSHCP Conservation Area, are not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Amount or Extent of Take

The loss of up to 3,027 acres of foraging habitat for the southwestern willow flycatcher in the Plan Area is not likely to result in direct mortality of adult birds; however, for some individuals, reproduction may be impaired or life expectancy shortened. Because of the large area covered, and because the occupation of modeled habitat by flycatchers is expected to fluctuate, it will be difficult to quantify the number of birds impacted over the 75-year permit term. Therefore, the Service is quantifying the take as the number of acres of modeled foraging habitat that will be impacted in the Plan Area as a result of the proposed action. We anticipate that up to 3,027 acres of modeled foraging habitat within the Plan Area will become unsuitable for the southwestern willow flycatcher as a result of the proposed action. With implementation of the Riparian/Riverine Areas and Vernal Pools policy, we anticipate that zero (0) southwestern willow flycatcher breeding territories will be taken as a result of the proposed action.

Take will be in the form of harm and injury. This level of take is not likely to result in jeopardy to the southwestern willow flycatcher.

Western Yellow-Billed Cuckoo (*Coccyzus americanus occidentalis*)Status of the species*Listing Status*

The western yellow-billed cuckoo is a candidate species for listing under the Federal Endangered Species Act (66 Federal Register 38611). The species is a Fish and Wildlife Service migratory non-game bird of management concern and is listed on the Federal Birds of Conservation Concern (2002). It was state listed as endangered in California on March 26, 1988.

Species Description

The western yellow-billed cuckoo is a slender, long-tailed bird, 26 to 30 cm in length. The head and upperparts are grayish brown, the underparts are dull white and the tail is grayish brown above and black below. The bill is moderately long, curved and hooked at the tip with a black upper mandible and yellow to orange yellow lower mandible. Females are slightly larger than males but with similar plumage. Juveniles have wing-coverts tinged with cinnamon brown and less distinct undertail pattern than adults (Hughes 1999).

Habitat Affinities

Yellow-billed cuckoos as a whole may nest in a variety of habitats including open woodland, parks, and riparian woodland (AOU 1998). By contrast, the western yellow-billed cuckoo in California requires dense, wide riparian woodlands with well-developed understories for breeding (Garrett and Dunn 1981). It occurs in densely foliated, deciduous trees and shrubs, especially willows which are required for roost and nest sites. It is restricted when breeding to river bottoms and other mesic habitats where humidity is high and where the dense understory abuts slow-moving watercourses, backwaters or seeps (Zeiner *et al.* 1990a). Willow is almost always a dominant component of the vegetation. In arid regions individuals are restricted to river bottoms, ponds, swampy areas and damp thickets with nesting occurring in willow, cottonwood and mesquite (Hughes 1999). Within the Sacramento Valley, it also utilizes adjacent orchards, especially walnut. Along the Colorado River, it may inhabit mesquite thickets where willow is absent (Fish and Wildlife Service 2001d).

The nest is a flimsy, open cup of twigs built on a horizontal limb of a tree or shrub at the height of 0.6 to 7.8 meters (2-25 feet). The western yellow-billed cuckoo shows a preference for nesting on east facing branches and has a very strong preference for placing the nest in a willow tree within riparian habitats (Amundson *et al.* 2000).

In a Central Valley location western yellow-billed cuckoos forage predominantly in riparian vegetation (55 percent), one third of the time in white alder, and 12 percent of the time in orchards. During the breeding season, the foraging areas of nesting pairs may overlap. The mean size of foraging areas is 19.6 hectares of which 10 hectares is usable habitat for foraging (Hughes 1999).

Life History

Nesting peaks later than in most other riparian species (mid-June through August) and may be triggered by an abundance of the cicadas, katydids, caterpillars, or other large prey which form the bulk of the diet (Fish and Wildlife Service 2001d). In California, most eggs are laid in mid-June to mid-July. The western yellow-billed cuckoo uses a distraction display to draw potential predators away from the nest (Laymon 1998). They are loosely territorial in that they do not defend a territory but given uniform habitat they are regularly spaced through the landscape (Laymon 1998).

The clutch size is variable, but usually it is 2 or 3 and development of the young is very rapid (Fish and Wildlife Service 2001d). The species is monogamous. Incubation lasts 11-12 days with a breeding cycle of 17 days from egg-laying to fledging of young (Preble 1957; Fish and Wildlife Service 2001d; Laymon 1998). Western populations are thought to be single-brooded (Hughes 1999). Both parents incubate eggs and care for the altricial young and occasionally non-parents tend nests as well (Hughes 1999). The young may leave the nest at 6-9 days in a helpless condition (Bent 1940; Hamilton and Hamilton 1965; Preble 1957) and are tended by their parents for at least two weeks after fledging (Laymon 1998). The young and adults depart from the breeding grounds beginning in late August. The species is a long distance migrant, migrating predominantly at night (Hughes 1999).

The mean number of surviving young per nest is 1.5 (Hughes 1999). Red-shouldered hawks and northern harriers have been observed preying on nestlings. Western yellow-billed cuckoos are capable of double and even triple brooding under good conditions so the average number of young can be much higher; however double and triple brooding is very rare (Laymon 1998).

Status and Distribution

The yellow-billed cuckoo species, as a whole, summers and nests from interior California east to New Brunswick sporadically southward to southern Mexico. The species presumably migrates throughout much of North America and winters primarily from northern to central South America (AOU 1998).

The northern limit of breeding of the western yellow-billed cuckoo in the coastal states is now in Sacramento Valley, California, and the northern limit of breeding in the western interior states is southern Idaho (Fish and Wildlife Service 2001d). It is an uncommon to rare summer resident of valley foothill and desert riparian habitats in scattered locations in California (Zeiner *et al.* 1990a). Along the Colorado River, the breeding population on the California side is estimated at 180 pairs (Gaines 1977b). Perhaps 100 or fewer additional pairs reside in the Sacramento and Owens valleys; along the South Fork of the Kern River, Kern County; along the Santa Ana River, Riverside County; and along the Amargosa River, Inyo and San Bernardino counties. Also it may nest along the San Luis Rey River, San Diego County.

The western yellow-billed cuckoo was formerly much more common and widespread throughout lowland California, but the numbers are drastically reduced by habitat loss (Grinnell and Miller 1944; Gaines 1974a; Garrett and Dunn 1981). The historic breeding range in California

extended northwest from San Diego County along the coast through San Francisco Bay to Sonoma County, San Joaquin and Sacramento valleys, from Kern County to Shasta County, and many outlying sites in Siskiyou, Inyo, and San Bernardino counties (Hanna 1937; Hughes 1999).

Threats

Numbers in California and other western areas have declined markedly in recent decades with destruction of riparian habitats (Laymon and Halterman 1987). The principal causes of riparian habitat losses are conversion to agriculture and other uses, dams and river flow management, stream channelization and stabilization, and livestock grazing. Available breeding habitats for the western yellow-billed cuckoo have also been substantially reduced in area and quality by groundwater pumping and the replacement of native riparian habitats by invasive non-native plants including tamarisk and giant reed (*Arundo donax*). A detailed analysis of the effects of tamarisk was prepared for the 12-month Finding for a Petition to List by the Fish and Wildlife Service (2001d). Tamarisk is not as great of an exotic pest in the Plan Area as it is in other areas. Of greater concern is the exotic plant giant reed which does occur within the Plan Area in large quantities. This plant species may cause similar degradation to riparian habitat as tamarisk resulting in low species diversity and low structure diversity.

Fragmentation of riparian habitat also reduces the quality of the habitat for the western yellow-billed cuckoo. Fragmentation results in the loss of patches large enough to sustain local populations, leading to local extinctions and the potential loss of migratory corridors which may affect the ability of the species to recolonize the habitat patches (Fish and Wildlife Service 2001d). Habitat fragmentation in California has been shown to exclude individuals where patch size is less than 100 by 300 meters (Hughes 1999).

Overuse of riparian habitat by livestock has been a factor in the degradation and modification of riparian habitats in the western United states. The effects include changes in plant community structure and species composition as well as the relative abundance of species and plant density. In addition, in areas where riparian habitat borders agricultural lands, pesticide use may affect western yellow-billed cuckoos indirectly by reducing prey numbers or directly by poisoning nestlings if sprayed in areas where the birds are nesting (Fish and Wildlife Service 2001d).

Conservation Needs

The conservation and recovery of the western yellow-billed cuckoo within the Plan Area would benefit from the preservation and expansion of unfragmented large habitat tracts, the elimination of invasive exotic plants within the Santa Ana River and Santa Margarita River watersheds, and active management of any and all current or future population centers and associated habitats. Management programs should include measures to provide undisturbed nesting areas that are hydrologically stable and of optimum size and composition (see, in particular, Laymon and Halterman 1987).

Environmental Baseline

Because of the relatively secretive nature of the species and the lack of a comprehensive survey effort of potential nesting habitat, the recent status and distribution of the species within western Riverside County is not definitively known. Geographic locations recorded within the U. C. Riverside database include: the Santa Ana River, Prado Park, Poorman Reservoir, North Peak Conservation Bank, and Temecula Creek. The latter two records are not recent, and breeding was not confirmed at the Poorman Reservoir locale.

The only known recent records of the species within the Plan Area away from Poorman Reservoir were from the Prado Basin and adjacent areas along Chino Creek (Fish and Wildlife Service 2001d). The three detections in 2001 occurred at a location near Mill Creek within the Prado Basin, a location to the north of there along Chino Creek, and at El Prado Golf Course, where a male was observed with a female (Pike *et al.* 2001).

However, western yellow-billed cuckoos were not detected during extensive 2002 and 2003 surveys within the Prado Basin and adjacent Chino Creek (Pat Tennant and Dharm Pellegrini, Orange County Water District, pers. comm., July 29, 2003; L. R. Hays, U.S. Fish and Wildlife Service, pers. obs.). This species was detected within the basin from 1986 through 2001, and breeding was repeatedly confirmed during that period of time (Pike *et al.* 2001). Although there are no confirmed current locations for western yellow-billed cuckoos within western Riverside County, the Plan Area could be potentially quite important to the species given evidence of recent breeding therein and the extremely limited occurrences of the western yellow-billed cuckoo throughout the species' range.

We created a breeding habitat model that focused exclusively on southern cottonwood/willow riparian in the Riverside Lowlands, Santa Ana Mountains, and San Jacinto Foothills bioregions. We also excluded habitat patches that were less than 15 hectares. Based on this analysis the Plan Area supports approximately 4,613 acres of modeled breeding habitat for the western yellow-billed cuckoo. Approximately 4,250 acres (92 percent) of this modeled habitat occurs within PQP Lands. All of the known or suspected breeding locations occur on PQP Lands.

Effects of the Action

Direct Effects

Our dataset identifies 4,613 acres of modeled habitat and five detection locations for the western yellow-billed cuckoo in the Plan Area. Of these totals, approximately 77 acres (2 percent) of modeled habitat and one point location occur outside the MSHCP Conservation Area.

Potential western yellow-billed cuckoo habitat outside the MSHCP Conservation Area will be subject to impacts from Covered Activities. Project-related activities that could potentially impact western yellow-billed cuckoo habitat outside the MSHCP Conservation Area include public and private development, agriculture, roadway and freeway projects and associated maintenance, flood control facilities, and future facilities necessary to support planned

development such as water/wastewater facilities, electrical utility facilities, and natural gas facilities.

Breeding territories for the cuckoo are not currently documented outside of the MSHCP Conservation Area; however, if overall numbers of this bird increase in southern California or rangewide over the 75-year permit term, we expect the Plan Area will also experience an increase in cuckoo numbers. An increase in cuckoo numbers in the Plan Area could be affected by the loss of modeled habitat outside of the MSHCP Conservation Area over the long-term. However, only 77 acres (2 percent) of this modeled habitat is outside the MSHCP Conservation Area, and this habitat is likely spread out in several separate patches along the Santa Ana River. Thus, the impact of this habitat loss to overall cuckoo reproduction and distribution in the Plan Area is likely minimal.

To offset potential impacts to the cuckoo in the Plan Area, 4,250 acres (92 percent) of cuckoo modeled habitat will remain within PQP Lands. An additional 287 acres (6 percent) of modeled habitat will be conserved in Additional Reserve Lands with management prescriptions that will benefit the cuckoo. In total, 4,537 acres (98 percent) of the modeled habitat will be conserved or remain in the Plan Area.

The only confirmed breeding territories in the Plan Area occur within PQP Lands in the Prado Basin. The Prado Basin/Santa Ana River is the largest block of contiguous modeled habitat in the Plan Area for cuckoo, and it is identified in the Plan as a cuckoo Core Area. However, other areas of modeled habitat that occur throughout the Plan Area are also important for expanding the range of the cuckoo and promoting recovery of the species.

Other Core Areas that will be conserved or remain in open space, as identified in the Plan, include Temescal Wash (including Alberhill Creek), Murrieta Creek, Temecula Creek, and San Timoteo Canyon. Each Core Area will include at least 328 feet (100 meters) of undeveloped landscape adjacent to the riparian woodland and scrub habitat and contain unfragmented habitat and landscape linkages to other Core Areas. According to the species-specific objectives of the Plan, these Core Areas must support a population of 20 western yellow-billed cuckoo pairs combined total.

Other important areas identified in the Plan in the MSCHP Conservation Area for providing linkages and additional potential breeding habitat include North Peak Conservation Bank, Poorman Reservoir, Lake Skinner, Wasson Canyon, Murieta Creek, Temecula Creek, Vail Lake, Wilson Valley, Bautista Creek, Potrero Creek, and Tualota Creek. Much of this habitat likely remains unoccupied by the western yellow billed cuckoo; however, these areas represent opportunities for increasing the number of breeding and/or foraging locations.

We anticipate that areas within the Plan Area that are occupied by the cuckoo or are deemed to have long-term conservation value will be avoided and protected. This additional protection will be met through implementation of the Riparian/Riverine Areas and Vernal Pools policy as described in the Conservation Measures section of this biological opinion. Wetland mapping assembled as part of that policy will be reviewed as part of the project review process and if riparian scrub and/or woodland are identified on the wetland maps, focused surveys for the

cuckoo will be conducted by a qualified biologist. If survey results are positive, 100 percent of the occupied portions of the property that provide for long-term conservation value for the cuckoo will be avoided and protected (long term protection and management). This protection will include 328 feet (100 meters) of undeveloped landscape adjacent to conserved habitat. We anticipate that these areas will be considered for inclusion in the MSHCP Conservation Area.

For those areas occupied by the cuckoo or are otherwise determined to provide long term conservation value for the cuckoo that have not been identified by the Plan for inclusion into the MSHCP Conservation Area, 100 percent avoidance and long-term management will be required unless a Biologically Equivalent or Superior Preservation Determination can demonstrate that a proposed alternative, including design features to minimize impacts and compensation measures (*e.g.*, restoration, enhancement), will provide equal or better Conservation than 100 percent avoidance of the area. The Wildlife Agencies will be notified and provided a 60-day review and response period prior to an approval of a Biologically Equivalent or Superior Preservation Determination by the Permittee. We anticipate that this evaluation process will provide for protection, restoration, enhancement or replacement of cuckoo habitats within the Plan Area and ensure that planned development outside of the MSHCP Conservation Area does not conflict with the long-term conservation value of cuckoo habitats within the MSHCP Conservation Area.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands, including surveys for the cuckoo. Cooperative management and monitoring are anticipated on PQP Lands, including the lands owned by the Corps of Engineers and the Orange County Water District in the Prado Basin. Surveys for the cuckoo will be conducted at least every three years to verify the continued use of, and successful reproduction at, 75 percent of the known occupied cuckoo Core Areas (including any nesting locations identified in the MSHCP Conservation Area in the future). If a decline in the distribution or reproductive status of the cuckoo is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP.

Other management measures listed in Section 5 of the Plan will help to reduce impacts to the cuckoo, such as a species-specific management plan or general management plan element that clearly identifies conservation measures to ensure that the species has sufficient habitat and is not impacted by fire, environmental contaminants, fragmentation-induced phenomena such as mesopredator release, and the direct and indirect impacts associated with cattle grazing and non-native plants and animals. Each Reserve Manager responsible for a Core Area as identified in the Species Account will evaluate the condition of the riparian vegetation within the Core Area and maintain a program to enhance and/or create riparian habitat within the Core Area. The maintenance or improvement of habitat at all locales will be accomplished by preserving the hydrological processes within the drainages that support the potential habitat and by selectively enhancing, rehabilitating or revegetating all such areas that are currently fragmented or otherwise degraded by, for instance, infestations of exotic plants and animals. It is anticipated that any impacts to cuckoo habitat from management actions will be minimized by adherence to appropriate survey protocols and other guidelines described in Section 7.4 of the Plan.

Indirect Effects

The western yellow-billed cuckoo could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These impacts include the indirect effects described in the “General Effects” section of this biological opinion. In particular, maintaining the hydrological processes and water quality standards (*e.g.*, controlling sedimentation and other pollutants) of wetland habitats will be important to sustaining the cuckoo in the MSHCP Conservation Area. Implementation of the Riparian/Riverine Area and Vernal Pools policy and the Urban/Wildlands Interface policy will help minimize the indirect effects of the Covered Activities on foraging and breeding habitat for the cuckoo.

Many of the western yellow-billed cuckoo Core Areas identified above are bisected by roadways. Road widening is proposed for several of these roads as described in Section 7.3.5 of the Plan. Existing and proposed roads and road widening projects contribute to habitat fragmentation. The detrimental effects of fragmentation are described in the “General Effects” section of this biological opinion. The guidelines and recommendations described in Section 7.5.1 of the Plan will help minimize the impact of road construction on habitat connectivity.

The western yellow-billed cuckoo may also be indirectly affected by allowable use, project-related activities within MSHCP Conservation Areas as described in Section 7.4 of the Plan. Allowable uses include emergency repairs and police services and public access activities, including associated infrastructure such as trails and kiosks. Typically, riparian areas are attractive locations for siting trails and public access for equestrians, mountain bikers and hikers. Similarly, riparian areas often become the only remaining wildlife corridor through urban areas and may require the construction of a wildlife crossing at roads and other barriers. Nevertheless, the guidelines found in Section 7 of the Plan for determining the locations and construction designs of trails and facilities should minimize any of the potential impacts discussed in the “General Effects” section of this biological opinion.

Conclusion

We anticipate the proposed action will affect the western yellow billed-cuckoo as described in the analyses above, including the loss of up to 2 percent of the modeled habitat for this species in the Plan Area. Implementation of the avoidance, minimization, and mitigation measures identified in the Plan will reduce the impacts to this species. In particular, we expect impacts from Covered Activities to be greatly minimized with implementation of the Riparian/Riverine Areas and Vernal Pools policy (*i.e.*, we anticipate no loss of occupied cuckoo habitats or areas otherwise determined to have long-term conservation value for the species).

We expect the cuckoo population in the Prado Basin and other important habitat areas mentioned above will be managed to promote breeding of this species and that the conservation objectives for the cuckoo as stated in the Plan will be met for the remaining 98 percent of the modeled habitat within both the existing PQP Lands and the Additional Reserve Lands. Together these lands form a system of large habitat blocks that are interconnected within the Plan Area. We anticipate that these areas will be monitored and managed cooperatively to benefit this species.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the western yellow-billed cuckoo. We reached this conclusion because the limited area of habitat loss and overall impact to the species is not anticipated to result in any direct take of western-yellow-billed cuckoo. Thus, the impacts to this species and its modeled habitat, when viewed in conjunction with the protection and management of the MSHCP Conservation Area, are not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Amount or Extent of Take

The loss of up to 77 acres of foraging habitat for the western yellow billed cuckoo in the Plan Area is not likely to result in direct mortality of adult birds. Because of the large area covered, and because occupation of modeled habitat by cuckoos is expected to fluctuate, it will be difficult to quantify the number of birds impacted over the 75-year permit term. Therefore, the Service is quantifying incidental take as the number of acres of modeled foraging habitat that will be impacted in the Plan Area as a result of the proposed action.

Therefore, we anticipate that up to 77 acres of foraging habitat within the Plan Area will become unsuitable for the western yellow-billed cuckoo as a result of the proposed action. With implementation of the Riparian/Riverine Areas and Vernal Pools policy, we anticipate that zero (0) western yellow billed cuckoo breeding territories will be taken as a result of the proposed action. This level of take is not likely to result in jeopardy to the western yellow billed cuckoo.

CRUSTACEANS

Riverside fairy shrimp (*Streptocephalus woottoni*)

Status of the Species

Listing Status

The Fish and Wildlife Service listed the Riverside fairy shrimp (*Streptocephalus woottoni*) as endangered on August 3, 1993 (58 FR: 41391). A vernal pool recovery plan which includes Riverside fairy shrimp was published in September 1998 (Fish and Wildlife Service 1998b). Critical habitat was designated for the species on May 30, 2001 (66 Federal Register 29384); however, this designation was vacated on October 30, 2002, by order of the Federal District Court for the District of Columbia.

Species Description

The Riverside fairy shrimp is a small freshwater crustacean in the Family *Streptocephalidae* of the Order *Anostraca*. The species was first collected in 1979 by Dr. Clyde Erickson and formally described as a new species in 1990 (Eng *et al.* 1990). The Riverside fairy shrimp is distinguished from similar species by its red-colored cercopods (anterior appendages), which

occur on all of the ninth and 30 to 40 percent of the eighth abdominal segments (Eng *et al.* 1990). Adult fairy shrimp may grow to a length of 13 to 25 millimeters (0.5 to 1.0 inches) (Eng *et al.* 1990). Like other fairy shrimps, Riverside fairy shrimp swim upside down throughout their life cycle.

Habitat Affinities

Fairy shrimp are restricted to vernal pools and vernal pool-like ephemeral basins. Vernal pools are a type of ephemeral wetland that occur from southern Oregon through California into northern Baja California, Mexico (Fish and Wildlife Service 1998b). They require a unique combination of climatic, topographic, geologic, and evolutionary factors for their formation and persistence. They form in regions with Mediterranean climates where shallow depressions fill with water during fall and winter rains and then dry up when the water evaporates in the spring (Collie and Lathrop 1976; Holland 1976; Holland and Jain 1977, 1988; Thorne 1984).

Downward percolation of water within the pools is prevented by the presence of an impervious subsurface layer consisting of claypan, hardpan, or volcanic stratum (Holland 1976, 1988). Seasonal inundation makes vernal pools too wet for adjacent upland plant species adapted to drier soil conditions, while rapid drying during late spring makes pool basins unsuitable for typical marsh or aquatic species that require a more permanent source of water. Upland vegetation communities associated with vernal pools include needlegrass grassland, annual grassland, coastal sage scrub, maritime succulent scrub and chaparral (Fish and Wildlife Service 1998b).

Riverside fairy shrimp prefer deep (greater than 25 centimeters in depth) vernal pools that range in temperature from 10° to 25° Celsius and remain filled for extended periods of time (Eng *et al.* 1990; Eriksen and Belk 1999, Fish and Wildlife Service 1993a). Water within pools supporting fairy shrimp may be clear, but more commonly it is moderately turbid (Eriksen and Belk 1999). Typically, pools supporting this species have low total dissolved solids and alkalinity (means of 77 and 65 parts per million, respectively), in association with pH at neutral or just below (7.1-6.4) (Eng *et al.* 1990; Gonzalez *et al.* 1996; Eriksen and Belk 1999). Riverside fairy shrimp may also be found in disturbed vernal pool habitats where basins have been compacted or artificially deepened and therefore hold water for longer periods of time. Although basins supporting populations often appear to be artificially created or enhanced, such basins are located within soils that are capable of seasonal ponding and are often surrounded by naturally occurring vernal pool complexes. These “artificial basins” function in the same manner as naturally occurring vernal pools by filling with late fall, winter and/or spring rains that gradually dry up during the spring and/or summer (Fish and Wildlife Service 1998b).

Life History

Riverside fairy shrimp are non-selective filter-feeders that filter suspended solids from the water column (Eriksen and Belk 1999). Detritus, bacteria, algal cells, and other items between 0.3 to 100 microns may be filtered and ingested (Eriksen and Belk 1999). Riverside fairy shrimp are preyed upon by a wide variety of wildlife, including beetles, dragonfly larvae, other arthropods,

frogs, salamanders, toad tadpoles, shorebirds, ducks and other migratory birds, and even other fairy shrimp.

Freshwater crustaceans, including the Riverside fairy shrimp, have a two-stage life cycle and spend the majority of their life cycle in the cyst stage (Templeton and Levin 1979, Schaal and Leverich 1981, Herzig 1985, Hairston and De Stasio 1988, Venable 1989). After hatching, Riverside fairy shrimp require 48 to 56 days to reach sexual maturity in contrast with other fairy shrimp that can reach maturity in less than 2 weeks (Hathaway and Simovich 1996). Fairy shrimp mate upon reaching maturity, and female Riverside fairy shrimp produce between 17 and 427 cysts (eggs) over their lifetime (Simovich and Hathaway 1997). The cysts are either dropped by the females to settle into the mud at the bottom of the pool, or they remain in the brood sac until the female dies and sinks to the bottom (Eriksen and Belk 1999). Fairy shrimp cysts may persist in the soil for several years until conditions are favorable for successful reproduction (U.S. Fish and Wildlife 2001e). The cysts will hatch in 7 to 12 days when water temperatures are between 10 and 20 degrees Celsius (Hathaway and Simovich 1996). Not all cysts are likely to hatch in a season, thus providing a mechanism for survival if the inundation period is too short in a given year (Simovich and Hathaway 1997).

Status and Distribution

Prior to the discovery of the Santa Rosa Plateau fairy shrimp, the Riverside fairy shrimp was believed to have the most restricted distribution of an endemic California fairy shrimp (Eng *et al.* 1990; Simovich and Fugate 1992). Its limited range includes Ventura, Los Angeles, Orange, San Diego, and Riverside counties in southern California, and Bajamar in Baja California, Mexico (Fish and Wildlife Service 1998b; Brown *et al.* 1993). With the exception of the Riverside populations and the population at Cruzan Mesa in Los Angeles County, all populations are within 10 miles of the coast over a north-south distance of approximately 125 miles.

In Ventura County, Riverside fairy shrimp are known from a single large pool in a grassland area at Carlsberg Ranch. Recent urban development adjacent to this pool appears to have affected the pool's hydrology (Rick Ferris, Fish and Wildlife Service, pers. comm. to J. Snapp-Cook, Fish and Wildlife Service, October 20, 2003).

In Los Angeles County, the species occurs at two locations: the Los Angeles International Airport and Cruzan Mesa. Habitat at the Los Angeles International Airport has been heavily affected by regular scraping and draining of ponding areas; however, Riverside fairy shrimp cysts persist in the soil. Proposed changes to the airport may preclude the on-site restoration of occupied Riverside fairy shrimp habitat (U.S. Federal Aviation Administration *et al.* 2003). At Cruzan Mesa, upland vegetation associated with the two occupied pools has recently been removed, which may result in siltation of the pools (Rick Ferris, Fish and Wildlife Service, pers. comm. to J. Snapp-Cook, Fish and Wildlife Service, October 20, 2003).

Riverside fairy shrimp are present in vernal pools in Orange County at the former El Toro Marine Corps Air Station, Saddleback Meadows, Tijeras Creek, Chiquita Ridge, and Radio Tower Road. The Orange County populations of the species occur primarily within pools formed by depressions in slumping earth or impounded ephemeral streams (Riefner and Pryor

1996; NCCP/SAMP Working Group 2003). Many of these pools have been affected by grazing and urban development (Fish and Wildlife Service 2001f).

In northern San Diego County the species has been observed within a single slump pool (Michael Brandman Associates 1998). In north coastal San Diego County the Riverside fairy shrimp occurs in vernal pools on Marine Corps Base Camp Pendleton and in a pool in the City of Carlsbad (Recon 2001). The pools on Marine Corps Base Camp Pendleton are affected by training exercises; the pool in Carlsbad is conserved but is surrounded by urban development. In central San Diego County there is a single occupied pool on Marine Corps Air Station Miramar that was burned during the 2003 wildfires. In southern San Diego County the species occurs in pools on Otay Mesa near the U.S./Mexico border. There has been significant work done to restore and enhance vernal pools for listed species including the Riverside fairy shrimp at two sites on Otay Mesa. Some occupied pools on Otay Mesa are threatened by off-road vehicle activity and urban development (The Environmental Trust 2003).

In Riverside County there are seven naturally occurring populations, one population in created pools, and one population proposed to be relocated into created pools, all of which are located within the Plan Area. These populations are discussed in detail in the environmental baseline. The pools in Riverside County are significant since they represent the most inland extent of the species range (Eriksen and Belk 1999). Also, the type locality for the species, which is of taxonomic significance, was located within the County (Eriksen 1988). Habitat within Riverside County is ideal for the species. The County harbors large vernal pools with relatively warm water that persist for long periods of time, allowing this slow-maturing species to reproduce. One of these pools, the Skunk Hollow Pool, is the largest valley vernal pool remaining in all of southern California (Eriksen and Belk 1999).

Threats

Threats to the Riverside fairy shrimp can be divided into three major categories: 1) direct destruction of vernal pools as a result of construction, vehicle traffic, domestic animal grazing, dumping, and deep plowing; 2) indirect threats which degrade or destroy vernal pools over time such as alteration of hydrology (*e.g.*, damming, draining), invasion of alien species, habitat fragmentation, and deleterious effects resulting from adjoining urban land uses; and 3) long-term threats including the effect of isolation on genetic diversity and locally-adapted genotypes, air and water pollution, drastic climatic variations, and changes in nutrient availability (Bauder 1986, Fish and Wildlife Service 1993a).

Conservation Needs

Conservation efforts for the Riverside fairy shrimp should address habitat loss and degradation resulting from both direct and indirect impacts to vernal pools, which are the major causes of decline for the species. Existing vernal pools and their watersheds should be secured from further loss and degradation in a configuration that maintains habitat function and species viability (Fish and Wildlife Service 1998b).

Environmental Baseline

Within the Plan Area the Riverside fairy shrimp has been recently documented in several locations. The species has been observed in the Skunk Hollow Pool, a 33-acre vernal pool at the Barry Jones Wetland Mitigation Bank (Eriksen 1988). In 1998, Riverside fairy shrimp were observed in the Australia Pool, a 0.937-acre pool located in the Lake Elsinore back basin (Jones 1998). The species has also been observed in the Schleuniger Pool, a 0.27-acre pool located just north of La Estrella Road (Hayworth 1998).

There are several recent records for Riverside fairy shrimp cysts within the Plan Area. Riverside fairy shrimp cysts were collected from two pools on March Air Reserve Base during dry season surveys conducted in 1998. No shrimp were observed during the 1998 wet season surveys in these pools. One pool (110 x 11 feet) is located within a drainage swale, and the other pool (362 by 280 feet) is currently being used as an athletic field and is mowed regularly (Patterson and Ayers 1998). Riverside fairy shrimp cysts were also collected from the Scott Pool, a 0.36-acre vernal pool located just northeast of the intersection of Scott Road and Menifee Road during dry season surveys conducted in 2002 (Helix Environmental Planning, Inc. 2002).

Several records for Riverside fairy shrimp have not been recently confirmed. There is a 1988 record from the Field Pool, a small pool located in a plowed field approximately 0.25 mile southeast of the Skunk Hollow Pool (Eriksen 1988). There is also a 1988 record from the Pechanga Pool, a pool located partially on private land and partially on the Pechanga Indian Reservation. Records from 1990 from the Banning Complex have not been recently confirmed (Michael Brandman Associates 2002).

Two records for the Riverside fairy shrimp that are mentioned in the Plan and elsewhere appear to be incorrect. The Plan cites the vacated Final Rule designating critical habitat for the Riverside fairy shrimp in stating that there are Riverside fairy shrimp on the Santa Rosa Plateau. The vacated Final Rule designating critical habitat also states that the Santa Rosa Plateau (along with Murrieta) represents the eastern limit of occupied Riverside fairy shrimp habitat (66 Federal Register 29389). However, after further investigation of our data sources, we have concluded that we have no positive survey records for Riverside fairy shrimp at the Santa Rosa Plateau. The Plan also includes a record for Riverside fairy shrimp at Alberhill. The source data for this record cites a document titled Vesting Tentative Tract 27346, December 29, 1992, and states that the survey biologist was Thomas Leslie. However, this locality from the UC Riverside dataset is apparently mapped incorrectly since Tentative Tract 27346 is located at the corner of Hunter Road and Winchester Road, near the type locality for the species, which is approximately 20 miles from Alberhill (T. Leslie, pers. comm. to S. Brown, Fish and Wildlife Service, July 31, 2003). Wet season fairy shrimp surveys have been conducted in three pools at Alberhill, and no fairy shrimp were observed in the pools (Glenn Lukos Associates 2000a). Since full protocol fairy shrimp surveys have not been completed at the Santa Rosa Plateau or Alberhill, more investigation is needed to determine whether the species occurs at these locations.

There is documentation of actions affecting the species within the Plan Area. The type locality for the species, located west of State Highway 79 and 3.2 miles north of Interstate 15 in Rancho California, was lost to a housing development in the early 1990s (Eriksen 1988; Eriksen and

Belk 1999; 58 Federal Register 41384). The Pechanga Pool has been subject to cultivation (Eriksen 1988). A second pool occupied by the species located on the Pechanga Indian Reservation was converted into a gravel pit in the early 1990s (Eriksen 1988; Eriksen and Belk 1999; 58 Federal Register 41388). The Scott Pool has recently been heavily impacted by discing, several pipeline projects, and the installation of a telephone pole. This pool also is located within the proposed project footprint for the Scott Road Improvement Project (Amec Earth and Environmental, Inc. 2002).

The Skunk Hollow population of Riverside fairy shrimp is conserved within the Barry Jones Wetland Mitigation Bank. The Barry Jones Wetland Mitigation Bank, comprising 140 acres and including the 33-acre Skunk Hollow Pool and 107 acres of the pool's watershed, was established in 1997 to serve as off-site compensatory mitigation for unavoidable impacts to wetland habitats (Center for Natural Lands Management 1997). We have conducted two consultations in this area that propose to impact Riverside fairy shrimp. The formal section 7 consultation for the Rancho Bella Vista Habitat Conservation Plan states that an undetermined number of Riverside fairy shrimp within the population at the existing Barry Jones Wetland Mitigation Bank may be affected by management activities within the project's open space area (Fish and Wildlife Service 2000b). The formal section 7 consultation for the Assessment District 161 Subregional Habitat Conservation Plan mentions that the Riverside fairy shrimp population at the Barry Jones Wetland Mitigation Bank may be affected by the EM-20 Pipeline and by Butterfield Stage Road, the construction of which will result in an incremental reduction in the watershed, an increase in siltation, and an increase in pollution from road run-off (Fish and Wildlife Service 2000c).

Riverside fairy shrimp were observed during 2001 wet-season surveys within 11 retention basins on the Redhawk Community Project site (Pacific Southwest Biological Services 2001; Helix Environmental Planning, Inc. 2001). The fairy shrimp cysts were collected from the basins in February of 2002 (Neudecker 2002), and the site has since been developed. To offset the loss of this impact to fairy shrimp from the Redhawk Project, 7 pools totaling 2.08 acres have been created on the Johnson Ranch property, and the Riverside fairy shrimp cysts collected from the Redhawk Project have been introduced into these pools (Neudecker 2003). The created pools have not yet met their success criteria (Fish and Wildlife Service 2003a); however, Riverside fairy shrimp were detected in all seven pools in 2003, and gravid females were observed in six of the pools (Neudecker 2003).

A 0.36-acre pool located on the Clayton Ranch Project site was shown to be occupied by the species during wet season surveys conducted in 2001 (Bomkamp 2001). Cysts have been salvaged from the basin in accordance with the section 7 consultation for the Clayton Ranch Development. A housing development, road, and culvert have been recently constructed in the vicinity of the Schleuniger Pool, which may threaten the long-term conservation of the area. To offset the loss of this impact to fairy shrimp from the Clayton Ranch Project, the 0.27-acre Schleuniger Pool and 0.73 acre of its 9.5-acre watershed will be restored and conserved and managed in perpetuity. In addition, two pools totaling 0.02 acre will be created on the Clayton Ranch Project Site within an onsite conservation area, and a 0.2-acre area surrounding these created pools will be restored. If these pools meet their success criteria, Riverside fairy shrimp collected from the onsite basin will be introduced into these created pools.

The following four occurrences and their watersheds are protected by existing conservation and management agreements: 1) Skunk Hollow Pool, 2) Field Pool, 3) seven Johnson Ranch Created Pools, and 4) two Clayton Ranch Proposed Pools. A fifth occurrence, Schleuniger Pool, is also protected by existing conservation and management agreements; however, part of its watershed remains unprotected.

Ephemeral pools have been documented within the Plan Area that have not been surveyed extensively for vernal pool species including the Palomar Pool, Wickerd Pool, Antelope Pool, Keller Pool, Madison Pool, Bundy Canyon Pools, George Pools, Skylark Pool, Lakeshore Pool, Wildlife Pools, Clay Pools, Garbani Pool, Auld Pool, Eastridge Pool, and many of the pools within the Salt Creek vernal pool complex located southwest of Hemet.

Vernal pools in and around the Santa Rosa Plateau have not been surveyed extensively for Riverside fairy shrimp. There are five mesas with basalt flow soils suitable for vernal pools in and around the Santa Rosa Plateau Ecological Reserve. A total of 15 pools have been observed on three of the mesas. Protocol fairy shrimp surveys have not been conducted in any of these pools. Limited fairy shrimp surveys were conducted in four pools on Mesa de Colorado and 9 pools on Mesa de Burro in 1995, but Riverside fairy shrimp were not observed during these surveys (Serpa 1995a, 1995b). Limited fairy shrimp surveys were conducted in three pools on Mesa de Colorado in 1998, and Riverside fairy shrimp were not observed (Angelos 1997, 1998). More investigation is needed to determine whether the species occurs at the Santa Rosa Plateau.

The vernal pool model was used to capture potential habitats supporting Riverside fairy shrimp. The vernal pool model included these parameters within the Riverside Lowlands and the Santa Ana Mountains bioregions: 1) vernal pools and playas, and 2) clayey soils (Altamont, Auld, Bosanko, Claypit, and Porterville), alkali soils (Willows, Traver, and Domino), and Santa Rosa Plateau basalt flow soils. We were unable to include additional soil types that harbor vernal pools, such as Murrieta stony clay loam, in our model because we do not have access to digital overlays mapping the extent of these soil types in the Plan Area. Based on our analysis, 42,349 acres of modeled habitat, with the potential to harbor vernal pools and associated species, including the Riverside fairy shrimp, occur within the Plan Area. Approximately 8,831 acres (21 percent) of this modeled habitat is within existing PQP Lands.

Effects of the Action

Direct effects

The Plan area includes 42,349 acres of modeled habitat for vernal pool species, including the Riverside fairy shrimp. Based on our analysis of the Conceptual Reserve Design, approximately 7,686 acres (18 percent) of the modeled habitat are within the Additional Reserve Lands and approximately 8,831 acres (21 percent) are within existing PQP Lands. Thus, the MSHCP Conservation Area will include 16,517 acres (39 percent) of modeled habitat for vernal pool species such as the Riverside fairy shrimp.

We anticipate the loss of up to 25,832 acres (61 percent) of this modeled habitat within the Plan Area over the 75-year permit term. However, implementation of the Riparian/Riverine Areas

and Vernal Pools policy as described in the “General Effects” section of this biological opinion will minimize the impact of this habitat loss on Covered Species such as the Riverside fairy shrimp.

The species-specific conservation objectives for the Riverside fairy shrimp state that 11,942 acres of landscape habitat that might contain suitable vernal pool habitat and five Core Areas will be included within the MSHCP Conservation Area, including Cores Areas at Santa Rosa Plateau Ecological Reserve, Skunk Hollow, Murrieta, and Lake Elsinore; the fifth Core Area is not described. The Plan also indicates that additional areas within the Criteria Area important for the Riverside fairy shrimp, identified through implementation of the Riparian/Riverine Areas and Vernal Pools policy, will be included within the Conservation Area.

We do not anticipate any effects to the Santa Rosa Plateau Pools, Johnson Ranch Created Pools, or the Clayton Ranch Proposed Pools and their watersheds from the MSHCP. The Plan proposes the construction of Butterfield Stage Road as a Covered Activity, and this road construction project has the potential to affect the Skunk Hollow Pool and the Field Pool. The Plan states that construction of the road will be consistent with the requirements of the Assessment District 161 Habitat Conservation Plan, which requires that the design and location of the road be determined in consultation with our office. Thus, we anticipate that any potential impacts to the Skunk Hollow Pool and the Field Pool and their watersheds will be addressed through close coordination and consultation with this office.

The only known pool occupied by Riverside fairy shrimp in Murrieta is the Schleuniger Pool; however, the Murrieta area has not been fully surveyed for fairy shrimp. Species-specific Objective 1 in the MSHCP states that the Murrieta Core Area will be conserved, and this pool location is within the Criteria Area and captured by the Conceptual Reserve Design. In addition, the Criteria for the cell group in this area encompass the entire watershed for this pool with the MSHCP expecting to result in the conservation of the remaining 8.5 acres of the Schleuniger Pool’s watershed. However, the MSHCP also proposes a Covered Activity that has the potential to impact the Schleuniger Pool. The Schleuniger Pool is located within the footprint of the proposed expansion of La Estrella Road to a 100-foot right-of-way. Individual public and private projects within the Plan Area are expected to be designed and implemented in accordance with the Criteria for each Area Plan (Section 6, pp. 6-74). Therefore, for the purposes of this analysis, we anticipate that the proposed road improvement will be designed so that the Schleuniger Pool and its watershed will not be impacted from the project, including but not limited to, the road itself, culverts under the road, and the fuel modification zones for the road or that the Criteria Refinement process will be implemented to result in the same or greater Conservation value and acreage to the MSHCP.

Riverside fairy shrimp have been observed in the Australia Pool in the Lake Elsinore back basin; however, the entire back basin has not been surveyed for the species. Species-specific Objective 1 in the MSHCP states that the Lake Elsinore back basin Core Area will be conserved. According to our interpretation of the cell criteria in this area, the Australia Pool will be protected by a minimum buffer of approximately 380 feet to a buffer of greater than 1,000 feet from the edge of the pool. Four additional pools (the two Wildlife Pools, the Skylark Pool and the Lakeshore Pool) that have been documented in the vicinity of the back basin are fairly large

and deep and may provide suitable habitat for the Riverside fairy shrimp; however, these have not been surveyed for the species. While the cell criteria do not provide for conservation of the entire back basin, the area will be subject to surveys and avoidance under the requirements of the Riparian/Riverine Areas and Vernal Pools policy. In addition, pools that are identified as important to the Riverside fairy shrimp may be considered for inclusion within the MSHCP Conservation Area in accordance with species-specific Objective 3 for this species.

Riverside fairy shrimp have not been observed at the Salt Creek Vernal Pool Complex; however, protocol surveys have not been conducted at all of the pools within this complex. Most of the Salt Creek Vernal Pool Complex falls within the MSHCP Conservation Area; however, three Covered Activities have the potential to impact the Salt Creek Vernal Pool Complex. These include the extension of Stowe Road through the Complex and its expansion to a width of 152 feet, the expansion of Florida Avenue/SR-74 to a width of 196 feet, and the expansion of SR79 to a width of 196 feet. We anticipate that impacts to the Salt Creek Vernal Pool Complex from these road improvements will be avoided and minimized if the area is occupied by Riverside fairy shrimp through implementation of the Riparian/Riverine Areas and Vernal Pools policy.

Four known populations of Riverside fairy shrimp are located outside of the MSHCP Conservation Area including two pools at March Air Reserve Base, Banning Complex, Pechanga Pool and Scott Pool. Impacts to these pools will be avoided and minimized through implementation of the Riparian/Riverine Areas and Vernal Pools policy.

The following documented unsurveyed pools are located outside of the Conservation Area: Palomar Pool, Wickerd Pool, Antelope Pool, Keller Pool, Eastridge Pool, the 4 to 5 pools in the George Pool Complex, Garbani Pool, Auld Pool, and Madison Pool. There are other pools that have not been surveyed adequately for Riverside fairy shrimp which are in the Criteria Area and may be incorporated into the MSHCP Conservation Area. These include 3 to 4 pools in the Bundy Canyon Complex, two Wildlife Pools, Skylark Pool, Lakeshore Pool, Clay Complex and Alberhill Pools. The MSHCP proposes a Covered Activity, Bundy Canyon Road, that has the potential to impact the Bundy Canyon Complex. Again, if the Bundy Canyon Complex or other unsurveyed pools are documented in the future to be occupied by Riverside fairy shrimp, we anticipate that impacts to these pools will be avoided and minimized through implementation of the Riparian/Riverine Areas and Vernal Pools policy.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands including surveys for the Riverside fairy shrimp. Cooperative management and monitoring is anticipated on PQP Lands. Surveys for the Riverside fairy shrimp will be conducted at least every eight years to verify occupancy at a minimum of 75 percent of the known locations for the species. If a decline in the distribution of the Riverside fairy shrimp is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP.

Other management actions described in Section 5, Table 5.2 of the MSHCP will help maintain Riverside fairy shrimp habitat, such as enhancement of historic or vestigial vernal pools, maintaining and/or preserving watersheds of conserved known or future vernal pools or depressions, and management to control illegal dumping.

Management actions to benefit the Riverside fairy shrimp (*e.g.*, salvage efforts, habitat creation/manipulation/restoration/enhancement) or other Covered vernal pool species may result in impacts, including death, to a small number of Riverside fairy shrimp including cysts. It is anticipated that any impacts to the Riverside fairy shrimp from management actions will be minimized by adherence to appropriate survey and monitoring protocols and other guidelines described in Section 7.4 of the MSHCP.

Indirect Effects

Riverside fairy shrimp could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These generally include the indirect effects discussed in the “General Effects” and the “Generalized Effects Analysis for Vernal Pools” sections of this biological opinion. Implementation of the Guidelines Pertaining to the Urban/Wildlands Interface policy, Riparian/Riverine Area and Vernal Pools policy, and the management provisions listed above will help to reduce indirect effects to this species.

Conclusion

We anticipate that the proposed action will directly and indirectly affect the Riverside fairy shrimp as described in the analysis above including the loss of up to 61 percent of its modeled habitat. Implementation of the avoidance, minimization, and mitigation measures identified in the Plan will reduce the impacts to this species. Specifically, the Riparian/Riverine Areas and Vernal Pools Policy requires that habitat for this species be mapped throughout the Plan Area and avoided if feasible. If avoidance is not feasible, surveys will be conducted and 90 percent of the occupied area determined to have long-term conservation value for the species will be conserved and managed. Consequently, we anticipate the loss of only 10 percent of occupied Riverside fairy shrimp habitats determined to have long-term conservation value for the species. We anticipate that this species will persist in the remaining 90 percent of occupied habitat with long-term conservation value for the species, including the 39 percent of the modeled habitat within both the existing PQP Lands and the Additional Reserve Lands

The MSHCP will further offset the proposed impacts to this species through management and monitoring actions within the Reserve, including the enhancement of historic or vestigial vernal pools within Core Areas. This enhancement will help offset the impacts of the action by increasing the quality of the habitat that is conserved for this species and by allowing the expansion of populations within the Reserve through the enhancement of historic or vestigial vernal pools that do not currently provide habitat for the species.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service’s biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the Riverside fairy shrimp. We reached this conclusion because the Core Areas for Riverside fairy shrimp at Skunk Hollow, Lake Elsinore Back Basin, and Murrieta will be conserved or will remain within the MSHCP Conservation Area. In addition, surveys and implementation of the Riparian/Riverine Areas and Vernal Pools policy may result in existing and newly discovered occurrences being avoided and/or included in the MSHCP Conservation Area. The Plan

provides for the survival of the species within the Plan Area by ensuring that the species is conserved within occupied areas with long-term conservation value throughout the Plan Area. The Plan will also support recovery of the species within the Plan Area by enhancing habitat conserved for the species, thereby improving the quality of the habitat conserved for the species and allowing for populations to expand into conserved areas that are currently unoccupied. Thus, the impacts to this species and its modeled habitat, when viewed in conjunction with the protection and management of the MSHCP Conservation Area, are not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Amount or Extent of Take

It is not possible to quantify the number of fairy shrimp adults, cysts, or populations that will be impacted throughout the Plan Area over the 75-year permit term. Thus, the Service is quantifying incidental take as the number of acres of modeled vernal pool habitat that will be impacted in the Plan Area as a result of the proposed action.

We anticipate that up to 25,832 acres of modeled vernal pool habitat within the Plan Area will become unsuitable for the Riverside fairy shrimp as a result of the proposed action. Riverside fairy shrimp and their cysts may also be taken through project-related salvage efforts and Reserve management activities including regular monitoring efforts and creation, restoration and enhancement efforts. Take will be in the form of harm, death, and injury. This level of anticipated take is not likely to result in jeopardy to the Riverside fairy shrimp.

Terms and Conditions for Fairy Shrimp Management Activities Involving Salvage, Creation, Restoration, and Enhancement efforts:

1. Fairy shrimp pond soil (inoculum) will be collected when it is dry to avoid damaging or destroying fairy shrimp cysts which are fragile when wet. A hand trowel or similar instrument will be used to collect the soil. Whenever possible, soil will be collected in chunks. The trowel will be used to pry up intact chunks of soil, rather than loosening the soil by raking and shoveling which can damage cysts. Soil will not be collected from any ponds until approved by the Service.
2. The soil from each pond will be stored individually in labeled bags or boxes that are adequately ventilated and kept out of direct sunlight in order to prevent the occurrence of fungus or excessively heating the soil.
3. Inoculum will not be introduced into the created ponds until after the created ponds have been demonstrated to retain water for a minimum 60 days and will be placed in a manner that preserves, to the maximum extent possible, the orientation of the fairy shrimp cysts within the surface layer of soil (*e.g.*, collected inoculum will be shallowly distributed within the pond so that cysts have the potential to be brought into solution upon inundation).

Vernal pool fairy shrimp (*Branchinecta lynchi*)Status of the Species*Listing Status*

The Fish and Wildlife Service listed the vernal pool fairy shrimp (*Branchinecta lynchi*) as threatened on September 19, 1994 (59 Federal Register 48136). Critical habitat was designated for the species on August 6, 2003 (68 Federal Register 46684).

Species Description

The vernal pool fairy shrimp is a small freshwater crustacean in the Family Branchinectidae, of the order *Anostraca*. Adult vernal pool fairy shrimp range in size from 10.9 to 25.0 millimeters (0.4 to 1.0 inches). The species is distinguished from a similar species, the Colorado fairy shrimp (*Branchinecta coloradensis*), by the males' ridge-like outgrowth on the basal segment of the antennae, and the females shorter, pyriform brood pouch. Vernal pool fairy shrimp, like other fairy shrimp, swim on their backs throughout their adult life cycle (Fish and Wildlife Service 1994b).

Habitat Associations

Fairy shrimp are restricted to vernal pools and vernal pool-like ephemeral basins. Vernal pools are a type of ephemeral wetland that occurs within a range that extends from southern Oregon through California into northern Baja California, Mexico (Fish and Wildlife Service 1998b). They require a unique combination of climatic, topographic, geologic, and evolutionary factors for their formation and continued existence. Vernal pools form in regions with Mediterranean climates where shallow depressions fill with water during fall and winter rains and then dry up when the water evaporates in the spring (Collie and Lathrop 1976, Holland 1976, Holland and Jain 1977, 1988, Thorne 1984). Downward percolation of water within the pools is prevented by the presence of an impervious subsurface layer consisting of claypan, hardpan, or volcanic stratum (Holland 1976, 1988). Seasonal inundation makes vernal pools too wet for adjacent upland plant species adapted to drier soil conditions, while rapid drying during late spring makes pool basins unsuitable for typical marsh or aquatic species that require a more permanent source of water. Upland vegetation communities associated with vernal pools include needlegrass grassland, annual grassland, coastal sage scrub, maritime succulent scrub and chaparral (Fish and Wildlife Service 1998b).

The vernal pool fairy shrimp inhabits seasonal pools in grass or mud bottomed swales, basalt flow depressions, sandstone rock outcrops, and alkaline playas (Fish and Wildlife Service 1994b). This species prefers pools with low to moderate dissolved solids that are often unpredictable and short lived (Eriksen and Belk 1999).

Life History

Anostracans, including the vernal pool fairy shrimp, are non-selective filter-feeders that filter suspended solids from the water column (Eriksen and Belk 1999). Detritus, bacteria, algal cells, and other items between 0.3 to 100 microns may be filtered and ingested (Eriksen and Belk 1999). Only rarely does the vernal pool fairy shrimp co-occur with other fairy shrimp species, and where it does, the vernal pool fairy shrimp is never the numerically dominant species (Eng *et al.* 1990). The vernal pool fairy shrimp has been observed swimming and competing for food resources with the versatile fairy shrimp and the Santa Rosa Plateau fairy shrimp. Fairy shrimp are preyed upon by a wide variety of wildlife, including beetles, dragonfly, insect larvae, frogs, salamanders, toad tadpoles, shorebirds, ducks, and even other fairy shrimp.

Freshwater crustaceans, including the vernal pool fairy shrimp, have a two-stage life cycle with the majority of their life cycle spent in the egg (cyst) stage (Templeton and Levin 1979, Schaal and Leverich 1981, Herzig 1985, Hairston and De Stasio 1988, Venable 1989). Vernal pool fairy shrimp females produce an unknown number of cysts per clutch and over their lifetime (Eriksen and Belk 1999). The cysts are either dropped to the pool bottom or remain in the brood sac until the female dies and sinks. Fairy shrimp cysts are capable of withstanding heat, cold and prolonged dessication and may persist in the soil for several years until conditions are favorable for successful reproduction (Fish and Wildlife Service 1994b). The cysts hatch when the vernal pools fill with rainwater. Not all cysts are likely to hatch in a season, thus providing a mechanism for survival if the inundation period is too short in a given year (Simovich and Hathaway 1997). This species can mature quickly, allowing it to persist in short-lived shallow pools; however the species also persists later into the spring where pools are longer lasting (Simovich *et al.* 1992).

Status and Distribution

The vernal pool fairy shrimp is endemic to vernal pools in the Central Valley, coast ranges, and a limited number of sites in the Transverse Range and the Santa Rosa Plateau of California. The vernal pool fairy shrimp has a sporadic distribution within vernal pool complexes, with most pools being uninhabited by this species. It has been reported to occur in low densities (Fish and Wildlife Service 1994b). Riverside County is significant to the species for a number of reasons. The Riverside County records represent the southernmost extent of the species range (Eriksen and Belk 1999). The Riverside County records are separated from the more northern localities by 177 miles (Eng *et al.* 1990). The largest valley vernal pool remaining in all of southern California is occupied by the species and is located at the Barry Jones Wetland Mitigation Bank (Eriksen and Belk 1999) within the Plan Area.

Threats

Threats to fairy shrimp can be divided into three major categories: 1) direct destruction of vernal pools as a result of construction, vehicle traffic, domestic animal grazing, dumping, and deep plowing; 2) indirect threats which degrade or destroy vernal pools over time including altered hydrology (*e.g.*, damming, draining), invasion of alien species, habitat fragmentation, and associated deleterious effects resulting from adjoining urban land uses; and 3) long-term threats

including the effect of isolation on genetic diversity and locally adapted genotypes, air and water pollution, drastic climatic variations, and changes in nutrient availability (Bauder 1986).

Conservation Needs

Conservation efforts for the vernal pool fairy shrimp within the Plan Area should address the major causes of decline for the species of habitat loss and degradation resulting from both direct and indirect impacts to vernal pools. Existing vernal pools and their associated watersheds should be secured from further loss and degradation in a configuration that maintains habitat function and species viability (Fish and Wildlife Service 1998b).

Environmental Baseline

Within the Plan Area the vernal pool fairy shrimp has been documented in the following locations: 1) the Skunk Hollow Pool, a 33-acre vernal pool at the Barry Jones Wetland Mitigation Bank (M. Simovich, USD, pers. comm. to S. Brown, Fish and Wildlife Service, August 4, 2003; Eriksen and Belk 1999); 2) 7 pools located on the Santa Rosa Plateau Ecological Reserve (Serpa 1995a, 1995b; Angelos 1998); and 3) the Stowe Pool, a pool located at the northwest corner of Stowe Road and California Avenue within the Salt Creek Vernal Pool Complex (Patterson 1998).

The Skunk Hollow Pool and the seven pools known to be occupied by the species within the Santa Rosa Plateau Ecological Reserve are protected by existing conservation and management agreements.

The MSHCP includes a record for the vernal pool fairy shrimp in the vicinity of the Pechanga Reservation. The source for this point is an Environmental Impact Report for a corridor project running from Banning Pass to San Diego County. The Environmental Impact Report states that vernal pool fairy shrimp were found at some point along this stretch but does not give a location. Because the Pechanga Reservation falls at the center of the survey area reported in the Environmental Impact Report, this is where the MSHCP described the locality. The precision for this record is greater than 8 kilometers. Due to the precision criteria we established for the GIS data discussed above, we are not considering this occurrence in our baseline and analysis.

Vernal pools in and around the Santa Rosa Plateau have not been surveyed extensively for vernal pool species. There are five mesas with basalt flow soils suitable for vernal pools in and around the Santa Rosa Plateau Ecological Reserve. A total of 15 pools have been observed on three of these mesas. Protocol fairy shrimp surveys have not been conducted in any of these pools. Limited fairy shrimp surveys were conducted in four pools on Mesa de Colorado and nine pools on Mesa de Burro in 1995 (Serpa 1995a, 1995b). Vernal pool fairy shrimp were observed in 4 of nine pools on Mesa de Burro, and in 1 of 4 pools on Mesa de Colorado in 1995 (Serpa 1995a, 1995b). Limited fairy shrimp surveys were conducted in three pools on Mesa de Colorado in 1998, and vernal pool fairy shrimp were present in all three pools (Angelos 1998).

Ephemeral pools have been documented within the Plan Area that have not been surveyed for vernal pool fairy shrimp including Palomar Pool, Wickerd Pool, Antelope Pool, Keller Pool,

Madison Pool, Bundy Canyon Complex, George Complex, Skylark Pool, Lakeshore Pool, Wildlife Pools, Clay Complex, Garbani Pool, Auld Pool, Eastridge Pool, Field Pool, and many of the pools within the Salt Creek Vernal Pool Complex.

There is documentation of actions affecting the vernal pool fairy shrimp within the Plan Area. The Stowe Pool has been disturbed by discing and sheep grazing (Patterson 1998). Dry land farming and alterations in hydrology have also affected the Salt Creek Vernal Pool Complex (California Natural Diversity Database, 2003). The Santa Rosa Plateau vernal pools are threatened by adjacent urban development and by the invasion of non-native grasses. Houses have been constructed across the road from Mesa de Colorado. Culverts have been constructed that connect this developed property to the property with vernal pools on Mesa de Colorado, allowing runoff from the developed property to flow down into the vernal pools (C. Bell, The Nature Conservancy, pers. comm. to S. Brown, Fish and Wildlife Service, August 20, 2003).

The vernal pool model was used to capture potential habitats supporting vernal pool fairy shrimp. The vernal pool model included these parameters within the Riverside Lowlands and the Santa Ana Mountains bioregions: 1) vernal pools and playas and 2) clayey soils (Altamont, Auld, Bosanko, Claypit, and Porterville), alkali soils (Willows, Traver, and Domino), and Santa Rosa Plateau basalt flow soils. Based on our analysis, 42,349 acres of modeled habitat, with the potential to harbor vernal pools suitable for the species, occur within the Plan Area. Approximately 8,831 acres (21 percent) of this modeled habitat is within existing PQP Lands. We were unable to include additional soil types that harbor vernal pools, such as Murrieta stony clay loam, in our model because we do not have access to digital overlays mapping the extent of these soil types in the Plan Area.

Effects of the Action

Direct effects

The Plan area includes 42,349 acres of modeled habitat for vernal pool species, including the vernal pool fairy shrimp. Based on our analysis of the Conceptual Reserve Design, approximately 7,686 acres (18 percent) of the modeled habitat are within the Additional Reserve Lands and approximately 8,831 acres (21 percent) are within existing PQP Lands. Thus, the MSHCP Conservation Area will include 16,517 acres (39 percent) of modeled habitat for vernal pool species such as the vernal pool fairy shrimp.

We anticipate the loss of up to 25,832 acres (61 percent) of this modeled habitat within the Plan Area over the 75-year permit term. However, implementation of the Riparian/Riverine Areas and Vernal Pools policy as described in the “General Effects” section of this biological opinion will minimize the impact of this habitat loss on Covered Species such as the vernal pool fairy shrimp.

The species-specific conservation objectives for the vernal pool fairy shrimp states that 476 acres of vernal pool and playa habitat within the West Hemet portion of Salt Creek, Santa Rosa Plateau Ecological Reserve, and Skunk Hollow and at least 2,647 acres of alkali playa habitat in the floodplain of the San Jacinto River and west Hemet portion of Salt Creek will be included

within the MSHCP Conservation Area. Also, at least three Core Areas of occupied vernal pools and their watersheds will be within the MSHCP Conservation Area including the west Hemet portion of Salt Creek, Santa Rosa Plateau Ecological Reserve, and Skunk Hollow. Additional areas within the Plan Area identified as important for the vernal pool fairy shrimp will be included within the MSHCP Conservation Area in accordance with the Riparian/Riverine Areas and Vernal Pools policy.

We do not anticipate any effects to the Santa Rosa Plateau Ecological Reserve Pools and their watersheds from public and private developments implemented under the MSHCP. The Plan proposes the construction of Butterfield Stage Road as a Covered Activity, and this road construction project has the potential to affect the Skunk Hollow Pool and the Field Pool. The Plan states that construction of the road will be consistent with the requirements of the Assessment District 161 Habitat Conservation Plan, which requires that the design and location of the road be determined in consultation with our office. Thus, we anticipate that any potential impacts to the Skunk Hollow Pool and the Field Pool and their watersheds will be addressed through close coordination and consultation with this office.

Most of the Salt Creek Vernal Pool Complex falls within the MSHCP Conservation Area; however, three Covered Activities have the potential to impact the Salt Creek Vernal Pool Complex. These include the extension of Stowe Road through the Complex and its expansion to a width of 152 feet, the expansion of Florida Avenue/SR-74 to a width of 196 feet, and the expansion of SR-79 to a width of 196 feet. Because the area is occupied by vernal pool fairy shrimp, we anticipate that impacts to the Salt Creek Vernal Pool Complex from these road improvements will be avoided and minimized through implementation of the Riparian/Riverine Areas and Vernal Pools policy.

The following documented unsurveyed pools are located outside of the Conservation Area: Palomar Pool, Wickerd Pool, Antelope Pool, Keller Pool, Eastridge Pool, the 4 to 5 pools in the George Pool Complex, Garbani Pool, Auld Pool, Madison Pool, Scott Pool, Banning Complex, and Pechanga Pool. There are other pools that have not been surveyed adequately for vernal pool fairy shrimp, which are in the Criteria Area and may be incorporated into the MSHCP Conservation Area. These include 3 to 4 pools in the Bundy Canyon Complex, two Wildlife Pools, Skylark Pool, Lakeshore Pool, Alberhill Pools, Clay Complex, and Scott Pool.

Protocol fairy shrimp surveys were completed at the Scott Pool. Dry season surveys produced 409 cysts of the genus *Branchinecta*. Survey biologists concluded that these were likely the cysts of the versatile fairy shrimp; however they stated that there is a chance cysts could belong to the endangered San Diego fairy shrimp or the vernal pool fairy shrimp. Wet season surveys have been completed at the Alberhill pools and vernal pool fairy shrimp were not observed; however surveys have not been completed to protocol. The MSHCP proposes a Covered Activity, Bundy Canyon Road, that has the potential to impact the Bundy Canyon Complex. Again, if the Bundy Canyon Complex or other unsurveyed pools are documented in the future to be occupied by vernal pool fairy shrimp, we anticipate that impacts to these pools will be avoided and minimized through implementation of the Riparian/Riverine Areas and Vernal Pools policy.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands including surveys for the vernal pool fairy shrimp. Cooperative management and monitoring are anticipated on PQP Lands. Surveys for the vernal pool fairy shrimp will be conducted at least every eight years to verify occupancy at a minimum of 75 percent of the known locations for the species. If a decline in the distribution of the vernal pool fairy shrimp is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP.

Other management actions described in Section 5, Table 5.2 of the MSHCP will help maintain vernal pool fairy shrimp habitat, such as enhancement of historic or vestigial vernal pools, maintaining and/or preserving watersheds of conserved known or future vernal pools or depressions, and management to control discing and illegal dumping.

Management actions to benefit the vernal pool fairy shrimp (*e.g.*, salvage efforts, habitat creation/ manipulation/restoration/enhancement) or other Covered vernal pool species may result in impacts, including death, to a small number of vernal pool fairy shrimp including cysts. It is anticipated that any impacts to the vernal pool fairy shrimp from management actions will be minimized by adherence to appropriate survey and monitoring protocols and other guidelines described in Section 7.4 of the MSHCP.

Indirect Effects

Vernal pool fairy shrimp could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These generally include the indirect effects discussed in the “General Effects” and the “Generalized Effects Analysis for Vernal Pools” sections of this biological opinion. Implementation of the Guidelines Pertaining to the Urban/Wildlands Interface policy, Riparian/Riverine Area and Vernal Pools policy, and the management provisions listed above will help to reduce indirect effects to this species.

Conclusion

We anticipate that the proposed action will directly and indirectly affect the vernal pool fairy shrimp as described in the analysis above including the loss of up to 61 percent of its modeled habitat. Implementation of the avoidance, minimization, and mitigation measures identified in the Plan will reduce the impacts to this species. The Riparian/Riverine Areas and Vernal Pools Policy requires that habitat for this species be mapped throughout the Plan Area and avoided if feasible. If avoidance is not feasible, surveys will be conducted and 90 percent of the occupied area determined to have long-term conservation value for the species will be conserved and managed. Consequently, we anticipate the loss of only 10 percent of occupied Riverside fairy shrimp habitats determined to have long-term conservation value for the species. We anticipate that this species will persist in the remaining 90 percent of occupied habitat with long-term conservation value for the species, including the 39 percent of the modeled habitat within both the existing PQP Lands and the Additional Reserve Lands.

The MSHCP will further offset the proposed impacts to this species through management and monitoring actions within the Reserve. One of the management actions proposed that may

benefit the species is the enhancement of historic or vestigial vernal pools within Core Areas for the Riverside fairy shrimp, which has been observed within the Plan Area to co-occur with the vernal pool fairy shrimp. This proposed enhancement may benefit the vernal pool fairy shrimp by increasing the quality of the habitat that is conserved for this species and by allowing the expansion of populations within the Reserve through the enhancement of historic or vestigial vernal pools that do not currently provide habitat for the species.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the vernal pool fairy shrimp. We reached this conclusion because all known populations of the species in the Plan Area will be conserved or will remain within the MSHCP Conservation Area in three Core Areas at the West Hemet portion of Salt Creek, Santa Rosa Plateau Ecological Reserve, and Skunk Hollow. In addition, surveys and implementation of the Riparian/Riverine Areas and Vernal Pools policy may result in existing and newly discovered occurrences being avoided and/or included in the MSHCP Conservation Area. The Plan provides for the survival of the species within the Plan Area by ensuring that the species is conserved within occupied areas with long-term conservation value throughout the Plan Area. The species may also benefit from enhancement actions proposed for a co-occurring species that will improve the quality of the habitat conserved for these species and allow for populations to expand into conserved areas that are currently unoccupied. Thus, the impacts to this species and its modeled habitat, when viewed in conjunction with the protection and management of the MSHCP Conservation Area, are not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Amount or Extent of Take

It is not possible to quantify the number of fairy shrimp adults, cysts, or populations that will be impacted throughout the Plan Area over the 75-year permit term. Thus, the Service is quantifying incidental take as the number of acres of modeled vernal pool habitat that will be impacted in the Plan Area as a result of the proposed action.

We anticipate that up to 25,832 acres of modeled vernal pool habitat within the Plan Area will become unsuitable for the vernal pool fairy shrimp as a result of the proposed action. Vernal pool fairy shrimp and their cysts may also be taken through project-related salvage efforts and Reserve management activities including regular monitoring efforts and creation, restoration and enhancement efforts. This level of anticipated take is not likely to result in jeopardy to the vernal pool fairy shrimp.

Terms and Conditions for Fairy Shrimp Management Activities Involving Salvage, Creation, Restoration, and Enhancement efforts:

1. Fairy shrimp pond soil (inoculum) will be collected when it is dry to avoid damaging or destroying fairy shrimp cysts which are fragile when wet. A hand trowel or similar instrument will be used to collect the soil. Whenever possible, soil will be collected in chunks. The trowel will be used to pry up intact chunks of soil, rather than loosening the

soil by raking and shoveling which can damage cysts. Soil will not be collected from any ponds until approved by the Service.

2. The soil from each pond will be stored individually in labeled bags or boxes that are adequately ventilated and kept out of direct sunlight in order to prevent the occurrence of fungus or excessively heating the soil.
3. Inoculum will not be introduced into the created ponds until after the created ponds have been demonstrated to retain water for a minimum 60 days and will be placed in a manner that preserves, to the maximum extent possible, the orientation of the fairy shrimp cysts within the surface layer of soil (*e.g.*, collected inoculum will be shallowly distributed within the pond so that cysts have the potential to be brought into solution upon inundation).

FISH

Santa Ana sucker (*Catostomus santaanae*)

Status of the Species

Listing Status

The Santa Ana sucker was federally listed as threatened on April 12, 2000 (65 Federal Register 19686). Critical habitat was designated on February 26, 2004 (69 Federal Register 8839); however, critical habitat was excluded within the Plan Area under section 4(b)(2) of the Act; therefore, it will not be considered further in this biological opinion. The Santa Ana sucker is considered a Species of Special Concern by the California Department of Fish and Game.

Species Description

The Santa Ana sucker was originally described by Snyder (1908) as *Pantosteus santa-anae*. The nomenclature was subsequently revised by Smith (1966) to *Catostomus santaanae*. The species is less than 6.3 inches in length, has silvery undersides, a darker back with irregular blotches and pigmented membranes connecting tail rays (Moyle 1976b).

Habitat Affinities

The Santa Ana sucker is fairly general in its habitat requirements, occupying low-gradient, lowland streams where water temperatures are less than 22 degrees Celsius. The Santa Ana sucker appears to fare best in small to medium streams with clear water and coarse substrates, such as the east fork of the San Gabriel River. Flowing water is essential, but flows can range from slight to swift. The Santa Ana sucker can tolerate seasonal turbidity, but Saiki (2000) found that their relative abundance is negatively correlated with turbidity.

The Santa Ana sucker is typically associated with gravel, cobble, and boulder substrates, although it is also found over sand and mud substrates. *Catostomus* spp. produce demersal,

adhesive eggs that are thought to be adapted to spawning habitat with boulders, cobble, and gravel rather than shifting sands or mud (Moyle 1976b).

Life History

Santa Ana suckers feed on algae, diatoms, aquatic insects and detritus scraped from rocks and other hard substrate (Greenfield *et al.* 1970). Aquatic insects comprise only a small component of their diet (Greenfield *et al.* 1970). They have a relatively short life span of three to four years, reach sexual maturity in one year, and have high fecundity. For example, 6 females ranging in size from 3.1 inches to 6.2 inches, produced between 4,423 and 16,151 eggs (Greenfield *et al.* 1970). Spawning generally occurs from late March to early July, with the peak occurring in late May and June (Greenfield *et al.* 1970; Swift 2001).

Although little is known about Santa Ana sucker movements, other species in the Catostomidae family are known to be highly vagile and undertake spawning migrations (Tyus and Karp 1990). For example, juveniles of the mountain sucker (*Catostomus platyrhynchus*) swim downstream and then move back upstream to spawn (Moyle 1976b). It is not known if the Santa Ana sucker follows this pattern; however, Swift (2001) reported that juveniles detected downstream of River Road in the Santa Ana River were likely the progeny of adults reproducing upstream. Therefore, in some instances, the Santa Ana sucker may need to return upstream to spawn.

Status and Distribution

Historically, the Santa Ana sucker occupied the Los Angeles, San Gabriel, and Santa Ana rivers from near the Pacific Ocean to their uplands (Swift *et al.* 1993). Although the Santa Ana sucker was described as common in the 1970s (Moyle 1976b), recent surveys indicate that the species has experienced declines throughout most of its range (Moyle *et al.* 1995, Swift *et al.* 1993) and persists in isolated, remnant populations. Approximately 70 to 80 percent of the Santa Ana sucker's historic range in the Los Angeles, San Gabriel, and Santa Ana rivers has been destroyed (65 Federal Register 19686).

The Santa Ana sucker only occupies portions of Big Tujunga Creek, a tributary of the Los Angeles River, between the Big Tujunga and Hansen dams; the west, east, and north forks of the San Gabriel River above the Morris Dam; and reaches of the Santa Ana River between the City of San Bernardino and the City of Anaheim (Moyle *et al.* 1995, Swift *et al.* 1993). There is a population of Santa Ana suckers in the Santa Clara River that is thought to be introduced, although this presumption is based on the absence of the species from early collections rather than any documented records of introduction (Hubbs *et al.* 1943, Miller 1968, Moyle 1976b, Bell 1978). Portions of this population have apparently hybridized with the Owens sucker (*Catostomus fumeiventris*) (Hubbs *et al.* 1943), and as a result, this population is not included within the range of the Santa Ana sucker.

Threats

In general, all remaining populations of the Santa Ana sucker are at risk due to their small size. Most of the lowland river habitats have been degraded, and the remaining populations of the

Santa Ana sucker are low in numbers. The following conditions continue to threaten the status of the Santa Ana sucker: 1) destruction, degradation, and fragmentation of habitat for the sucker through urbanization, channelization and other flood control structures; 2) dewatering of habitat from water diversion and withdrawal; 3) reductions in water quality; 4) fire (*i.e.*, reduced habitat quality from increased sedimentation and loss of riparian shading); 5) recreational activities including off-road vehicle use and bathing; and 6) competition and predation from non-native species (65 Federal Register 19686).

Conservation Needs

Barriers to fish movement should be modified or eliminated, a dependable water supply should be secured, and water quality standards should be examined. In addition, the practice of stocking non-native fishes in lakes, ponds, and other drainages within the Santa Ana River watershed should be evaluated for its effect upon the sucker and other State-listed and/or sensitive fish species. A non-native plant and animal species eradication program could reduce the adverse effects by removing these organisms from the watershed or reducing their numbers and/or distribution. Research on the actual effects of tertiary-treated wastewater and pesticide and herbicide contamination on the Santa Ana sucker should be conducted so that appropriate efforts can be made to minimize potential detrimental effects. Acute and chronic toxicity studies targeting the Santa Ana sucker should be conducted so that protective water quality standards for regulated discharges can be developed and implemented. Efforts to effectively curb urban runoff should be developed and implemented to prevent Santa Ana suckers from being adversely affected by non-point source pollution. In addition, impaired portions of the Santa Ana River and its tributaries should be priorities for addressing the total maximum daily load of dissolved solids and contaminants.

Environmental Baseline

Within the Plan Area, the Santa Ana sucker occupies the entire length of the Santa Ana River within Riverside County, as well as Sunnyslope Creek, a tributary to the Santa Ana River. Additional tributaries may also support the Santa Ana sucker; however, they have not been extensively surveyed. The Santa Ana River flows southwesterly into northern Riverside County from the San Bernardino County line into eastern Orange County at the northwest corner of Riverside County. The greatest portion of the population exists between the San Bernardino County line and where the Metropolitan Water District pipeline (between Anza Drain and Van Buren Boulevard) crosses the river, and then, in the Plan Area, the abundance of Santa Ana suckers gradually decreases through the remainder of the Santa Ana River.

As the Santa Ana River passes into Riverside County from San Bernardino County, riparian vegetation, gravel and cobble substrate, and meandering streams provide diverse habitats suitable for sucker spawning, foraging, and refugia for up to 15 miles within the Plan Area. Since the Santa Ana River in Orange County contains relatively unsuitable habitat, and the Santa Ana River in San Bernardino County contains less than four miles of suitable habitat, Riverside County contains the largest amount of suitable habitat within the Santa Ana River watershed.

Within the Plan Area, our agency has completed formal section 7 consultations with the Federal Highway Administration and the Corps of Engineers regarding effects to the Santa Ana sucker from road and flood control projects (Appendix 5). These actions have resulted in the loss of small portions of perennial streambed, habitat degradation, and loss of Santa Ana suckers through removal and relocation activities and the probable mortality of any suckers not detected during the relocation efforts. These effects were minimized and offset by the implementation of best management practices during construction, removal and relocation of Santa Ana suckers prior to carrying out construction activities in the river, and restoration and/or creation of habitat for the sucker within the perennial streambed.

Within the Plan Area, a multi-agency partnership of Federal and local government agencies and the private sector form the Santa Ana Sucker Conservation Program (Conservation Program). The Conservation Program encourages a river-wide approach to conservation of the sucker within the Santa Ana River and its tributaries. This approach also aims to increase the knowledge base to implement recovery strategies for the sucker, ensures that each participating agency minimizes, to the extent possible, the effects of routine activities on the sucker, and develops habitat restoration and enhancement techniques for degraded habitat. The Conservation Program has already benefitted the sucker by improving the Service's recommended avoidance and minimization measures for ongoing activities. In addition, the research funded by the partnership has resulted in a detailed description of spawning and nursery habitat and is developing appropriate habitat restoration techniques that will be essential to maintain the sucker population in the Santa Ana River.

There are 13 occurrences in our dataset of the Santa Ana sucker within the Plan Area. Nine of these occurrences are within existing PQP Lands; the remaining four occurrences are located outside of PQP Lands and Additional Reserve Lands. Three of these are from the UC Riverside dataset; they appear to either be historic occurrences or have a low precision value that places the points in urbanized areas away from a watershed. We do not consider these occurrences to represent meaningful data due to their uncertain nature. The remaining point from the CNDDDB is within a tributary to the Santa Ana River, likely the Anza Park or the Arroyo Tequesquite drainages, which may be valid point from 1991. However, that area is now within an urbanized portion of the Plan Area.

Based on the above information, we considered a total of 10 occurrence points from our dataset to represent meaningful distribution data within the Plan Area for Santa Ana sucker. Using this information and data submitted to the Santa Ana Watershed Project Authority between 2000 and 2003 (Saiki 2000; Swift 2001, Haglund *et al.* 2002, 2003) and because most larger drainages in the Plan Area are managed by flood authorities, we believe that the current distribution of the Santa Ana sucker within the Plan Area is within existing PQP Lands and Additional Reserve Lands.

To model habitat for the Santa Ana sucker the boundaries of the Santa Ana River were expanded with a buffer area to capture all of the available riparian habitat in the floodplain between the levees in the northeastern portion of the river and in any tributaries to the Santa Ana River that could provide habitat (*e.g.*, Sunnyslope Creek) in order to capture the meandering nature of the river, its tributaries, and dynamic hydrologic processes that provide essential habitat for native

fish. Modeled habitat for the Santa Ana sucker included vegetation types associated with rivers in the Plan Area including mule fat scrub, riparian/arundo forest, riparian forest, riparian scrub, southern cottonwood/willow riparian, southern sycamore/alder riparian woodland, southern willow scrub, tamarisk scrub, Riversidean alluvial fan sage scrub, disturbed alluvial habitat, marsh, coastal and valley freshwater marsh as well as open water, ponds, and reservoirs. By using such a buffer, the modeled habitat also included some grasslands, coastal scrub, Diegan coastal sage scrub, and Riversidean sage scrub within the floodplain. Modeled habitat also includes all of the habitat within the Prado Basin that may be inundated from flood control or water conservation activities but that frequently provides stream habitat during drier times. Although much of the modeled habitat within Prado Basin has not been documented to support the Santa Ana sucker in recent years, it is connected with the Santa Ana River and has not been exhaustively surveyed for the species. We also included approximately 1,000 acres that are riparian areas but had been classified inappropriately in our dataset as urban/exotic, non-native grassland, or dairy/livestock. Based on this analysis, the Plan Area supports approximately 7,790 acres of modeled habitat for the Santa Ana sucker. Approximately 6,827 acres (88 percent) of this modeled habitat occurs within PQP Lands.

Effects of the Action

Direct Effects

The Plan Area includes 7,790 acres of modeled habitat for the Santa Ana sucker. The loss of 443 acres (6 percent) of this modeled habitat is anticipated over the 75-year permit term due to development impacts. These 443 acres of modeled habitat are scattered in smaller disjunct patches mostly along the margin of the Santa Ana River and at bridge crossings. About 6,827 acres (88 percent) of modeled Santa Ana sucker habitat is within existing PQP Lands and approximately 520 acres (7 percent) of this habitat will be within the Additional Reserve Lands. Therefore, we anticipate that approximately 94 percent of the modeled habitat for the Santa Ana sucker will be conserved or remain within the Plan Area.

Covered Activities in the Plan that may adversely affect the Santa Ana sucker include the construction of new roads, road widening and road maintenance; flood control activities; the construction and operation of Future Facilities such as water and wastewater treatment plants, electrical utility facilities, and natural gas facilities; and the development of land for residential, commercial, and industrial use (*i.e.*, urbanization).

Construction as a result of new or widened roads and bridges, road maintenance, new flood control, and/or flood control maintenance activities that take place within or upstream of occupied habitat could directly affect the Santa Ana sucker by crushing fish and their eggs and/or larvae during construction, smothering fish and their eggs and/or larvae due to sediment movement during construction, degrading streambed habitat (*i.e.*, flattening or removing pool-riffle complexes, removing riparian vegetation), and altering hydrological processes such as the direction and velocity of stream flow that can undercut banks. Undercut banks can lead to a reduction in channel stability resulting in further erosion and increased sedimentation, smothering or desiccation of sucker eggs and/or larvae, and a loss of vegetative cover. However, we anticipate that implementation of the Riparian/Riverine Areas and Vernal Pools policy will

help ensure that effects to riparian habitat important to sucker are avoided where possible. We also anticipate that implementation of the Guidelines for Facilities Within the Criteria Area, including the Construction Guidelines and Best Management Practices, will avoid and/or minimize potential impacts to the Santa Ana sucker.

We have no project-specific information regarding the future energy and water delivery systems or the development of residential, commercial, or industrial facilities that may occur within the Plan Area over the life of the permit. However, where these facilities will occur within habitat for the Santa Ana sucker, we anticipate that the direct effects of facility construction, operation and maintenance such as ground disturbance and changes to water quality or quantity within the Santa Ana River, as described in the “General Effects” section of this biological opinion, will be minimized and/or avoided by compliance with the Riparian/Riverine Areas and Vernal Pools policy, the Urban/Wildlands Interface Guidelines, Facilities Siting Criteria, Construction Guidelines and Best Management Practices, where applicable.

To offset the loss of Santa Ana sucker habitat within the Plan Area, implementation of the MSHCP will conserve and manage areas containing modeled habitat for the sucker. The Plan outlines five species-specific conservation objectives for the species:

1. Include within the MSHCP Conservation Area 3,480 acres of suitable habitat for the sucker including the Santa Ana river within its natural river bottom and banks;
2. Include within the MSHCP Conservation Area the Core Areas upstream of River Road, between River Road and Prado Dam, and downstream of Prado Dam; the known spawning areas at Sunnyslope Creek and the area just below Mission Boulevard upstream to the Rialto Drain; and refugia and dispersal areas including the Market Street Seep, Mount Rubidoux Creek, Anza Park Drain, Arroyo Tequesquite, Hidden Valley Drain and Evans Lake Drain;
3. Include within the MSHCP Conservation Area the natural river bottom and banks of the Santa Ana River from the Orange/Riverside County line upstream to the boundary of the Plan Area, including the adjacent upland habitat where available to provide shade and suitable microclimate conditions;
4. Reserve Managers responsible for the areas outlined in conservation objectives 2 and 3 in the MSHCP Conservation Area will assess barriers to sucker movement and the need for connectivity, and will identify measures to restore connectivity to be implemented as feasible;
5. Reserve Managers responsible for the areas outlined in conservation objectives 2 and 3 will assess threats to the sucker from degraded habitat (*e.g.*, water quality, non-native invasive plants and animals, loss of habitat); identify areas necessary for successful spawning; identify areas for creation of stream meander, pool/riffle complexes, and reestablishment of native riparian vegetation as appropriate and feasible; and identify and implement management measures to address threats and protect critical areas.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands including surveys for the Santa Ana sucker. Cooperative management and monitoring are anticipated on PQP Lands through the Santa Ana Sucker Conservation Program. Surveys for the sucker will be conducted at least every eight years to verify occupancy at a minimum of 75 percent of the Core Areas identified above. If a decline in the distribution of the sucker is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific conservation objectives identified above and in Section 9, Table 9.2 of the MSHCP.

Reserve Managers will conduct or cooperate with Federal, State, and local agencies in a bullfrog and non-native fish eradication program within the Santa Ana River. The program will include development of fish barriers at sources of non-native species (*e.g.*, Prado ponds or Evans Lake) and active removal of non-native fish. Reserve Managers will prepare a monitoring plan to assess the extent of sucker movement within the Santa Ana River, the need for population connectivity and measures to remove barriers to movement. Reserve Managers will conserve natural river bottom and banks and adjacent habitat that provide shade and suitable microclimate within the Santa Ana River at specific tributaries detailed in Table 9-2 of the Plan. Reserve Managers will also maintain or improve existing water quality and flow levels in the Santa Ana River by the use and enforcement of current or better water quality standards and at a minimum maintain existing flows. Permitted activities must maintain current water quality standards and flows. Reserve Managers will enhance and/or create sucker habitat appropriate for spawning, foraging and refugia within the Santa Ana River and its tributaries as directed in the management plan. Enhancement will include control of exotic plant species, creation of stream meanders and riffle/pool complexes and reestablishment of native riparian vegetation; these enhancement measures will be concentrated between Mission Boulevard and the Orange/Riverside County line. Reserve Managers will protect and manage core population areas. They will also identify and implement steps to reduce turbidity below Prado Dam by conducting a sediment transport study on the Santa Ana River in cooperation with other Federal, State and local agencies.

Implementation of management and monitoring activities for the Santa Ana sucker may harm individuals of the species. For example, mechanical methods (*e.g.*, gillnets, trapping) for non-native species eradication may also net or trap Santa Ana suckers, which may be killed or injured by this activity. Depending on the type of program implemented, monitoring of fish passage within a watershed may impact sucker. To directly study sucker passage, suckers may be caught, tagged, released and recaptured to determine their ability to move within the watershed. It is anticipated that any impacts to Santa Ana sucker from management and monitoring actions will be minimized by adherence to appropriate trapping protocols and other guidelines described in Section 7.4 of the MSHCP.

Indirect Effects

The Santa Ana sucker could be subject to indirect effects from Covered Activities both inside and outside the MSHCP Conservation Area. These include the indirect effects described in the “General Effects” section of this biological opinion. Potential indirect effects to the Santa Ana sucker and its habitat include changes to water quality and quantity from road and/or bridge construction or widening, flood control, urbanization and future facilities that could result in

increased runoff as described in the “General Effects” section of this biological opinion. We anticipate that indirect effects to the Santa Ana sucker from changes to water quality and quantity, introduction of new discharge points, and changes to hydrology, streambed dynamics and stream length will be avoided and minimized by compliance with the Riparian/Riverine Areas and Vernal Pools Policy, Facilities Siting Criteria, Construction Guidelines and Best Management Practices, and implementation of the conservation objectives to maintain or improve existing water quality and flow levels.

Conclusion

We anticipate the proposed action will directly and indirectly affect the Santa Ana sucker as described in the analyses above, including the loss of 6 percent of the modeled habitat for this species in the Plan Area. Implementation of the policies, guidelines, and conservation objectives identified in the Plan will significantly reduce impacts to this species. We anticipate that this species will persist in the remaining 94 percent of the modeled habitat within both the existing PQP Lands and the Additional Reserve Lands. We anticipate that these areas will be monitored and managed cooperatively to the benefit of this species. Overall, the loss of habitat for the species is very low, and the Plan will implement long-term protection of modeled habitat that supports the core occurrences for the species, in addition to extensive monitoring and management activities to offset the impacts to the Santa Ana sucker.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service’s biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the Santa Ana sucker. We reached this conclusion because 94 percent of the modeled habitat for the Santa Ana sucker and almost the entire distribution of the sucker within the Plan Area will be included in the MSHCP Conservation Area. Thus, the impacts to this species and its associated habitat, when viewed in conjunction with the protection and management of the MSHCP Conservation Area, are not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Amount or Extent of Take

Occupation of modeled habitat by the Santa Ana sucker is expected to fluctuate over time and baseline survey data is incomplete. Because estimating the actual number of Santa Ana suckers that may be harmed is not feasible, we are quantifying the take as the number of acres of Santa Ana sucker modeled habitat that will be impacted in the Plan Area as a result of the proposed action.

We anticipate that up to 443 acres of modeled habitat within the Plan Area will become unsuitable for the Santa Ana sucker as a result of the proposed action. A small, but undeterminable, number of Santa Ana sucker are also anticipated to be taken as a result of management and monitoring actions. Take will be in the form of harm, death, and injury. This level of anticipated take is not likely to result in jeopardy to the Santa Ana sucker.

Incidental take of Santa Ana suckers is not authorized for flood control activities or bridge widening or replacement projects that are currently being addressed under separate consultations (*i.e.*, Programmatic Section 7 Consultation on the Santa Ana Sucker Conservation Program and the Section 7 Consultation on the Van Buren Bridge Replacement Project).

INSECTS

Delhi sands flower-loving fly (*Rhaphiomidas terminatus abdominalis*)

Status of the Species

Listing Status

The Delhi Sands flower-loving fly, *Rhaphiomidas terminatus abdominalis* (Diptera: Mydidae), was listed as endangered on September 22, 1993, pursuant to section 4 of the Act. The Delhi Sands flower-loving fly was listed because widespread loss and degradation of its habitat had proceeded to the point where extinction was imminent. Critical habitat for Delhi Sands flower-loving fly has not been proposed or designated.

Species Description

The Delhi Sands flower-loving fly is one of 19 *Rhaphiomidas* species and 5 recognized subspecies, all of which are restricted to southwestern United States and northwestern Mexico (Cazier 1985; Peterson 1981; Rogers and Mattoni 1993). Delhi Sands flower-loving fly adults are large insects (approximately 2.5 centimeters in length) with elongate bodies. An important distinguishing character is the Delhi Sands flower-loving fly's long proboscis, which it uses to extract nectar while hovering next to flowers. The Delhi Sands flower-loving fly is a strong, fast flyer capable of dispersal flights in which animals fly so rapidly that observers quickly lose visual contact (Kingsley 1996).

Habitat Affinities

The Delhi Sands flower-loving fly is generally found in areas containing Delhi fine sands soil type or windblown soils. The areas covered by these Delhi soils make up the Colton Dunes system, which originally covered an estimated 88 square kilometers (40 square miles) within southwestern San Bernardino and northwestern Riverside counties (Woodruff 1980).

The dominant physical characteristic of the Colton Dunes ecosystem is a series of dynamic windblown (aeolian) dunes, subject to repeated ground surface changes during periodic, seasonal, high winds. "Santa Ana" winds normally occur during autumn and winter and facilitate transportation and maintenance of sand and provide periodic endogenous disturbance, disturbance to which the system has been exposed repeatedly through evolutionary time (McIntyre and Hobbs 1999). The endogenous disturbance of the dune system by high winds may be an essential component of ecosystem function for the Delhi Sands flower-loving fly.

Characteristic plants associated with the Delhi Sands flower-loving fly include California buckwheat (*Eriogonum fasciculatum*), telegraph weed (*Heterotheca grandifolia*), and California croton (*Croton californicus*). Increased cover of introduced vegetation appears to reduce Delhi Sands flower-loving fly abundance (Ballmer 1989). Suitable habitat ideally contains only sparse vegetative cover, usually less than 40%. The Colton Dunes also support a number of other rare plants and animals including the legless lizard (*Anniella pulchra*), San Diego horned lizard (*Phrynosoma coronatum blainvillii*), Delhi Sands metalmark butterfly (*Apodemia mormo nigrescens*), Delhi Sands Jerusalem cricket (*Stenopelmatus* undescribed species), convergent apiocerid fly (*Apiocera convergens*), and the potentially extinct Pringle's monardella (*Monardella pringlei*). The Delhi Sands metalmark butterfly was recently described from the area (Emmel and Emmel 1998).

Life History

The life history of the Delhi Sands flower-loving fly is largely unknown. Oviposition (egg laying) generally occurs within loose, sandy soils in late summer months and may primarily occur near telegraph weed (Rogers and Mattoni 1993; Kingsley 1996). Larval stages develop completely underground and emerge as adults from July through September. Larval food sources are unknown. Most larvae within the Mydidae are predacious (Borror *et al.* 1989), but Delhi Sands flower-loving fly larvae failed to feed when presented with a variety of potential prey sources in laboratory trials (Rogers and Mattoni 1993). Adults are most active during the warmest, sunniest parts of the day, and both males and females extract nectar from California buckwheat (Kingsley 1996). It is not clear if nectar feeding is essential for adult survival or reproduction.

Status and Distribution

As of 1989, Balmer estimated that over 97 percent of the Colton Dunes system had been developed or severely modified (Ballmer 1989). This loss of Delhi soils was primarily attributed to conversion of land to agricultural uses and development for urban or commercial use (Service 1997c). Osborne (2002a) recently estimated this loss to be closer to 98 or 99 percent due to ongoing impacts of this nature. Based on a preliminary GIS analysis of mapped soils and updated aerial photography, the loss of potentially suitable habitat may be closer to 90 percent (U.S. Fish and Wildlife GIS mapping 2003). This difference is a reflection of the fact that Delhi Sands flower-loving fly are now known to utilize moderately disturbed habitats such as the Fontana Business Center site.

Of the approximately 29,337 acres of Delhi soils that existed historically within San Bernardino and Riverside counties (the presumed original range of Delhi Sands flower-loving fly), approximately 5,881 acres of Delhi soils outside of "dairy" areas were still vacant or undeveloped in 1999. Only 13 known locations of the Delhi Sands flower-loving fly have been identified in areas that are not developed, and the status of many of these populations is unknown. In addition, development has been authorized at one of these locations (FWS-WRIV-1968). Virtually all populations occur in small, isolated habitat patches surrounded by incompatible land uses and are highly vulnerable to extirpation. Nearly all areas with extant

populations have been proposed for development at some time, and almost all of the remaining habitat is privately owned.

Based on the best available survey information, there are seven known breeding sites (locations) distributed across three recovery units that are identified in the Service's recovery plan for the Delhi Sands flower-loving fly (Service 1997c). For the purpose of our analysis, we are defining a breeding site as a contiguous block of habitat with no deterrents or obstacles to movement (e.g., buildings, roads with heavy traffic) where evidence of reproduction (pupal cases, oviposition=egg laying, teneral adults=newly emerged) has been observed. It is important to understand that these breeding sites are not necessarily stable populations, and recent survey information is lacking for most sites. The Colton recovery unit supports three breeding sites; the Jurupa recovery unit supports two known breeding sites; and the Ontario recovery unit supports two breeding sites. The Delhi Sands flower-loving fly has been observed at eight other localities, but two of these localities have been developed, one is scheduled for development, and we have no direct evidence of Delhi Sands flower-loving fly reproduction at the remaining sites based on the available survey information.

The number of individuals observed at known occupied sites is extremely low in comparison with population sizes of related species with similar ecological and life history strategies (Rogers and Mattoni 1993). Due to the cryptic nature of the Delhi Sands flower-loving fly and existing regulations that do not allow mark-recapture techniques, it is not possible to accurately estimate population sizes for the Delhi Sands flower-loving fly (Kingsley 2002). However, few Delhi Sands flower-loving fly surveys report five or more individuals from occupied sites, and this supports Rogers and Mattoni's (1993) assertion that no more than a few hundred individuals existed in 1989. It is possible that even fewer Delhi Sands flower-loving flies exist today than in 1989 due to continued habitat loss and fragmentation. In addition, the quality of habitat and the area of Delhi soils now available to sustain breeding colonies at the 13 occupied sites are variable. The highest quality and largest contiguous block of available Delhi sands are found within the Colton recovery unit. Lands currently in conservation for the Delhi Sands flower-loving fly include limited areas within five of the seven known breeding sites and one additional site where Delhi Sands flower-loving flies have been observed, but no reproduction has been documented. A total of 112 acres of land throughout the three recovery units is currently conserved for the Delhi Sands flower-loving fly.

Ontario Recovery Unit

Within the Ontario recovery unit, breeding locations are known for the Delhi Sands flower-loving fly in an approximately 32-acre site near Mira Loma (Impact Sciences 1997; Thomas Olsen Associates Inc. 1999; Ecological Sciences, Inc. 2001a; P. Sorenson pers. obs.; R. Rogers pers. obs.; K. Osborne pers. obs) and an approximately 40-acre Southern California Edison easement in Ontario (Wilcox 1998a). A 3-acre parcel and a 10-acre parcel have been acquired for Delhi Sands flower-loving fly conservation at the Mira Loma location. A single male Delhi Sands flower-loving fly was observed in a 30-acre parcel north of SR-60, south of Philadelphia Street, east of Dulles Drive and west of the San Sevaine Storm Drain Channel in Mira Loma (Ecological Sciences, Inc. 2000).

Jurupa Recovery Unit

Within the Jurupa recovery unit, Delhi Sands flower-loving flies have been observed at at least four sites. At the two following sites, reproduction has not been documented.

1. At an approximate 20-acre site south of Jurupa Avenue along a Southern California Edison right-of-way easement approximately 0.5 miles south of the Fontana Business Center project site and south of Jurupa Avenue, one male Delhi Sands flower-loving fly was observed in 1998; however, no additional sightings were recorded in seven subsequent visits (Wilcox 1998a). This easement may serve as an effective corridor for movement of Delhi Sands flower-loving flies between populations, but it is unlikely to support a stable Delhi Sands flower-loving fly population in isolation.
2. A single Delhi Sands flower-loving fly was observed at the corner of Santa Ana Avenue and Locust Avenue (Sprague 1998) within a residential area east of the Empire Center site. This observation was not near any undeveloped area thought to suitable for a Delhi Sands flower-loving fly breeding colony; thus, this Delhi Sands flower-loving fly was likely dispersing in search of suitable habitat patches.

The other two sites where the Delhi Sands flower-loving fly has been observed within the Jurupa recovery unit, the Jurupa Hills site and the Empire Center site, are known Delhi Sands flower-loving fly breeding sites.

3. The Jurupa Hills site is located south of Beech Avenue in Fontana and crosses the Riverside-San Bernardino county line. Outside of the Colton recovery unit, the Jurupa Hills population of Delhi Sands flower-loving flies is the only population that the recovery plan specifically identifies for conservation in order for the Delhi Sands flower-loving fly to be considered for down-listing. The Jurupa Hills site consists of approximately 30 acres of conserved Delhi Sands flower-loving fly habitat in Riverside County (FWS-1-6-00-F-09) and an estimated 30 acres of occupied Delhi Sands flower-loving fly habitat on privately-owned, non-conserved habitat in San Bernardino County within Fontana. There have been numerous observations of Delhi Sands flower-loving flies, over multiple years, at the Jurupa Hills site, and a pupal case was found in 1995 demonstrating reproduction (Thomas Olsen and Associates 1996a; Larry Munsey International 2000; G. Ballmer pers. comm. 1998).
4. The Empire Center site is roughly 200 acres of suitable and potential Delhi Sands flower-loving fly habitat east of Sierra Avenue and north of Santa Ana Avenue in Fontana. Several Delhi Sands flower-loving flies were observed at the Empire Center site including a teneral adult demonstrating reproduction (Osborne 2002a; Goodlett 2002). Incidental take of Delhi Sands flower-loving flies at this site was recently authorized through section 7 consultation and issuance of a biological opinion to the Corps of Engineers (FWS-SB-1788.9).

5. Anecdotal evidence suggests that another breeding site may exist within this recovery unit with a highly patchy distribution on Rattlesnake Mountain, but protocol surveys and habitat assessments have not been conducted (Greg Ballmer, pers. comm, 2004).

Colton Recovery Unit

The Colton recovery unit supports six known Delhi Sands flower-loving fly locations. Two additional locations where Delhi Sands flower-loving flies were observed have already been developed.

1. The largest location is roughly 500 acres of contiguous habitat south of Interstate 10 and north of Agua Mansa Road in Colton. Evidence of breeding has been observed at this site (Wilcox 1998b, 2002), and a 7.5-acre site has been acquired for conservation through an HCP (FWS-SB-898).
2. Excellent habitat is found in two 30-acre sites, which are connected by potentially suitable habitat, south of San Bernardino Avenue between Riverside and Pepper Avenues (Goodlett 2003), and evidence of breeding has been observed (K. Osborne pers. comm. 2003). A total of 14.8 acres have been set aside for conservation in this location (FWS-SB-760, Service 1996b).
3. Evidence of breeding has been observed in the 10-acre Hospital Reserve, which has been set aside for Delhi Sands flower-loving fly conservation, south of Arrowhead Regional Medical Center in San Bernardino (Kingsley 1996). This site is contiguous with occupied 20-acre and 18-acre sites (Osborne 2002b, K. Osborne pers. comm. 2003).
4. A site generally surrounding Industrial Avenue in Rialto was judged to be approximately 265 acres of habitat in 1989 (Ballmer 1989), and Delhi Sands flower-loving flies have been observed several times with no evidence of breeding (Ballmer 1989; RB Riggan and Associates 1996; Larry Munsey International Inc. 1998; Wilcox 1998a; J. Newman pers. obs.). A total of 36.5 acres have been set aside for Delhi Sands flower-loving fly conservation in this site (FWS-1-6-97-F-12; FWS-SB-771).
5. Two male Delhi Sands flower-loving flies were observed with no evidence of breeding in the Agua Mansa Industrial Center where Agua Mansa Road crosses the San Bernardino and Riverside County line (Thomas Olsen and Associates 1996b).
6. Delhi Sands flower-loving flies have been observed near the intersection of Sycamore Avenue and Arlu Street in Rialto (Osborne 2003).

In total, within San Bernardino County, approximately 82 acres of habitat have been acquired for Delhi Sands flower-loving fly conservation. Thirteen acres of Delhi Sands flower-loving fly habitat were acquired for conservation in the City of Ontario. In the City of Colton, approximately 25 acres are conserved north of Interstate 10, and 44 acres south of Interstate 10. Within Riverside County, 30 acres of Delhi Sands flower-loving fly habitat were acquired in the Jurupa Hills for Delhi Sands flower-loving fly conservation. In each case, substantial additional

lands will need to be acquired to ensure long-term conservation of existing populations. In addition, habitat corridors will need to be established to allow for dispersal among sites.

Threats

The primary cause for the decline of the Delhi Sands flower-loving fly is degradation of its habitat for agricultural and dairy uses and, more recently, the conversion/destruction of habitat through urban and commercial development. The trend for the San Bernardino Valley is for native habitats and low-intensity land uses to be converted into more profitable enterprises. This results in the continued conversion and fragmentation of native habitats on private lands. Nationwide, this conversion and fragmentation represents a major threat to ecosystem health and conservation of biological diversity (Meffe and Carroll 1997). Development has led to the direct loss of Delhi Sands flower-loving fly habitat and populations and resulted in indirect impacts to habitat through fragmentation and associated edge effects, including disruption of aeolian wind movement of sand throughout the Colton Dunes ecosystem.

Delhi Sands flower-loving fly populations are at risk simply because of their small size. Small populations have higher probabilities of extinction than larger populations because their low abundance renders them susceptible to inbreeding, loss of genetic variation, high variability in age and sex ratios, demographic stochasticity and other random naturally occurring events, like wildfires, floods, droughts, or disease epidemics (Soulé 1987). Owing to the probabilistic nature of extinction, some small populations will survive in the short term when faced with these demographic, environmental, and genetic stochastic risks, but will eventually disappear.

Another factor that renders populations vulnerable to stochastic events is isolation, which often acts in concert with small population size to increase the probability of extinction. Urbanization and land conversion have fragmented the historic range of the Delhi Sands flower-loving fly such that remaining blocks of occupied habitat may now function more independently of each other where they were formerly connected. Isolated populations are more susceptible to long-term/permanent extirpation by accidental or natural catastrophes because the likelihood of recolonization following such events is negatively correlated with the extent of isolation. The extirpation of remnant populations during local catastrophes will continue to become more probable as land development eliminates habitat and further constricts remaining populations. For these reasons, preservation of remaining occupied sites alone will not ensure Delhi Sands flower-loving fly survival. Restoration of degraded and disturbed sites will be necessary for the survival of the subspecies, so that populations are robust enough to sustain themselves through stochastic events and remain viable despite the indirect effects of surrounding development. Because the Delhi Sands flower-loving fly has moderate movement ability in the adult phase (flying), different types of surrounding non-habitat, such as a vacant field versus commercial development, will have different effects on dispersal potential between habitat fragments (Ricketts 1999).

Fragmentation of habitat and the consequent edge effects often lead to increased vulnerability to introduced predators and competitors. For example, Argentine ants (*Linepithema humile*) are invading native California ecosystems. These non-native ants may have adverse direct or indirect effects on Delhi Sands flower-loving fly populations. Argentine ants are known to

exclude native ant species upon invasion (Holway *et al.* 2002), and they are known to reduce Dipteran richness and abundance in urban southern California habitat fragments (Bolger *et al.* 2000). Argentine ants could adversely affect Delhi Sands flower-loving fly individuals directly by preying on larva and teneral (newly emerged) adults, by affecting the ecosystem prey base or seed plants, or by disrupting key ecosystem functions typically carried out by native ants. Invasion of these ants is expected with development and associated irrigation adjacent to areas occupied by Delhi Sands flower-loving flies and can have cascading effects through the ecosystem.

Edge effects also facilitate the introduction of invasive, alien weeds that degrade Delhi Sands flower-loving fly habitat by out-competing and supplanting native vegetation. Additionally, these weeds alter the amount of soil moisture or otherwise alter the soil substrate. These opportunistic alien species displace native plant communities. Native plants cannot compete with drought-tolerant annual grasses in many parts of the Colton Dunes ecosystem once these grasses are established. The diversity and abundance of arthropods have been found to be significantly reduced in coastal dune areas containing non-native plants versus native vegetation (Nagano *et al.* 1981; Nagano and Hogue 1982; Slobodchikoff and Doyen 1977). Similar effects are expected within the Colton Dunes ecosystem.

Conservation Needs

The recovery plan for the Delhi Sands flower-loving fly describes actions that would lead to the down-listing of the subspecies and would prevent its extinction (Service 1997c). The plan established that the Delhi Sands flower-loving fly can be considered for reclassification to threatened status when at least eight populations spread across three recovery units (i.e., Colton, Jurupa, and Ontario) are permanently protected with dispersal corridors that are managed to maintain sand supply and sparse native vegetation. All three recovery units are experiencing rapid growth through commercial, industrial, and urban development. Populations within the three recovery units must be conserved in order to maintain the subspecies' distribution and genetic diversity. The criterion in the recovery plan for the Jurupa recovery unit is that the Jurupa Hills population of Delhi Sands flower-loving flies in Fontana must be secured. The criterion for the Colton recovery unit is the permanent protection of at least four Delhi Sands flower-loving flies populations, including two populations north of Interstate 10 and two south of Interstate 10, including the largest block of Colton Dunes located south of Interstate 10 and north of Agua Mansa Road. The locations of the remaining Delhi Sands flower-loving fly populations that would have to be protected were not specified in the recovery plan, although at least one population would need to be conserved in the Ontario recovery unit since the eight populations must be spread across the three recovery units. The recovery plan also specifies management and monitoring guidelines and outreach efforts as part of the strategy to reach the conservation goals identified therein.

The survival and recovery of the Delhi Sands flower-loving fly is dependent on the protection of occupied and restorable habitat. Occupied habitat contains individuals of the subspecies and associated habitat for breeding, feeding, sheltering, and/or habitat used for dispersal. Restorable habitat is an area that contains Delhi soils, not now occupied by Delhi Sands flower-loving flies, but that could be managed to support recolonization by Delhi Sands flower-loving flies. To

maintain the subspecies' distribution and its genetic diversity throughout its present range, conserved habitat is needed within the three recovery units. Because information is still lacking to determine the amount of habitat needed to sustain viable Delhi Sands flower-loving fly populations within the recovery units, the recovery plan gives priority to protecting existing populations, including protection of dispersal corridors between populations. High priority is also given to establishing new populations of the Delhi Sands flower-loving fly (Service 1997c).

Another important component of the recovery plan is scientific research into the general biology of this subspecies. A basic understanding of the feeding requirements and dispersal capabilities will be necessary to effectively manage the Delhi Sands flower-loving fly for conservation purposes. There are also important gaps in our understanding of specific habitat requirements for this subspecies.

The recovery plan also calls for public outreach aimed at instilling an appreciation for the Colton Sand Dune system. The outreach program is particularly important as a means for increasing public knowledge and understanding about this inland dune system and the native plants and animals that inhabit the area, and to accurately describe how economic development can coexist with endangered species conservation.

Environmental Baseline

Within the Plan Area, breeding sites are known for the Delhi Sands flower-loving fly in the vicinity of Mira Loma near the intersection of SR- 60 and Milliken Avenue (Impact Sciences 1997, 1998; Thomas Olsen Associates Inc. 1999; Ecological Sciences, Inc. 2001a; P. Sorenson pers. obs.; R. Rogers pers. obs.; K. Osborne pers. obs), the Jurupa Hills directly south of Beech Avenue in Fontana, San Bernardino County (Greg Ballmer, pers. comm. 1998; Thomas Olsen Associates Inc. 1996a; Larry Munsey International Inc. 1999a, 1999b, 2000); and the area surrounding Agua Mansa Road in Riverside County (Thomas Olsen Associates, Inc. 1996b). The Mira Loma location supports the only known sustainable population in the Ontario recovery unit, and suitable habitat within the Plan Area likely contributes to the viability of this population.

A single male Delhi Sands flower-loving fly was observed north of SR-60, south of Philadelphia Street, east of Dulles Drive and west of the San Sevaine Storm Drain Channel in Mira Loma (Ecological Sciences, Inc. 2000). Within Riverside County, remaining suitable habitat with long-term conservation value is generally within the vicinity of known occupied sites. The only known historic record for this species in Riverside County is from the Mira Loma area in 1941 (Ballmer 1989).

The known occupied habitat within the Plan Area in the Jurupa Hills has been purchased for multiple species conservation including the Delhi Sands flower-loving fly. This land was purchased through a formal section 7 consultation with the California Department of Transportation in order to reduce impacts related to the Interstate 15/ Galena Street interchange (FWS-1-6-00-F-09). A management plan is currently under development for this conservation land. No additional suitable habitat for the Delhi Sands flower-loving fly has been secured within Riverside County.

The Plan Area includes 2,615 acres of modeled habitat for the Delhi Sands flower-loving fly, of which 100 acres will remain in PQP Lands. Based on field visits and survey reports, we believe that a significant portion of the modeled habitat in the Plan Area is unlikely to support populations of the Delhi Sands flower-loving fly that will be determined to have long-term conservation value to the species due to the isolation of suitable habitat by existing urban development. Based on our field work, we estimate that between 220 and 240 acres of high value, suitable habitat remain and would not only contribute, but may be necessary, to maintain and support the existing populations.

Effects of the Action

Direct Effects

Up to 2,500 acres (96 percent) of the modeled habitat for the Delhi Sands flower-loving fly could be impacted over the 75-year permit term, and 14 acres will be protected within Additional Reserve Lands. Implementation of the avoidance and minimization measures outlined below will significantly reduce the amount of impact to occupied habitat.¹ With the exception of Cells 21, 22 and 55 within Area Plan Subunit 3 of the Jurupa Area Plan, surveys for the Delhi Sands flower-loving fly will be required until such time that the Additional Reserve Lands are assembled and conservation objectives for this species are met. Surveys for the Delhi Sands flower-loving fly will be conducted, according to accepted Fish and Wildlife Service protocol, for future projects where suitable habitat for the species is present within mapped Delhi Soils as determined by the surveying biologist (MSHCP Exhibit 12, Delhi Sands flower-loving fly soils with Criteria Area).

If a project site is determined to be occupied, 75 percent of the mapped Delhi Soils or 75 percent of the suitable habitat on the project site for the Delhi Sands flower-loving fly will be conserved. The Fish and Wildlife Service will have 60 days to review and comment on the determinations that identify the extent of suitable habitat for the Delhi Sands flower-loving fly. If the Fish and Wildlife Service does not concur with the determination, the applicable local Permittee(s) and the Fish and Wildlife Service will meet and confer within 10 working days to seek resolution on the determination. We anticipate that impacts to the species at occupied sites (25 percent loss areas) will be concentrated such that the avoided remaining habitat on such sites (75 percent avoided areas) will continue to support the existing population of Delhi Sands flower-loving fly over the long-term. If it is determined by the Service that the onsite conservation of avoided areas will not contribute to the long-term conservation of the Delhi Sands flower-loving fly, the project applicant will be required to pursue offsite conservation at a 3:1 ratio giving priority to Core Areas as described below (see Proposed Special Terms and Condition 11 for TE-088609-0).

¹ The MSHCP describes three potential methods to conserve the Delhi Sands flower-loving fly within the Plan Area. These methods are defined as Objectives 1A, 1B, and 1C. The Permittees will implement Objective 1B (March 3, 2004, pers. com. from Michelle Ouellette to Karen Goebel).

If it is determined that 75 percent conservation of the occupied site is not feasible and the Fish and Wildlife Service concurs that onsite conservation will not contribute to the long-term conservation of the Delhi Sands flower-loving fly, then offsite conservation at a 3:1 ratio will be pursued (*i.e.*, 3 acres conserved for every acre impacted). The 3:1 ratio of offsite conservation will be determined by calculating loss of project-site mapped Delhi Soils or, with Fish and Wildlife Service concurrence, loss of project-site suitable habitat for the Delhi Sands flower-loving fly. We anticipate that only if long-term survival of the species on a site is not considered attainable will impacts be mitigated off-site in area(s) that provide clear long-term benefit to the species.

Conservation of any offsite Delhi Sands flower-loving fly habitat will be pursued within three Core Areas, including suitable dispersal and/or movement habitat and interconnecting linkages within the Core Areas themselves, or be contiguous to areas already conserved for the Delhi Sands flower-loving fly both within or outside of the Plan Area. The first priority for conservation will be within the following occupied Core Areas: 1) within the northwestern corner of the Plan Area near Hammer Avenue and SR 60 (Mira Loma), 2) in the Jurupa Hills, and 3) in the Agua Mansa Industrial Center. If conservation for the Delhi Sands flower-loving fly cannot be achieved in these areas, other conservation efforts may be pursued both within and outside the MSHCP Plan Area (*i.e.*, San Bernardino County), subject to approval by the Wildlife Agencies and provided that the areas have long-term conservation value for the Delhi Sands flower-loving fly.

Within Cells 21, 22, and 25 of Area Plan Subunit 3 of the Jurupa Area Plan, no surveys for Delhi Sands flower-loving fly will be required. Instead, at least 50 acres of Delhi Sands flower-loving fly habitat will be acquired and included in the MSHCP Conservation Area as Additional Reserve Lands. Priorities for conservation of these 50 acres will be the same as described above. When overall conservation of at least 220 acres of habitat for the Delhi Sands flower-loving fly has been achieved as described above, surveys will be discontinued.

The MSHCP presents a proposal for improvements and expansion of SR-60 (MSHCP, Section 7, page 7-37) that warrants discussion due to its proximity to a population of Delhi Sands flower-loving fly in San Bernardino County. The proposed SR-60 improvements within Proposed Noncontiguous Habitat Block 1 would allow for the widening of the freeway from 6 lanes up to an additional 8 standard or HOV lanes. These improvements in Riverside County include a 75-foot wide rail corridor, which would need to extend to San Bernardino County and perhaps beyond. SR-60 is currently a 6-lane facility in Riverside County, while SR-60 consists of 8 standard and 2 HOV lanes to the east in San Bernardino County (Cathy Bechtel, Director of Transportation Planning and Policy Development, Riverside County Transportation Commission, pers. comm. April 22, 2004). The addition of 4 standard or HOV lanes in Riverside County would make the number of lanes equal in this portion of SR-60 to that found in San Bernardino County. In light of the current disparity in lane number, the potential addition of 8 standard or HOV lanes in Riverside County would not necessitate a reciprocal addition of lanes (*i.e.*, 4 standard or HOV lanes) within the existing continuation of the freeway to the west in San Bernardino County. Moreover, the proposed SR-60 improvements within the Plan Area will not require road-widening alternatives immediately outside the limits of the Plan Area, where the population of the Delhi Sands flower-loving fly occurs, because the existing right-of-

way could easily accommodate 4 standard or HOV lanes. In addition, giving coverage for the railway within the Plan Area will not require corridor alternatives immediately outside the limits of the Plan Area because we anticipate that any railway alternative would 1) look beyond the Plan Area at the time of project design and 2) be flexible in location and design.

The Fish and Wildlife Service anticipates that an undetermined number of Delhi Sands flower-loving fly could be harmed over the 75-year permit term from loss of breeding, feeding, and sheltering habitat. A maximum of 2,500 out of 2,615 acres of suitable habitat will be authorized for development within the Plan Area, if none of this acreage is determined to be occupied. However, implementation of the surveys and associated conservation measures will minimize the loss of occupied habitat to 25 percent of the area(s) determined to be important to the long-term conservation of the species, and the proposed permit condition will help assure that avoided occupied sites will continue to support Delhi Sands flower-loving fly over the long-term. The species will benefit by the acquisition and management of at least 50 acres of prime habitat and up to 170 acres of additional suitable habitat.

We estimate that between 220 and 240 acres of high value, suitable habitat remain and would not only contribute, but may be necessary, to maintain and support the existing populations. In particular, we believe that areas with long-term conservation value are concentrated near the known, occupied locations described above, and new observations will likely occur in small, isolated areas where conservation would not substantially contribute to the survival or recovery of the species. Mitigation efforts will give priority in the Plan Area to conserving up to 220 acres of high value habitat important to the long-term conservation of the Delhi Sands flower-loving fly.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands to maintain presence of the Delhi Sands flower-loving fly at existing levels and provide opportunities for colonization. Management measures will include sand management, access control, weed control and revegetation (MSHCP Table 5-2). Cooperative management is anticipated on PQP Lands. Surveys for the Delhi Sands flower-loving fly and successful reproduction at conservation sites will be conducted every year for the first five years after conservation sites are established (MSHCP Table 5-8). After this five year period, survey requirements will be established by reserve managers. Surveys for the Delhi Sands flower-loving fly will be conducted at least every eight years to verify occupancy at a minimum of 75 percent of known locations. If a decline in the distribution of the Delhi Sands flower-loving fly is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP.

Management actions to benefit the Delhi Sands flower-loving fly (*e.g.*, weed abatement, habitat manipulation, general maintenance activities) or other Covered Species may result in impacts, including death, to a small number of individual Delhi Sands flower-loving fly. It is anticipated that any impacts to Delhi Sands flower-loving fly from management actions will be minimized by adherence to appropriate protocols and other guidelines described in Section 7.4 of the MSHCP.

Indirect Effects

In general, implementation of the Plan may increase fragmentation and isolation of existing Delhi Sands flower-loving fly populations and limit the potential for colonization of currently unoccupied suitable habitat. The management provisions listed above will help to offset the indirect effects to this species.

Conclusion

We anticipate that the proposed action will directly and indirectly affect the Delhi Sands flower-loving fly as described in the analysis above, including the loss of up to 96 percent of modeled habitat in the Plan Area. Implementation of the avoidance, minimization, and management measures identified in the Plan will reduce the impacts to this species. Implementation of the Plan will result in the conservation, within and/or outside the Plan Area, of a minimum of 50 acres of suitable habitat and up to 170 acres of additional suitable habitat determined to have long-term conservation value for the species. We anticipate that any lands set aside for Delhi Sands flower-loving fly conservation will contribute to long-term conservation of the species and will be managed and maintained to benefit this species.

After reviewing the current status of the species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Fish and Wildlife Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the Delhi Sands flower-loving fly. We reached this conclusion because loss of occupied habitat will be limited to 25 percent of occupied area(s) within the Plan Area determined to have long-term conservation value for the species at least until an additional 220 acres of occupied Delhi Sands flower-loving fly habitat are conserved through implementation of the Plan. Highest conservation priority will be given areas with known conservation value in Riverside County. Each of the three areas identified in the Plan (Mira Loma, Jurupa Hills and the Agua Mansa Industrial Center) support populations of the Delhi Sands flower-loving fly with high conservation value, and protection of additional habitat in these areas will substantially improve the potential for long-term survival of the species. To our knowledge, these areas represent the most suitable remaining habitat for the Delhi Sands flower-loving fly in Riverside County, and the loss of occupied habitat outside these areas is not anticipated to result in the loss of populations of Delhi Sands flower-loving fly with long-term conservation value. Therefore, impacts to this species' and its habitat, when viewed in conjunction with protection and management of the MSHCP Conservation Area and surveys and procedures developed under the Plan to minimize loss of occupied habitat, are not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Amount or extent of take

It is not possible to quantify the number of Delhi Sands flower-loving fly individuals (eggs, larvae, pupae and adults) or populations that will be impacted throughout the Plan Area over the 75-year permit term. Thus, the Fish and Wildlife Service is quantifying incidental take as the number of acres of modeled habitat that will be impacted in the Plan Area as a result of the proposed action.

We anticipate that up to 2,500 acres of modeled habitat within the Plan Area will become unsuitable for the Delhi Sands flower-loving fly as a result of the proposed action. Until implementation of the Plan results in conservation of an additional 220 acres of Delhi Sands flower-loving fly habitat, take will occur only within 25 percent of occupied areas and in areas where Delhi Sands flower-loving fly conservation is determined to be infeasible and the Fish and Wildlife Service concurs that conservation of the area will not contribute to long-term survival of the Delhi Sands flower-loving fly. A small, but undeterminable, number of Delhi Sands flower-loving flies are anticipated to be taken as a result of management actions. Take will be in the form of harm, death, and injury. This level of anticipated take is not likely to result in jeopardy to the Delhi Sands flower-loving fly.

Quino checkerspot butterfly (*Euphydryas editha quino*)

Status of the Species

Listing Status

The Fish and Wildlife Service listed the Quino checkerspot butterfly (*Euphydryas editha quino*) as endangered on January 16, 1997 (62 Federal Register 2313). Designation of critical habitat for the Quino checkerspot butterfly was proposed on February 7, 2002 (66 Federal Register 9476), and finalized on April 15, 2002 (67 Federal Register 18356). The final recovery plan for this species was signed on August 11, 2003, and published on September 17, 2003 (Fish and Wildlife Service 2003b, "Recovery Plan").

Species Description

The Quino checkerspot butterfly is a recognized subspecies of Edith's checkerspot (*Euphydryas editha*), and is a member of the family Nymphalidae, the brush-footed butterflies. The Quino checkerspot butterfly differs from the other Edith's checkerspot subspecies in size, wing coloration, and larval and pupal phenotypes (Mattoni *et al.* 1997). The adult Quino checkerspot butterfly is moderate in size with a wingspan of approximately 4 centimeters (1.5 inches). The dorsal (top) sides of its wings are covered with a red, black, and cream colored checkered pattern, the ventral (bottom) sides are mottled with tan and gold, and the abdomen has red stripes across the top.

While researchers have spent more than 40 years conducting extensive focused research in North America and Europe on checkerspot butterflies (Ehrlich and Hanski 2004), in particular the federally endangered bay checkerspot butterfly and other Edith's checkerspot butterflies (*Euphydryas editha bayensis*), specific information on the Quino checkerspot butterfly is limited (67 Federal Register 18356). Because a number of biological and ecological similarities exist between the bay and Quino checkerspot butterflies, we conclude that most of research conclusions reached for the bay checkerspot butterfly can be extrapolated to the Quino checkerspot butterfly (67 Federal Register 18356; Fish and Wildlife Service 2003b).

Habitat Associations

Quino checkerspot butterflies are generally found in open areas within a number of native plant communities, including grasslands, forblands, coastal sage scrub, chaparral, vernal pools, and sparse woodlands (primarily juniper woodlands). Open areas are a critical landscape feature for the Quino checkerspot butterfly, and suitable habitat tends to be distributed as patches across several vegetation communities. Optimal habitat contains little or no invasive exotic vegetation, minimal habitat disturbance, and a well-developed cryptogamic crust (*i.e.*, a thin organic soil crust composed of cyanobacteria, lichens, moss, and fungi). The presence of topographical features that include hilltops and ridgelines are also important to the Quino checkerspot butterfly. Observations of Quino checkerspot butterflies have been made from approximately 150 meters (500 feet) to over 1,500 meters (5,000 feet) in elevation.

The majority of sites occupied by the Quino checkerspot butterfly contain dwarf plantain, the primary larval host plant (plants on which adults deposit eggs and larvae feed) for the Quino checkerspot butterfly. Other important primary larval host plants include woolly plantain (Pratt 2000, 2001 as cited in the Fish and Wildlife Service 2003b), white snapdragon (Pratt 2001), and thread-leaved bird's beak (62 Federal Register 2313; Fish and Wildlife Service 2003b). An important secondary host plant (a plant consumed by larvae but not used by adults for depositing eggs) is owl's-clover. Adults nectar mostly on a variety of small annuals such as goldfields, popcornflower, and gilia (Murphy *et al.* 1983; Mattoni *et al.* 1997; Fish and Wildlife Service 2003b). Because of its obligatory primary and secondary larval host plant associations, the Quino checkerspot butterfly is restricted by the distribution and availability of its host plants.

Some local populations of Quino checkerspot butterfly larvae may depend on secondary host plants to survive. Typically, secondary host plants are important when the primary host plants begin to dry up and become inedible before larvae are mature enough to enter into diapause (diapause is a low-metabolic resting state that may last for a year or more, depending on climatic conditions) (Singer 1972; Ehrlich *et al.* 1975). Owl's-clover is known to be important as a pre-diapause secondary host plant for bay checkerspot butterflies (Singer 1972). Secondary host plant species may also be important for post-diapause larvae if primary host plant species are not abundant enough when the larvae emerge from diapause. Species that serve as host plants may vary by site and by year depending on local population preferences and host plant availability (Fish and Wildlife Service 2003b).

Critical Habitat

Critical habitat for the Quino checkerspot butterfly was designated on April 15, 2002 (67 Federal Register 18356). The Fish and Wildlife Service designated 4 non-contiguous critical habitat units totaling 171,605 acres. Accounting for roughly 58 percent of the designated critical habitat or approximately 100,200 acres, only Units 1 and 2 occur, in whole or in part, in the Plan Area. Unit 1, the Lake Mathews Unit, encompasses approximately 14,250 acres within the northwestern portion of Riverside County, and is divided into two subunits, the Harford Springs (approximately 8,200 acres) and Lake Mathews/Estelle Mountain Reserve subunits (approximately 6,050 acres). The latter subunit is not known to be occupied by the butterfly. Unit 2, the Southwest Riverside Unit, includes approximately 85,950 acres within southwestern

Riverside County and northern San Diego County. This unit is divided into two subunits, the Temecula/ Murrieta/Oak Grove (approximately 73,810 acres) and Brown Canyon subunits (approximately 12,140 acres). Because 1,924 acres of critical habitat occur on Tribal land (Cahuilla Band of Indians) and 3,170 acres of land occur in San Diego County, Unit 2 includes about 80,856 acres of critical habitat within the Plan Area. As a result, roughly 55 percent or 95,106 acres of designated critical habitat for the Quino Checkerspot butterfly occurs within the Plan Area.

As summarized in the final rule (50 Federal Register 18356), the primary constituent elements within designated critical habitat for the Quino checkerspot butterfly consist of:

1. Grassland and open-canopy woody plant communities, such as coastal sage scrub, open red shank chaparral, and open juniper woodland, with host plants or nectar plants;
2. Undeveloped areas containing grassland or open-canopy woody plant communities, within and between habitat patches, utilized for Quino checkerspot butterfly mating, basking, and movement; or
3. Prominent topographic features, such as hills and/or ridges, with an open woody or herbaceous canopy at the top. Prominence should be determined relative to other local topographic features.

Life History

The life cycle of the Quino checkerspot butterfly typically includes one generation of adults per year with a 4 to 6 week flight period beginning from late January to early May depending on weather conditions (Emmel and Emmel 1973 as cited in Fish and Wildlife Service 2003b). The timing of the initiation of flight season varies from year to year and from site to site. During the flight period adult butterflies move about and search for nectar sources and mates. The Quino checkerspot butterfly may “hilltop.” Hilltopping is a behavior where the male butterflies patrol locally prominent geographic features such as hilltops and ridgelines in order to locate mates. Females usually mate on the day that they emerge from their pupae, and lay one or two egg clusters per day for most of their adult life. The eggs hatch 10 to 14 days later and the larvae begin to immediately feed on their host plant (Fish and Wildlife Service 2003b). As the larvae grow, they periodically molt (shed their skins). Each phase between molts is referred to as an “instar” with the first instar being the first larval stage after hatching. During the third instar, larvae are able to move among individual host plants. Larvae usually wander independently in search of food, and may switch from feeding on the plant on which they hatched to another plant of the same species or a secondary host plant. As summer approaches the food plants dry out. In their third or fourth instar, larvae enter into an obligatory diapause. Diapause allows larvae to survive regular seasonal climatic extremes (summer heat and winter cold) and also to better survive times of extended adverse conditions, such as drought. After diapause, the larvae become active and feed. They then enter their pupal stage, and within 2 to 6 weeks they metamorphose into adults and emerge as butterflies living 10 to 14 days. The adult butterflies feed, disperse, reproduce, and then die. For additional discussion on the life cycle of the Quino checkerspot butterfly, please refer to the Recovery Plan (Fish and Wildlife Service 2003b).

Most Edith's checkerspot butterfly populations, including the Quino checkerspot butterfly, exhibit one or more elements of metapopulation structure (Fish and Wildlife Service 2003b). For a detailed discussion of the population structure of the Quino checkerspot butterfly, please refer to pages 21 through 27 of the Recovery Plan (Fish and Wildlife Service 2003b) and the new book edited by Ehrlich and Hanski (2004).

As discussed on page 28 of the Recovery Plan (Fish and Wildlife Service 2003b), Quino checkerspot butterfly "populations do appear to fit the qualitative description of a [metapopulation] resilient [natural] system." Furthermore, the Recovery Plan noted that "[a]lthough resilient populations may naturally show great fluctuations in size, they are capable of maintaining . . . their integrity over time if suitable habitat remains available." For an additional discussion of the metapopulation resilience of the Quino checkerspot butterfly, please refer to pages 28 through 31 of the Recovery Plan (Fish and Wildlife Service 2003b).

Status and Distribution

As briefly described in the Introduction of the Recovery Plan (Fish and Wildlife Service 2003b), the Quino checkerspot butterfly is now known only from western Riverside County, southern San Diego County, and northern Baja California, Mexico. Historically the range of this taxon included much of coastal California south of Ventura County and inland valleys south of the Tehachapi Mountains. More than 75 percent of its historic range has been lost (Brown 1991), including more than 90 percent of its coastal mesa and bluff distribution. Primarily due to direct and indirect human impacts including habitat loss and fragmentation, invasion of nonnative plant species, and disrupted fire regimes, range-wide Quino checkerspot butterfly populations likely have been reduced in number and size by more than 95 percent. For a detailed discussion of the status, and historical and current distribution of the Quino checkerspot butterfly, please refer to pages 32 through 35 of the Recovery Plan (Fish and Wildlife Service 2003b).

Threats

As summarized on page 55 of the Recovery Plan (Fish and Wildlife Service 2003b), the Quino checkerspot butterfly is threatened primarily by urban and agricultural development, invasion by nonnative species, off-road vehicle use, grazing, and fire management practices. Other less-significant factors negatively affecting the taxon include enhanced nitrogen deposition (Allen *et al.* 1998), elevated atmospheric carbon dioxide concentrations (Coviella and Trumble 1998), and climate change (Parmesan 1996; Field *et al.* 1999; Parmesan *in press*). For an exhaustive discussion of the threats facing the Quino checkerspot butterfly, please refer to pages 55 through 65 of the Recovery Plan (Fish and Wildlife Service 2003b).

Conservation Needs

As discussed on page 71 of the Recovery Plan (Fish and Wildlife Service 2003b), "[t]he survival and recovery of the Quino checkerspot butterfly depends on protection, restoration and management of habitat within the distribution of metapopulations, augmentation of extant populations, and reintroduction or discovery of populations in areas not known to be currently occupied." The Fish and Wildlife Service further noted in the Recovery Plan in light of the fact

that “each extant population is unique, and their dynamics and distributions have not been studied, adaptive management practices and monitoring will be key aspects of recovery.” Because of the high degree of threat posed by the invasion of nonnative plants, ongoing management of all populations will be necessary into the foreseeable future. Conservation of the Quino checkerspot butterfly will require protection of all areas occupied by the taxon, including patches of larval host plants and sites used by adults during breeding, oviposition, nectaring, and dispersal.

The overall objective of the Recovery Plan (Fish and Wildlife Service 2003b) is to reclassify the Quino checkerspot butterfly from endangered to threatened status and ensure the species’ long-term conservation. The Recovery Plan identified interim goals as: 1) protecting habitat supporting known current population distributions (occurrence complexes²) and landscape connectivity between them; 2) maintaining or creating resilient populations; and 3) conducting research necessary to refine recovery criteria. For an additional discussion of the recovery objectives and criteria for the Quino checkerspot butterfly, please refer to Part II of the Recovery Plan (Fish and Wildlife Service 2003b) on pages 92 through 124.

Environmental Baseline

The Quino checkerspot butterfly is sparsely distributed from the northwest portion of the Plan Area near Harford Springs trending southeast to the San Diego County line. Due to mapping limitations our model could not capture all habitat features essential for the Quino checkerspot butterfly (*e.g.*, host plants and nectaring sources, hilltops, and cryptogamic soils). Our modeled area included habitat within the Quino checkerspot butterfly survey area map (Fish and Wildlife Service 2002d), recovery unit boundaries (Fish and Wildlife Service 2003b), and the Santa Margarita Ecological Reserve, although the reserve is not known to be occupied. The Santa Margarita Ecological reserve was included because the reserve offers some of the same habitat conditions that are present on the Santa Rosa Plateau. The primary vegetation types used to model habitat for the Quino checkerspot butterfly included coastal sage scrub, Riversidean alluvial fan sage scrub, desert scrub, chaparral, playas and vernal pools, grasslands, and peninsular juniper woodland up to an elevation of 5,500 feet.

Based on this analysis, the Plan Area supports approximately 209,551 acres of potential Quino checkerspot butterfly habitat. This habitat includes: 83,608 acres of coastal sage scrub; 2,464 acres of Riversidean alluvial fan sage scrub; 8,905 acres of desert scrub; 58,954 acres of grassland; 1,005 acres of peninsular juniper woodland and scrub; 54,567 acres of chaparral; and 48 acres of playas and vernal pools. The Plan Area encompasses 27 known occurrence complexes including 7 core complexes, which accounts for 52 percent of the occurrence complexes and 70 percent of the core occurrence complexes in the United States (Fish and

² According to page 35 of the Recovery Plan (Fish and Wildlife Service 2003b), “[s]patially clustered Quino checkerspot butterfly observations are called occurrence complexes in this recovery plan; the largest ones (in area or number of reported individuals) are termed ‘core occurrence complexes.’ Occurrence complexes represent current short-term documented local occupancy, probably within the greater distribution of extant metapopulations.” “Core occurrence complexes may represent current population density centers.”

Wildlife Service 2003b). Approximately 58,211 acres (28 percent) of modeled habitat and portions of 17 (63 percent) of the 27 known occurrences complexes occur within PQP Lands.

Since 1986, Quino checkerspot butterfly have been observed in several areas the Plan Area. These areas are the Gavilan Hills, Canyon Lake, Menifee Valley, Winchester, Diamond/Domenigoni Valley, Brown Canyon, Scott Road area, Wildomar (*i.e.*, Clinton Keith Road and I-15), Warm Springs Creek/Hogbacks, Temecula, Rancho California, French Valley, Lake Skinner/Skinner Reserve (including Bachelor Mountain and adjacent to Skunk Hollow), Sage, San Ignacio, Rocky Ridge, south of SR-79 south and east of I-15, Black Hills, Oak Mountain, Pauba Valley, Vail Lake, Butterfield/Radec, Wilson Valley, Aguanga, Durasno Valley, Spring Canyon (*i.e.*, also known as Iron Spring Canyon), Anza, Silverado, the southern edge of Garner Valley (including Pine Meadow and Lookout Mountain), and the southern edge of the San Bernardino National Forest (including the Santa Rosa Summit). Historical observations (prior to 1986) include areas no longer thought to be occupied in the Plan Area. These areas include Lake Mathews, Estelle Mountain, Alberhill, and Lake Elsinore.

The populations in the Plan Area are likely to be less at risk of extirpation than the San Diego County populations due to wider elevation range and wider number of primary host plant species associated with occupied habitat (Fish and Wildlife Service 2003b). In addition, the Quino checkerspot butterfly populations in the Plan Area were not subject to the catastrophic fires of 2003 in San Diego County, the effects of which are not yet known in that county.

Since its listing in 1997, several Federal actions have affected this species within the Plan Area (See Appendix 5). The Federal actions have included 12 section 7 consultations for activities associated with urban development. These consultations have resulted in the take of Quino checkerspot butterfly occurrence complexes and the loss of over 2,500 acres of occupied and/or suitable landscape level habitat.

Within the action area, the Recovery Plan (Fish and Wildlife Service 2003b) described 4 recovery units. The Recovery Plan synonymously used the term “habitat units” for recovery units as well. Below is a brief analysis of the baseline within each of the 4 recovery units.

Northwest Riverside County Recovery Unit

This recovery unit is generally located in northwestern Riverside County, west of I-215, and south of Lake Mathews; and it encompasses the Harford Springs and Canyon Lake occurrence complexes, and the Lake Mathews historic population site. Within this recovery unit, the Fish and Wildlife Service has designated approximately 14,250 acres of critical habitat. The 6,050-acre Lake Mathews/Estelle Mountain Reserve subunit is not known to be occupied by the butterfly. These acres constitute the entire Lake Mathews Unit (Unit 1).

The habitat quality of this recovery unit was described in detail on page 38 of the Recovery Plan (Fish and Wildlife Service 2003b). To summarize, though the habitat has been degraded by recent off-road vehicle use, potentially discing, refuse dumping, invasive plants, we concluded that these sites may still be restored. The threats facing this recovery unit were summarized on page 76 of the Recovery Plan (Fish and Wildlife Service 2003b) as “primarily from habitat

destruction and fragmentation due to development, and habitat degradation due to off-road vehicle activity, nonnative plant invasion, and grazing.”

Southwest Riverside County Recovery Unit

This recovery unit is generally located in western Riverside County east of I-215 to about 760 meters (2,500 feet) in elevation, between Winchester and Temecula; and it encompasses the Warm Springs Creek (core), Warm Springs Creek North, Winchester, Domenigoni Valley, and Skinner/Johnson (core) occurrence complexes. Within this recovery unit, the Fish and Wildlife Service has designated approximately 15,472 acres of critical habitat. These acres constitute the western portion of the Temecula/Murrieta/Oak Grove subunit of the Southwest Riverside Unit (Unit 2).

The habitat quality of this recovery unit was described on page 41 of the Recovery Plan (Fish and Wildlife Service 2003b). To summarize, “[l]andscape and habitat connectivity is fragmented by agriculture and ongoing development throughout this region, with the exception of the Southwest Riverside County Multiple Species (Shipley) Reserve area.” Most of the landscape connectivity in the recovery unit has been highly compromised by roads and the associated development. Landscape connectivity between occurrence complexes may need to be enhanced or artificially accomplished by ongoing butterfly augmentation efforts. The threats facing this recovery unit were summarized on page 79 of the Recovery Plan (Fish and Wildlife Service 2003b) as “primarily resulting from habitat destruction, degradation, and fragmentation associated with development and off-road vehicle use outside of the Southwest Riverside County Multiple Species Reserve. Within the Southwest Riverside County Multiple Species Reserve, nonnative plant species invasion poses the greatest threat.”

South Riverside County Recovery Unit

This recovery unit is generally located between the northeastern slope of Palomar Mountain (south of SR-79) and the town of Hemet (south of SR-74); and it encompasses Pauba Valley, Black Hills, Vail Lake (core), Sage (core), Brown Canyon, San Ignacio, Rocky Ridge, Wilson Valley (core), Butterfield/Radec, Billy Goat Mountain, Aguanga, Dameron Valley, and Oak Grove occurrence complexes. The Oak Grove occurrence complex occurs outside the Plan Area within San Diego County, while the Aguanga and Dameron Valley occurrence complexes straddle the boundary between Riverside and San Diego counties and, thus, occur only in part within the Plan Area. Within this recovery unit, the Fish and Wildlife Service has designated approximately 53,778 acres of critical habitat. These acres constitute most of the Brown Canyon subunit and the central portion of the Temecula/ Murrieta/Oak Grove subunit of the Southwest Riverside Unit (Unit 2).

The habitat quality of this recovery unit was described on page 43 of the Recovery Plan (Fish and Wildlife Service 2003b). To summarize, existing landscape connectivity between occurrence complexes is generally good, though off-road vehicles and refuse dumping have negatively affected the Vail Lake and Wilson Valley occurrence complexes. The Brown Canyon occurrence complex apparently has not been affected by development or recreational activities. The threats facing this recovery unit were summarized on page 79 of the Recovery Plan (Fish

and Wildlife Service 2003b) as “threatened by proposed development, nonnative plant invasion, off-road vehicle activity, and illegal trash dumping.”

South Riverside/North San Diego Counties Recovery Unit

This recovery unit is located between 1,070 and 1,520 meters (3,500 and 5,000 feet) in elevation in Riverside and San Diego Counties, surrounding the community of Anza and the Cahuilla Indian Reservation, east of Mount Palomar, north of Warner Springs, and west of the Anza Borrego State Park. The recovery unit encompasses Southwest Cahuilla, Tule Peak (core), Silverado (core), Spring Canyon, Cahuilla Creek, Bautista Road, Pine Meadow, and Lookout Mountain occurrence complexes. Within this recovery unit, the Fish and Wildlife Service has designated approximately 11,606 acres of critical habitat. These acres constitute a small portion of the Brown Canyon subunit and the eastern portion of the Temecula/Murrieta/Oak Grove subunit of the Southwest Riverside Unit (Unit 2).

The habitat quality of this recovery unit was described on page 46 of the Recovery Plan (Fish and Wildlife Service 2003b). To summarize, “[h]abitat patches appear to be well connected, except where lands have been developed north and west of the Cahuilla Tribal trust lands.” Though the Silverado occurrence complex is protected, habitat destruction in the Southwest Cahuilla occurrence complex was documented in 2003. Most known occupied areas are owned by Federal agencies (*i.e.*, Bureau of Land Management and San Bernardino National Forest) or managed for the butterfly (*i.e.*, Silverado Ranch) within the Plan Area. Portions of the Cahuilla Creek, Silverado, and Southwest Cahuilla occurrence complexes (approximately 82 percent of the Cahuilla Creek, 31 percent of the Silverado, and 16 percent of the Southwest Cahuilla occurrence complexes) occur on the Cahuilla Band of Indians’ lands. Landscape connectivity likely exists between the occurrence complexes in San Diego and Riverside counties, and between complexes in Riverside County through undeveloped lands east of the Cahuilla Tribal trust lands. The threats facing this recovery unit were summarized on page 81 of the Recovery Plan (Fish and Wildlife Service 2003b) as “primarily off-road vehicle use, increasing development pressure (Coronado 2003), grazing, nonnative plant invasion, and fire.” The purported threat of increasing development pressure was based on an economist’s prediction.

Effects of the Action

Direct Effects

The Plan Area includes 209,551 acres of modeled habitat and 27 occurrence complexes that include 7 core occurrence complexes identified in the Recovery Plan (Fish and Wildlife Service 2003b). Quino checkerspot butterflies would be subject to impacts associated with development and other proposed activities over the 75-year permit term within 98,839 acres (47 percent) of modeled habitat, which encompasses 45 of the 393 (11 percent) Quino checkerspot butterfly point locations in our dataset. Because much of the coastal sage scrub, Riversidean alluvial fan sage scrub, desert scrub, grassland, peninsular juniper woodland and scrub, chaparral, and playas and vernal pool habitat do not have the appropriate open habitat described above for the Quino checkerspot butterfly, modeled habitat likely significantly overestimates the amount of suitable habitat for Quino checkerspot butterfly within the Plan Area. In light of our proposed permit

term and condition, build out of the MSHCP likely will result in the loss of 1 of 27 (4 percent) known occurrence complexes in the Plan Area and 1 of the 52 (2 percent) known occurrence complexes throughout the species' range in the United States.

To offset impacts to the Quino checkerspot butterfly in the Plan Area, 52,502 acres (25 percent) of modeled habitat will be conserved within the anticipated Additional Reserve Lands with management prescriptions that will benefit the Quino checkerspot butterfly. The anticipated Additional Reserve Lands include 143 (36 percent) of the point locations in our dataset, with another 30 (8 percent) point locations likely to be conserved by the criteria refinement process. An additional 59,159 acres (28 percent) of modeled habitat for the Quino checkerspot butterfly will remain in PQP Lands, which likely will be managed for the butterfly. PQP Lands contain 175 (46 percent) of the point locations for the Quino checkerspot butterfly in our dataset. In total, 53 percent of the modeled habitat for the Quino checkerspot butterfly will be conserved or remain in the Plan Area. This modeled habitat includes 348 of the 393 (89 percent) of the Quino checkerspot butterfly point locations in our dataset and, at least, 96 percent of the Quino checkerspot butterfly occurrence complexes identified in the Plan Area. More importantly and with the implementation of a proposed permit term and condition, all 7 core occurrence complexes identified in the Recovery Plan (Fish and Wildlife Service 2003b) for Quino checkerspot butterfly will be included in the MSHCP Conservation Area.

The MSHCP identifies 7 core areas supporting the Quino checkerspot butterfly within the MSHCP Conservation Area (see Objective 1 page I-18 in MSHCP). These areas are Lake Mathews/Estelle Mountain/Harford Springs Core Area; Warm Springs Creek Core Area; Johnson Ranch/Lake Skinner Core Area; Oak Mountain Core Area; Wilson Valley Core Area; Sage Core Area; and Silverado/Tule Peak Core Area. In addition, the MSHCP proposes to conserve an additional six areas (see Objective 2 page I-18 in MSHCP) that are identified as French Valley, Oak Mountain/Vail Lake, Anza Valley, Sage/Wilson Valley, Brown Canyon/Cactus Valley, and Aguanga.

The Permittees would implement management and monitoring practices within the anticipated Additional Reserve Lands. Cooperative management and monitoring are anticipated on PQP Lands. The distribution of the butterfly within the Conservation Area would be documented once per year through surveys verifying occupancy at a minimum of 75 percent of the known locations (Table 5-8). If a decline in the distribution of the Quino checkerspot butterfly is documented below the verified 75 percent distribution annually, management prescriptions would be triggered to meet the species specific objectives identified in Section 9, Table 9.2 of the MSHCP.

Other management actions described in Section 5, Table 5.2, and Section 6 (*i.e.*, Urban/Wildlands Interface) in the MSHCP would also be undertaken for the Quino checkerspot butterfly. These management actions include, but are not limited to, adaptive management to maintain or enhance occupied or unoccupied Quino checkerspot butterfly habitat, management for nonnative species, farming, grazing, off-road vehicles, human collection, and other specific threats to the species. These management actions should assist in the maintenance of known habitat and populations of the Quino checkerspot butterfly. Some take within the Conservation Area associated with management activities may occur. For example, activities such as weed

eradication or prescribed burning in the Conservation Area may result in death or injury to individual butterflies.

To minimize mortality from road strikes and maintain dispersal corridors, the MSHCP proposes to implement “engineering design measures” to accommodate butterfly dispersal across roadways that intersect with the Conservation Area. These “design measures” are described in Section 7 in the MSHCP and include the potential use of wildlife overcrossings, undercrossings, or roadbed sinkings. The MSHCP acknowledges that information does not exist on the effectiveness (*i.e.*, minimize dispersal mortality) of these types of wildlife crossings for the Quino checkerspot butterfly. In addition, the MSHCP proposes to implement measures to direct the Quino checkerspot butterfly away from potentially hazardous situations caused by new or expanded roadways. The MSHCP proposes to install tall barriers (*e.g.*, tall fencing, vegetation windrows) in “some situations” in Core/Linkage areas (Section 7, page 7-84 in MSHCP). Based on the description in the MSHCP, we anticipate that the placement of these barriers would occur where cores and linkages intersect. Since the Quino checkerspot butterfly has been observed avoiding tall (over 7 feet) barriers, the use of these barriers may be effective in decreasing mortality rates near certain potentially hazardous locations (*e.g.*, high traffic roads).

Northwest Riverside County Recovery Unit

This recovery unit includes 50,887 acres of modeled habitat and 2 occurrence complexes as identified in the Recovery Plan (Fish and Wildlife Service 2003b). Quino checkerspot butterflies would be subject to impacts associated with development and other proposed activities over the 75-year permit term within 23,014 acres of modeled habitat. However, although the current status of both occurrence complexes is uncertain, build out of the MSHCP likely would not result in the loss of either complex. Nonetheless, both occurrence complexes are vulnerable to the existing threats posed by adjacent activities (*e.g.*, agricultural), a fragmented reserve edge, off-road vehicles, and invasive species.

To offset impacts to the Quino checkerspot butterfly in this recovery unit, 14,209 acres of modeled habitat will be conserved within the anticipated Additional Reserve Lands with management prescriptions that will benefit the Quino checkerspot butterfly. An additional 13,664 acres of modeled habitat for the Quino checkerspot butterfly will remain in PQP Lands, which likely will be managed for the butterfly. In light of the offsetting land conservation and management prescriptions within this recovery unit, the MSHCP will not appreciably diminish the species’ reproduction, numbers, and distributions within this recovery unit.

Southwest Riverside County Recovery Unit

This recovery unit includes 23,513 acres of modeled habitat and 5 occurrence complexes as identified in the Recovery Plan (Fish and Wildlife Service 2003b). Quino checkerspot butterflies would be subject to impacts associated with development and other proposed activities over the 75-year permit term within 9,379 acres of modeled habitat. However, build out of the MSHCP likely would not result in the loss of any occurrence complex. Nonetheless, 4 of the 5 occurrence complexes are vulnerable to the existing threats posed by adjacent activities (*e.g.*, agricultural), a fragmented reserve edge, off-road vehicles, and invasive species. The

Winchester occurrence complex is the most vulnerable due to the historic loss of most of the complex and the existing lack of landscape connectivity.

To offset impacts to the Quino checkerspot butterfly in this recovery unit, 5,835 acres of modeled habitat will be conserved within the anticipated Additional Reserve Lands with management prescriptions that will benefit the Quino checkerspot butterfly. An additional 8,299 acres of modeled habitat for the Quino checkerspot butterfly will remain in PQP Lands, which likely will be managed for the butterfly. In light of the existing threats posed by adjacent activities, a fragmented reserve edge, off-road vehicles, and invasive species, such management is especially important in this recovery unit. In particular, management will need to focus on the likely resulting fragmented habitat patches, like Proposed Core 2, which are vulnerable to edge effects. In light of the offsetting land conservation and management prescriptions within this recovery unit, the MSHCP will not appreciably diminish the species' reproduction, numbers, and distributions within this recovery unit.

South Riverside County Recovery Unit

This recovery unit includes 51,001 acres of modeled habitat and 13 occurrence complexes as identified in the Recovery Plan (Fish and Wildlife Service 2003b). Quino checkerspot butterflies would be subject to impacts associated with development and other proposed activities over the 75-year permit term within 19,869 acres of modeled habitat. However, build out of the MSHCP likely would result in only the loss of 1 occurrence complex first observed in 2001 (*i.e.*, Black Hills).

To offset impacts to the Quino checkerspot butterfly in this recovery unit, 26,361 acres of modeled habitat will be conserved within the anticipated Additional Reserve Lands with management prescriptions that will benefit the Quino checkerspot butterfly. An additional 4,771 acres of modeled habitat for the Quino checkerspot butterfly will remain in PQP Lands, which likely will be managed for the butterfly. In light of the offsetting land conservation and management prescriptions within this recovery unit, the MSHCP will not appreciably diminish the species' reproduction, numbers, and distributions within this recovery unit.

South Riverside/North San Diego Counties Recovery Unit

This recovery unit includes 63,933 acres of modeled habitat and 8 occurrence complexes as identified in the Recovery Plan (Fish and Wildlife Service 2003b). Quino checkerspot butterflies would be subject to impacts associated with development and other proposed activities over the 75-year permit term within 31,359 acres of modeled habitat.

Build out of the MSHCP using our interpretation of the Criteria likely would significantly affect the Tule Peak core occurrence complex. However, a biological issue and consideration identified in the REMAP Area Plan (Section 3.3.12 of the MSHCP) is to “[c]onserve undeveloped uplands including agricultural land, annual grassland, and coastal sage scrub that support or provide potential Habitat for Quino checkerspot butterfly.” In addition, policy REMAP 12.4 of the County's General Plan provides general conservation direction to “[c]onserve undeveloped uplands including agricultural land, annual grassland and coastal sage

scrub that support or provide potential habitat for quino checkerspot butterfly, with a focus on proposed conservation areas within the recovery units identified in the *Quino Checkerspot Butterfly Draft Recovery Plan* (Fish and Wildlife Service 2001).” To ensure consistency with this biological issue and consideration, the Fish and Wildlife Service has proposed a permit term and condition that would require the Regional Conservation Authority (RCA) to conserve the Quino checkerspot butterfly within the Tule Creek/Anza Valley Subunit of the REMAP Area Plan and, if necessary, use the Criteria Refinement Process to achieve this conservation. As a result, though our interpretation of the MSHCP Criteria likely would result in the loss of 71 percent of the Tule Peak occurrence complex, a requirement that the RCA shall conserve the Quino checkerspot butterfly within the Tule Creek/Anza Valley Subunit should allow for necessary interpretations and, if necessary, refinements of the Criteria to achieve this biological issue and consideration. This goal appears to be obtainable given that, in a statistical summary of the REMAP Area Plan in the General Plan, the County estimated that, of the 511,855 acres in the area plan, 398,823 acres (78 percent) will end up in open space (mostly existing Forest Service and Bureau of Land Management lands, and anticipated Additional Reserve Lands) and 7,513 acres (1 percent) in agriculture, while only 105,519 acres (21 percent) would end up developed (e.g., residential, commercial, industrial). Though implementation of the MSHCP Criteria likely would result in the loss of 84 percent of the Southwest Cahuilla occurrence complex outside Cahuilla Indian Lands, the Cahuilla Creek occurrence complex occurs primarily (82 percent) within Tribal lands that are outside the Plan Area. Given the small portion of this occurrence complex with the Plan Area (18 percent), we do not anticipate the MSHCP will significantly affect this occurrence complex. Though the Bautista, Pine Grove and Lookout Mountain occurrence complexes may be further isolated by build out, these occurrence complexes occur largely on anticipated Additional Reserve or PQP lands (*i.e.*, San Bernardino National Forest). Despite the reduction in landscape connectivity, build out of the MSHCP likely will not result in the loss of these 3 occurrence complexes. In sum and in light of the proposed permit term and condition, we do not anticipate the loss of any occurrence complex within this recovery unit.

To offset impacts to the Quino checkerspot butterfly in this recovery unit, 5,960 acres of modeled habitat will be conserved within the anticipated Additional Reserve Lands with management prescriptions that will benefit the Quino checkerspot butterfly. An additional 26,614 acres of modeled habitat for the Quino checkerspot butterfly will remain in PQP Lands, which likely will be managed for the butterfly. In light of the offsetting land conservation and management prescriptions within this recovery unit and our proposed a permit term and condition, the MSHCP will not appreciably diminish the species’ reproduction, numbers, and distributions within this recovery unit.

Outside All Habitat Regions and Recovery Units

Outside all of the recovery units within the Plan Area and not considered essential to the species’ survival and recovery (Fish and Wildlife Service 2003b), we identified 20,217 acres of modeled habitat. Though not known to be occupied, Quino checkerspot butterflies would be subject to impacts associated with development and other proposed activities over the 75-year permit term within 15,218 acres of modeled habitat.

Within this portion of the Plan Area, 136 acres of modeled habitat will be conserved within the anticipated Additional Reserve Lands with management prescriptions that will benefit the Quino checkerspot butterfly. An additional 4,863 acres of modeled habitat for the Quino checkerspot butterfly will remain in PQP Lands, which likely will be managed for the butterfly.

Indirect Effects

The Quino checkerspot butterfly may be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These impacts include the indirect effects described in the “General Effects” section of this biological opinion. Of greatest concern is the further fragmentation of habitats (including cores and linkages), accelerated invasion of habitats by nonnative species, increased dust and trash dumping within habitats, potential increase in off-road vehicle use and hiking trails within habitats, and potential alteration of fire frequency within habitats. After build out of the MSHCP, the occurrence complexes within the Plan Area most affected by such indirect effects include: Bautista Road, Pine Meadow, Lookout Mountain, Winchester, Warm Springs Creek, Warm Springs Creek North, Harford Springs, and Canyon Lake. Long-term persistence of these complexes likely will depend on appropriate management. In addition, as a covered activity in the MSHCP, the Off-Highway Motor Vehicles Recreation Division of the California Department of Parks and Recreation proposes to develop and operate a State vehicular recreation area, the Laborde Canyon Off-Highway Vehicle Park/State Vehicle Recreation Area (Laborde Canyon SVRA), 4 miles southwest of Beaumont. Well outside the range of the Quino checkerspot butterfly, the proposed 1,200-acre Laborde Canyon SVRA likely will attract some off-road vehicle enthusiasts that are now impacting unprotected occurrence complexes. The remaining 16 occurrence complexes are not dependant on management for persistence within the Plan Area, recognizing that most of the Dameron Valley (65 percent within northern San Diego County) and Cahuilla Creek occurrence complexes (82 percent within the Cahuilla Band of Indians reservation) occur outside the Plan Area.

Critical Habitat Effects

Build out of the MSHCP likely will impact 5,077 acres (35 percent) of the 14,250 acres of designated critical habitat for the Quino checkerspot butterfly within Unit 1 (*i.e.*, Lake Mathews Unit). Using modeled habitat for the species as a surrogate for the primary constituent elements within critical habitat, build out of the MSHCP likely will result in an estimated loss of 1,654 acres (21 percent) of the 7,844 acres of primary constituent elements for the Quino checkerspot butterfly within Unit 1. Offsetting the impacts to 5,077 acres of designated critical habitat for the Quino checkerspot butterfly within Unit 1, build out of the MSHCP will result in the conservation and management of 14,209 acres of modeled habitat within the anticipated Additional Reserve Lands within the Northwest Riverside County recovery unit. An additional 13,664 acres of modeled habitat for the Quino checkerspot butterfly will remain in PQP Lands within this recovery unit and likely managed for the butterfly. The conservation and management of 27,873 acres of modeled habitat within, between, and adjacent to the Harford Springs and Lake Mathews/Estelle Mountain Reserve subunits of Unit 1 more than offsets the impacts to critical habitat and the associated loss of 1,654 acres of primary constituent elements. In sum, the effects of the proposed action on Unit 1, impacts to critical habitat together with the offsetting land conservation and management prescriptions, do not appreciably diminish the

value of the primary constituent elements essential to the species' conservation nor do the effects preclude the ecological role of that designated critical habitat in both the survival and recovery of the species.

Build out of the MSHCP likely will impact 17,657 acres (22 percent) of the 80,856 acres of designated critical habitat for the Quino checkerspot butterfly within the MSHCP portion of Unit 2 (*i.e.*, Southwest Riverside Unit). Using modeled habitat for the species as a surrogate for the primary constituent elements within critical habitat, build out of the MSHCP likely will result in an estimated loss of 11,563 acres (23 percent) of the 49,300 acres of primary constituent elements for the Quino checkerspot butterfly within Unit 2. Offsetting the loss of 17,657 acres of designated critical habitat for the Quino checkerspot butterfly within Unit 2, build out of the MSHCP will result in the conservation and management of 38,156 acres of modeled habitat within the anticipated Additional Reserve Lands within the Southwest Riverside County, South Riverside County, and South Riverside/North San Diego County recovery units. An additional 39,684 acres of modeled habitat for the Quino checkerspot butterfly will remain in PQP Lands within these recovery units and likely managed for the butterfly. The conservation and management of 77,840 acres of modeled habitat within, between, and adjacent to the Brown Canyon and Temecula/Murrieta/Oak Grove subunits of Unit 2 more than offsets the impacts to critical habitat and the associated loss of 11,563 acres of primary constituent elements. In sum, the effects of the proposed action on Unit 2, impacts to critical habitat together with the offsetting land conservation and management prescriptions, do not appreciably diminish the value of the primary constituent elements essential to the species' conservation nor do the effects preclude the ecological role of that designated critical habitat in both the survival and recovery of the species.

Build out of the MSHCP likely will impact 22,734 acres (24 percent) of the 95,106 acres of designated critical habitat for the Quino checkerspot butterfly within Plan Area, which amounts to a 13 percent loss of the 171,605-acre rangewide designation of critical habitat. Using modeled habitat for the species as a surrogate for the primary constituent elements within critical habitat, build out of the MSHCP likely will result in an estimated loss of 13,218 acres (23 percent) of the 57,144 acres of primary constituent elements for the Quino checkerspot butterfly within Plan Area. Offsetting the loss of 22,734 acres of designated critical habitat for the Quino checkerspot butterfly within the Plan Area, build out of the MSHCP will result in the conservation and management of 52,365 acres of modeled habitat within the anticipated Additional Reserve Lands within the Plan Area. An additional 53,348 acres of modeled habitat for the Quino checkerspot butterfly will remain in PQP Lands within the Plan Area and likely managed for the butterfly. The conservation and management of 105,713 acres of modeled habitat within, between, and adjacent to critical habitat within the Plan Area more than offsets the impacts to such critical habitat and the associated loss of 11,563 acres of primary constituent elements. In sum, the effects of the proposed action critical habitat within the Plan Area, impacts to critical habitat together with the offsetting land conservation and management prescriptions, do not appreciably diminish the value of the primary constituent elements essential to the species' conservation nor do the effects preclude the ecological role of that designated critical habitat in both the survival and recovery of the species.

Conclusion

We anticipate the proposed action will directly and indirectly affect the Quino checkerspot butterfly as described in the analyses above, including the loss of up to 47 percent of the modeled habitat for this species in the Plan Area. Implementation of the avoidance, minimization, and management prescriptions identified in the Plan and our proposed permit term and condition will reduce the impacts to this species. In this regard, the prescriptions with the offsetting land conservation will ensure the impacts will not appreciably diminish the species' reproduction, numbers, and distributions within each of the 4 recovery units. We anticipate that 26 Quino checkerspot butterfly occurrence complexes within the MSHCP Plan Area will persist and that the conservation objectives for this butterfly will be met as stated in the Plan for the 110,712 acres of the modeled habitat within the existing PQP Lands and the anticipated Additional Reserve Lands. As detailed above, we anticipate that these areas will be monitored and adaptively managed cooperatively to benefit this species.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Fish and Wildlife Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the Quino checkerspot butterfly and is not likely to destroy or adversely modify designated critical habitat. Despite the degraded condition of the environmental baseline, we reached this conclusion based on the low level of impacts (4 percent to occurrence complexes and 11 percent to point locations in our dataset from the Plan Area) that are more than offset by conservation of 52,502 acres of modeled habitat within the anticipated Additional Reserve Lands with management prescriptions that will benefit the Quino checkerspot butterfly. These lands and an additional 59,159 acres of PQP Lands will be adaptively managed for the butterfly. As stated in the Recovery Plan, survival and recovery of the Quino checkerspot butterfly not only depends on protection, and restoration and management of habitat within the range of the species, but augmentation of extant populations and reintroduction or discovery of populations in areas not known to be occupied. The impacts associated with loss of this species' modeled habitat when viewed in conjunction with the protection and management of the MSHCP Conservation Area is not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range. As described above regarding critical habitat, the effects of the proposed action (*i.e.*, impacts to critical habitat together with the offsetting land conservation and management prescriptions) do not appreciably diminish the value of the primary constituent elements essential to the species' conservation nor do the effects preclude the ecological role of that designated critical habitat in both the survival and recovery of the species.

Amount or Extent of Take

We anticipate the take of all life stages (eggs, larvae, pupae adults) of the Quino checkerspot butterfly within up to 98,839 acres of Quino checkerspot butterfly habitat outside of the MSHCP Conservation Area. A small, but undeterminable, number of Quino checkerspot butterfly are anticipated to be taken as a result of management actions. Take will be in the form of harm, death, and injury. This level of anticipated take is not likely to result in jeopardy to the Quino checkerspot butterfly.

MAMMALS

San Bernardino kangaroo rat (*Dipodomys merriami parvus*)

Status of the Species

Listing Status

The San Bernardino kangaroo rat (SBKR) was emergency listed as endangered on January 27, 1998 (62 Federal Register 49401) because its historic range had been reduced by approximately 95 percent. All remaining populations were considered threatened by habitat loss, degradation, and fragmentation from urban development, sand and gravel mining, flood control projects, groundwater recharge activities, and vandalism. Upon expiration of the emergency rule, we listed the species as endangered on September 24, 1998 (63 Federal Register 51005). Critical habitat was proposed for the SBKR on December 8, 2000 (65 Federal Register 77178), and designated on April 22, 2002 (67 Federal Register 19811). The San Bernardino kangaroo rat is considered a Species of Special Concern by the California Department of Fish and Game.

Species Description

The SBKR is one of 19 recognized subspecies of Merriam's kangaroo rat (*Dipodomys merriami*), a widespread species distributed throughout the arid regions of the western United States and northwestern Mexico (Hall 1981; Williams *et al.* 1993b). There are three recognized subspecies of Merriam's kangaroo rat within California: *Dipodomys merriami merriami*, *Dipodomys merriami collinus*, and the SBKR.

The SBKR is yellowish-brown and has a body length of about 95 millimeters (3.7 inches) and a total length of 230 to 235 millimeters (9 to 9.3 inches). It is darker and smaller than either of the other two subspecies of Merriam's kangaroo rat in southern California, *D. merriami merriami* and *D. merriami collinus*.

Habitat Affinities

Historically, the SBKR was distributed across a mosaic of areas with sandy soils, including dry washes, braided river channels, terraces, and alluvial deposits (McKernan 1997). In general, SBKR appears to have a strong preference for well-drained, sandy substrates where they are able to dig simple, shallow burrows (McKernan 1997; MEC Analytical Systems 2000). The SBKR also occupies gravelly soils (McKernan 1993) and areas where sandy soils are at least partially deposited by winds (*e.g.*, Jurupa Mountains, McKernan 1997). It appears less abundant in areas with silt-clay soils (MEC Analytical Systems 2000).

The SBKR appears to reach its highest densities in areas with low to moderate (30 to 50 percent) perennial vegetative cover and greater than 40 percent bare ground, although this species can occur within areas supporting higher or lower shrub cover. Areas with a dense cover (greater than 60 percent) of nonnative annual plants and/or litter are typically either unoccupied by the SBKR or occupied at low densities. Within otherwise suitable shrub habitat for the SBKR, the

percent cover of herbaceous vegetation and sand depth can range from very low to very high (McKernan 1997; MEC Analytical Systems 2000).

Favorable conditions for the SBKR frequently occur in Riversidean alluvial fan sage scrub. This vegetation type is characterized by low growing shrubs and other perennial species tolerant of a relatively sterile, rapidly draining substrate, and includes elements from chaparral, coastal sage scrub, and desert communities (Holland 1986). Three phases (pioneer, intermediate, and mature) of Riversidean alluvial fan sage scrub have been described. These phases appear to correlate with factors indicative of fluvial disturbance such as time since last flood with significant overbank flows, elevation and distance from the main river channel, and substrate features such as texture and moisture (Smith 1980; Hanes *et al.* 1989). Under natural conditions, flood waters periodically overtop or “break out” of alluvial river channels in unpredictable spatial and temporal patterns, scouring vegetation and transporting and depositing sands. These geomorphological processes contribute to a braided mosaic of pioneer, intermediate, and mature associations of Riversidean alluvial fan sage scrub on the flood plain.

High densities of the SBKR have been documented in pioneer and intermediate phases of Riversidean alluvial fan sage scrub, which generally correlate with areas that have been more-recently disturbed by floods (within the last 40 to 70 years, McKernan 1997; MEC Analytical Systems 2000). The pioneer or earliest phase has sparse vegetation with low diversity and structure. This phase is typically found within and adjacent to active river channels or recently scoured streambeds (Smith 1980; Hanes *et al.* 1989). The intermediate phase, which represents the progressive development of the Riversidean alluvial fan sage scrub community in terms of density and diversity, is typically found between the active river channel and mature flood plain terraces at higher elevations. Areas with intermediate Riversidean alluvial fan sage scrub are subject to periodic flooding at longer intervals than the pioneer phase. The mature or latest phase occurs in areas infrequently affected by flooding (*e.g.*, upper alluvial terraces) and, as a result, has the highest structure and densest cover (Smith 1980; MEC Analytical Systems 2000). These areas with mature, dense vegetation are generally occupied at low densities by the SBKR, with animals found in scattered microsites (pockets or patches) with more-open shrub cover and loose, sandy soils (Braden and McKernan 2000). Such areas may be critical to the long-term survival of the species, providing a source of animals for recolonization following catastrophic floods that may drown kangaroo rats inhabiting lower areas of the flood plain.

The SBKR has shallow burrow systems and therefore generally does not persist in highly degraded habitats, such as areas that are frequently disced, graded, or inundated. However, it can recolonize some degraded areas once disturbance activities cease and the vegetation begins to recover.

Critical Habitat

Critical habitat for the SBKR was designated on April 23, 2002 (67 Federal Register 19811) and includes approximately 13,485 hectares (33,295 acres) in San Bernardino and Riverside counties, California. Primary constituent elements for the SBKR consist of those habitat components that are essential for their primary biological needs of foraging, reproduction, rearing of young, intraspecific communication, dispersal, genetic exchange, and/or sheltering.

The primary constituent elements occur in areas influenced by historic and/or current geomorphological processes and areas of wind-blown sand that support Riversidean sage scrub or a mosaic of this and other associated vegetation types (coastal sage scrub, chaparral) in San Bernardino and Riverside counties. Primary constituent elements are also found in areas that provide connectivity or linkage between or within larger core areas, including open space and disturbed areas containing introduced plant species. These areas may include marginal habitats such as agricultural lands that are disced annually, out-of production vineyards, margins of orchards, areas of active or inactive industrial or resource extraction activities, and urban/wildland interfaces.

Four critical habitat units have been designated for SBKR: the Santa Ana River (Unit 1), Lytle and Cajon Creeks (Unit 2); the San Jacinto River-Bautista Creek (Unit 3), and the Etiwanda Alluvial Fan and Wash (Unit 4). Unit 3 is the only critical habitat unit in Riverside County.

Life History

Few specifics are known about the life history and ecology of the SBKR because few species-specific studies have been conducted. SBKR are primarily nocturnal and active throughout the year. They reside in burrow systems, each of which appears to be occupied by a single adult. The burrow systems of many adults are often clustered in a given area. SBKR typically emerge from their burrows after sunset and may be active at any time during the night.

Though few specifics are known about the diet of the SBKR, they are granivorous and feed primarily on the seeds of Riversidean alluvial fan sage scrub species and other forbs that they harvest from the soil. They often cache seeds in small surface pits for later consumption. This behavior may enable them to endure temporary shortages of food, as has been documented for other species of *Dipodomys* (Williams *et al.* 1993a as cited in Goldingay *et al.* 1997). Green vegetation and insects may be important seasonal food sources.

Little is known about the spatial requirements of the SBKR. In other species of *Dipodomys*, the sizes of home ranges vary depending on habitat features, season, food availability, population density, and sex. Behrends *et al.* (1986) reported that home ranges for the Merriam's kangaroo rat in Riverside County, California, averaged 0.8 acre (0.33 hectare) for males and 0.8 acre (0.31 hectares) for females. Outlying areas of home ranges of neighboring kangaroo rats may overlap, but adults actively defend small core areas near their burrows (Jones 1993).

Little is known about the mating system of the SBKR. Females are capable of having more than one litter per year, and litter sizes probably average between two and three young (M. O'Farrell, Las Vegas, Nevada, as cited in MEC Analytical Systems 2000). Reproductive activities peak in June and July, although the SBKR appears to have a prolonged breeding season. Pregnant or lactating females have been captured between January and November, while males in scrotal condition have been captured between January and August (McKernan 1997).

No estimates of age-specific survival rates, age structures, sex ratios, or dispersal rates are available from populations of the SBKR. Little is known about factors that cause mortality or adversely affect birth rates in the SBKR. The availability of suitable sites for burrows, free from

winter flooding, may limit densities of kangaroo rats in some areas, especially near active river channels. Rapid decreases in kangaroo rat populations have been documented after seed caches are depleted during droughts of more than 1 year (Williams *et al.* 1993a as cited in Goldingay *et al.* 1997).

Specific information on the types and abundances of predators of the SBKR is lacking. However, natural predators likely include the common barn owl, great horned owl, long-eared owl, San Diego gopher snake, California king snake, red diamond rattlesnake, southern Pacific rattlesnake, gray fox, coyote, badger, long-tailed weasel, and bobcat.

Information regarding parasites and pathogens associated with the SBKR is generally lacking. A number of parasites and pathogens, however, are associated with the genus *Dipodomys* and therefore may be important in regards to SBKR conservation (Whitaker *et al.* 1993). Some parasites and pathogens may have deleterious effects on populations, particularly in small, isolated populations (Whitaker *et al.* 1993).

Status and Distribution

The historical range of the SBKR extended from the San Bernardino Valley in San Bernardino County to the Menifee Valley in Riverside County (Lidicker 1960; Hall 1981). Within this range, the SBKR was known from over 25 localities (McKernan 1997). From the early 1880s to the early 1930s, the SBKR was a common resident of the San Bernardino and San Jacinto Valleys (Lidicker 1960). By 1997, however, the SBKR was only known to occupy a total of approximately 3,247 acres (1,299 hectares) in six widely separated sites (McKernan 1997). Three sites (*i.e.*, Etiwanda alluvial fan, Reche Canyon, Jurupa Hills) supported only small, remnant populations, while three sites (Santa Ana River and its tributaries, Lytle and Cajon creeks, San Jacinto River and Bautista Creek) supported higher densities of kangaroo rats and were estimated to contain larger areas of occupied habitat (McKernan 1997).

The range of the SBKR is partially overlapped by the distribution of the Steven's kangaroo rat and is entirely overlapped by the range of the Pacific kangaroo rat (*Dipodomys simulans*). These species may compete for limiting resources in areas where they overlap. However, differences in habitat selection among these species may minimize competition. The SBKR primarily occurs in sage scrub habitats with open, low shrub cover and sandy soils (McKernan 1997). In contrast, the Steven's kangaroo rat typically is associated with open, arid, Riversidean alluvial fan sage scrubland associations (O'Farrell *et al.* 1986; O'Farrell and Uptain 1987; O'Farrell 1990) and occurs on a variety of soil types. The Pacific kangaroo rat typically inhabits denser shrub cover on a variety of soil types.

Within the Plan Area the SBKR is known to occur in the San Jacinto River and Bautista Creek drainages in the vicinity of San Jacinto, Hemet, and Valle Vista (67 Federal Register 19819). Along the San Jacinto River, SBKR occurs from the upper reach of habitat in the River downstream to SR-79, within the confined portion of the floodplain, beyond the earthen flood control levee, and along the river into the San Jacinto Valley and foothills of the Badlands. In Bautista Creek, SBKR occurs upstream of the Bautista flood control basin until the topography

of the canyon becomes too steep. Two SBKR-occupied tributaries to the San Jacinto River occur on Tribal lands.

There also are historic records for Homeland, Perris, the March Air Force Reserve Base, San Jacinto Wildlife/Lake Perris and Moreno Valley areas. But it is unlikely that these populations have survived habitat conversion to agriculture and housing and consequent habitat fragmentation and isolation (Dudek 2001).

Threats

Threats to the SBKR include habitat loss, destruction, degradation, and fragmentation due to sand and gravel mining operations, flood control projects, ground-water pumping and water spreading (*i.e.*, groundwater recharge), road crossings in riverine habitat, off-highway vehicle (OHV) use, agriculture, or some combination of these.

Sand and aggregate mining continue to degrade habitat occupied by the SBKR along the Santa Ana and San Jacinto rivers and Bautista, City, Cajon, and Lytle creeks. However, sand and gravel mining in Cajon Creek has been addressed through consultation, and the Cajon Creek Conservation Bank is a result of this effort [Formal Section 7 Consultation and Reinitiation of Consultation and Revision to Biological Opinion on Mining Activities and Industrial Development at the CalMat San Bernardino and Cajon Creek Properties, Lytle-Cajon Wash, San Bernardino County, California (1-6-94-F-51, and 1-6-94-F-51R1, respectively)]. Informal Section 7 consultation is underway with other sand and gravel operators in Lytle Creek and the development of a Habitat Conservation Plan pursuant to section 10 of the Act is underway for numerous sand and gravel operators in the upper Santa Ana River floodplain. A mining site on the San Jacinto River consists of almost 100 hectares (247 acres) of leased land that occurs entirely in the floodplain (Army Corps of Engineers 1996, Predischarge Notification 96-00397-RRS; KCT Consultants, Inc. 1998). Mining activities have adversely affected approximately 30 hectares (74 acres) of Riversidean alluvial fan sage scrub and are proposed to expand (KCT Consultants, Inc. 1998).

Flood control structures often confine, isolate, or fragment populations of SBKR, thereby predisposing them to catastrophes and other risks faced by small populations. Historically, SBKR occupied floodplains and adjacent upland communities containing appropriate physical and vegetative characteristics. Animals from the upper terraces of the floodplain and adjacent uplands were available to recolonize extirpated areas that were flooded and scoured during storm events. However, conversion of floodplains into narrow, monotypic channels has removed the physical structure (*i.e.*, terracing) as well as area of the active floodplain. Also, upland refugia are generally no longer available because they have been isolated by berms or levees and converted into agricultural fields, residential sites, and industrial developments. Therefore, remaining populations of SBKR within the channelized portions of rivers are at risk due to confined flooding, and recolonization following local extirpation has been precluded. Channelization also predisposes local populations of the SBKR to extirpation during large floods by drowning animals within channelized areas that confine flood waters, and eliminating or isolating upland terraces essential for recolonization. For example, the construction of berms into the floodplain along the San Jacinto River threatens SBKR by restricting them to the active

floodplain where they are susceptible to drowning due to the frequent, channelized flood flows. Also, the construction of a concrete channels along the confluence of the San Jacinto River and Bautista Creek is likely to have isolated the population of SBKR along Bautista Creek from the rest of the population in the San Jacinto River.

Flood control structures have significantly altered the natural hydrology of all alluvial areas occupied by the SBKR by decreasing the magnitude and distribution of flooding, scouring, and sand transport and deposition. In the absence of flood scouring, sediments and organic matter accumulate over time and contribute to the maturation of Riversidean alluvial fan sage scrub, increased vegetation cover, and increased density of nonnative Riversidean alluvial fan sage scrub. These conditions do not provide the open environment favored by the SBKR and, therefore, reduce the suitability of the habitat for this species. Within channelized areas, confined flood events often scour too frequently to maintain suitable habitat for the SBKR. In addition, many areas that would normally revegetate following flood events and, thereby, provide suitable habitat for the SBKR, have been denuded of vegetation by ongoing flood control and maintenance activities within spreading basins and channels. New flood control levees are proposed for the San Jacinto River as a part of this Plan.

Decades of groundwater pumping have severely depleted ground water reserves within the Plan Area and have resulted in an ever-increasing need to recharge groundwater supplies by percolating either imported or local water supplies into the local groundwater basins (October 13, 2000, Draft Program Environmental Impact Report for the San Bernardino Valley Municipal Water District Proposed Regional Water Facilities Master Plan). Groundwater recharge areas are generally unsuitable for the SBKR because of the periodic presence of standing water and the degradation of alluvial scrub communities. These activities are ongoing in the Santa Ana and San Jacinto rivers as well as Bautista, Cajon, City, and Lytle creeks. Because most of these operations were begun prior to the listing of the SBKR or its designated critical habitat, these degraded conditions constitute the baseline environmental condition for the SBKR.

Off-highway vehicle use directly damages plant communities, the soil crust, and the burrow systems of kangaroo rats thereby degrading habitat. Habitat degradation continues to occur as a result of trespass by off-highway vehicles that degrades SBKR habitat in the San Jacinto River, and trampling by recreationalists in Bautista Creek is ongoing as target and "paint-ball" shooting are common activities in this area (1994-present, N. Ferguson, CFWO, personal observations).

Agricultural activities (*e.g.*, dry-land farming) along the edges of the San Jacinto River in the vicinity of Hemet and the City of San Jacinto occasionally result in the discing of patches of suitable or occupied habitat for SBKR. Discing destroys the animals' burrows and degrades remaining vegetation associations. In combination, these factors have greatly increased the susceptibility of this population to extinction during a catastrophic event (*e.g.*, 100-year flood) by restricting it to areas most vulnerable during floods.

Continued urban development and fragmentation of habitat is also likely to promote higher levels of predation by urban-associated animals, as the interface between natural habitat and urban areas is increased (Church and Lawton 1987). Domestic or feral cats are known to be predators of native rodents, and predation by cats has been documented for the SBKR (R.

McKernan, San Bernardino Natural History Museum, Redlands, California, unpublished data). Much of this activity has already occurred in the western portions of the Plan Area (*e.g.*, within the Riverside Lowlands Bioregion). However, expanding development within the Vail Lake Area and the cities of Winchester, Hemet, Redlands, Highland, and San Bernardino are introducing new urban development at into or adjacent to alluvial fan habitat historically or currently occupied by SBKR (CFWO GIS internal database 2004).

All remaining populations of the SBKR are at risk due to their small size. Small populations have a higher probability of extinction than larger populations because their low abundance renders them susceptible to stochastic (random, naturally occurring) events such as inbreeding, the loss of genetic variation, demographic problems like skewed variability in age and sex ratios, and catastrophes such as floods, droughts, or disease epidemics (Lande 1988; Frankham and Ralls 1998; Saccheri *et al.* 1998). These chance events can affect small populations with devastating results. Extirpation can even occur when the members of a small population are healthy because whether the population increases or decreases in size is less dependent on the age-specific probabilities of survival and reproduction than on raw chance (sampling probabilities). Owing to the probabilistic nature of extinction, some small populations will survive when faced with these demographic, environmental, and genetic stochastic risks; however, many will eventually go extinct (Caughley and Gunn 1996).

Another factor that renders populations of SBKR vulnerable to stochastic events is isolation, which often acts in concert with small population size to increase the probability of extinction for endangered populations. Altered fluvial processes, urbanization, and land conversion have fragmented the historic range of the SBKR such that remaining blocks of occupied habitat may now function independently of each other. Isolated populations are more susceptible to extirpation by accidental or natural catastrophes because their re-colonization has been precluded. Hence, the extirpation of remnant populations during local catastrophes will continue to become more probable as land development further constricts remaining populations. The San Jacinto River and Bautista Creek populations are especially vulnerable to extirpation due to the limited range for SBKR in those drainages.

Conservation Needs

To maintain or improve the status of SBKR, occupied areas should be secured and managed to increase the distribution and abundance of the species. Populations should be independently viable with stable or increasing numbers (*e.g.*, exhibiting demonstrable long-term reproductive success). The natural ecosystem processes necessary to maintain viable, dynamic mosaics of habitat for the SBKR must be maintained in each conservation area. This includes a natural fluvial regime or a managed alternative that periodically results in scouring, sand transport and deposition, and plant community responses similar to those expected under a natural fluvial regime.

Environmental Baseline

Within the Plan area the SBKR is known to occur in a scattered distribution within the San Jacinto River and Bautista Creek. Our database contains 22 records of SBKR within these areas

documented over the past 10 years (CFWO GIS internal database 2004). However, extensive surveys of potential habitat areas have not been conducted. Furthermore, species distribution is anticipated to shift over time given changes to habitat conditions brought on by changes in seasonal weather patterns (*e.g.*, droughts and/or spatial changes in seasonal sand deposition). Three records in our database are assumed extirpated: a record from the Temecula/Winchester area that is now residential development, a record from the Banning Pass/Cabazon area is questionable because the subspecies *D. m. simiolus* occurs just to the east and no subspecific identification was given with this record for SBKR; and a record from the Vail Lake area is assumed erroneous as this location is outside of the historic range of SBKR. The remaining records in our database all occur within the San Jacinto River and Bautista Creek Plan Area.

The vegetation communities used to model SBKR habitat include chaparral; coastal sage scrub; Riversidean alluvial fan sage scrub; desert scrub, Peninsula juniper woodlands and scrub, grassland, and mule-fat scrub. Modeled habitat was created using Riversidean alluvial fan sage scrub habitat within the San Jacinto Valley Hydrologic Unit and then buffered by adding the remaining vegetation types within 1,640 feet (500 meters) of the Hydrologic Unit. We then removed any modeled habitat that occurred outside of the historic range of the species (*e.g.*, the Santa Ana Mountains Bioregion). Based on this analysis, the Plan Area supports 16,409 acres of modeled habitat for the SBKR. Approximately 3,690 acres (22 percent) of this modeled habitat are within existing PQP Lands. However, there may be other areas of suitable habitat for the SBKR within the Plan Area (*e.g.*, the Cactus Valley alluvial wash south of occupied habitat in Bautista Creek).

Critical Habitat

The San Jacinto River-Bautista Creek Unit of designated SBKR critical habitat (Unit 3) encompasses approximately 2,260 hectares (5,565 acres) in Riverside County and includes portions of San Bernardino National Forest, Soboba Band of Luiseno Indians Reservation, Bautista Creek, and areas along the San Jacinto River in the vicinity of San Jacinto, Hemet, and Valle Vista. This unit, which represents the southern extent of the currently known distribution of the species, is adjacent to San Bernardino National Forest and includes occupied habitat and approximately 330 hectares (815 acres) of lands not currently known to be occupied by SBKR. An estimated 330 hectares (815 acres) of designated critical habitat downstream of (west) of SR-79 is not now known to be occupied by SBKR; historic records indicate occupancy, but the Service is not aware of any recent trapping efforts to confirm presence or absence of the species in this area.

The function of critical habitat as it was designated within Unit 3 is as follows: to maintain a core population of SBKR essential for the long-term survival and recovery of the subspecies, to retain habitat connectivity within the floodplain, to maintain functioning hydrological conditions, and/or to provide refugia habitat (*i.e.*, as a source of animals for re-colonization of habitat in active floodways (67 Federal Register 19816-19). Critical habitat was designated on Tribal Lands in portions of the San Jacinto River and two of its tributaries as these areas are among the least affected by flood control activities, and they have been documented as supporting the largest known density of animals in Unit 3 (67 Federal Register 19819). However, tribal lands are not considered a part of the MSHCP.

The Plan Area includes 4,912 acres (88 percent) of the critical habitat within the 5,565-acre Critical Habitat Unit 3. Approximately 1,468 acres (30 percent) of critical habitat within the Plan Area are within existing PQP Lands.

Effects of the Action

Direct effects

The Plan Area includes approximately 16,409 acres of modeled habitat for the SBKR. There are 4,557 acres (28 percent) of this modeled habitat outside of the MSHCP Conservation Area; of that 359 acres (2 percent of total modeled habitat) occur within the Mammal Species Survey Area for the SBKR (Section 6, Figure 6-5, pp. 6-68). The SBKR is considered an Additional Survey Needs and Procedures species. Surveys will be conducted in the SBKR survey area as part of the project review process for public and private projects where suitable habitat is present. Until such time that the Additional Reserve Lands can be assembled and conservation objectives for SBKR are met, surveys will be conducted for public and private projects within the SBKR survey area. Populations detected as a result of survey effort will be avoided according to the procedures outlined in the Additional Survey Needs and Procedures (Section 6.3.2 of the Plan; *i.e.*, 90 percent of portions of property with long-term conservation value will be avoided until the species conservation goals are met). While only 2 percent of the modeled habitat outside the MSHCP Conservation Area is in the survey area, the survey area includes habitat with the highest probability of supporting SBKR.

Within the 359 acres of modeled habitat outside the MSHCP Conservation Area, but within the Mammal Species Survey Area, we anticipate that up to 10 percent of the area with long-term conservation value for this species (as discussed above) will be lost to individual projects, including all individuals within project footprints. For those locations found to contain large numbers of individuals or otherwise determined to be important to the overall conservation of the SBKR, the Plan allows flexibility to acquire these locations for inclusion into the Additional Reserve Lands (Section 6, pp. 6-70).

SBKR will be subject to impacts associated with development and other proposed Covered Activities within 4,198 acres of modeled habitat outside of both the MSHCP Conservation Area and the Mammal Species Survey Area (26 percent of total modeled habitat). Thus, all individual SBKR outside of the MSHCP Conservation Area and outside of the SBKR survey area are anticipated to be impacted over the 75-year permit term as a result of the proposed Covered Activities.

Because the SBKR is not widely distributed within the Plan Area, species-specific conservation objectives are provided in the Plan to ensure that suitable habitat and extant populations of the SBKR will persist (Section 9, pp. 9-103). These conservation objectives include the conservation of 4,440 acres of occupied and suitable SBKR habitat in the MSHCP Conservation Area with at least 75 percent of the area (*i.e.*, 3,330 acres) occupied and that at least 20 percent of the occupied habitat supports medium to high SBKR densities. Medium to high density is defined as more than 5 to 15 individuals per hectare as measured across any 8-year period (McKernan 1997). If a decline in the distribution or density of the SBKR is documented below

this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Table 9.2.

Based on our dataset, it appears that more than the 11,852 acres of modeled habitat are proposed for inclusion in the MSHCP Conservation Area. Approximately 3,690 acres (22 percent) of the modeled SBKR habitat occur within PQP Lands and 8,162 acres (50 percent) occur within the Additional Reserve Lands. Thus, the MSHCP Conservation Area will include 11,852 acres (72 percent) of the modeled SBKR habitat in the Plan Area.

We assume all extant occurrences of SBKR within the Plan Area occur within the San Jacinto River and Bautista Creek. The distribution of SBKR is anticipated to shift over time within available remaining habitat based upon changing environmental conditions. Although this conclusion is based upon the distribution of a limited number of data points that do not represent an exhaustive survey of the Plan Area, we believe that most of the currently occupied habitat for SBKR will be included within the MSHCP Conservation Area. The MSHCP Conservation Area and the Mammal Survey Area encompass all but one of the known records of SBKR within the San Jacinto River and Bautista Creek.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands including surveys for the SBKR. Cooperative management and monitoring are anticipated on PQP Lands. Surveys for the SBKR will be conducted at least every eight years to verify occupancy and every 1 to 8 years to measure abundance at a minimum of 75 percent of the known locations. If a decline in the distribution of the SBKR is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP.

Other management measures described in Section 5, Table 5.2 of the Plan will help to avoid and minimize impacts to the SBKR by maintaining or restoring ecological processes within the historic floodplains of the San Jacinto River, Bautista Creek and their tributaries, and other localities within the Criteria Area determined to be occupied in the future by SBKR. Maintenance and/or restoration of ecological processes within the MSHCP Conservation Area may include: 1) allowing for natural dynamic fluvial processes of flooding, scouring and habitat regeneration, and possibly fire, to maintain healthy alluvial fan sage scrub habitat; 2) careful planning and design of existing and future authorized uses that may affect natural processes such as flood control, water conservation, and sand and gravel mining; 3) control of other uses and disturbances such as farming and discing for weed abatement, heavy grazing, off-road vehicles, and vandalism; and 4) control of invasive exotic species. The proposed MSHCP Conservation Area is a large, contiguous block of modeled habitat for SBKR that provides for significant habitat connections between currently known, occupied locations over a significant spatial area (CFWO internal GIS database 2004). The proposed management activities are anticipated to result in substantial benefit for SBKR by enhancing and/or restoring the fluvial processes necessary to the perpetuation of suitable habitat for this species. Furthermore, we anticipate that the current limited distribution of SBKR within the Plan area will be increased by the proposed management activities.

Management actions to benefit SBKR (*e.g.*, trapping, habitat manipulations) or other Covered Species may result in impacts, including death, to a small number of individual SBKR. It is anticipated that any impacts to SBKR from management actions will be minimized by adherence to appropriate trapping protocols and other guidelines described in Section 7.4 of the MSHCP.

Indirect Effects to SBKR

The San Bernardino kangaroo rat could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These include the indirect effects described in the “General Effects” section of this biological opinion. Plan implementation may increase fragmentation among SBKR populations. The detrimental effects of fragmentation are described in the “General Effects” section of this biological opinion. The guidelines and recommendations described in Section 7 will help minimize the impact of road construction, flood control projects, and urban development on habitat connectivity. In addition, implementation of the proposed species-specific conservation objectives identified in Table 9.2 will reduce indirect effects of potential changes in hydrology as a result of Plan implementation.

Effects to Critical Habitat

A total of 33,295 acres have been designated as critical habitat for SBKR, including 5,565 acres (16 percent) of which are in the San Jacinto-Bautista Creek Critical Habitat Unit 3. The Plan Area includes 4,912 acres of designated critical habitat for SBKR, of which 3,634 acres (74 percent) are within the MSHCP Conservation Area. Therefore, we anticipate that Plan implementation will result in loss of approximately 1,278 acres (26 percent) of critical habitat within Unit 3 and 3 percent of all designated critical habitat for SBKR.

The intended functions of critical habitat designated in the Plan Area are to maintain a core population of SBKR essential for the long-term survival and recovery of the species, to retain habitat connectivity within the floodplain, to maintain functioning hydrological conditions, and/or to provide refugia habitat (*i.e.*, as a source of animals for re-colonization of habitat in active floodways (67 Federal Register 19816-19). Implementation of the MSHCP is anticipated to provide protection and management for 3,634 acres (74 percent) of critical habitat within the Plan Area. The management and monitoring activities discussed above are anticipated to maintain the important ecological functions and enhance the distribution and abundance of SBKR within these areas of critical habitat thereby minimizing the effects of Plan implementation on SBKR designated critical habitat.

Conclusion

We anticipate the proposed action will directly and indirectly affect the SBKR as described in the analyses above, including the loss of up to 26 percent of its modeled habitat in the Plan Area. An additional 2 percent of SBKR modeled habitat outside the MSHCP Conservation Area will be subject to surveys. Once the conservation objectives for the SBKR have been met, avoided areas, which have not been otherwise conserved, may be impacted. We anticipate that occurrences determined to be important to the overall conservation of the species will be

considered for inclusion in the Additional Reserve Lands and that at least some of the avoided areas may be maintained as open space habitat.

Implementation of the avoidance, minimization, and/or mitigation measures included in the Plan will reduce the impacts to the SBKR. We anticipate that this species will persist in the remaining 72 percent of the modeled habitat within both the existing PQP Lands and the Additional Reserve Lands. Together these lands form a system of large, contiguous habitat blocks that are inter-connected within the Plan Area. These areas include 74 percent of designated critical habitat for SBKR within the Plan Area. We anticipate that these areas will be monitored and managed cooperatively to benefit SBKR.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of SBKR or to adversely modify its designated critical habitat. We base this conclusion on the fact that no known population of the SBKR would be affected by the proposed action, and individuals in nearly all modeled habitat will be protected within the MSHCP Conservation Area or avoided until species-specific conservation objectives are met. Furthermore, 74 percent of the critical habitat in the Plan Area will be managed and protected to ensure its continued function. Thus, the impacts to this species and its associated habitat, when viewed in conjunction with the protection and management of this MSHCP Conservation Area, is not anticipated to result in an appreciable reduction in the numbers, reproduction or distribution of this species throughout its range.

Amount or Extent of Take

We anticipate the take of all San Bernardino kangaroo rats within up to 4,557 acres of habitat outside of the MSHCP Conservation Area. A small, but undeterminable, number of San Bernardino kangaroo rats are anticipated to be taken as a result of management actions. Take will be in the form of harm, death, and injury. This level of anticipated take is not likely to result in jeopardy to the San Bernardino kangaroo rat.

Stephens' kangaroo rat (*Dipodomys stephensi*)

Status of the Species

Listing Status

The Stephens' kangaroo rat was listed as endangered on September 30, 1988 (53 Federal Register 38465) by the Fish and Wildlife Service (1988) and as threatened by California Department of Fish and Game in 1971.

Species Description

The Stephens' kangaroo rat, a rodent of the family Heteromyidae, is 1 of 21 species of kangaroo rats (genus *Dipodomys*) (Williams *et al.* 1993b). The genus *Dipodomys* generally occurs in the

more arid portions of the North American continent (Schmidly *et al.* 1993). The Stephens' kangaroo rat is medium sized for the genus. The average adult weight is approximately 70 grams (2.5 ounces), and the total adult body-plus-tail length ranges between 23 and 30 centimeters (9 and 12 inches), with the tail 1.45 times the length of head and body (Bleich 1977).

Habitat Affinities

The Stephens' kangaroo rat occurs in relatively dry inland valleys of the Peninsular Ranges of San Bernardino, Riverside and San Diego counties of southern California and typically inhabits areas characterized by low perennial and annual cover and large areas of bare ground (Grinnel 1933; Lackey 1967a; Bontrager 1973; Bleich 1973 and 1977; Bleich and Schwartz 1974; Thomas 1975; O'Farrell *et al.* 1986; O'Farrell and Clark 1987; O'Farrell and Uptain 1989; Price *et al.* 1994; Price *et al.* 1995; Goldingay and Price 1997). Typical habitat consists of native and non-native annual herbs (*e.g.*, gold fields and filaree) and native and non-native grasses (*e.g.*, foxtail fescue and foxtail chess). Certain non-native grasses (*e.g.*, *Bromus diandrus*) can exclude or otherwise degrade Stephens' kangaroo rat habitat if they become too dense (O'Farrell and Uptain 1989). The Stephens' kangaroo rat is also found in sparse coastal sage scrub habitat (*e.g.*, cover usually less than 30 percent, O'Farrell and Clark 1987) where perennial species such as encelia, coastal sagebrush, and California buckwheat occur.

Soil type can directly influence the distribution of kangaroo rats by affecting their ability to establish burrows and indirectly influence distribution through its effect on the resulting plant community and its propensity for having standing water. Well-drained, friable soils appear very important to Stephens' kangaroo rat distribution (O'Farrell and Uptain 1989).

Life History

The Stephens' kangaroo rat is solitary and nocturnal (Bleich 1977; O'Farrell 1990). Though it is solitary, burrows are frequently found in clusters. The Stephens' kangaroo rat may modify and utilize pocket gopher and California ground squirrel burrows (Thomas 1975). It feeds primarily upon the seeds and vegetative parts of forbs such as filaree and grasses (*e.g.*, *Bromus madritensis rubens* and *Schismus barbatus*) (Lowe 1997). Additional plants documented in the diet of this animal include California buckwheat, common fiddleneck, coastal sagebrush and tarweed (Lowe 1997).

Home ranges of individual Stephens' kangaroo rats vary from approximately 0.05 hectare to nearly 0.2 hectare (0.1 acre to nearly 0.4 acre) (Thomas 1975, Bleich 1977). Thomas (1975) reported that the population density increased as the mean home range size decreased. Population density studies, based on trapping results per unit area, have resulted in estimates from 1.0 to 65.0 Stephens' kangaroo rats per hectare (0.5 to 26.30 per acre) (O'Farrell 1991, 1994, 1997, 1998; O'Farrell *et al.* 1994; McClenaghan and Taylor 1993a; Goldingay and Price 1997). However, because different methods were used to determine population densities, the results from these studies are not directly comparable.

Although Stephens' kangaroo rat is generally considered a relatively sedentary species, individuals are capable of dispersing over considerable distances. Some studies have

documented Stephens' kangaroo rats moving at least 1,000 m (3,281 feet, O'Farrell 1993, Price *et al.* 1994). Use of roadways may facilitate dispersal through marginal or unsuitable habitat and facilitate colonization of suitable patches (O'Farrell and Uptain 1989). As stated in the Plan, Stephens' kangaroo rats will cross (or attempt to cross) at least two-lane paved roads, a behavior born out by the observation of roadkill in areas occupied by the species. Given the dynamic and temporary nature of suitable habitat (*e.g.*, currently suitable habitat may convert to shrublands or dense grasslands rendering previously occupied areas unsuitable), long distance dispersal would be consistent with a colonizing species such as the Stephens' kangaroo rat.

The reproductive season for the Stephens' kangaroo rat is variable depending on conditions such as amount and timing of rainfall, though it typically centers around late winter (Bontrager 1973; McClenaghan and Taylor 1993b). Reproductively active individuals have been documented year round, however (McClenaghan and Taylor 1993b). The average litter size for the Stephens' kangaroo rat in captivity had been reported as 2.5 individuals (Lackey 1967b), although, in the wild, litter sizes as large as 4 individuals have been documented during years of high rainfall (O'Farrell 1997). Abundant rainfall causing increased vegetation growth can positively affect Stephens' kangaroo rat populations through subsequent increased food supplies; however, it can also negatively affect populations because dense vegetation growth may preclude Stephens' kangaroo rat use (Price and Kelly 1992; O'Farrell 1993, 1997).

Stephens' kangaroo rats are considered to be relatively long-lived and can live up to 8 years in captivity (O'Farrell 1997); however, definitive information on their life span in the wild is lacking. Price and Kelly (1992) reported a maximum life span of 706 days; with average life spans of 75-111 days during a 20-month study (previous trapping studies allowed documentation of older individuals).

Specific information on the types and abundances of predators of the Stephens' kangaroo rat is lacking. However, natural predators likely include the common barn owl, great horned owl, long-eared owl, San Diego gopher snake, California king snake, red diamond rattlesnake, southern Pacific rattlesnake, gray fox, coyote, badger, long-tailed weasel, and bobcat.

Information regarding parasites and pathogens associated with the Stephens' kangaroo rat is generally lacking. A number of parasites and pathogens, however, are associated with the genus *Dipodomys* and therefore may be important in regards to Stephens' kangaroo rat conservation (Whitaker *et al.* 1993). Some parasites and pathogens may have deleterious effects on populations, particularly in small, isolated populations (Whitaker *et al.* 1993).

Status and Distribution

The Stephens' kangaroo rat was historically and is currently distributed throughout the inland valleys of the coastal side of the Peninsular Ranges of San Bernardino, Riverside, and San Diego counties of southern California and is found from approximately 27 to 1,280 meters (90 to 4,200 feet) above mean sea level (Grinnell 1922, Lackey 1967a, Hall 1981, Bleich 1973, Bleich and Schwartz 1974, O'Farrell and Uptain 1989, O'Farrell *et al.* 1986, Dudek & Associates 1998b, Ogden Environmental and Energy Services Co., Inc. 1998). The entire geographic range of the Stephens' kangaroo rat was estimated to be approximately 2,870 square kilometers or 287,000

hectares (1,108 square miles) at the time of its listing in 1987 (Fish and Wildlife Service 1987). The range of the Stephens' kangaroo rat has been refined since the listing of this animal through the discovery of populations in the general vicinities of Norco and Anza in Riverside County and Guejito Ranch and Ramona in San Diego County.

Large areas of suitable habitat have been lost due to agriculture and more recently urban and industrial development (Price and Endo 1989). During a range-wide study, O'Farrell and Uptain (1989) determined that remaining occupied areas tended to be small (68 sites were less than 40 hectares {100 acres}), and 6 of 79 occupied sites were destroyed prior to completion of the report.

Remaining Stephens' kangaroo rat populations show higher genetic variability among occupied locations than anticipated according to mtDNA analysis (Metcalf *et al.* 2001). Based on topography, Metcalf *et al.* divided the species' range into three geographic regions: northern (Norco, Alessandro Heights, Sycamore Canyon, Lake Mathews, Steele Peak, and Potrero Creek); central (Motte-Rimrock Reserve, San Jacinto, Canyon Lake, Cottonwood Canyon, and Shipley Reserve); and southern (Lake Skinner, Lancaster Valley, Camp Pendleton, Fallbrook, and Guejito) (The Plan, Vol II-B, p. M-207). Metcalf *et al.* found that the different geographic regions differ genetically, with the central area having the greatest diversity of genetic lineages. These results suggest that dispersal among occupied sites was historically limited, and effective population sizes were large.

Threats

The primary threat to this species is continued habitat loss and degradation resulting in highly fragmented habitat which in turn isolates populations. The primary factors contributing to this threat include urban development, agriculture, edge effects (*e.g.*, invasive species, predation from urban-associated predators), and removal of habitat disturbance events that promote succession of grasslands into unsuitable dense vegetation and shrub habitat (Fish and Wildlife Service 1997d). Encroachment of non-native grasses (*i.e.*, *Bromus* spp.), especially during years of high rainfall, degrade Stephens' kangaroo rat habitat, which can result in the decrease of Stephens' kangaroo rat populations and even extirpation from local patches (O'Farrell and Uptain 1989; O'Farrell 1997; Dudek 1998a). Non-native predators, in general, are threats to the Stephens' kangaroo rat. Fragmentation of habitat is likely to promote higher levels of predation by urban-associated predators, such as the domestic cat, as the interface between natural areas and urban areas is increased (Church and Lawton 1987). Impacts to habitat can result in decreased populations and extirpation from local patches (O'Farrell and Uptain 1989, O'Farrell 1997, Dudek 1998a). Urban development has permanently removed habitat and has isolated much of the remaining habitat for the species. In a study of remaining occupied areas, 68 of 79 sites studied were less than 100 acres in size (O'Farrell and Uptain 1989).

Conservation Needs

This species needs conservation of suitable habitat that represents the entirety of its range in large blocks and/or several smaller blocks of habitat within 500 to 1,000 meters of each other unobstructed by urbanization, freeways or other barriers to maintain dispersal patterns. Areas

should be conserved with minimal fragmentation to reduce the threat of urban edge effects. Conserved areas should be connected to other areas of natural habitat to maintain movement of the larger mammalian predators such as coyote, bobcat, and mountain lion to keep non-native predators such as house cats in check. These conserved areas must be managed to control the spread of non-native grasses and non-native predators.

It will be important to reduce the potential for local extinction to maintain the current pattern of genetic diversity in this species. If translocation becomes necessary to enhance existing populations, the newly introduced populations may swamp existing genetic make-up.

Environmental Baseline

Within the Plan Area the Stephens' kangaroo rat occurs in a patchy distribution, ranging from the Corona/Norco Hills area just north of SR-91 and east of I-15 in the west to Blackburn Canyon in the east, the Temecula Creek and Cahuilla Valley areas in the south, and Pigeon Pass between SR-60 and I-10 in the north. The acreage of occupied habitat varies markedly over time following changes in habitat conditions associated with climate fluctuations and disturbance events.

We prepared a Stephens' kangaroo rat model based on grasslands that included a 100-meter distance or buffer into adjoining areas of open coastal sage scrub, desert scrubs, chaparral, field croplands, and alkali playas in the Riverside Lowlands, San Jacinto Foothills, and Desert Transition bioregions. This model was based on known locations that occur in grasslands and associated ecotones in a variety of open habitat types. However, not all habitat that adjoins grassland areas is open. Many grassland areas are sharply demarcated with thick chaparral or coastal sage scrub that would not be suitable for Stephens' kangaroo rat. Further, based on negative survey results, not all grassland areas are necessarily occupied by Stephens' kangaroo rat. Thus, modeled habitat likely overestimates the amount of suitable habitat for Stephens' kangaroo rat within the Plan Area.

Based on this analysis, the Plan Area supports approximately 187,792 acres of modeled habitat for the Stephens' kangaroo rat. Approximately 25,778 acres (14 percent) of this modeled habitat occur within existing PQP Lands. Our dataset includes approximately 300 point locations for the Stephens' kangaroo rat within the Plan Area.

Important Stephens' kangaroo rat populations are protected within seven core reserves designated under the *Habitat Conservation Plan for the Stephens' Kangaroo Rat in Western Riverside County* (SKR HCP, Riverside County Habitat Conservation Agency (RCHCA) 1996; Fish and Wildlife Service 1997d). In 2002, the amount of occupied habitat in six of the seven core reserves was estimated as follows: Lake Mathews-Estelle Mountain core reserve (approximately 3,989 occupied acres); Lake Skinner-Domenigoni Valley core reserve (2,157 acres); San Jacinto Wildlife Area-Lake Perris core reserve (3,475 acres); Sycamore Canyon-MARB core reserve (1,336 acres); Potrero ACEC (13.06 acres); and Motte-Rimrock core reserve (342 acres) (RCHCA 2003). The seventh core reserve is located around Steele Peak and contained approximately 860 occupied acres in 1996 (RCHCA 1996). This totals 12,172 acres of occupied habitat in the seven core reserves at the time the SKR HCP was finalized.

Subsequently, more land was added to this core reserve system totaling 12,460 acres. The goal of the SKR HCP is to conserve an additional 2,540 acres to total 15,000 acres of conserved occupied habitat within the area covered by the SKR HCP.

Additional populations in the Anza/Cahuilla/Durasno Valleys and Badlands/Potrero Valley are considered important for Stephens' kangaroo rat conservation but were not included in the SKR HCP (Fish and Wildlife Service 1997d). A population in Norco Hills adjacent to the Santa Ana River in the City of Norco initially included approximately 1,000 acres of occupied and potential habitat (Dudek 2003). These lands are in private ownership and are subject to ongoing indirect impacts of adjacent land uses, and it is estimated that the Norco Hills area will be reduced to 457 acres of highly fragmented habitat due to pending development projects. Scattered populations are also known from the Wilson Creek, Sage, Lewis Valley, Vail Lake and Aguanga areas. The majority of the species range occurs within the Plan Area. Populations from outside the Plan Area are known only from northern San Diego County (Fish and Wildlife Service 1997d).

The SKR HCP includes a provision under which the MARB portion of the Sycamore Canyon-MARB core reserve can be traded for other lands of equivalent acreage and biological value. The March Joint Powers Authority, the agency responsible for the disposition of the MARB portion of the reserve, and the RCHCA traded the MARB portion of the reserve for lands in the Potrero Valley that have recently been acquired by the County of Riverside and the California Department of Fish and Game from Lockheed Martin. The RCHCA intends to use these lands just acquired in Potrero Valley to complete the conservation goal of 15,000 acres of SKR habitat. Potrero Valley was not initially included in the SKR HCP area because of a specific plan that proposed housing development on highly valuable occupied Stephens' kangaroo rat habitat. No incidental take for Stephens' kangaroo rat was authorized for this specific plan area in Potrero Valley under the SKR HCP.

The trade out of MARB and credit for Potrero Valley has recently been approved by the Department of Fish and Game and the Service as discussed in a Dec 29, 2003, letter to the RCHCA. This letter states that of the 2,540 acres required to expand the core reserves, the Service and the Department agreed in 1998 that 1,454 acres of occupied habitat still needs to be protected to complete the core reserve expansion requirement. Based on recent surveys, the amount of occupied habitat on the Potrero Valley site is approximately 2,488 acres with an additional 570 acres of potentially occupied habitat. The trade out of approximately 1,300 acres of occupied habitat at March Air Force Base for the establishment of a core reserve on the Potrero Valley site results in a net acreage of 1,188 acres (2,488-1300) that may be credited towards the remaining 1,454 acres needed to meet the expansion requirement. Additionally, 311 acres of occupied SKR habitat have been conserved adjacent to SKR HCP core reserves through individual projects and may also be used to credit the remaining 1,454 acres needed to meet the expansion requirement. Thus, the addition of 1,499 acres to the SKR HCP core reserve system meets the 15,000-acre requirement of the SKR HCP.

Relationship of the SKR HCP to the MSHCP

The SKR HCP covers approximately 533,954 acres within the central portion of the MSHCP Plan Area. The SKR HCP will remain in place and continue to be implemented as a distinct

HCP. Incidental take of SKR has already been issued consistent with the SKR HCP within the SKR HCP boundary or fee area. Thus, we are analyzing the effect of the MSHCP on the SKR outside of the SKR HCP boundary but within the Plan Area except for most of Potrero Valley, which is credited toward completing the expansion requirements of the SKR HCP. All of Stephens' kangaroo rat modeled habitat (3,022 acres) within the Potrero Valley acquisition boundary have been subtracted from our projection of acreage conserved or lost outside the SKR HCP boundary and added to our projection of acreage conserved or lost inside the SKR HCP boundary.

Upon expiration of the SKR HCP's initial 30-year term in 2026, the RCA will process an amendment to the MSHCP to allow coverage for Stephens' kangaroo rat throughout the Plan Area. Alternatively, at any time prior to the expiration of the SKR HCP, the SKR HCP permittees may elect to have the MSHCP assume all or a portion of the requirements set forth in the SKR HCP provided that an amendment to the SKR HCP is processed as set forth in section 5 of the SKR HCP, and an amendment to the MSHCP is processed as provided for in section 16.2 and 20.0 of the MSHCP IA.

Based on our model, the area outside the SKR HCP boundary, but inside the Plan Area, supports approximately 68,600 acres of modeled habitat for the Stephens' kangaroo rat. Approximately 3,995 acres (6 percent) of the modeled habitat occur within PQP Lands.

Effects of the Action

Direct Effects

In appropriate habitat, proposed residential, commercial and urban development outside of MSHCP Conservation Area that is outside of the SKR HCP boundary will result in direct mortality of Stephens' kangaroo rats from crushing of their burrows during clearing, grading, and associated construction activities. Without detailed information on Stephens' kangaroo rat distribution and density within the Plan Area, we cannot determine how many individuals or populations will be affected by planned development. However, we anticipate the loss of up to 49,142 acres (72 percent) of modeled Stephens' kangaroo rat habitat outside of the SKR HCP boundary but within the MSHCP Plan Area, over the 75-year permit term.

Most of these 49,142 acres of non-conserved modeled habitat for Stephens' kangaroo rat are primarily concentrated in the following areas: 1) the area south of Temecula Creek and east of I-15; 2) portions of a broad area east of Lake Skinner and Domenigoni Reservoir and north of Vail Lake; 3) adjoining areas to the Cahuilla Indian Reservation on the west, north, and southeast; 4) an area north and south of I-10 in the vicinity of Banning; 5) an area along I-10 in the vicinity of Calimesa; 6) upper Labordi Canyon in the Badlands west of SR-79 and south of SR-60; 7) the Norco Hills; 8) an area west of I-15 primarily within the southern portion of the City of Corona; and 9) scattered patches in the Prado Basin and north and south of SR-60 west of the Santa Ana River. All of these areas have at least one Stephens' kangaroo rat observation or are contiguous with an area that has a Stephens' kangaroo rat observation, but the vast majority of these areas are on private land and have not been surveyed.

To offset the loss of Stephens' kangaroo rat habitat outside the SKR HCP boundary, but within the MSHCP Plan Area, implementation of the MSHCP will conserve and manage areas containing modeled habitat for the Stephens' kangaroo rat. Additional Reserve Lands will include 15,463 acres (23 percent) of modeled Stephens' kangaroo rat habitat outside the SKR HCP boundary, but within the MSHCP Plan Area. An additional 3,995 acres (6 percent) of modeled habitat will remain within PQP Lands. In total, 28 percent of the modeled habitat for Stephens' kangaroo rat will be conserved or remain outside the SKR HCP boundary, but within the MSHCP Plan Area.

Most of the modeled habitat outside of the SKR HCP boundary but within the MSHCP Conservation Area is located in the broad area east of Domenigoni Reservoir and Lake Skinner and north of Vail Lake. Other areas of modeled habitat in the MSHCP Conservation Area include an area adjoining the south side of Cahuilla Indian Reservation, including Silverado Conservation Bank, an area northwest of the SR-74 and I-15 junction, the northern edge of the Badlands and contiguous areas surrounding San Timoteo Creek, and grasslands southeast of Lake Elsinore. All of these areas have at least one Stephens' kangaroo rat observation or are contiguous with an area that has a Stephens' kangaroo rat observation with the exception of the grasslands southeast of Lake Elsinore.

The MSHCP will also conserve Stephens' kangaroo rat modeled habitat within the SKR HCP boundary that otherwise would have been authorized for take under the SKR HCP. These areas primarily consist of Additional Reserve Lands totaling about 18,053 acres. These additional conserved acres occur primarily in the Badlands, the Lake Mathews and Steele Peak area, and areas west of the Lake Skinner Reserve. These Additional Reserve Lands provide valuable linkages between the Sam Jacinto Core Reserve and the Badlands, including Potrero Valley, and throughout the Lake Mathews/Steele Peak area. In addition, PQP Lands that contain modeled habitat will be included in the MSHCP Conservation Area including the Box Springs Mountains and an area contiguous with the south side of the Lake Skinner core reserve.

To better understand how the conserved and non-conserved areas outside of the SKR HCP boundary discussed above will affect the Stephens' kangaroo rat, we grouped all modeled habitat patches within 500 meters of each other that were collectively 1,000 acres or greater in area. We also grouped all modeled habitat patches within 1,000 meters of each other that were collectively 1,000 acres or greater in area. The 500 and 1,000 meters provide a range of known distances that the Stephens' kangaroo rat has dispersed barring any natural or unnatural obstructions. The 1,000 acres represents a generally accepted minimum area which might have long term viability for the Stephens' kangaroo rat (SKR HCP 1996).

Very few modeled habitat areas were more than 1,000 meters apart and collectively less than 1,000 acres in size. For example, one group of habitat patches within 1,000 meters of each other that were collectively 1,000 acres or greater totaled 163,924 acres within the Plan Area. However, with highways and urbanization, many of these modeled habitat areas are functionally much smaller in size. Thus, we focused on the 500-meter analysis unless otherwise noted below.

Several areas of modeled habitat patches were greater than 500 meters apart from each other and collectively less than 1,000 acres primarily in more urbanized locations. For example, all of the

modeled habitat patches along SR-60 and west of the Santa Ana River are relatively small and fragmented with highways and urbanization between them that prevents dispersal. Further, because these patches of modeled habitat are typically no more than 200 acres, they are highly susceptible to urban edge effects. The implication of this result is that these smaller fragmented habitat patches are considered to have poor long-term viability for populations of Stephens' kangaroo rat.

Similarly, several relatively small modeled habitat patches in the Prado Basin and the City of Corona were identified as being greater than 500 meters apart from each other and collectively less than 1,000 acres in size. There are no known records from the Prado Basin, and the area is fragmented with the Santa Ana River and Highway 91. The patches in the central portion of the City of Corona are likely surrounded by urbanization. These areas would have poor long-term viability for populations of Stephens' kangaroo rat.

However, we also identified several areas of habitat patches within 500 meters of each other that were collectively 1,000 acres or greater in area. The largest group of habitat patches within 500 meters of each other is located in the area east of Domenigoni Reservoir and Lake Skinner and north of Vail Lake. This area is currently rural in character and topographically hilly with some steep canyons and contains approximately 19,000 acres of modeled habitat patches within 500 meters of each other. Within this large grouping of habitat patches, the MSHCP Conservation Area will include two distinct areas that are within 500 meters of each other and greater than 1,000 acres: 1) a 4,569 acre area just east of Lake Skinner; and 2) a 1,829 acre area just east of Domenigoni Reservoir. Importantly, these two areas are linked to the Lake Skinner-Domenigoni SKR HCP core reserve. Modeled habitat within each of these two areas is expected to be large enough to provide for viable populations of the Stephens' kangaroo rat based on their size and contiguity with the Lake Skinner-Domenigoni core reserve and the National Forest. Additionally, much of the remaining areas outside of the MSHCP Conservation Area here is designated as rural and mountainous and could provide some additional habitat value to the Stephens' kangaroo rat.

The next largest group of habitat patches within 500 meters of each other occurs in the northern Badlands and adjoining areas around San Timoteo Creek and I-10. About a fifth of this grouping (about 3,000 acres) will be conserved primarily in Additional Reserve Lands adjacent to the Badlands and San Timoteo Creek south of I-10. These areas contained within the MSHCP Conservation Area, in conjunction with the contiguous Additional Reserve Lands and PQP Lands within the SKR HCP boundary, are anticipated to provide connectivity and provide for a long-term viable reserve for the Stephens' kangaroo rat depending on local densities. However, virtually all of the modeled habitat (about 11,500 acres) throughout the rapidly urbanizing Calimesa area along I-10 is outside the MSHCP Conservation Area in areas anticipated to be impacted by Covered Activities proposed in the Plan. I-10 likely creates a barrier between modeled habitat areas north and south of the Interstate.

The area of modeled habitat along I-10 (about 5,200 acres) further east in the vicinity of Banning is entirely outside of the MSHCP Conservation Area. However, I-10 likely creates a barrier between modeled habitat areas north and south of the Interstate. Because of the rural and open nature of the land south of I-10, we consider this area of modeled habitat to be connected for

Stephens' kangaroo rat to Potrero Valley immediately downslope, which is less than 1,000 meters away. Thus, the modeled habitat area south of I-10 could be viable habitat for the Stephens' kangaroo rat because of its connectivity with Potrero Valley. We have no information, however, about local Stephens' kangaroo rat densities here.

Surrounding the Cahuilla Indian Reservation, three separate aggregate groupings of habitat patches that are greater than 1,000 acres in size and greater than 1,000 meters apart emerged. One of these areas on the south side of the Cahuilla Indian Reservation is within the MSHCP Conservation Area including the Silverado Conservation Bank and surrounding habitat patches. This area is approximately 1,600 acres in size and should provide enough habitat for long term viability depending on local densities of Stephens' kangaroo rat. Also, this area is contiguous with large tracts of open space to the south on PQP Lands so that the large mammalian predators should remain in the area to control non-native predators of the Stephens' kangaroo rat. However, the remaining areas of modeled habitat to the west and north of the Cahuilla Indian Reservation are outside of the MSHCP Conservation Area.

Modeled habitat within the Norco Hills that straddles the SKR HCP boundary was identified as having more than 1,000 collective acres less than 500 meters apart. However, the Norco Hills is a rapidly urbanizing area that is fragmented into areas below 1,000 acres by permitted housing tracts, mini malls, and roadways with 4 or more lanes. This area is not considered to support long-term viable populations of Stephens' kangaroo rat.

The modeled habitat west of I-15 in the area of southern Corona was identified as having more than 1,000 collective acres less than 500 meters apart. However, this area was grouped with a much larger network of habitat patches in the Lake Mathews and Steele Peak area. I-15 likely creates a barrier between modeled habitat areas east and west of the Interstate. Thus, the area of modeled habitat west of I-15 is likely not much greater than 1,000 acres. Our most recent satellite imagery for this area dated 1996 indicates that this area is not urbanized. However, its northern edge in 1996 abuts new housing tracts. We have not yet confirmed if this area supports undeveloped habitats or is otherwise largely urbanized. There is at least one known location from the northern edge of this area. None of this site is included in the MSHCP Conservation Area.

An area of modeled habitat that straddles the SKR HCP boundary northwest of the SR-74 and I-15 junction is approximately 1,000 acres. This area within the MSHCP Conservation Area is likely at or under 1,000 acres in size. However, because it is adjacent to the Cleveland National Forest that provides a full range of natural predators to control predators of the Stephens' kangaroo rat, this site might support viable populations of Stephens' kangaroo rats depending on local densities.

Although our model identified the grasslands southeast of Lake Elsinore as habitat, based on our knowledge of the site-specific conditions of this area, we expect the Stephens' kangaroo rat to only occur here in extremely low numbers.

The area south of Temecula Creek and east of I-15 was also identified as having more than 1,000 collective acres of modeled habitat patches less than 500 meters apart. However, this area is

now highly fragmented with urbanization, and we have stated in individual project consultations that impacts to Stephens' kangaroo habitat should be addressed by conserving land elsewhere that would more likely provide long-term conservation value for the species. This area is not included in the MSHCP Conservation Area.

Modeled habitat patch analysis summary

Areas having more than 1,000 collective acres of modeled habitat patches less than 500 meters apart that will not be conserved by the MSHCP include portions of the broad area east of the Lake Skinner-Domenigoni core reserve and north of Vail Lake, the areas along I-10 in Calimesa and Banning, two areas adjoining the Cahuilla Indian Reservation, and the area centered in southern Corona if still undeveloped.

However, four areas having more than 1,000 collective acres of modeled habitat patches less than 500 meters apart that will be conserved primarily in Additional Reserve Lands include the two distinct areas east of and contiguous with the Lake Skinner-Domenigoni core reserve, the Silverado Conservation Bank and surrounding modeled habitat patches, and the northern Badlands and adjoining areas around San Timoteo Creek and I-10. These areas are expected to provide for viable populations of Stephens' kangaroo rat and maintain valuable linkages to conserved areas within the SKR HCP.

Species objectives and management

The MSHCP will include within the MSHCP Conservation Area a minimum of 15,000 acres of occupied habitat (as defined in the SKR HCP), as measured across any consecutive 8-year period, in a minimum of six Core Areas within the existing boundary of the SKR HCP. Core Areas as identified in the SKR HCP include Lake Mathews-Estelle Mountain, Motte Rimrock Reserve, Lake Skinner-Domenigoni Valley, San Jacinto Wildlife Area-lake Perris, Steele Peak, and Potrero ACEC. Recently, the March Air Force Base Reserve was traded out for the acquisition of Potrero Valley.

Potrero Valley and an area in the Anza and Cahuilla Valleys are considered as two separate Core Areas within the MSHCP Conservation Area from the 6 Core Areas mentioned above. Between the Potrero Valley and the Anza and Cahuilla Valley Core Areas, at least 3,000 acres of occupied habitat, as measured across any 8-year period, will be maintained. As stated in the Stephens' kangaroo rat Species Account of the Plan, the MSHCP Conservation Area would conserve adequate representations of the older and younger populations with three of the core reserves containing the older populations and at least four of the core reserves containing the younger populations.

The Permittees will implement management and monitoring practices within the MSHCP Conservation Area both within and outside of the SKR HCP boundary including surveys for the Stephens' kangaroo rat. Cooperative management and monitoring are anticipated on PQP Lands. Surveys for the Stephens' kangaroo rat will be conducted at least every 1 to 8 years to verify that at least 30 percent of the occupied habitat (approximately 4,500 acres) at a population density of medium or higher (*i.e.*, at least 5-10 individuals per hectare) across all Core Areas.

No single Core Area will account for more than 30 percent of the total medium (or higher) population density. If a decline in the distribution of the Stephens' kangaroo rat is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP.

Management actions to benefit Stephens' kangaroo rats (*e.g.*, trapping, habitat manipulations) or other Covered Species may result in impacts, including death, to a small number of individual Stephens' kangaroo rats. It is anticipated that any impacts to Stephens' kangaroo rats from management actions will be minimized by adherence to appropriate trapping protocols and other guidelines described in Section 7.4 of the MSHCP.

Indirect Effects

Stephens' kangaroo rats could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These include the indirect effects described in the "General Effects" section of this biological opinion. Each of the major habitat complexes identified above is bisected by at least one major road artery. Road widening is proposed for several of these roads as described in Section 7.3.5 in the MSHCP. Existing and proposed roads and road widening projects may increase fragmentation among Stephens' kangaroo rat populations. The detrimental effects of fragmentation are described in the "General Effects" section above. The guidelines and recommendations described in Section 7 of the MSHCP will help minimize the impacts of road construction on habitat connectivity.

Conclusion

We anticipate the proposed action will directly and indirectly affect the Stephens' kangaroo rat as described in the analyses above, including the loss of up to 72 percent of the modeled habitat for this species outside the SKR HCP area, but within the MSHCP Plan Area. Implementation of the avoidance, minimization, and mitigation measures identified in the Plan will reduce the impacts to this species. We anticipate that this species will persist in most of the remaining 28 percent of the modeled habitat within both the existing PQP Lands and the Additional Reserve Lands outside the SKR HCP boundary, but within the Plan Area because these lands are generally contained in large blocks that are connected to the SKR HCP Reserve system and/or other large natural areas in surrounding public lands. Further, we anticipate that this species will greatly benefit from the 18,053 acres of Additional Reserve Lands of modeled habitat contributed by the MSHCP within the SKR HCP boundary that was otherwise authorized for take under the SKR HCP by generally expanding the existing or planned core habitat complexes and contributing to functional linkages among these core complexes.

In the Plan Area, approximately 42,540 acres of modeled habitat within the MSHCP Conservation Area occurs within the SKR HCP boundary together with 19,459 acres of modeled habitat within the MSHCP Conservation Area outside the SKR HCP boundary for a total of 61,999 acres. Within this conserved acreage are eight Core Areas identified by the Plan. Three additional areas of conserved modeled habitat patches within 500 meters of each other that were collectively 1,000 acres or greater emerged from our model. Together, the MSHCP Conservation Area inside and outside the SKR HCP boundary includes most of the largest

blocks of modeled habitat, which are thought to contribute to the long-term conservation of the Stephens' kangaroo rat. We anticipate that these areas will be monitored and managed cooperatively to benefit this species.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the Stephens' kangaroo rat. We reached this conclusion based on the widespread distribution of the Stephens' kangaroo rat in the Plan Area and because the impacts associated with loss of this species' modeled habitat, when viewed in conjunction with the protection and management of the MSHCP Conservation Area, is not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Amount or Extent of Take

We anticipate the take of all Stephens' kangaroo rats within up to 49,142 acres of modeled Stephens' kangaroo rat habitat outside of the SKR HCP fee area and outside of the MSHCP Conservation Area. A small, but undeterminable, number of Stephens' kangaroo rats are anticipated to be taken as a result of management actions. Take will be in the form of harm, death, and injury. This level of anticipated take is not likely to result in jeopardy to the Stephens' kangaroo rat.

PLANTS

California Orcutt grass (*Orcuttia californica*)

Status of the Species

Listing Status

California Orcutt grass was federally listed as endangered on August 3, 1993 (58 Federal Register 41391). The State of California also listed the species as endangered in September, 1979. Critical habitat has not been designated for this species. The Recovery Plan for Vernal Pools of Southern California was completed in September 1998 and included California Orcutt grass (Fish and Wildlife Service 1998b).

Species Description

California Orcutt grass is one of five species in the genus *Orcuttia* in the family Poaceae (Reeder 1993). This species, first collected by Charles Orcutt, was described by George Vasey (1886). At the time, two other varieties were recognized (*Orcuttia californica* var. *viscida* and *Orcuttia californica* var. *inaequalis*). Reeder (1982) elevated all of the varieties to species status. This small, annual, bright gray-green grass reaches about 10 centimeters (4 inches) in height and secretes sticky exudate. A secretion on all leaves is first glistening and watery, but as the plant matures, the secretion becomes thicker, denser and brownish. This secretion, believed to aid in water conservation during the warm spring and hot summer months, is aromatic and bitter tasting

and may serve to deter animal predation (Crampton 1959; Griggs 1981). Inflorescences consist of seven spikelets arranged in two ranks, with the upper spikelets overlapping on a somewhat twisted axis. California Orcutt grass is differentiated from other species in the genus by the following characteristics: teeth of lemma (bract enclosing the floret) 5 millimeters (0.2 inches) long or less; the teeth sharp-pointed or with awns 5 millimeters (0.2 inches) long or less; culms (stems) usually prostrate; caryopsis (fruit) 1.5-1.8 millimeters (0.06-0.07 inches) long; plants sparingly pilose (bearing soft and straight spreading hairs); and spikelets remote on the axis below, crowded toward the apex.

Habitat Affinities

All known California Orcutt grass localities are associated with vernal pools (Crampton 1959; Reeder 1982; CNPS 2001; Fish and Wildlife Service 1998b). California Orcutt grass tends to grow in the deeper and wetter portions of the vernal pool basins, but this annual does not show much growth until the basins become somewhat desiccated (Fish and Wildlife Service 1993a; Reiser 1996). Griggs and Jain (1983) observed that individual plants found in deeper portions of the pools tend to be more fully developed and larger than individuals at the pool margins.

Life History

California Orcutt grass flowers from April through June (Munz 1974) and appears to be strongly adapted to wind pollination. Stamens are 2 to 3 centimeters long and the species is protandrous (*i.e.*, anthers develop before the stigma is receptive). In combination with the protandry, this species is believed to be an outcrosser (Griggs and Jain 1983). *Orcuttia* floral spikelets are of indeterminate growth, the duration of which is dependant on the duration of favorable environmental conditions.

Griggs (1981) observed in the field that, following pool inundation, fungi covered the seeds which germinated approximately two weeks later. Griggs (1981) experimented with various methods of seed gemination in the laboratory, observing that only when fungi covered the seeds did germination occur (often at a rate of 90 to 100 percent). Studies conducted by Keeley (1988) revealed that anaerobic conditions promote germination of California Orcutt grass fruits, but fungicide treatment appears to inhibit germination (fungal growth developed on the seeds in all other treatments). A dependence on fungus and anaerobic conditions for germination is consistent with conditions in water-filled vernal pools and may explain how germination is cued during years of sufficient rainfall (Keeley 1988).

Studies of other *Orcuttia* species indicate that the number of fruits produced per plant is highly variable within a population, and variation in seed production between seasons can show a two- or three-fold difference. This is not unexpected given the dependence of *Orcuttia* species on a synchrony of environmental conditions (timing and duration of rainfall, temperature, etc.) (Griggs and Jain 1983). California Orcutt grass seeds can remain dormant for at least three to four years and possibly longer, germinating in the spring only after flooding of the vernal pools (Griggs 1981; Griggs and Jain 1983). California Orcutt grass remains intact and upright upon senescence. The first heavy rainstorms of the late fall or early winter cause the plants to fall apart, releasing the fruit formed the previous summer. The fruits either become firmly attached

to the muddy surface of the pool or sink to the bottom if the pool is inundated (Griggs 1981). California Orcutt grass seedlings grow for several weeks submerged, producing leaves that float on the surface. After the pools have dried California Orcutt grass produces a new set of foliage that will last for one to two months until flowering and fruiting have occurred (Griggs 1981, Keeley 1988).

Status and Distribution

The current range of California Orcutt grass is from the Carlsberg vernal pool located in Moorpark in Ventura County, south to the vernal pools around San Quintin, Baja California, Mexico (Fish and Wildlife Service 1998b). Its elevational range is from 15 to 625 meters (Reeder 1993; CNPS 2001).

In Los Angeles County, the species is known from two localities near Santa Clarita and Woodland Hills. In Ventura County, the species is known from the Carlsberg vernal pool located in Moorpark. In Riverside County, the species occurs at the Santa Rosa Plateau, Skunk Hollow, the Murrieta area, and the Hemet area. In San Diego County, California Orcutt grass is found in two pools on Marine Corps Air Station Miramar in Carlsbad and in four pool complexes on Otay Mesa. In Baja California, Mexico, the species has been detected on Mesa de Colonet and in pools at San Quintin.

Threats

California Orcutt grass and its habitat are threatened by habitat destruction and fragmentation from urban and agricultural development, pipeline construction, alteration of hydrology and flood plain dynamics, excessive flooding, off road vehicle activity, trampling by cattle and sheep, weed abatement, fire suppression practices (including discing and plowing), and competition from alien plant species as well as other vernal pool species (Fish and Wildlife Service 1998b). A number of specific threats to the species have been documented within the Plan Area. As is discussed in specific examples below, within the Plan Area, California Orcutt grass has been subjected to loss or degradation of habitat due to urban development, conversion to agriculture, and grazing. The species has been affected indirectly by alterations in hydrology, invasion of non-native species, and deleterious effects resulting from habitat fragmentation and adjoining urban land uses.

Conservation Needs

The conservation needs of California Orcutt grass include conservation and management of known occurrences in Ventura, Los Angeles, San Diego, and Riverside counties in a manner that provides for long-term viability of the species. Newly discovered ephemeral pools that support the species should be conserved in the same manner. Western Riverside County is important to the continued survival and recovery of California Orcutt grass because this area includes the most inland extent of the species' range and the largest remaining valley vernal pool in southern California, which is occupied by the species. Actions that would modify the hydrology supporting the species' habitat or increase the likelihood of deleterious effects from any identified threat should be avoided.

Recovery efforts necessary for the survival and recovery of California Orcutt grass are addressed in the Recovery Plan for Vernal Pools of Southern California. The Recovery Plan states that existing vernal pools occupied by California Orcutt grass should be secured from further loss and degradation in a configuration that maintains habitat functions and species viability. The Recovery Plan specifically mentions the importance of conserving the Hemet complexes for this species, which are located within the Plan Area.

Environmental Baseline

Within the Plan Area California Orcutt grass has been documented in the Skunk Hollow Pool, a 33-acre vernal pool at the Barry Jones Wetland Mitigation Bank (CNDDDB 2003); several pools at the Santa Rosa Plateau (CNDDDB 2003); the Stowe Pool, a pool located at the northwest corner of Stowe Road and California Avenue within the Salt Creek Vernal Pool Complex west of the City of Hemet (CNDDDB 2003); the Scott Pool, a 0.36-acre vernal pool located just northeast of the intersection of Scott Road and Menifee Road (Amec Earth and Environmental, Inc. 2002); and the Wickerd Pool, a 3-acre vernal pool located at the intersection of Lindenberger Road and Wickerd Road (Ecological Sciences, Inc. 2001b).

There are several questionable records for California Orcutt grass that are in need of verification. There is a 1922 record for California Orcutt grass on a 1-acre desiccating mud flat in Menifee Valley. The locality is imprecise, and the record has not been recently confirmed. Development has occurred in the area. It is unknown whether this occurrence persists. The MSHCP mentions a questionable locality for the species west of the Santa Rosa Plateau, possibly in Tenaja Canyon. The geographic information system attributes for this record credit the Rancho Santa Ana Botanical Garden (RSABG); however, the Rancho Santa Ana Botanical Garden does not have a herbarium specimen for this location. The Plan mentions a 1997 record of California Orcutt grass located at the intersection of Borel Road and Benton Road. This data was collected from an unknown Environmental Impact Report and should be confirmed (S. Miller, Dudek and Associates, Inc., pers. comm. to D. Stadtlander, CFWO, August 28, 2003).

There is documentation of actions affecting California Orcutt grass within the Plan Area. A desiccating mud flat located at Murrieta Hot Springs was once occupied by the species; however, this population was reported as extirpated in 1976 (CNDDDB 2003). The Stowe Pool has been disturbed by discing, sheep grazing, and the invasion of non-native grasses (Patterson 1998; CNDDDB 2003). The Salt Creek Vernal Pool Complex, which has not been surveyed extensively for the species, has been degraded by human activities including dry land farming and alterations in hydrology. The Scott Pool has recently been heavily affected by discing, several pipeline projects, and the installation of a telephone pole. This pool is within the proposed project footprint for the Scott Road Improvement Project (Amec Earth and Environmental, Inc. 2002). Effects to potential habitat for California Orcutt grass in the Warm Springs Creek drainage were addressed in the formal section 7 consultation for the Southern California Gas Company Pipeline 6900.

Actions affecting the populations of California Orcutt grass at the Santa Rosa Plateau have been documented. The Santa Rosa Plateau Ecological Reserve, comprising approximately 9,000 acres and including the pools occupied by California Orcutt grass, was assembled between 1983 and

1991 and is managed by The Nature Conservancy, Fish and Wildlife Service, California Department of Fish and Game, Riverside County Parks and Open Space District, and the Metropolitan Water District of Southern California (Dangermond & Associates, Inc. 1991; Metropolitan Water District of Southern California *et al.* 1991). The Santa Rosa Plateau vernal pools are threatened by adjacent urban development and by the invasion of non-native grasses. Houses have been constructed across the road from the Santa Rosa Plateau Ecological Reserve and within the watershed of Mesa de Colorado vernal pools. Run-off from the residential property can flow into the vernal pools through culverts or over the road (C. Bell, The Nature Conservancy, pers. comm. to S. Brown, CFWO, August 20, 2003).

Actions affecting the population of California Orcutt grass at the Barry Jones Wetland Mitigation Bank have been documented. The Barry Jones Wetland Mitigation Bank, comprising 140 acres and including the 33-acre Skunk Hollow Pool and 107 acres of the pool's watershed, was established in 1997 to serve as off-site compensatory mitigation for unavoidable impacts to wetland habitats (Center for Natural Lands Management 1997). The formal section 7 consultation for the Rancho Bella Vista Habitat Conservation Plan states that 100 California Orcutt grass individuals may be affected by management activities within the existing Barry Jones Wetland Mitigation Bank (Fish and Wildlife Service 2000a). The formal section 7 consultation for the Assessment District 161 Subregional Habitat Conservation Plan mentions that the California Orcutt grass population at the Barry Jones Wetland Mitigation Bank may be affected by the EM-20 Pipeline and by Butterfield Stage Road, the construction of which will result in an incremental reduction in the watershed, an increase in siltation, and an increase in pollution from road run-off (Fish and Wildlife Service 2000b).

There are ephemeral pools documented within the Plan Area where no surveys have been conducted for California Orcutt grass. These pools include, but are not limited to, Palomar Pool, Wickerd Pool, Antelope Pool, Keller Pool, Madison Pool, Field Pool, Bundy Canyon Complex, George Complex, Skylark Pool, Lakeshore Pool, Wildlife Pools, Clay Complex, Garbani Pool, Auld Pool, Eastridge Pool, Banning Complex, and Pechanga Pool, and many of the pools within the Salt Creek Vernal Pool Complex located on the western edge of the City of Hemet within and beyond City limits.

Vernal pools in and around the Santa Rosa Plateau have not had thorough surveys conducted for vernal pool endemic species. Some records of vernal pool species exist for these pools; however, thorough surveys need to be completed before the extent of the ranges of vernal pool associated species on the Santa Rosa Plateau can be determined. There are five mesas with basalt flow soils suitable for vernal pools in and around the Santa Rosa Plateau Ecological Reserve. Mesa de Burro and Mesa de la Punta both fall within the Santa Rosa Plateau Ecological Reserve. Mesa de Colorado is located on the southwest edge of the Reserve and extends beyond the boundaries of the Reserve. Redonda Mesa and Avenaloca Mesa are both outside of the Reserve and have not been surveyed for vernal pools or vernal pool species. Lathrop and Thorne (1983) reported 13 vernal pools totaling 53.18 acres on Mesa de Colorado, Mesa de Burro and Mesa de la Punta at the Santa Rosa Plateau. In the vicinity of the Santa Rosa Plateau Ecological Reserve there are two pools located south of Avocado Mesa Road on Mesa de Colorado. These pools are not included in the 13 reported by Lathrop and Thorne (1983). One pool is on private property, and the other falls within the boundary of the Santa Rosa

Plateau Ecological Reserve. These two pools have not been surveyed for vernal pool associated species (C. Bell, The Nature Conservancy, pers. comm. to S. Brown, CFWO, August 19, 2003). California Orcutt grass has been observed in six pools on Mesa de Burro (B1, B2, B5, B6, B7, and B8) and in three pools on Mesa de Colorado (C1, C3 and C4) (CNDDDB 2003).

The vernal pool model was used to capture potential habitats supporting California Orcutt grass. The vernal pool model included these parameters within the Riverside Lowlands and the Santa Ana Mountains Bioregions: 1) vernal pools and playas and 2) clayey soils (Altamont, Auld, Bosanko, Claypit, and Porterville), alkali soils (Willows, Traver, and Domino), and Santa Rosa Plateau basalt flow soils. Based on our analysis, 42,349 acres of modeled habitat, with the potential to harbor vernal pools suitable for the species, occur within the Plan Area. Approximately 8,831 acres (21 percent) of modeled habitat occur within PQP Lands. We were unable to include additional soil types that harbor vernal pools, such as Murrieta stony clay loam, in our model because we do not have access to digital overlays mapping the extent of these soil types in the Plan Area.

Effects of the Action

Direct Effects

The Plan Area includes 42,349 acres of modeled habitat for California Orcutt grass. There are 25,832 acres (61 percent) of modeled habitat outside the MSHCP Conservation Area; of that 24,046 acres (57 percent of total modeled habitat) occur within the Narrow Endemic Plant Species Survey Areas (NEPSSA) 1, 2, 3, 3a, 4 and 9 (Figure 6-1, pp. 6-30). California Orcutt grass is considered a Narrow Endemic Plant Species. Until such time that the Additional Reserve Lands are assembled and conservation objectives for this species are met, surveys will be conducted as part of the project review process for public and private projects where suitable habitat for California Orcutt grass is present within NEPSSA 1, 2, 3, 3a, 4 and 9. For example Antelope Pool, Keller Pool, and Auld Pool are located within NEPSSA survey areas 1, 2, 3, 3a, 4 and 9, and these areas have not been surveyed for California Orcutt grass.

Populations detected as a result of survey efforts will be avoided according to the procedures outlined in the Narrow Endemic Plant Species policy (section 6.1.3 of the Plan; *i.e.*, 90 percent of portions of property with long-term conservation value will be avoided until the species conservation objectives are met). For those locations found to contain large numbers of individuals or otherwise determined to be important to the overall conservation of the species, the Plan allows flexibility to acquire these locations for inclusion into the Additional Reserve Lands (pp. 6-40).

The Skunk Hollow Pool and the nine pools known to be occupied by California Orcutt grass within the Santa Rosa Plateau Ecological Reserve are protected by existing conservation and management agreements. We do not anticipate any adverse effects to the Santa Rosa Plateau Ecological Reserve pools or their watersheds from the MSHCP. Similarly, the Field Pool and its watershed are identified by the Plan as within PQP Lands. We do not have documentation of surveys for California Orcutt grass at the Field Pool. However, the Plan proposes the construction of Butterfield Stage Road as a Covered Activity, and this road construction project

has the potential to affect the Skunk Hollow Pool and the Field Pool. The Plan states that construction of the road will be consistent with the requirements of the Assessment District 161 Habitat Conservation Plan, which requires that the design and location of the road be determined in consultation with our office. Thus, we anticipate that any potential impacts to the Skunk Hollow Pool and the Field Pool and their watersheds will be addressed through close coordination and consultation with this office.

Within the 24,046 acres of modeled habitat outside of the MSHCP Conservation Area, but within the NEPSSA for California Orcutt grass (57 percent of total modeled habitat), we anticipate that up to 10 percent of the area with long-term conservation value for this species (as discussed above) will be lost to individual projects. For example, the population of California Orcutt grass that is located at the Scott Pool is outside of the MSHCP Conservation Area but within NEPSSA 4. The questionable records at Menifee Valley are also located outside of the MSHCP Conservation Area but are within NEPSSA 3. Any Covered Activities potentially impacting confirmed populations in these areas would be subject to the procedures outlined in the Narrow Endemic Plant Species policy.

California Orcutt grass will be subject to impacts associated with development and other proposed Covered Activities within 1,786 acres of modeled habitat that is outside of the MSHCP Conservation Area and outside of the NEPSSA for California Orcutt grass (4 percent of total modeled habitat).

The California Orcutt grass record at the intersection of Borel and Benton Roads is outside of the MSHCP Conservation Area and the NEPSSA for California Orcutt grass. In addition, the Palomar Pool, the Eastridge Pool, the 4 to 5 pools in the George Complex, the Garbani Pool, the Madison Pool, the Banning Complex, and the Pechanga Pool have not been surveyed for California Orcutt grass and are located outside of the NEPSSA. However, because California Orcutt grass is associated with vernal pools, we anticipate that implementation of the Riparian/Riverine Areas and Vernal Pools policy will help maintain habitat for some California Orcutt grass populations outside of the MSHCP Conservation Area and outside of the NEPSSA for this species.

California Orcutt grass occurs within the Salt Creek Vernal Pool Complex. Part of the Salt Creek Vernal Pool Complex is conserved within the 45.42 acre Upper Salt Creek Wetlands Preserve. The entire Salt Creek Vernal Pool Complex has not been surveyed for the species. Within the complex, California Orcutt grass has been observed at the Stowe Pool. The Stowe Pool is not within the Upper Salt Creek Wetlands Preserve.

The MSHCP proposes three Covered Activities that have the potential to impact the Salt Creek Vernal Pool Complex, including the California Orcutt grass population in the Stowe Pool. These Covered Activities are: 1) the expansion of Stowe Road to an urban arterial with a 152-foot right-of-way and its extension to the east through the vernal pool complex; 2) the expansion of Florida Avenue/SR-74 to an expressway with a 196-foot right-of-way; and 3) the expansion of SR-79 to an expressway with a 196-foot right-of-way.

In species-specific objectives 2 and 4, the MSHCP addresses the proposed conservation of populations of California Orcutt grass within the upper Salt Creek area west of Hemet. Objective 2 states that the known location in the upper Salt Creek area west of Hemet will be included within the MSHCP Conservation Area. Objective 4 states that the watershed of the vernal pool occurrences at upper Salt Creek will be included within the MSHCP Conservation Area to maintain hydrologic conditions. Together with existing conservation and the requirements of the Riparian/Riverine Areas and Vernal Pools policy and the Narrow Endemics Policy (this complex is located within NEPSSA survey area 3), the conservation proposed by the MSHCP is expected to provide for the conservation of the Salt Creek Vernal Pool Complex including the populations of California Orcutt grass within the complex. Therefore, for the purposes of this analysis, we anticipate that the three proposed road improvement projects will be designed so that the Salt Creek Vernal Pool Complex and its watershed will not be impacted from the proposed road improvement projects, including but not limited to, the roads themselves, culverts under the roads, and the fuel modification zones for the roads.

Because the California Orcutt grass is not widely distributed within the Plan Area, species-specific conservation objectives are provided in the MSHCP (Section 9, Table 9.2, pp. 9-111) to ensure that suitable habitat and known populations of the California Orcutt grass will persist. At least three of the known locations of California Orcutt grass at the Santa Rosa Plateau, Skunk Hollow, and the upper Salt Creek drainage west of Hemet will be included within the MSHCP Conservation Area, and the hydrologic processes of the pool complexes associated with these known locations will be maintained to provide for persistence of the species. In addition, at least 6,680 acres of playas and vernal pools within the Riverside Lowlands Bioregion will be included within the MSHCP Conservation Area of which 3,830 acres are Additional Reserve Lands and 2,870 acres are existing PQP Lands.

Approximately 8,831 acres (21 percent) of the modeled California Orcutt grass habitat occur within PQP Lands and 7,686 acres (18 percent) occur within the Additional Reserve Lands. Thus, the MSHCP Conservation Area will include 16,517 acres (39 percent) of the modeled California Orcutt grass habitat in the Plan Area. As indicated above, this species will also benefit from implementation of the Riparian/Riverine Area and Vernal Pools policy.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands including surveys for California Orcutt grass. Cooperative management and monitoring is anticipated on PQP Lands. Surveys for California Orcutt grass will be conducted at least every 8 years to verify occupancy of 75 percent of known locations. If a decline in the distribution of California Orcutt grass is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP. Other management actions described in Section 5, Table 5.2 of the MSHCP will help maintain California Orcutt grass habitat, such as preventing alteration of hydrology and floodplain dynamics, off-road vehicle use, grazing and competition from non-native plants. Implementation of these management actions will help to avoid and minimize adverse effects to California Orcutt grass.

Indirect Effects

California Orcutt grass could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These generally include the indirect effects discussed in the “General Effects” and the “Generalized Effects Analysis for Vernal Pools” sections of this biological opinion. Implementation of the Guidelines Pertaining to the Urban/Wildlands Interface policy, Riparian/Riverine Area and Vernal Pools policy, and the management provisions listed above will help to reduce the indirect effects to this species.

Conclusion

We anticipate the proposed action will directly and indirectly affect California Orcutt grass as described in the analyses above, including the loss of up to 4 percent of its modeled habitat. An additional 57 percent of California Orcutt grass modeled habitat in the Plan Area will be subject to surveys within NEPSSA 1, 2, 3, 3a, 4, and 9. Once the conservation objectives for California Orcutt grass have been met, avoided areas, which have not been otherwise conserved, may be impacted. We anticipate that occurrences determined to be important to the overall conservation of the species will be considered for inclusion in the Additional Reserve Lands and that some of the avoided areas may be maintained as open space habitat. In addition, this species occurs within vernal pools, a habitat type that is afforded protection throughout the Plan Area by the Riparian/Riverine Area and Vernal Pools policy. Vernal pools will be mapped throughout the Plan Area and avoided if feasible. If avoidance is not feasible, a determination of Biologically Equivalent or Superior Preservation must demonstrate that the proposed action will provide equal or better conservation than avoidance of the occupied habitat. This species is anticipated to persist within areas conserved through implementation of the NEPSSA surveys and Riparian/Riverine Area and Vernal Pools policy, as well as the remaining 39 percent of its modeled habitat within both the PQP Lands and the Additional Reserve Lands.

The MSHCP will further offset the proposed impacts to this species through management and monitoring actions within the Reserve. We anticipate that conserved areas will be monitored and managed cooperatively to benefit this species. One of the management actions proposed that may benefit the species is the enhancement of historic or vestigial vernal pools within Core Areas for the Riverside fairy shrimp, which has been observed within the Plan Area to co-occur with California Orcutt grass. This proposed enhancement may benefit California Orcutt grass by increasing the quality of the habitat that is conserved for this species and by allowing the expansion of populations within the Reserve through the enhancement of historic or vestigial vernal pools that do not currently provide habitat for the species.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service’s biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of California Orcutt grass. We reached this conclusion because the Salt Creek Vernal Pool Complex, which is the remaining unprotected area of greatest importance to the species within the Plan Area, and 39 percent of the modeled habitat for the species will be conserved or remain in the MSHCP Conservation Area. In addition, the Narrow Endemic Plant Species Survey and the Riparian/Riverine Areas and Vernal Pools policies together provide for the conservation of

the species throughout the Plan Area. Thus, impacts to this species and its modeled habitat, when viewed in conjunction with the protection and management of the MSHCP Conservation Area, are not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of California Orcutt grass throughout its range.

Munz's onion (*Allium munzii*)Status of the Species/Environmental Baseline

Since the Munz's onion is endemic to the Plan Area, its status range-wide and in the Plan Area are the same.

Listing Status

The Fish and Wildlife Service listed Munz's onion as endangered on October 13, 1998 (63 Federal Register 54975). The Service determined that the designation of critical habitat was not prudent at the time of listing; however, on July 1, 2002, the U.S. District Court ordered that we complete critical habitat designation for this species by May 30, 2005. The State of California listed the species as threatened in 1990, and the species is a CNPS List 1B species. No recovery plan has been prepared.

Species Description

Munz's onion, a member of the lily family (Liliaceae), is a perennial bulb (McNeal 1992). Munz's onion plants have a single leaf and white to pale pink flowers that bloom from March to May (CNPS 2001). The plants are dormant except in the spring and early summer months. The best time to detect the species is in early May. It shares its range and habitat with the similar-appearing *Allium haematochiton* (red-skinned onion). Though the two species can occur within several feet of each other, the species do not interbreed (CDFG 1989). Munz's onion is distinguished from other members of the genus *Allium* within its geographic distribution by its solitary, terete leaf.

Munz's onion belongs to the *Allium fimbriatum* complex, a group of seven species found primarily in California (McNeal 1992), and was first referred to as *Allium fimbriatum* var. *munzii* by Marion Ownbey (Munz and Keck 1959). McNeal (1992) elevated this taxon to species status based on unique morphological characteristics of the perianth and ovarian crests. Elliptic to broadly ovate and mostly obtuse perianth segments, in addition to flower color (white versus purple) and the irregularly dentate ovarian crests distinguish Munz's onion from other onions in the *Allium fimbriatum* complex.

Habitat Affinities

Munz's onion is restricted to mesic clay soils in western Riverside County, California, along the southern edge of the Perris basin. The clay soils are scattered in a band several miles wide and extending 40 miles from Gavilan Hills to west of Temescal Canyon and Lake Elsinore at the eastern foothills of the Santa Ana Mountains and along the Elsinore Fault Zone to the

southwestern foothills of the San Jacinto Mountains near Lake Skinner and Vail Lake. The clay deposits typically support grassland vegetation within a surrounding scrub community. Rounded cobbles and boulders are embedded within the clay, which has a sticky, adobe consistency when wet and large cracks when dry. Munz's onion is typically found on the more mesic sites within the clay deposits (Boyd 1988).

Munz's onion occurs at elevations from 300 to 1,070 meters and is frequently found in association with southern needlegrass grassland, mixed grassland, and open coastal sage scrub or, occasionally, in cismontane juniper woodlands and chamise chaparral (California Department of Fish and Game 1989). Clay soil associations include Altmont, Auld, Bosanko, and Porterville clay soil types. At least one population (Bachelor Mountain) was reported by Bramlet in 1991 to be associated with pyroxenite outcrops instead of clay (CNDDDB 2003). There are claypit areas in the Plan Area resulting from ongoing or historic clay mining activities. These areas may have supported Munz's onion historically. They also offer the possibility of reestablishment of Munz's onion populations.

A characteristic "clay soil flora" is associated with the island-like clay deposits in southwestern Riverside County. This includes perennial herbs, such as chocolate lily, Palmer's grappling hook, knot-weed spine flower, purple sanicle, snakeroot, lomatium, lace parsnip, Cleveland's shooting star, goldenstar, soaproot, many-stemmed dudleya, red-skinned onion, and Munz's onion (Boyd 1988).

Life History

After seeds germinate, three to five years are required for the plant to reach maturity and produce flowers (Schmidt 1980). The flowering period for this species is March to May (CNPS 2001). Prior to flowering, a single, round leaf is produced (Munz 1974). After flowering, the plant dies back to the bulb. Munz's onion is well adapted to summer drought and varied amounts of rainfall from year to year and exhibits a corollary variation in aboveground emergence from year to year. McNeal (1992) observed that flowering in the *Allium fimbriatum* complex appeared to be correlated with rains in the late fall and early winter. When rainfall is plentiful, most plants within a population bloom. When rainfall is light, most plants sprout leaves, but very few flower. There is no information regarding pollinators. No studies are available regarding seed dispersal.

Status and Distribution

The Munz's onion is endemic to southwestern Riverside County, where there are 16 known extant occurrences. There are 37 records in our database, but 4 records could not be verified, and 21 appeared to be duplicate records or repeated observations of the same population. In addition, four occurrences did not appear in our database but are believed to be extant (Riverside County Habitat Conservation Agency 1996; Pacific Bay Homes 2000; Service 2001; CNDDDB 2003). The 16 occurrences include two occurrences not described in the MSHCP (an observation of two individual plants on Bachelor Mountain and a population of unknown size adjacent to Collier Marsh near Temescal Wash) and excludes an occurrence identified in the

MSHCP (Occurrence 8 in the Plan) that is believed to have been eliminated by the Sycamore Creek development.

Munz's onion occurs in scattered populations from the Gavilan Plateau and Estelle Mountain area southeast through the foothills north and northwest of Lake Elsinore, to the Paloma Valley, Skunk Hollow, and Lake Skinner area (Boyd and Mistretta 1991; Winter 1992; CNDDDB 2000; NRC 2000). The populations are primarily in the Riverside Lowlands Bioregion, with a few occurrences in the Santa Ana Mountains Bioregion, and one occurrence of two plants on the west edge of the San Jacinto Foothills Bioregion.

Modeled habitat for this species includes all vegetation types on Altamont, Auld, Bosanko, Claypit, and Porterville soils between elevations of 984 and 3,281 feet (300 and 1,000 meters) in the Santa Ana Mountains and Riverside Lowlands bioregions. Based on this analysis, the Plan Area supports approximately 5,338 acres of modeled habitat for the Munz's onion. Approximately 1,386 acres (26 percent) of this modeled habitat occurs within PQP Lands. Because the Munz's onion needs specific microhabitat features, such as mesic conditions, modeled habitat likely overestimates the extent of suitable habitat for this species. Five of the sixteen known occurrences are located completely within PQP Lands, and two populations are located partially in PQP Lands and partially on private lands.

At the time of listing, the Service estimated the total population to be approximately 20,000 to 70,000 individuals. Five populations are large (more than 2,000 individuals) and cover as much as 20 acres. Most populations contain fewer than 1,000 individuals, occupying areas ranging from several meters to less than 2.5 acres. The largest populations are at Harford County Park and adjacent private lands (20,000 to 50,000 individuals together), Alberhill Mountain (at least 7,700 individuals), Elsinore Peak (~5,000 individuals), Dawson Canyon (~2,000 individuals), Estelle Mountain (at least 2,000 individuals), and Bachelor Mountain (more than 3,000 individuals).

Below is a status summary for each of the extant occurrences known for this species.

A population of Munz's onion exists on the southern border of Harford Springs County Park and extends onto private lands across Ida Leona Road in the Gavilan Hills. The population estimates from surveys between 1986 and 1998 range from 2,000 to 51,000 individuals.

A population of about 300 plants on 18 acres of Altmont clay soil is conserved on private land immediately adjacent to the Sycamore Creek development, northwest of I-15 and Indian Truck Trail Road, in Temescal Canyon.

A population of about 250 plants is conserved in the Skunk Hollow Wetland Conservation Bank. This site is adjacent to the Johnson Ranch conservation area and is surrounded by housing developments.

A population of about 2,000 plants is located on private land on the south flank of Upper Dawson Canyon in the Gavilan Hills.

A population of about 7,700 plants is located on private land on the south side of Alberhill Mountain, west of I-15, in the City of Lake Elsinore.

A population of about 1,000 plants is located on private land east of I-15, west of DiPalma's Italian Village, between Indian Canyon and Horsethief Canyon.

A population of an estimated 2,000 plants occurs in the Lake Mathews-Estelle Mountain Reserve northwest of the Estelle Mountain summit in the gabilan Hills. This population has not been surveyed since 1986.

A population of about 440 plants is conserved in the Southwestern Riverside County Multi-Species Reserve (SRCMSR) in the north Domenigoni Hills on either side of Old Mine Road. The SRCMSR is different from the Reserve Lands described in the Plan and is included in PQP Lands for this analysis.

A population is located on the south slope of Bachelor Mountain, along a maintenance road associated with Lake Skinner Dam. Surveys between 1989 and 1992 have documented between about 200 and 4,400 plants. The majority of this occurrence is under managed conservation in the SRCMSR. A portion of the population is located on adjacent Bureau of Land Management land, surrounded on three sides by the SRCMSR.

A population of about 150 plants occurs in the SRCMSR on the south slope of Bachelor Mountain, about a mile east of the population described previously.

A population of over 1,000 plants occurs on Elsinore Peak, west of the City of Lake Elsinore on the Cleveland National Forest and adjacent private lands. This occurrence is located on a marine terrace and is associated with clay soils in the grassland-chaparral ecotone and is the highest known elevation recorded for this species.

A population of about 1,000 plants occurs west of Lindenberger Road, 0.8 miles south of Scott Road, southeast of Sun City. Part of this occurrence was conserved on a 36.3-acre parcel in conjunction with a section 7 consultation regarding a Sempra gas pipeline (Service 2001g). A second part of this occurrence was protected on a 65.5-acre parcel in conjunction with a consultation under section 7 of the Act associated with the Warmington development (Service 2002f). An estimated 100 plants were observed in the impact area of the Warmington development.

A population of several thousand individuals is located at the northern boundary of the City of Lake Elsinore, within the North Peak Specific Plan Area. The population is on lands purchased and conserved by Riverside County. This land will become part of the Additional Reserve Lands under the MSHCP.

A population of about 300 plants is located on private lands northeast of Alberhill, 1.0 miles north of I-15 and 1.2 miles northeast of the intersection of Lake Street and I-15.

Two individual plants were discovered on land owned by Metropolitan Water District on the north slope of Bachelor Mountain in 1999. We are unaware if any additional surveys have been conducted at this site.

A population of unknown size occurs in Temescal Valley, west of I-15, between Nichols Road and Riverside Drive, on a low hill adjacent to Collier Marsh (Alberhill marsh) and near Temescal Wash.

Threats

As much as 80 to 90 percent of the suitable habitat for this species has been lost to agriculture, urbanization, and clay mining (California Department of Fish and Game 1989). Populations continue to be threatened by development, dryland farming activities, off-road vehicle activity, clay mining, and competition with non-native plants (Roberts 1993a; Fish and Wildlife Service 1998h; CNDDDB 2003).

Clay pit mining has affected and continues to threaten Munz's onion populations. The largest disturbances resulting from clay mining operations have been west of Alberhill and northwest of Indian Truck Trail. At least three smaller historic clay mining areas are known from Dos Lagos (Butterfield Station) east of Temescal Wash, Estelle Mountain, and north Domenigoni Hills. Clay mining activities are ongoing in the area northwest of Alberhill and continue to threaten the large population there.

The native perennial and annual grasslands found on most clay soils in the Plan Area have been negatively affected by grazing activities and a frequent fire return interval. Even conserved areas are at risk of trampling and foraging primarily by sheep, which have been known to escape onto the Estelle Mountain areas containing Munz's onion. Historic grazing has also led to the invasion by non-native grasses and forbs over large areas. Fire and atmospheric nitrification of soil (resulting from air pollution) may each play a role in advancing the invasion of non-native grasses. Many of the native grasslands and a large portion of the sage scrub areas in the Plan Area have been replaced by non-native annual grasses and forbs by repeated cycles of fire, grazing and nitrification. Competition with non-native grasses is a threat to Munz's onion because the non-native annual grasses form a dense cover that is more difficult for the Munz's onion to penetrate than cover provided by the more patchily distributed native grasses or open sage scrub and chaparral communities.

Historic and recent development, road building, and road maintenance threaten Munz's onion populations. The Sycamore Creek development, for example, impacted a portion of the adjacent Munz's onion population, and development of a freeway interchange at Indian Truck Trail is known to have significantly reduced one population. Existing roads have bisected Munz's onion populations or reduced population numbers significantly at Gavilan Hills, Alberhill, Di Palma, and Indian Truck Trail.

Off-road vehicle activity can trample onions and alter soil conditions. The Elsinore Peak population has been negatively affected by off-road vehicle activity. Off-road vehicle activity remains a threat to almost every remote occurrence of this species.

Utility development has negatively affected Munz's onion populations at Elsinore Peak and Scott Road. Due to the large number of utility right-of-ways criss-crossing the Plan Area, development and maintenance of these facilities remains a threat to the species where they intersect with suitable habitat. Right-of-way maintenance activities, such as mowing or grubbing, can result in degradation of population viability if repeatedly conducted during the spring and summer growth period.

Finally, Munz's onion may be subject to habitat destruction or degradation because suitable habitat has not been identified. Since Munz's onion is often found in areas with native and non-native grasses, the habitat may appear superficially similar to non-native grassland throughout the Plan Area. Thus, Munz's onion is often assumed to be absent without verifying the habitat characteristics or conducting surveys for Munz's onion.

Conservation Needs

Munz's onion is endemic to the western portion of the Plan Area. The conservation needs of Munz's onion include conservation and management of occurrences with long-term conservation value in a manner that provides for long-term viability of the occurrences at those locations. Suitable habitat throughout the western half of the plan area should be conserved in large, contiguous blocks, and managed to minimize impacts such as off-road vehicles, invasion by non-native species, and clay-mining. Any native grasslands found to contain Munz's onion should be given high priority for conservation. Newly detected populations important to the long-term conservation of the species should be conserved *in situ* in a manner that protects the viability of the population. Actions that would increase the likelihood of deleterious effects from any identified threat should be avoided. Any large-scale translocation of Munz's onion should be avoided unless this method is proven effective through smaller-scale experimentation and study of previous translocation efforts.

Effects of the Action

Direct Effects

The Plan Area includes 5,338 acres of modeled habitat for Munz's onion. There are 3,296 acres (62 percent) of modeled habitat outside the MSHCP Conservation Area; of that 2,972 acres (56 percent of total modeled habitat) occur within the Narrow Endemic Plant Species Survey Areas (NEPSSA) 1, 3 and 4 (Section 6, Figure 6-1). Munz's onion is considered a Narrow Endemic Plant Species. Until such time as the Additional Reserve Lands are assembled and conservation objectives for this species are met, surveys will be conducted as part of the project review process for public and private projects where suitable habitat for Munz's onion is present within NEPSSA 1, 3 and 4. Populations detected as a result of survey efforts will be avoided according to the procedures outlined in the Protection of Narrow Endemic Plant Species (section 6.1.3 of the Plan; *i.e.*, 90 percent of portions of property with long-term conservation value will be avoided until the species conservation objectives are met). Once species objectives are met, avoided populations may be impacted, but for those locations found to contain large numbers of individuals or otherwise determined to be important to the overall conservation of the species,

the Plan allows flexibility to acquire these locations for inclusion into the Additional Reserve Lands (pp. 6-38 to 6-40).

Within the 2,972 acres of modeled habitat outside of the MSHCP Conservation Area, but inside the NEPSSA for Munz's onion (56 percent of total modeled habitat), we anticipate that up to 10 percent of the area with long-term conservation value for this species (as discussed above) will be lost to individual projects.

Munz's onion will be subject to impacts associated with development and other proposed Covered Activities within 324 acres of modeled habitat that are outside of the MSHCP Conservation Area and outside of the NEPSSA for Munz's onion (6 percent of total modeled habitat). Thus, all individual Munz's onion plants and populations outside of the MSHCP Conservation Area and outside the NEPSSA for Munz's onion are anticipated to be impacted over the 75-year permit term as a result of the proposed Covered Activities.

Because the Munz's onion is not widely distributed within the Plan Area, specific conservation objectives are provided in the MSHCP (Section 9, pp. 9-126) to ensure that suitable habitat and known populations of the Munz's onion will persist. Of the 16 known occurrences, 12 are entirely within the MSHCP Conservation Area; 2 occurrences are partially within the conservation area, and 2 are outside the MSHCP Conservation Area. Furthermore, the Plan states that the two whole and two partial populations currently outside the MSHCP Conservation Area will be added to the MSHCP Conservation Area. Finally, at least 21,260 acres of modeled habitat for Munz's onion will be included in the MSHCP Conservation Area.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands including surveys for the Munz's onion. Cooperative management and monitoring are anticipated on PQP Lands. Surveys for the Munz's onion will be conducted at least every eight years to verify occupancy at a minimum of 75 percent of the known locations. If a decline in the distribution of Munz's onion is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP. Other management actions described in Section 5, Table 5.2 of the MSHCP include addressing competition with non-native plant species, clay mining, off-road vehicle use, and discing activities. Implementation of these management actions will help to avoid and minimize adverse effects to Munz's onion.

Indirect Effects

Munz's onion could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These generally include the indirect effects discussed in the "General Effects" section of this biological opinion. Implementation of the management actions described in Section 5 of the MSHCP and Guidelines Pertaining to the Urban/Wildlands Interface policy will help to reduce the indirect effects to this species.

Conclusion

We anticipate the proposed action will directly and indirectly affect Munz's onion as described in the analysis above, including the total loss of 17 percent of its modeled habitat. An additional 56 percent of modeled habitat outside of the MSHCP Conservation Area will be subject to surveys in NEPSSA 1, 3 and 4. Once the conservation objectives for Munz's onion have been met, avoided areas, which have not otherwise been conserved, may be affected. We anticipate that occurrences determined to be important to the overall conservation of the species will be considered for inclusion in the Additional Reserve Lands and that at least some of the avoided areas may be maintained as open space habitat. Implementation of the avoidance, minimization, and mitigation measures identified in the Plan will reduce the impacts to Munz's onion. This species is anticipated to persist within the remaining 38 percent of its modeled habitat within both the PQP Lands and the Additional Reserve Lands. We anticipate that these areas will be monitored and managed cooperatively to benefit this species.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the Munz's onion. We reached this conclusion because 38 percent of the modeled habitat and all 16 known localities will be included in the MSHCP Conservation Area. In addition, NEPSSA surveys for the Munz's onion may result in newly discovered occurrences being included in the MSHCP Conservation Area. Thus, impacts to this species and its modeled habitat, when viewed in conjunction with the protection and management of the MSHCP Conservation Area, are not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of the Munz's onion throughout its range.

Nevin's barberry (*Berberis nevinii*)

Status of the Species

Listing Status

Nevin's barberry was federally listed as endangered on October 13, 1998 (63 Federal Register 54956). No critical habitat has been designated for Nevin's barberry, and no recovery plan has been prepared by the Service for this species. The State of California listed the species as endangered in January 1987.

Species Description

Nevin's barberry is a 1 to 4-meter (3 to 13 foot) tall rhizomatous, evergreen shrub in the Berberidaceae (Barberry family). The pinnately compound leaves are gray-green with serrate, spine-tipped margins. The flowers, clustered in loose racemes, have six yellow petals arranged in two series. The 6 to 8-millimeter (less than 0.3 inches) long berries are yellowish-red with brownish seeds. This species is distinguished from others in the genus by the leaves, few flowered racemes, and reddish fruits.

Habitat Affinities

At the time of listing, plants were thought to occur as discrete, localized occurrences in only two types of habitats: sandy and gravelly places along the margins of dry washes and on coarse soils in chaparral (63 Federal Register 54958). However, plants at Oak Mountain in Riverside County are on heavy adobe/grabbo-type soils, and several other populations of Nevin's barberry in the Vail Lake Area are associated with meta-sedimentary substrates and springs or seeps (V. Soza, Rancho Santa Ana Botanic Garden, personal communication to Jesse Bennet, CFWO, January 9, 2003,).

Based upon extensive field experience, Steve Boyd (V. Soza, Rancho Santa Ana Botanic Garden, personal communication to Jesse Bennet, CFWO, January 9, 2003) has characterized four types of suitable habitat for this species as follows: 1) relatively flat or low relief clay lenses with higher water-holding capacity, consisting of heavy adobe/grabbo-type soils derived from metavolcanic geology (*i.e.*, Mesozoic basic intrusive rock); 2) meta-sedimentary substrates associated with springs or seeps below 548 meters (1,800 feet) in elevation; 3) sedimentary soils such as sandy arkose or Temecula arkos soils below 548 meters (1,800 feet) in elevation on slopes up to 15 meters above drainage bottoms; and 4) alluvial soils originating from primarily non-marine sedimentary substrates in alluvial scrub habitat in washes and canyons within 20 meters of the canyon bottom and below 1,800 feet in elevation (*i.e.*, the habitat characteristics outlined in the listing rule).

The elevation range of the species is typically from 300 to 659 meters (984 to 2,162 feet) (63 Federal Register 54958). However, an occurrence at Big Oak Mountain is at 2,700 feet (V. Soza, Rancho Santa Ana Botanical Garden, personal communication to J. Bennett, CFWO, January 9, 2003), and other scattered naturalized populations have been established outside this elevation range (CNDDDB 2003; Reiser 1996).

Life History

Nevin's barberry is believed to have a life span of more than 50 years (Mistretta 1989). The racemes of yellow flowers bloom from March through April (63 Federal Register 54958), and the seeds may be dispersed by animals; various birds have been observed eating the berries (Wolf 1940).

This species appears to have naturally low rates of regeneration due to sporadic production of viable seed (Mistretta and Brown 1989). In cultivation studies, the reproductive success rate is observed to be low (Mistretta 1989). One instance of clonal regeneration has been documented in San Bernardino County (A. Sanders, Curator of the Herbarium, UCR, personal communication to N. Ferguson, CFWO, October 10, 2003).

This species is fire-adapted and will re-sprout following fire that is not too severe (63 Federal Register 54958). Although long-lived, reproduction from seeds is necessary to replace senescent individuals and sustain the species. Fire return intervals on the Cleveland National Forest now average between 40 and 50 years (K. Winter, USFS, pers. comm. to N. Ferguson, CFWO, October 14, 2003). However, an increase in fire frequency could likely adversely affect Nevin's

barberry if adult plants were burned prior to reaching reproductive maturity (*i.e.*, before about six years of age).

Status and Distribution

Nevin's barberry is endemic to southwestern cismontane southern California from the foothills of the San Gabriel Mountains of Los Angeles County to near the foothills of the Peninsular Ranges of southwestern Riverside County (63 Federal Register 54958). This species was known historically from fewer than 30 scattered occurrences within Los Angeles, San Bernardino, and Riverside counties. Of these, at least seven occurrences are known to be extirpated, mostly due to factors associated with urban development (63 Federal Register 54958).

Nevin's barberry is an easily identifiable plant conspicuous in surrounding chaparral vegetation by its grey-green foliage. The total number of individuals was reported to be 1,000 plants in 1987, but later reports from 1991 and 1997 indicated that only 500 individual plants were detected from all known sites (63 Federal Register 54958). However, this data does not include information regarding occurrences outside of the range considered upon listing (*i.e.*, CNDDDB and Reiser cited above). Nevin's barberry also occurs near San Timoteo Creek in the Crafton Hills in adjacent San Bernardino County (CFWO GIS internal database 2004).

The largest remaining cluster of native populations of Nevin's barberry in Riverside County occur in the Vail Lake/Oak Mountain area (63 Federal Register 54958). This occurrence was documented to consist of approximately 200 plants (Stephenson and Calcarone 1999), but only two individuals were noted recently at Oak Mountain (V. Soza, Rancho Santa Ana Botanical Garden, personal communication to Jesse Bennett, CFWO, January 9, 2003). In the Vail Lake area, most of the plants are on private lands with a few individuals occurring on Bureau of Land Management lands north of the lake and in the Cleveland National Forest southeast of the lake (63 Federal Register 54958). Extant native occurrences include Dripping Springs (near Aguanga) and Scott Canyon; an occurrence at Arroyo Seco appears to be introduced (Stephenson and Calcarone 1999).

The following geographic locations have recently been identified as potentially suitable habitat for Nevin's barberry within Riverside and San Bernardino counties: 1) in the front range of the Agua Tibia/Palomar Mountains; 2) south and east of Vail Lake in the Temecula Creek drainage to the Warner Springs/Henshaw area; 3) in the lower elevations of the San Bernardino National Forest adjacent to San Timoteo Canyon occurrence in the Crafton Hills; and 4) on the western side of the San Jacinto Mountains in the badlands area along the San Jacinto fault towards Bautista Canyon (V. Soza, Rancho Santa Ana Botanic Garden, personal communication to Jesse Bennet, CFWO, January 9, 2003).

Threats

Nevin's barberry is threatened by urban development, competition by annual grasses, off-road vehicle activity, emergency flood control activities (vegetation stripping), alteration of natural fire regime, and fire fighting activities (63 Federal Register 54958). The California Native Plant Society identifies development and road maintenance as the primary threats to Nevin's barberry

range-wide (2001). This species is susceptible to infection by the fungus *Puccinia graminis* (Whittemore 1997 as cited by Dudek 2001).

As with chaparral species in general, fire frequency is an important factor to species persistence. Infrequent burns with the accompanying buildup of high fuel loads in chaparral communities results in unnaturally hot fires that may kill plants and destroy the seed banks of some species. A too frequent occurrence of fires can burn young or re-sprouting shrubs before they become reproductively mature, thus depleting or exhausting the seed bank (63 Federal Register 54958). However, the effects of an altered fire regime on Nevin's barberry are unknown (63 Federal Register 54958).

Within the Plan area, Nevin's barberry continues to be threatened by development projects (Stephenson and Calcarone 1999). Past attempts to purchase and conserve occupied habitat for Nevin's barberry in Riverside County have been unsuccessful (63 Federal Register 54961). On private lands, fire suppression and brush clearing and possibly changes to the natural fire regime remain as significant threats to species persistence (Stephenson and Calcarone 1999).

Conservation Needs

Conserved habitat should include enough of the surrounding chaparral and sage scrub habitat to maintain the area's natural fire ecology (*i.e.*, it must be large enough so that unburned habitat remains following wildfires). Therefore, a sufficiently large conservation area is necessary to provide a functional buffer to off-set the effects of increased urbanization and/or public access to occupied areas (*e.g.*, increased proximity to ignition triggers and grading for structure protection from wildfire). Long-term habitat protection and coordination with landowners on fire-suppression activities are also necessary. The Service coordinates with the Forest Service fire-fighting team when suppression or fire-fighting activities need to occur within sensitive habitats.

As little is known about the recruitment needs of this species, it is likely that long-term monitoring will be necessary to detect successful recruitment events and possibly determine the conditions under which recruitment can occur.

Environmental Baseline

Our database includes 37 records of Nevin's Barberry in the Plan Area that have been documented since 1987. As discussed in the "Status and Distribution" section above, at the time of listing, fewer than 23 occurrences range-wide were thought extant. We consider four of these 37 records to represent extirpated occurrences of Nevin's barberry (see below). The range of the species had been extensively surveyed, and it was thought that additional, undetected populations were not likely to occur within the Vail Lake area (63 Federal Register 54958); however, our database now has 32 records of Nevin's barberry in the Vail Lake area alone. Given the low number of individual plants detected near Vail Lake as recently as 2003, we consider it possible that many of these records represent multiple reports of individual plants within a single distribution.

Jurupa Hills: Two records were documented from the Jurupa Hills in 1999. However, these areas appear to have since been developed into single-family homes and a school site (CFO GIS database 2004).

Temecula: Two records near Temecula lie outside of existing PQP Lands and the proposed Additional Reserve Lands. The occurrences were documented in 1998 and 1996 and were then considered to be in residential/urban/exotic or field/cropland areas, respectively. Therefore, we anticipate that these occurrences are likely extirpated. Furthermore, the MSHCP also indicates that an occurrence near Temecula has yet to be verified (Dudek 2003, pp. P-243).

Soboba Badlands: There is one record in the Soboba Badlands adjacent to the San Jacinto Wildlife Area presumed still extant. This occurrence is included in the Additional Reserve Lands that include proposed Core 3 (Badlands/Potrero).

Vail Lake: There are a total of 32 records of Nevin's barberry within the Agua Tibia Mountains and San Jacinto Foothill bioregions that include the Vail Lake area. These occurrences have been documented over a four-year period (*i.e.*, 1987 to 1990) by multiple observers; 10 of these records overlap spatially, and others are recorded in close proximity to each other. Therefore, it is not possible to discern whether these individual point locations represent distinct occurrences of the species or are separate observations of a single occurrence over its spatial distribution. Furthermore, there are no data to indicate the number of plants observed at each observation so it is not possible to accurately quantify either the actual number of distinct occurrences or plants within the Plan Area. However, as Nevin's barberry is a conspicuous, long-lived perennial species, the number of individual plants and the extent of localized distribution are not anticipated to fluctuate with annual conditions.

The 32 records within the Vail Lake and Agua Tibia Wilderness areas are within either existing PQP Lands or proposed Additional Reserve Lands and include existing Core M (Agua Tibia Wilderness). Modeled habitat for the species occurs within both existing Core M and within Proposed Linkage 4.

The vegetation types used to model habitat for the Nevin's barberry include chaparral and Riversidean alluvial fan sage scrub between 300 and 659 meters (984 and 2,162 feet) in elevation. Although substrate affinities have been documented for this species (*e.g.*, low-relief clay lenses with water-holding capacity, springs or seeps, and alluvial soils in washes and canyons), it is not possible to model habitat parameters at this scale of resolution. But, we are confident that the combined elevation and vegetation parameters adequately capture potential habitat for this species. Based on these criteria, the Plan Area includes 11,775 acres of modeled habitat for the Nevin's barberry. Approximately 2,252 acres (19 percent) of the modeled habitat occur within PQP Lands.

Effects of the Action

Direct Effects

The Plan Area includes 11,775 acres of modeled habitat for Nevin's barberry. There are 4,434 acres (38 percent) of this modeled habitat outside the MSHCP Conservation Area; of that 2,427 acres (21 percent of total modeled habitat) occur within the Criteria Area Species Survey Areas (CASSA) 5 and 6 (Figure 6-2, pp. 6-64). Nevin's barberry is considered an Additional Survey Needs and Procedures species. Until such time that the Additional Reserve Lands are assembled and conservation objectives for this species are met, surveys will be conducted as part of the project review process for public and private projects where suitable habitat for Nevin's barberry is present within CASSA 5 and 6. Populations detected as a result of survey efforts will be avoided according to the procedures outlined in the Additional Survey Needs and Procedures (section 6.3.2 of the Plan; *i.e.*, 90 percent of portions of property with long-term conservation value will be avoided until the species conservation objectives are met). For those locations found to contain large numbers of individuals or otherwise determined to be important to the overall conservation of the species, the Plan allows flexibility to acquire these locations for inclusion into the Additional Reserve Lands (Section 6, pp. 6-70).

Within the 2,427 acres of modeled habitat outside of the MSHCP Conservation Area, but within the CASSA for Nevin's barberry (21 percent of total modeled habitat), we anticipate that up to 10 percent of the area with long-term conservation value for this species (as discussed above) will be lost to individual projects. Our database shows only one record of Nevin's barberry outside of the MSHCP Conservation Area, and this occurrence is within CASSA 5. If this occurrence of Nevin's barberry or other occurrences within CASSA 5 or 6 are confirmed to contain large numbers of individuals or otherwise determined to be important to the overall conservation of the species, the Plan allows flexibility to acquire these locations for inclusion into the Additional Reserve Lands (Section 6 pp. 6-70). Therefore, we anticipate that implementation of the Plan will conserve known locations of Nevin's barberry within the Plan Area and will provide a mechanism for the conservation of significant occurrences that may be detected as a result of surveys within the CASSA for this species (CFWO GIS internal database 2004). Furthermore, large blocks of contiguous, modeled habitat for this species will be protected in the two known areas of distribution within the Plan Area (*i.e.*, the Vail Lake area and the Soboba Badlands).

Nevin's barberry could also be subject to impacts associated with development and other proposed Covered Activities within 2,007 acres of modeled habitat that is outside of the MSHCP Conservation Area and outside of the CASSA for Nevin's barberry (17 percent of total modeled habitat). However, our database contains no records of Nevin's barberry outside of the MSHCP Conservation Area that are also outside of the CASSA for the Nevin's barberry.

SR-79 passes through modeled habitat in the proximity of four records of this species, and this road is proposed for realignment. Since this proposed project falls within the CASSA for Nevin's barberry, we anticipate that the Additional Survey Needs and Procedures (MSHCP Section 6.3.2, pp. 6-63) process will be implemented as part of this project.

Because Nevin's barberry is not widely distributed within the Plan Area, specific conservation objectives are provided in the MSHCP (Section 9, pp. 9-127) to ensure that suitable habitat and known populations of Nevin's barberry will persist. The Plan states that at least 49 locations supporting Nevin's barberry within 8,000 acres of habitat will be included within the MSHCP Conservation Area. The development of this Conservation Area is anticipated to mitigate the additional fire hazards potentially introduced into habitat supporting Nevin's barberry following Plan implementation.

Based on our analysis, approximately 2,252 acres (19 percent) of modeled habitat for Nevin's barberry occur within PQP Lands, and 5,089 acres (43 percent) occur within the Additional Reserve Lands. Thus, the MSHCP Conservation Area will include 7,341 acres (62 percent) of the modeled Nevin's barberry habitat in the Plan Area.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands including surveys for Nevin's barberry. Cooperative management and monitoring is anticipated on PQP Lands. Surveys for Nevin's barberry will be conducted at least every eight years to verify occupancy of 75 percent of known locations. If a decline in the distribution of Nevin's barberry is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP. Other management actions described in Section 5 of the MSHCP, such as addressing competition with non-native plant species, controlling flood control activities and taking steps to prevent the alteration of the natural fire regime will help maintain habitat for Nevin's barberry. Implementation of these management actions will help to avoid and minimize adverse effects to Nevin's barberry. The proposed management activities are anticipated to address currently identified threats to species persistence and, although little is known about the reproduction and/or limits to the distribution of Nevin's barberry, the proposed surveys and cooperative management activities may influence factors limiting its current distribution.

Indirect Effects

Nevin's barberry could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These generally include the indirect effects discussed in the "General Effects" section of this biological opinion. Implementation of the guidelines, processes and policies, and the management provisions of the MSHCP will help to reduce indirect effects to this species.

Conclusion

We anticipate the proposed action will directly and indirectly affect Nevin's barberry as described in the analyses above, including total loss of up to 17 percent of its modeled habitat. An additional 21 percent of Nevin's barberry modeled habitat outside the MSHCP Conservation Area will be subject to surveys within CASSA 5 and 6. Once the conservation objectives for Nevin's barberry have been met, avoided areas, which have not been otherwise conserved, may be impacted. We anticipate that occurrences determined to be important to the overall conservation of the species will be considered for inclusion in the Additional Reserve Lands and that at least some of the avoided areas may be maintained as open space habitat. Implementation

of the avoidance, minimization, and mitigation measures identified in the Plan will further reduce the impacts to Nevin's barberry. This species is anticipated to persist within the remaining 62 percent of its modeled habitat within both the PQP Lands and the Additional Reserve Lands. We anticipate that these areas will be monitored and managed cooperatively to benefit this species.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of Nevin's barberry. We reached this conclusion because approximately 62 percent of Nevin's barberry modeled habitat and the majority of the documented occurrences will be protected or will remain within the MSHCP Conservation Area. In addition, required surveys for Nevin's barberry may result in newly discovered occurrences being included in the MSHCP Conservation Area. Thus, impacts to this species and its modeled habitat, when viewed in conjunction with the protection and management of the MSHCP Conservation Area, are not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of Nevin's barberry throughout its range.

San Diego ambrosia (*Ambrosia pumila*)

Status of the Species

Listing Status

San Diego ambrosia was federally listed as endangered on July 2, 2002 (67 Federal Register 44372). The Service determined that designation of critical habitat for San Diego ambrosia is prudent. Critical habitat will be designated in the future. No recovery plan has been prepared. This species is also on the California Native Plant Society's List 1B (RED 3-3-2).

Species Description

San Diego ambrosia is an herbaceous perennial in Asteraceae (Sunflower family) (Munz 1974) that spreads vegetatively by means of slender, branched, underground rhizome-like roots from which the aerial (aboveground) stems arise (Fish and Wildlife Service 2002g). This rhizomatous perennial habit results in groupings of aerial stems, often termed clones, that are or were at one time, all attached to each other. When the underground interconnections disintegrate, aerial stems that are genetically identical are physically separate. The aerial stems sprout in early spring after the winter rains and generally deteriorate in late summer. The plant may not be in evidence from late summer to early spring.

The aerial stems are 5 to 30 centimeters (2 to 12 inches) tall, but may grow to 50 centimeters (20 inches), and are densely covered with short hairs. The leaves are two to four times pinnately divided into many small segments and are covered with short, soft, gray-white, appressed (lying flat on surface) hairs. San Diego ambrosia may be distinguished from other species of *Ambrosia* in the area by its herbaceous perennial growth form, leaves which are two to four times pinnately

divided, cup-like involucre lacking hooked spines, and lack of longer, stiff hairs on the stems and leaves (Fish and Wildlife Service 2002g).

The male flowers are yellow to translucent and are borne in clusters on terminal racemes (flower stalks). The female flowers have no petals and are yellowish-white. Female flowers are in clusters in the axils of the leaves below the male flower clusters. San Diego ambrosia is sensitive to seasonal conditions and variation, causing the amount of aboveground mass to fluctuate from year to year.

Habitat Affinities

San Diego ambrosia occurs in open habitats with coarse substrates near seasonally dry drainages and floodplains, on upper terraces of rivers and drainages, as well as in open grasslands, openings in coastal sage scrub, and on clay slopes or on the dry margins of vernal pools (Munz 1974; Reiser 1996). The species may also be found in disturbed sites, such as fire fuel breaks and edges of dirt roadways. In general, the species is associated with seasonal flooding, ponding, or pooling, in areas underlain by sandy alluvium. Reiser (1996) noted that San Diego ambrosia may also occur in creek beds and gaps in woody riparian vegetation. Dudek and Associates (1999c) found San Diego ambrosia in sandy loam textured soils that were moderately acidic (pH ranging from 4.48 to 5.77) and low in salinity. Boling (1988) reported San Diego ambrosia on slopes from 0-9 percent slopes on sandy or clay loams. At Mission Trails Regional Park in San Diego, San Diego ambrosia occurred on slopes ranging from a 0-18 percent grade with the vast majority of plants occurring at slope angles of less than 5 percent (Dudek 1999c). San Diego ambrosia generally occurs at low elevations (*i.e.*, less than 150 meters in San Diego County) (Payne 1993). Commonly associated species include bunch grass, wild oats, *Bromus* spp., star thistle, *Ambrosia psilostachya*, tarplant, *Holocarpha virgata*, saltgrass, mule-fat, broom baccharis, California buckwheat, turkey-mullein, and several vernal pool species (Burrascano 1997; Dudek 1999c).

Life History

Ambrosia species are probably primarily wind-pollinated (Payne 1993). Because pollen is contained in the downward facing male cluster and is positioned above female flower heads, *Ambrosia pumila* may self-pollinate. Perennial *Ambrosia* species generally produce fewer seeds than annual species and invest more reproductive resources in below ground root structures (Payne 1962). Although plants may flower, the annual seed production may be low. Field collections have not provided evidence for the production of significant numbers of viable seeds. The MSHCP cites several biotechnical reports from transplantation efforts that suggest propagation and dispersal by seeds is limited in this species.

Because San Diego ambrosia is one of the few members of the *Ambrosia* genus that does not have armed involucre bracts, it is unlikely that seeds disperse by attaching to animals. Additionally, because the species has been reported to persist within horse corrals and is aromatic, it may be unpalatable and unlikely to be dispersed by ungulate consumption.

Propagation of San Diego ambrosia is primarily through extensions of rhizomes. The species' propensity to reproduce asexually suggests that the most common form of dispersal may be movement of rhizome-like structures either short distances by growth or longer distances by flood disturbance. Because San Diego ambrosia reproduces vegetatively and appears to be limited in its ability to sexually reproduce, it is probably not capable of adapting to rapidly changing conditions. This may be a factor related to its limited distribution.

Most technical studies and anecdotal accounts have reported preliminary success propagating San Diego ambrosia from root material both in the nursery and in the field (Boling 1988; Marquez 1991-1993; RECON 1993; Johnson, *et al.* 1999). Low genetic diversity and low rates of sexual reproduction may be further diminished by propagation and transplantation. When small samples of root material are collected from insular populations and propagated and transplanted over larger areas, reproductive function problems may increase. Research concerning the genetic diversity and sexual reproduction of the plant is needed to answer basic questions about the biology and long-term viability of this species. We are unaware of any reports of successful seed propagation.

Status and Distribution

San Diego ambrosia is distributed from western Riverside County and western San Diego County, California, south in widely scattered populations along the west coast of Baja California, Mexico, to the vicinity of Cabo Colonet (Munz 1974; Reiser 1996). Additional populations occur in the central highlands of Baja California, in the vicinity of Laguna Chapala near Catavina (Reiser 1996). Some remnant populations have been found in urbanized places, such as National City (Reiser 1996).

Historically, San Diego ambrosia has been reported from 51 occurrences in the United States (CNDDDB 2002); four of these were combined with other occurrences; six were based on misidentified specimens; and two were based on old collections that have not been documented since 1936 (CNDDDB 1999). Three occurrences consist of transplanted plants from other localities that were, subsequently, partially or totally eliminated (CNDDDB 2002). Therefore, there are 36 verifiable records for this species in the United States. Twenty of these (55 percent) have been extirpated since the 1930's, nearly all by commercial development and activities associated with highway construction (Fish and Wildlife Service 2002g). One record for San Diego ambrosia, with a single stem recorded in 1996, is considered non-viable due to the size of the occurrence and the high level of disturbance at the site (CNDDDB 2002). Subtracting this non-viable occurrence, there are currently 15 extant native occurrences of this species. Twelve occurrences are in San Diego County. The species is known from four occurrences in Riverside County, but only three are known to be extant (CNDDDB 2003; City of Lake Elsinore 2000). These occurrences are located at North of Alberhill Mountain, South of Alberhill Mountain along Nichols Road, and at Skunk Hollow. The occurrences in Riverside County are relatively isolated from those in San Diego County since the most likely means of dispersal is through rhizomes carried along waterways, and the populations in San Diego and Riverside counties are not connected hydrologically.

Threats

The primary threat to San Diego ambrosia is habitat loss due to urbanization, flood control, and non-native species competition. Nearly all U.S. populations occur in sites that are disturbed and frequently affected by secondary impacts (trampling, non-native plant competition) due to the proximity of development and infrastructure (roads and utility corridors). While San Diego ambrosia is considered to be tenacious in appropriate habitats, it may be a weak competitor with invasive herbaceous and non-native grass species.

In Riverside County, the three verified extant occurrences are subject to several threats: public access, vehicles, power line and road maintenance, the proposed Nichols Road and Lake Street expansion, alteration of hydrology, habitat conversion through development, repeated human disturbance, changes in soil conditions, grazing, lack of surveys, and invasion by non-native grasses.

San Diego ambrosia prefers areas of exposed soil and likely does not compete well in areas of dense vegetation. The species rarely persists in areas dominated by grasses, such as wild oat. Changes in hydrology and adjacent land use practices could result in significant threats of non-native plant invasion at each of the three known sites.

Conservation Needs

The conservation needs of San Diego ambrosia include managing and conserving populations in San Diego and Riverside counties in a manner that provides for long-term viability of the occurrences at these locations. To the greatest extent possible, new discoveries should be conserved and managed as well. Actions that would modify the hydrology that supports the species' habitat or increase the likelihood of deleterious effects from any identified threat should be avoided. New research to determine whether out-crossing is necessary for viable seed production and research in transplantation methodology could help transplantation and restoration efforts, but transplantation should continue to be considered experimental until efforts to populate new areas with this species show long-term persistence has been achieved.

In Riverside County, management of the Nichols Road population, including avoiding impacts associated with maintenance and repairs on roads and utilities would substantially increase the likelihood that the species will persist. Circulation element improvements should include measures to restrict access to this and other occurrences, while maintaining habitat requirements (*e.g.*, hydrology, full sun, high percentage of soil exposure). Due to the low number of populations in the Plan Area, conservation of each population would substantially increase the likelihood of persistence in the Plan Area.

Environmental Baseline

Within the Plan Area, there are 11 records for the San Diego ambrosia in our dataset, but 8 of these records are either duplicates or repeated observations of the same population. The species is known from four occurrences in the Plan Area, three of which are known to be extant (CNDDDB 2003; City of Lake Elsinore 2000). One historic occurrence record from 1940 is

located along Arlington Avenue in La Sierra Heights. This occurrence may still be extant, though attempts to relocate it have failed, and it is surrounded by pavement and urbanization. Thus, for the purposes of our analysis, we consider the Plan Area to include only three confirmed extant occurrences of San Diego ambrosia.

Two of the extant occurrences are relatively close together, located to the north and south of Alberhill Mountain, and were historically connected by Temescal Wash. The northern occurrence of San Diego ambrosia, located east of Lake Street and immediately south of Interstate 15, was discovered during surveys conducted in 2000. This occurrence has approximately 12,800 stems in six patches (each may be a clonal patch) located on a terrace of Temescal Wash in disturbed ruderal grassland associated with a historic clay pit mining operation. It is the largest occurrence in the Plan Area. The reach of Temescal Creek, adjacent to this occurrence, was relocated away from this site as part of an ongoing mining operation and effectively separated the floodplain from the occupied terrace. The patches are situated in, and likely depend upon, areas of localized seasonal ponding in shallow depressions created by human disturbance (some appear to be tire ruts), and it is unlikely that the natural flood regime is functioning at this site. The long-term effects of isolating this population from the floodplain are not known.

The locality south of Alberhill Mountain, containing up to 3,400 stems in an undetermined number of patches, is the second largest of the three occurrences. San Diego ambrosia can be found on either side of Nichols Road, in mostly disturbed ruderal vegetation immediately west of the Temescal Wash, and along the power line right-of-way immediately south of Nichols Road. The Temescal Wash floodplain, though bisected by Nichols Road, remains intact. The Nichols Road occurrence may be the only location in the Plan Area where natural dispersal could occur via water movement, and translocation of seed or rhizomes could occur along Temescal Wash. It is possible that the linear pattern of the Nichols Road occurrence, as it leads away from the Temescal Wash floodplain, could have been created through seed dispersal resulting from repeated power line right-of-way maintenance activities. Most of the potential habitat for this species is on private land, so surveys have not been conducted to determine if additional occurrences are extant upstream and downstream of the known occurrences.

Both occurrences adjacent to Alberhill Mountain are accessible by the public on foot and in vehicles. The occurrence in North Alberhill, though private property, is easily accessible via an ungated entrance from Lake Street. The Nichols Road occurrence is fully accessible from the pavement and from the adjacent power line road. Many of the plants are within a few feet of the pavement, and because there is no shoulder on Nichols Road, plants could easily be degraded by off-road vehicles and hiking. However, the San Diego ambrosia may be less vulnerable than other species to this type of disturbance because it resprouts from root stock each year.

Increased human activity in the Alberhill area would increase the threat of flood control activities that could result in loss of floodplain function that the local San Diego ambrosia occurrences may depend upon for persistence and dispersal. Very little information is known regarding the effects of hydrologic changes on species persistence. Changes in hydrologic regime may alter soil salinity, water availability, and other soil characteristics in the areas where this species occurs. Soils associated with the North Alberhill occurrence may be undergoing

changes in salinity or other soil characteristics since it was removed from the floodplain of the Temescal Wash.

The Nichols Road population is stretched out along Nichols Road, in part, and in discrete patches along a power line right-of-way leading west from the west bank of Temescal Wash. Activities associated with the maintenance of these facilities (*e.g.*, vehicular traffic in the right-of-way) pose an ongoing threat to this occurrence. Nichols Road becomes flooded during concentrated rainfall events increasing the risk that vehicles may pursue a dryer course and could lead the City to realign or rebuild this section of road to eliminate the flooding problem. Expansion of Nichols Road is a Covered Activity within the proposed circulation element. Mowing, grading and grubbing along the power line right of way could also contribute to the degradation of this occurrence.

The October 2000 Draft Environmental Impact Report for the Alberhill/Lake Elsinore Sports and Entertainment Center Program included a proposed multiple raceway (525-acre sports complex, a 30-acre commercial site, a 42-acre industrial site, a 1,715-room hotel, golf course and 300 town homes) and included straightening and/or widening both Nichols Road and Lake Street, but these efforts have not moved forward since that time. The proposal would completely alter the landscape, and likely the hydrology, at Alberhill. Without significant avoidance measures, the proposed development would likely threaten the continued existence of both the Nichols Road and North Alberhill occurrences, and ultimately the persistence of the species in the Plan Area.

Temescal Wash is managed to ensure above ground flows from Lake Elsinore and discharge from several industrial sources. Changes in the discharge rate and /or contaminants entering Temescal Wash, associated with flooding of the roadway, could affect San Diego ambrosia at the Nichols Road site.

The third, relatively small, occurrence of San Diego ambrosia (approximately 500 stems in a 50-meter area) is probably an outlier in terms of habitat, as it is associated with the floodplain of a relatively large vernal pool, known as Skunk Hollow, which is fed partially by overflows from adjacent Tualota Creek. The Skunk Hollow occurrence is conserved as part of a Corps of Engineers mitigation bank.

Modeled habitat for the San Diego ambrosia includes all vegetation types in the Riverside Lowlands bioregions within the 100-year or 500-year floodplain between elevations of 656 and 1,641 feet (200 and 500 meters), except disturbed/developed lands, agriculture, and open water. In addition, the habitat model captured all vegetation types at Skunk Hollow, regardless of elevation or flood limits. Based on this analysis, the Plan Area supports approximately 18,688 acres of modeled habitat for the San Diego ambrosia. Approximately 5,019 acres (27 percent) of the modeled habitat occurs within PQP Lands. Only the Skunk Hollow occurrence is on PQP Lands.

Effects of the Action

Direct Effects

The Plan Area includes 18,688 acres of modeled habitat for San Diego ambrosia. There are 7,130 acres (38 percent) of modeled habitat outside the MSHCP Conservation Area; of that, 3,327 acres (18 percent of total modeled habitat) occur within the Narrow Endemic Plant Species Survey Areas (NEPSSA) 1, 2, 3, 3a, 4 and 7 (Figure 6.1, pp. 6-30). San Diego ambrosia is considered a Narrow Endemic Plant Survey Species. Until such time as the Additional Reserve Lands are assembled and conservation objectives for this species are met, surveys will be conducted as part of the project review process for public and private projects where suitable habitat for San Diego ambrosia is present within NEPSSA 1, 2, 3, 3a, 4 and 7. Detected populations will be avoided according to the procedures outlined in the Protection of Narrow Endemic Plant Species (Section 6.1.3 of the Plan; *i.e.*, 90 percent of portions of property with long-term conservation value will be avoided until the species conservation objectives are met). For those locations found to contain large numbers of individuals or otherwise determined to be important to the overall conservation of the species, the Plan allows flexibility to acquire these locations for inclusion into the Additional Reserve Lands (pp. 6-38).

Within the 3,327 acres of modeled habitat outside of the MSHCP Conservation Area, but within the NEPSSA for San Diego ambrosia (18 percent of total modeled habitat), we anticipate that up to 10 percent of the area with long-term conservation value for this species (as discussed above) will be lost to individual projects. The Lake Street population of San Diego ambrosia is the northern most occurrence of the species and the largest of three occurrences in the Plan Area. This occurrence is outside of the MSHCP Conservation Area but within the NEPSSA for San Diego ambrosia. We anticipate that the Narrow Endemic Plant Species Avoidance and Minimization measures (Section 6, pp. 6-38) will be implemented for any proposed development projects that fall within the NEPSSA for San Diego ambrosia (*e.g.*, Alberhill/Lake Elsinore Sports and Entertainment Center Program). Based on current knowledge on the size and distribution of the San Diego ambrosia occurrences in the Plan Area, the Lake Street occurrence is important to the overall conservation of the species. Surveys in NEPSSA 1, 2, 3, 3a, 4 and 7 may also lead to the discovery of other significant occurrences of San Diego ambrosia. The Plan allows flexibility to acquire these locations for inclusion into the Additional Reserve Lands (Section 6, pp. 6-70).

San Diego ambrosia will be subject to impacts associated with development and other proposed Covered Activities within 3,803 acres of modeled habitat that is outside of the MSHCP Conservation Area and outside of the NEPSSA for San Diego ambrosia (20 percent of total modeled habitat). Thus, any individual San Diego ambrosia plants and populations persisting outside of the MSHCP Conservation Area and outside the NEPSSA for San Diego ambrosia are anticipated to be impacted over the 75-year permit term as a result of the proposed Covered Activities.

Because the San Diego ambrosia is not widely distributed within the Plan Area, specific conservation objectives are provided in the MSHCP (Section 9, pp. 9-135) to ensure that suitable habitat and known populations of the San Diego ambrosia will persist. The Plan states that at

least two of the known locations of San Diego ambrosia will be included within the MSHCP Conservation Area, including the populations at Nichols Road and Skunk Hollow. In addition, at least 21,800 acres of grassland and playa/vernal pools at appropriate elevations within the Riverside Lowlands Bioregion will be included within the MSHCP Conservation Area. We anticipate this species will also benefit from the implementation of the Riparian/Riverine Area and Vernal Pools policy.

Based on our dataset, 11,558 acres (62 percent) of modeled habitat for the San Diego ambrosia will be included within the MSHCP Conservation Area, including 2 of 3 extant records in the Plan Area. Approximately 6,539 acres (35 percent) of modeled San Diego ambrosia habitat will be conserved within Additional Reserve Lands, which includes the Nichols Road population. Another 5,019 acres (27 percent) of modeled San Diego ambrosia habitat will remain within PQP Lands, including the Skunk Hollow population. The Nichols Road population is the only population connected to an active stream channel (Temescal Creek) and is, therefore, the population most likely to disperse and lead to new occurrences. Most of Temescal Creek is proposed for conservation under the MSHCP, which will greatly increase the likelihood that the San Diego ambrosia will persist in the Plan Area. In general, conserved modeled habitat for the San Diego ambrosia is interconnected with other areas of conserved habitat through preservation of creeks and rivers and associated riparian habitat. In addition, we anticipate that implementation of the Riparian/Riverine Area policy will assist in providing some protection to this species' habitat by avoiding and/or minimizing direct impacts to riparian and riverine habitats.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands including surveys for the San Diego ambrosia. Cooperative management and monitoring are anticipated on PQP Lands. Surveys for the San Diego ambrosia will be conducted at least every eight years to verify occupancy at a minimum of 75 percent of the known locations. If a decline in the distribution of San Diego ambrosia is documented below this threshold, management measures will be triggered, as appropriate, to meet the species' conservation objectives identified in Section 9, Table 9.2 of the MSHCP. Other management actions described in Section 5, Table 5.2 of the MSHCP include management of non-native species and trampling. Implementation of these management actions will help to avoid and minimize adverse effects to San Diego ambrosia.

Indirect Effects

San Diego ambrosia could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These generally include the indirect effects discussed in the "General Effects" section of this biological opinion. Implementation of the Guidelines Pertaining to the Urban/Wildlands Interface policy, Riparian/Riverine Area and Vernal Pools policy, and the management provisions listed above will help to reduce the indirect effects to this species.

Conclusion

We anticipate the proposed action will directly and indirectly affect San Diego ambrosia as described in the analyses above, including total loss of up to 20 percent of its modeled habitat. An additional 18 percent of San Diego ambrosia modeled habitat outside the MSHCP Conservation Area will be subject to surveys within NEPSSA 1, 2, 3, 3a and 7. Once the conservation objectives for San Diego ambrosia have been met, avoided areas, which have not been otherwise conserved, may be impacted. We anticipate that occurrences determined to be important to the overall conservation of the species, such as the Lake Street population of San Diego ambrosia, will be considered for inclusion in the Additional Reserve Lands and that at least some of the avoided areas may be maintained as open space habitat. Implementation of the avoidance, minimization, and mitigation measures identified in the Plan will further reduce the impacts to San Diego ambrosia. This species is anticipated to persist within the remaining 62 percent of its modeled habitat within both the PQP Lands and the Additional Reserve Lands. We anticipate that these areas will be monitored and managed cooperatively to benefit this species.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the San Diego ambrosia. We reached this conclusion because 62 percent of San Diego ambrosia habitat and at least two of the three known extant occurrences will be protected or will remain within the MSHCP Conservation Area. In addition, conserved modeled habitat for the San Diego ambrosia is generally interconnected with other areas of conserved habitat through preservation of creeks and rivers and associated riparian habitat. Most of Temescal Creek, which contains the only known population in the Plan Area connected to an active riverine system, is proposed for conservation under the MSHCP. NEPSSA surveys for the San Diego ambrosia may result in existing or newly discovered occurrences being included in the MSHCP Conservation Area. Thus, impacts to this species and its habitat, when viewed in conjunction with the protection and management of the MSHCP Conservation Area, are not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of San Diego ambrosia throughout its range.

San Diego button-celery (*Eryngium aristulatum* var. *parishii*)

Status of the Species

Listing Status

San Diego button-celery was federally listed as endangered on August 3, 1993 (58 Federal Register 41391). It was listed as endangered in the State of California in July 1979, and it is on the California Native Plant Society's List 1B (RED 2-3-2). Critical habitat has not been designated for the San Diego button-celery. The Recovery Plan for Vernal Pools of Southern California, which includes San Diego button-celery, was published in September 1998 (Fish and Wildlife Service 1998b).

Species Description

The San Diego button-celery is a perennial herb from a persistent tap root and is in the carrot family (Apiaceae). The plant has a spreading to erect habit, reaching a height of 41 centimeters or more. The stems and toothed leaves are gray-green with spinose lobes, giving it a prickly appearance. Inflorescences form on short peduncles (stalks) with few to many-flowered heads. Flowers are white and vary in length from 1.7 to 2.8 millimeters (Munz 1974).

San Diego button-celery is one of three subspecies of *E. aristulatum* (Constance 1993). San Diego button-celery is separated from *E. a. aristulatum* by the presence of styles in fruit that are about the same length as the calyx (outer whorl of protective leaves around the flower) and is separated from *E. a. hooveri* by the presence of bractlets (modified leaves) without callused margins (Constance 1993). Many of the populations identified as Diego button-celery on Marine Corps Base Camp Pendleton are a recently described new species: *E. pendletonensis* (Marsden and Simpson 1999). San Diego button-celery is distinguished from *E. pendletonensis* by a combination of leaf and flower characteristics.

Habitat Affinities

San Diego button-celery is associated with white clay bottom vernal pools devoid of hardpans (Fish and Wildlife Service 1993a). This species is somewhat more tolerant of peripheral vernal pool habitat than most obligate vernal pool species such as San Diego Mesa mint with which it sometimes grows (Reiser 1994).

Status and Distribution

San Diego button-celery occurs in vernal pools and surrounding habitat from the Santa Rosa Plateau in Riverside County, California, south to the mesas north of Ensenada, Mesa de Colonet, and San Quintin in Baja California, Mexico (CNDDDB 2000; Kim Marsden, pers. comm., 1997 in Fish and Wildlife Service 1998b). In San Diego County, it is found in pools on Del Mar Mesa, Mira Mesa, Kearny Mesa, Marine Corps Base Camp Pendleton, Tierrasanta, San Marcos, Carlsbad, Ramona, and Marine Corps Air Station, Miramar. It has been extirpated from a site in La Jolla (Bauder 1986). San Diego button-celery is also found in the southern portion of San Diego County on Otay Mesa, near the Lower Otay Reservoir and in Proctor Valley. It was historically found near the Tijuana Airport, but it is believed to be extirpated from this locale. There are no known herbarium collections for San Diego button-celery from the San Diego Mesa (e.g., Normal Heights, San Diego State University) (Fish and Wildlife Service 1998b). The California Native Plant Society (2001) notes that this plant has been found at elevations from 20-620 meters above mean-sea-level.

Life History

Most commonly a perennial herb with a persistent tap root, San Diego button-celery is occasionally an annual under less favorable conditions. San Diego button-celery flowers from April to June. It reproduces by out-crossing and is presumably insect-pollinated (Ogden Environmental *et al.* 2000). It is reliant on vernal wet conditions and has developed

mechanisms such as aerenchyma tissues that promote gas exchange underwater to cope with this habitat.

Threats

San Diego button-celery is threatened by urbanization and agricultural conversion throughout much of its range and by off-road vehicle use, livestock grazing, trampling, and competition with non-native species (Fish and Wildlife Service 1993a, 1998b). In Riverside County, on the Santa Rosa Plateau Ecological Reserve, the species has been affected indirectly by alterations in hydrology, invasion of non-native species, and deleterious effects resulting from habitat fragmentation and adjoining urban land uses. Run-off from residential property within the water shed of the Mesa de Colorado pools can flow into the vernal pools through culverts or over the road (Carol Bell, Santa Rosa Plateau Ecological Reserve, pers. comm., 2003). Such run-off can result in the degradation of water quality and changes in the availability of nutrients. Appropriate habitat near occupied areas, where no surveys have been conducted for the species, may be lost or degraded by conversion to agriculture, grazing, and residential development.

Conservation Needs

Existing vernal pools and their associated watersheds should be secured from further loss and degradation in a configuration that maintains habitat function and species viability (Fish and Wildlife Service 1998b). The conservation needs of San Diego button-celery include managed conservation of known occurrences in San Diego and Riverside counties in a manner that provides for long-term viability of the occurrences at these locations. Any new discoveries should be conserved in the same manner. Actions that would modify the hydrology that supports San Diego button-celery habitat or increase the likelihood of deleterious effects from any identified threat should be avoided.

Although the San Diego button-celery has gained a level of protection as a result of being listed under the Act, the species continues to be affected by numerous threats throughout its range. Recovery efforts necessary for the survival and recovery of the San Diego button-celery are addressed in the Recovery Plan for the Vernal Pools of Southern California (Fish and Wildlife Service, 1998b). The Riverside Management Unit is one of five management units identified by the Recovery Plan. The recovery plan states that preservation of pools must be on a geographical scale for both individual species and the landscape in which they reside. Representation of the vernal pools and their associated watersheds within each Management Unit is important for the successful conservation of a full array of vernal pools and their constituent species. The recovery plan states that the extreme rarity and restricted geographic range of the species supports the need to conserve the maximum amount of remaining existing populations and habitat. This criterion will ensure the maintenance of the broadest array of vernal pool species, reduce the risk of losing individual species or pool types, retain local genetic differentiation, buffer environmental variation, and provide the opportunity for reestablishment of new populations. The recovery criteria for the species recommend that existing vernal pools currently occupied by San Diego button-celery and their associated watersheds be secured from further loss and degradation in a configuration that maintains habitat function and species viability.

Environmental Baseline

Within the action area, San Diego button-celery is known only from vernal pools and drainages on and near the Santa Rosa Plateau Ecological Reserve. Lathrop and Thorne (1983) counted 13 vernal pools totaling 53.18 acres on three mesas at the Santa Rosa Plateau Ecological Reserve. An additional pool has since been identified in the reserve on Mesa de Colorado. The San Diego button-celery has been recorded from four pools (pools C1, C2, C3, and C4 from Lathrop and Thorne 1983), in a drainage northeast of pool C2 on Mesa de Colorado, in five pools (pools B1, B2, B3, B6, and B8), and a swale southwest of pool B8 on Mesa de Burro (CNDDDB 2003). Small populations have been observed within Mesa de Colorado on private property west of Via Volcano (Zachary Principe, Santa Rosa Plateau Ecological Reserve, pers. comm. 2003). There is also a large patch of San Diego button-celery west of Mesa de Colorado, outside of the current Santa Rosa Plateau Ecological Reserve boundary and near the intersection of De Luz Creek and an unnamed tributary (Zachary Principe, Santa Rosa Plateau Ecological Reserve, pers. comm., 2003).

Other undiscovered populations of the species may occur within the Plan Area. Mesa de Colorado extends beyond the Ecological Reserve boundary, and portions of the mesa have not been surveyed for the San Diego button-celery (Carol Bell, Santa Rosa Plateau Ecological Reserve, pers. comm., 2003). Redonda Mesa may support one or more vernal pools and associated vernal pool species, including the San Diego button-celery; however, this mesa has not been surveyed. Because the San Diego button-celery is not restricted to vernal pools, precise locations of potential habitat are not known for this species, and it may exist in several locations throughout the Santa Rosa Plateau where surveys have not been conducted.

Two occupied vernal pools on Mesa de Colorado within the Santa Rosa Plateau Ecological Reserve (pools C1 and C4 from Lathrop and Thorne 1983) are threatened by adjacent residential development. Houses have been constructed across the road from the Ecological Reserve and construction has begun in another parcel within the watershed of the pools. Run-off from the residential properties can flow into the vernal pools through culverts or over the road (Carol Bell, Santa Rosa Plateau Ecological Reserve, pers. comm., 2003). In addition, the patches of San Diego button-celery outside of the Reserve are on private property and may be directly and/or indirectly affected by residential development (Zachary Principe, Santa Rosa Plateau Ecological Reserve, pers. comm., 2003).

A total of 2,574 acres of modeled habitat for the San Diego button-celery exists within the Plan Area. The following habitat features were included in our model: 1) Vernal pools in the Santa Ana Mountains Bioregion and 2) Clayey soils (only Porterville contributed to the model) and Santa Rosa Plateau Basalt Flow Soils associated with all vegetation communities within the Santa Ana Mountains Bioregion. We did not include additional soil types that harbor vernal pools, such as Murrieta stony clay loam, in our model because we were unable to incorporate digital overlays mapping the extent of these soil types in the Plan Area. Thus, Redondo Mesa and Mesa de la Punta and most of Mesa de Burro were not captured in our modeled habitat. However, large areas with steep slopes, that are unlikely to support vernal pools or appropriate San Diego button-celery habitat, were captured in our modeled habitat. The habitat model captures habitat that may harbor undocumented vernal pools or other habitat that may be suitable

for the San Diego button-celery. As mentioned above, Lathrop and Thorne (1983) documented 13 vernal pools totaling only 53.18 acres on the Santa Rosa Plateau.

Effects of the Action

Direct Effects

Development activities outside of the MSHCP Conservation Area may result in the loss of San Diego button-celery through destruction of habitat. The Plan Area includes 2,573 acres of modeled habitat for the San Diego button-celery and additional occupied and potential habitat is known in the Plan Area. Without detailed information on San Diego button-celery distribution and density within the Plan Area, we cannot determine how many individuals or populations will be affected by planned development; however, we anticipate the loss of 342 acres (29 percent) of modeled San Diego button-celery habitat within the Plan Area. Thus, any individual San Diego button-celery plants or populations persisting in these areas are anticipated to be impacted over the 75-year permit term as a result of proposed development. No vernal pools or other habitat currently known to be occupied by San Diego button-celery will be lost through implementation of the MSHCP.

Because the San Diego button-celery is not widely distributed within the Plan Area, specific conservation objectives are provided in the MSHCP (Section 9, pp. 9-136) to ensure that suitable habitat and known populations of the San Diego button-celery will persist. The Plan states that at least four of the known locations of San Diego button-celery will be included within the MSHCP Conservation Area on the Santa Rosa Plateau. In addition, in order to maintain existing hydrologic conditions, the watershed of the known locations on the Santa Rosa Plateau will be included within the MSHCP Conservation Area. We anticipate this species will also benefit from the implementation of the Riparian/Riverine Area and Vernal Pools policy.

Based on our analysis, implementation of the MSHCP will conserve and manage large areas containing modeled habitat for the San Diego button-celery and additional, but non-quantified, acreage that was not captured in the modeled habitat. Additional Reserve Lands will include 901 acres (35 percent) of modeled San Diego button-celery habitat in the Plan Area. An additional 1,330 acres (52 percent) of modeled habitat for this species will remain in PQP Lands. In total, 87 percent of the modeled habitat for the San Diego button-celery, including all of the known occupied locations for this species, will be conserved or remain in the Plan Area. All known occupied locations will be conserved in the Additional Reserve Lands or remain in PQP Lands. In addition, the watersheds of the known locations for the San Diego button-celery within the Santa Rosa Plateau will be included within the MSHCP Conservation Area in order to maintain existing hydrologic conditions (Section 9, Table 9.2).

The Permittees will implement management and monitoring practices within the Additional Reserve Lands including surveys for the San Diego button-celery. Cooperative management and monitoring are anticipated on PQP Lands. Surveys for the San Diego button-celery will be conducted at least every eight years to verify occupancy at a minimum of 75 percent of known locations. If a decline in the distribution of the San Diego button-celery is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-

specific objectives identified in Section 9, Table 9.2 of the MSHCP. Other management actions described in Section 5, Table 5.2 of the MSHCP will help maintain San Diego button-celery habitat, such as maintaining the watershed and hydrologic conditions of the known vernal pool complexes on the Santa Rosa Plateau. Implementation of these management actions will help to avoid and minimize adverse effects to San Diego button-celery.

Indirect Effects

San Diego button-celery could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These generally include the indirect effects discussed in the “General Effects” section of this biological opinion. Indirect effects with the potential to affect vernal pools and the species that occupy them, including the San Diego button-celery, within the Plan Area are addressed in the Generalized Effects Analysis for Vernal Pools. Implementation of the Guidelines Pertaining to the Urban/Wildlands Interface policy, Riparian/Riverine Area and Vernal Pools policy, and the management provisions listed above will help to reduce the indirect effects to this species.

Specific planned activities are known from the watershed of Mesa de Colorado, which extends beyond the boundary of the Santa Rosa Plateau Ecological Reserve, and these activities may indirectly impact vernal pools on this mesa. There are eight parcels along Via Volcano, and residential or single family home construction may be proposed for these parcels. They cover the majority of the watershed outside of the Reserve for two vernal pools, and four culverts carry water directly from these parcels to the pools on the Reserve property (Zachary Principe, Santa Rosa Plateau Ecological Reserve, pers. comm. 2003). Both vernal pools are known to be occupied by the San Diego button-celery (Lathrop and Thorne 1983). Construction activities and subsequent residential uses on these parcels could result in adverse indirect impacts to the pools and the San Diego button-celery populations therein through altered hydrology and discharge of materials into these culverts. However, since these parcels are included within the Additional Reserve Lands and are important to the long-term conservation of the San Diego button-celery, we anticipate that the conservation Criteria identified within each individual cell/cell group covering these parcels will be achieved, or if appropriate, refined through the Criteria Refinement Process. Likewise, any single family homes planned for these parcels would be subject to the siting requirements identified in Section 7.3.2 for locating building footprints and any necessary access roads in the least sensitive portion of any individual parcel; in particular, if houses are built on these properties, they should be sited such that drainage will flow away from any vernal pools or other formations that may support San Diego button-celery.

Conclusion

We anticipate the proposed action will directly and indirectly affect the San Diego button-celery as described in the analyses above, including the loss of 13 percent of its modeled habitat in the Plan Area. No known populations of the San Diego button-celery will be lost as a result of Covered Activities in the Plan. Additional populations may be found and protected in association with survey efforts for other covered species through implementation of the Riparian/Riverine Areas and Vernal Pools policy. Implementation of the avoidance, minimization, and mitigation measures identified in the Plan will reduce the impacts to this

species. This species is anticipated to persist within the remaining 87 percent of its modeled habitat within both the PQP Lands and the Additional Reserve Lands. We anticipate that these areas will be monitored and managed cooperatively to benefit this species.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the San Diego button-celery. We reached this conclusion because no known San Diego button-celery populations will be affected through implementation of the MSHCP, and the impacts associated with loss of this species' modeled habitat, when viewed in conjunction with the protection and management of the MSHCP Conservation Area, are not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of the San Diego button-celery throughout its range.

San Jacinto Valley crownscale (*Atriplex coronata* var. *notatior*)

Status of the Species/Environmental Baseline

Since the San Jacinto Valley crownscale is endemic to the Plan Area, its status range-wide and in the Plan Area are the same.

Listing Status

On December 15, 1994, the San Jacinto Valley crownscale was proposed for listing as endangered, and critical habitat for the species was proposed for 3,845 acres in Riverside County (59 Federal Register 64812). The final rule for its listing was issued on October 13, 1998 (63 Federal Register 54975); however, at the time of final rule, the Service determined that designation of critical habitat was not prudent. A recovery plan is in preparation.

Species Description

San Jacinto Valley crownscale, a member of the goosefoot family (Chenopodiaceae), is an erect, gray-scurfy annual, 1 to 3 dm (4 to 12 in) tall. The grayish leaves are sessile, alternate, 8 to 20 mm (0.3 to 0.8 inch) long, and elliptic to ovate-triangular in outline. This taxon is monoecious (male and female flowers on the same plant). The female flowers are obscure and develop spherical bracts in the fruiting phase. These bracts have dense tubercles (nodules) that are roughly equal in number to the marginal teeth (Munz 1974; Taylor and Wilken 1993).

San Jacinto Valley crownscale can be distinguished from the more northern *A. c.* var. *coronata* by its erect stature, the spheric shape of the bracts together in fruiting stage, and the more numerous tubercles and marginal teeth on the bracts. The distributions of the two varieties do not overlap. *A. c.* var. *coronata* is found in the Sacramento, San Joaquin and neighboring valleys, while San Jacinto Valley crownscale is restricted to Riverside County.

San Jacinto Valley crownscale occurs with eight other native and one introduced species of *Atriplex* within its range (Bramlet 1993a). It can be distinguished from these taxa by a

combination of characteristics, including annual habit, the shape of the leaf, and the size and form of the bract (Munz 1974; Taylor and Wilken 1993). No mention of hybridization was found in the literature reviewed.

Habitat Affinities

San Jacinto Valley crownscale is restricted to highly alkaline, silty-clay soils in association with the Traver-Domino-Willows soil association, with the majority of the populations associated with the Willows soil series. It occurs in alkali sink scrub, alkali playa, vernal pools, and, to a lesser extent, in annual alkali grassland communities (Bramlet 1993a; Roberts 1993b). It is dependent on seasonal wetland habitats as well as adjacent transitional wetlands and marginal wetlands within a watershed for dispersal (Fish and Wildlife Service 1994c). Seasonal flooding or ponding is an important process that maintains the successional state of alkali playa and vernal pool habitat. Flooding and ponding can also function to restore disturbed alkali habitat and disperse seed (Fish and Wildlife Service 1994c). The duration and extent of flooding or ponding can be extremely variable from one year to the next.

This species is found in association with other listed or sensitive MSHCP Covered Species, including Parish's brittlescale, thread-leaved brodiaea, smooth tarplant, California Orcutt grass, Coulter's goldfields, little mousetail and spreading navarretia (Bramlet 1993a; Roberts 1993b; Fish and Wildlife Service 1998h).

Life History

This bushy, erect annual is monoecious, with the staminate and pistillate flowers occurring in mixed clusters. San Jacinto Valley crownscale germinates after water has receded (Fish and Wildlife Service 1994c), usually flowers in April and May, and sets fruit by May or June (Bramlet 1992). Other sources indicate that the flowering period may extend to August (California Native Plant Society 2001; Munz 1974).

San Jacinto Valley crownscale is a prolific seeder. Preliminary studies indicate that San Jacinto Valley crownscale seeds retain a relatively high viability for at least several seasons. A viable seed bank may exist in the soil of a known site even if plants are removed or fail to germinate for a season (Ogden Environmental and Energy Services Corporation 1993a). Seeds are dispersed by seasonal flooding or ponding. San Jacinto Valley crownscale will generally germinate in the spring as flows recede. The number San Jacinto Valley crownscale plants in a population complex varies in response to rainfall, extent of winter flooding, and temperature (Fish and Wildlife Service 1998h).

Status and Distribution

The San Jacinto Valley crownscale is endemic to the Plan Area. It is known from the San Jacinto, Perris, Menifee, and Elsinore valleys in western Riverside County, California (Roberts 1993b; Roberts and McMillan 1997; CNDDDB 2003). It is associated with alkali vernal plains within the floodplain areas of the San Jacinto River, Salt Creek, and Temescal Creek. Rarely, the species is found associated with vernal pools outside of floodplain areas. The MSHCP states

that approximately 28,794 acres of alkali soils (of the Domino/Traver/Willow series) are present in the Plan Area (excludes soils on Tribal Lands, Vol II, pp. IIA-35). Not all of this area is expected to have been occupied by San Jacinto Valley crownscale since the appropriate hydrological processes must also be present to support the species.

Our dataset intersected the Domino/Traver/Willow soils series with grassland and playa/vernal pool habitats within the Riverside Lowlands Bioregion. While there is substantial intersection of this soil series with these specific habitat types, some playa and vernal pool habitat does not fall on these soils. We included this habitat in our model because while most San Jacinto Valley crownscale populations occur on the Domino/Traver/Willow soil series, some are found in areas adjacent to these soils (D. Bramlet, pers. comm. to J. Terp, Fish and Wildlife Service, 2003). Approximately 8,954 acres of modeled habitat for the species occurs within the Plan Area with about 3,065 acres of this modeled habitat within PQP Lands.

Between 1990 and 1994, it was estimated that the population of plants was approximately 78,000 individuals (Fish and Wildlife Service 1998h). In the 1998 final rule listing the species, the Service estimated the total occupied habitat consisted of approximately 400 acres of alkali habitats within a range of approximately 8,200 acres of potentially suitable habitat for this species in western Riverside County. Of the 78,000 plants, approximately 75 percent were associated with three population centers found in Mystic Lake, the Lakeview-Nuevo segment of the San Jacinto River, and the upper Salt Creek area, on the western edge of the City of Hemet. In 2000, Glen Lukos Associates, Inc. surveyed the San Jacinto River between the Ramona Expressway and the mouth of Railroad Canyon. They identified approximately 83,741 individual plants occupying an aggregate total of 236 acres within their 6,000-acre survey area. They further estimated the range-wide population of approximately 106,000 plants based on expected populations of 7,470 and 15,000 plants at the San Jacinto Wildlife Area and Upper Salt Creek Drainage, respectively.

The San Jacinto Valley crownscale is currently known from roughly 18 localities in four general occurrence complexes. The occurrence complexes are at the San Jacinto Wildlife Area/Mystic Lake, in the flood plain of the San Jacinto River mostly between the Ramona Expressway and Goetz Road, in the upper Salt Creek drainage in the west Hemet area, adjacent to Temescal Wash near Alberhill and Lake Elsinore, and between Diamond Valley Reservoir and Lake Skinner (this is a PQP area but don't know who owns it). These areas are described in more detail below. Most of the known occurrences of San Jacinto Valley crownscale are on privately owned land. There are three localities on State land (San Jacinto Wildlife Area), one locality is partially on County-owned land (Riverside County Habitat Conservation Agency along the San Jacinto River), and one locality is on a private preserve managed by Metropolitan Water District. This plant is not known to occur on Federal lands.

San Jacinto Wildlife Area: According to Bramlet (1996), the San Jacinto Wildlife Area contains from 1,350 to 1,970 acres of alkali sink habitat, including excellent stands of alkali grassland. Other portions of this area contain alkali habitats but are highly degraded and contain dense stands of weedy, introduced species. The general Mystic Lake area contains 700 to 2,300 acres of alkali scrub habitat depending on the level of the lake; in most years, less than 1,000 acres of habitat for San Jacinto Valley crownscale are available (Bramlet 1996). The two duck clubs,

Ramona and Mystic Lake, are east of the San Jacinto Wildlife Area and contain around 400 acres of alkaline habitat. One of the largest populations of San Jacinto Valley crownscale (estimated to be 20,000 plants) was found on the shoreline of Mystic Lake. About 50 to 1,000 plants have been seen in several areas in the San Jacinto Wildlife Area to the southwest of this larger population (CNDDDB 2003). Another location documented from 1991 lies along the upper portion of the San Jacinto River, upstream of Mystic Lake, outside of the Wildlife Area.

San Jacinto River and Perris: The floodplain of the San Jacinto River from the Ramona Expressway south to Nuevo Road contains fairly large populations of San Jacinto Valley crownscale. Bramlet (1996) estimated that this area contains approximately 846 acres of habitat. The region extending from Nuevo Road to I-215 contains around 1,394 acres of habitat for the species. The alkali playa habitat has been greatly decreased over the years due to agriculture, especially irrigated crops and alfalfa farming. The Perris region extends from I-215 on the east to Goetz Road and in the southwest corner to the mouth of Railroad Canyon. It is estimated that this region contains around 1,580 acres of potential habitat for the San Jacinto Valley crownscale (Bramlet 1996).

Upper Salt Creek: The Upper Salt Creek drainage in and west of Hemet contains large areas of alkali grassland with alkali playa and vernal pool communities. This region includes around 1,200 acres of alkali habitat (Bramlet 1996).

Alberhill/Lake Elsinore: This location of 185 plants was noted in 1997 and mapped as southeast of Nichols Road and west of Alberhill Creek (CNDDDB 2003). Based on the metadata accompanying the GIS data, another occurrence in the Alberhill area may be a duplicate of this point, although it is mapped slightly further east of this point. Our dataset includes another two points for San Jacinto Valley crownscale to the southeast of the Alberhill locations and east of Lake Elsinore; however, we believe these occurrences may be duplicates of each other, and the location further north may be more accurately mapped. The CNDDDB information indicates that there is the potential for more populations in the nearby playa habitat.

In 1998, the Service issued a non-jeopardy opinion to the U.S. Army Corps of Engineers for the Metropolitan Water District's Inland Feeder Project for impacts to San Jacinto Valley crownscale on 241 acres that could contain alkali playa/grassland/sink and vernal pools.

Threats

San Jacinto Valley crownscale is declining throughout its range due to habitat destruction and fragmentation resulting from urban and agricultural development, pipeline construction, alteration of hydrology and flood plain dynamics, excessive flooding, channelization, off-road vehicle activity, trampling by cattle and sheep, weed abatement, fire suppression practices (including discing and plowing), and competition from non-native plant species (Bramlet 1993a; Roberts and McMillan 1997; Fish and Wildlife Service 1998h).

The Eastern Municipal Water District (EMWD) has proposed to develop 320 acres of permanent wetlands on the eastern edge of the lake using reclaimed and storm water as a multi-purposed effort to conserve San Jacinto Valley crownscale and other species (EMWD 1994; J. Lewis,

EMWD, pers. comm. to K. Cleary-Rose, Fish and Wildlife Service 2003). There is a concern, however, that this development would alter the existing inundation cycle for wetland and alkali playa habitat around the margins of Mystic Lake (Bramlet 1996).

Specific Covered Activities and ongoing activities that threaten San Jacinto Valley crownscale plants and habitat include the following: 1) the addition and expansion of circulation element roadways in the floodplain of the San Jacinto River; 2) implementation of the east-west CETAP corridors; 3) the San Jacinto River Flood Control Project and the use of the Ramona Expressway to restrict flows in the river as part of that project; and 4) ongoing and future agricultural activities and urbanization that may introduce exotic plants, suppress or extirpate existing populations and alter hydrology that the species depends upon.

Conservation Needs

San Jacinto Valley crownscale is restricted to the highly alkaline silty-clay soils associated with the Domino/Traver/Willow soil association, with most populations occurring on the Willow soil series. The conservation needs of San Jacinto Valley crownscale include conservation and management of occurrences in a manner that provides for long-term viability of the species within the larger context of the vernal playa community and its supporting hydrology. The spatial distribution of San Jacinto Valley crownscale shifts over time as environmental conditions and the seed bank distribution change (Fish and Wildlife Service 1998h). Crownscale occupying seasonal wetland habitat is dependent on adjacent transitional wetlands and marginal wetlands within the watershed for dispersal (Fish and Wildlife Service 1994c). Thus, more habitat than is occupied during any one season is necessary to maintain population dynamics and microhabitat diversity within a watershed. Activities that would modify the hydrology supporting the species habitat or increase the likelihood of deleterious effects from any identified threat should be avoided.

Effects of the Action

Direct Effects

The Plan Area includes approximately 8,955 acres of modeled habitat for San Jacinto Valley crownscale. There are 1,824 acres (20 percent) of modeled habitat outside of the MSHCP Conservation Area; of that, approximately 869 acres (10 percent of total modeled habitat) occur within the Criteria Area Species Survey Areas (CASSA) 2, 3, and 3a (Figure 6-2, pp. 6-64). The San Jacinto Valley crownscale is considered an Additional Survey Needs and Procedures species. Until such time that the Additional Reserve Lands are assembled and conservation objectives for this species are met, surveys for San Jacinto Valley crownscale will be conducted where suitable habitat is present for the species within CASSA 2, 3, and 3a. Populations detected as a result of survey efforts will be avoided according to the procedures outlined in the Additional Survey Needs and Procedures (section 6.3.2 of the Plan; *i.e.*, 90 percent of portions of property with long-term conservation value will be avoided until the species conservation objectives are met).

For those locations found to contain large numbers of individuals or otherwise determined to be important to the overall conservation of the species, the Plan allows flexibility to acquire these locations for inclusion into the Additional Reserve Lands (pp. 6-70).

Within the 869 acres of modeled habitat that is outside the MSHCP Conservation Area, but within the CASSA for San Jacinto Valley crownscale (10 percent of total modeled habitat), we anticipate that up to 10 percent of the area with long-term conservation value for the species (as discussed above) will be lost to individual projects.

San Jacinto Valley crownscale will be subject to impacts associated with proposed residential, commercial, urban, and agricultural development within 955 acres of this modeled habitat that is outside of the MSHCP Conservation Area and outside of the CASSA for San Jacinto Valley crownscale (10 percent of total modeled habitat). Thus, all individual San Jacinto Valley crownscale plants and populations persisting in these areas are anticipated to be impacted over the 75-year permit term as a result of the planned development. This includes locations west of the Upper Salt Creek area both north and south of SR-74/79, three unverified datapoints east and southeast of the mapped Alberhill location, one unverified datapoint northwest of the Perris locations, the one point in the upper San Jacinto River, and potentially some portions of populations along the San Jacinto River. The locations west of the Upper Salt Creek area fall within Rural Mountainous zoning where development is anticipated to occur at a slower rate and at lower densities. With appropriate conservation planning, it is possible that San Jacinto Valley crownscale locations in this area could persist in conjunction with low intensity development.

Of the 955 acres of modeled habitat for San Jacinto Valley crownscale that are outside of the MSHCP Conservation Area and outside of the CASSA for San Jacinto Valley crownscale, 31 acres of modeled habitat occur within CASSA 1 and 4 (17 and 14 acres, respectively). This represents less than one percent of modeled habitat for the species.

Because the San Jacinto Valley crownscale is not widely distributed within the Plan Area, specific conservation objectives are provided in the MSHCP (Section 9, pp. 9-137) to ensure that suitable habitat and most known populations of the species will persist. The Plan states that the MSHCP Conservation Area will include the two core areas that are along the San Jacinto River (Mystic Lake and the river southwest of Mystic Lake to the Perris Area), the core area at Upper Salt Creek, and the location at Alberhill. These areas will either remain on PQP Lands or be conserved within the Additional Reserve Lands. In addition, at least 6,900 acres of grassland and playa/vernal pool habitat within the San Jacinto River, Mystic Lake and Salt Creek areas will be included within the MSHCP Conservation Area. Floodplain areas along the San Jacinto River will be included to preserve floodplain processes important to the survival of the San Jacinto Valley crownscale. Salt Creek floodplain in its existing condition (from Warren Road to Newport Road) and vernal pools in Upper Salt Creek will be included within the MSHCP Conservation Area and floodplain processes maintained to provide for persistence of the species. While not explicit as a planning species for the San Jacinto Valley Subunit 4 (Hemet Vernal Pool Areas - East, Section 3, pp. 3-342), we anticipate that planning for that subunit will include consideration of San Jacinto Valley crownscale to achieve the conservation objectives for the species. We also anticipate that implementation of the Riparian/Riverine Areas and Vernal Pools policy will assist in providing some protection to this species' habitats by avoiding and/or

minimizing direct and indirect impacts to riparian, riverine, and vernal pool habitats. Additional locations of San Jacinto Valley crownscale may also be conserved indirectly through efforts to meet the species-specific objective of conserving 6,900 acres of alkali playa and vernal pool habitat within the MSHCP Conservation Area.

Based on our dataset, it appears that more than the 6,900 acres of grassland, alkali playa and vernal pool habitat proposed for inclusion in the MSHCP Conservation Area will remain in the Plan Area. Approximately 3,065 acres of modeled habitat fall within PQP Lands and 4,065 acres fall within the Additional Reserve Lands. Thus, the MSHCP Conservation Area will include up to 7,130 acres (80 percent) of the modeled San Jacinto Valley crownscale habitat in the Plan Area.

Of the known mapped locations of San Jacinto Valley crownscale, some locations were not captured well by our interpretation of the conservation criteria for the cell. The criteria for cell 3276 in the Mead Valley Area Plan Subunit 4 (Lower San Jacinto River, Section 3, pp. 3-235) indicates that 45 to 55 percent of the cell group would be conserved, focusing in the southern portion of the cell. The locations near Case Road east of Perris Airport are not captured fully by this description. The Plan has conflicting criteria for cell 3891 in Upper Salt Creek, with San Jacinto Valley Sub Area criteria (Section 3, pp. 3-365) focusing conservation on the eastern portion of the cell and the Harvest Winchester Sub Area criteria (Section 3, pp. 3-171) focusing conservation on the western portion of that same cell. However, the Plan has sufficient flexibility to allow the criteria for these cells and others needing to be adjusted to include species locations. The locations may also be conserved indirectly through efforts to meet the species objectives of inclusion of 6,900 acres of appropriate habitat and maintenance of floodplain processes within the MSHCP Conservation Area. Thus, it is likely that all or a portion of the Case Road location and the location in cell 3891 of Upper Salt Creek will be included in the Additional Reserve Lands.

Any populations in the lower San Jacinto River may be at risk from the San Jacinto River Flood Control Project. We assume that a population will not be impacted by this proposed Covered Activity unless criteria in Section 7.3.7 of the Plan are met. The criteria includes conservation of land (called "mitigation lands") and providing hydrology for the continued survival of the San Jacinto Valley crownscale (among other species). Like other species on the floodplains of the San Jacinto River, San Jacinto Valley crownscale depends on specific hydrology: sporadic flooding in combination with slow drainage in alkaline soils characterized by alkali scrub, alkali playa, alkali vernal pool and alkali annual grassland habitat. These habitats form a dynamic matrix that allows the populations of San Jacinto Valley crownscale to expand into favorable sites and retreat from less favorable sites in response to disturbance and annual rainfall. As stated in the MSHCP, flooding at irregular intervals is an important process that maintains crownscale habitat in a successional state, restores disturbed alkali habitats, and probably disperses seed. We anticipate that any reduction in the population size will be minimized through adherence to the criteria of the flood control project of providing hydrology and the species-specific conservation objective of maintaining floodplain processes. Also, mitigation lands may include acreage located outside the Lakeview/Nuevo and Mead Valley Area Plans if the Wildlife Agencies determine that such acreage provides the same or greater conservation value and acreage to the MSHCP Conservation Area. We anticipate that any reduction in the

population size will be minimized through adherence to these criteria, such that the distribution of this species will be maintained in the Plan Area.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands including surveys for the San Jacinto Valley crownscale. Cooperative management and monitoring is anticipated on PQP Lands. Surveys for the San Jacinto Valley crownscale will be conducted at least every 8 years to verify occupancy at a minimum of 75 percent of the known locations. If a decline in the distribution of San Jacinto Valley crownscale is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP. Other management actions described in Section 5 of the MSHCP will help maintain habitat and populations of San Jacinto Valley crownscale within core areas. These management actions include maintaining and enhancing the floodplain processes of the San Jacinto River, Mystic Lake, and Upper Salt Creek, including intermittent flooding and periodic pooling; preventing alteration of hydrology and floodplain dynamics; and addressing farming, fire and fire suppression activities, off-road vehicle use, and competition from non-native plants. Implementation of these management actions will help to avoid and minimize adverse effects to San Jacinto Valley crownscale.

Indirect Effects

San Jacinto Valley crownscale could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These generally include the indirect effects discussed in the “General Effects” section of this biological opinion. Implementation of the Guidelines Pertaining to the Urban/Wildlands Interface, Riparian/Riverine Area and Vernal Pools policy, and the management provisions listed above will help to reduce the indirect effects to this species.

Conclusion

We anticipate the proposed action will directly and indirectly affect the San Jacinto Valley crownscale as described in the analysis above, including total loss of 10 percent of its modeled habitat. An additional 10 percent of San Jacinto Valley crownscale modeled habitat outside the MSHCP Conservation Area will be subject to surveys within CASSA 2, 3, and 3a. Once the conservation objectives for San Jacinto Valley crownscale have been met, avoided areas, which have not been otherwise conserved, may be impacted. We anticipate that occurrences determined to be important to the overall conservation of the species will be considered for inclusion in the Additional Reserve Lands and that at least some of the avoided areas may be maintained as open space habitat. Implementation of the avoidance, minimization and mitigation measures identified in the Plan will further reduce impacts to San Jacinto Valley crownscale. This species is anticipated to persist within the remaining 80 percent of its modeled habitat within both the PQP Lands and the Additional Reserve Land. We anticipate that these areas will be monitored and managed cooperatively to benefit this species.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service’s biological

opinion that the action, as proposed, is not likely to jeopardize the continued existence of the San Jacinto Valley crownscale. We reached this conclusion because 80 percent of San Jacinto Valley crownscale modeled habitat and 62 percent of the known occurrences will be protected or will remain within the MSHCP Conservation Area. In addition, required surveys for the San Jacinto Valley crownscale may result in newly discovered occurrences being included in the MSHCP Conservation Area, and management actions will address maintenance and enhancement of floodplain processes important to the species. Thus, impacts to this species and its modeled habitat, when viewed in conjunction with the protection and management of the MSHCP Conservation Area, are not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of San Jacinto Valley crownscale throughout its range.

Santa Ana River woolly-star (*Eriastrum densifolium* ssp. *sanctorum*)Status of the Species*Listing Status*

Santa Ana River woolly-star was federally listed as endangered on September 28, 1987 (52 Federal Register 36270). Critical habitat was not designated for this subspecies. No recovery plan has been released. The subspecies was listed as endangered by the State of California in January 1987.

Species Description

Woolly-star is a short-lived, perennial, subshrub of the phlox family (Polemoniaceae). It has a basally branched, generally erect or spreading form, reaching 75 centimeters (30 inches) in height. The entire plant, including the inflorescence, is covered with woolly pubescence, giving it a silvery-white appearance. The inflorescence is dense and spiny-bracted with about 20 flowers. The flowers have blue to violet-blue, elongate, funnel-shaped corollas that are usually longer than 25 millimeters (1.0 inch), although occasionally as short as 20 millimeters (0.8 inch). The light gray-green leaves generally curve upward. The leaves are irregularly divided to the midrib into two to six narrow lobes and are up to 50 millimeters (2.0 inches) long.

Four other subspecies of *Eriastrum densifolium* have been recognized. A key feature that distinguishes Santa Ana River woolly-star from other subspecies is the length of its corolla or floral tube which is over 30 millimeters (1 inch); floral tube lengths in the other four subspecies do not exceed 20 millimeters (0.8 inches) (Hickman 1993a).

Habitat Affinities

Woolly-star is a pioneer species that colonizes washed sand deposits created by sporadic stream flow action. Between major flood events, these deposits typically exist as terraces above the high water mark of the river and associated braided streams (Zembel and Kramer 1985). Woolly-star grows primarily in Riversidean alluvial fan sage scrub habitat in sandy soils from 360 to 630 meters (1,200 to 2,000 feet) in elevation (52 Federal Register 36268). The subspecies thrives in the nutrient poor sands of early seral stage habitat that have more than 97 percent sand

(*i.e.*, 0.5 to 2 millimeters; 0.02 to 0.08 inch) particles. The dominant species on young substrates include California buckwheat, scalebroom, fastigate golden aster, and California croton. Woolly-star also remains competitive on intermediate-aged substrates that have between 90 and 97 percent sand particles. The dominant species on intermediate substrates include California buckwheat, scalebroom, California juniper, valley cholla, and coastal prickly pear. In the few locations where woolly-star occurs in mature seral stages, plants are relatively few and appear to be declining in vigor, probably because competition from shrubs and annual herbs limits the establishment of the subspecies. The dominant species in mature seral stages include sugar bush, holly-leaved cherry, and chamise. Total vegetative cover at sites supporting woolly-star ranges from 42 to 48 percent at younger sites and 66 to 88 percent at older sites (Wheeler 1991).

Life History

The woolly-star is a short-lived perennial plant with an average life span of five years; however, occasionally plants may persist for 10 years (Burk *et al.* 1988). Plants flower at the beginning of their second growing season. Flowering is heaviest in June (Muñoz 1991; Erickson 1993; Stone 1995) but extends from late May through mid-August (Patterson and Tanowitz 1989). The amount and timing of seasonal rainfall may affect the time of flowering (Erickson 1993). Corollas are lavender-blue becoming pinkish-purple with age (Muñoz 1991).

Available information indicates that woolly-star is primarily outcrossing (*i.e.*, does not readily self-fertilize) and dependent on one or more pollinators (Jones and Burk 1996). The flowers are protandrous (anthers release pollen prior to the maturation and receptivity of the stigma), a condition that commonly prevents self-pollination within the same flower. Self-pollination in woolly-star produces negligible fruit or seed set (Muñoz 1991; Stone 1995). Many species of insects and other animals visit woolly-star flowers, but pollination is effected by comparably few of these (Erickson 1993). The most important pollinators are the solitary digger bee, giant flower-loving fly, and hummingbirds, primarily the black-chinned hummingbird and Anna's hummingbird. The relative importance of the pollinators differed among locations (Muñoz, 1991).

The majority of seeds fall within 0.3 meters (one foot) of the parent plant (Burk *et al.* 1989). Seeds that remain in the capsules at the onset of the winter rains become trapped within the capsules due to the hygroscopic contraction and closing of the capsule valves (Wheeler 1991). These capsules may remain on the plant for several seasons. The retention of seeds within capsules may be a flood-adapted dispersal mechanism as plants are washed away and capsules broken open allowing seed deposit downstream (Burk *et al.* 1989). There is no evidence that woolly-star plants resprout vegetatively following flood events.

Seeds germinate within 48-72 hours following fall storms depositing roughly 25-30 millimeters (1 inch) of rain. Little above-ground growth is visible for the first weeks following germination because the seedling generates a primary taproot (Wheeler 1991). Burk *et al.* (1988) and Wheeler (1991) found that seedling establishment is inhibited on surfaces with higher percent cover of annuals, grasses, and litter and less bare ground and predict that eventually recruitment will cease, resulting in local extinctions. Seedling survivorship is highest in areas with lower cover of annual plants, grasses, litter, and less bare ground. Stands of plants occurring on older

surfaces are comprised chiefly of mature plants with few juveniles whereas stands on “younger” surfaces exhibit a higher percentage of young plants.

Status and Distribution

Historically, woolly-star occupied about 110 kilometers (60 miles) of habitat along the Santa Ana River from an elevation of about 600 meters (2,000 feet) at the base of the San Bernardino Mountains, through Riverside County, to about 150 meters (500 feet) in the vicinity of Santa Ana Canyon in Orange County. Woolly-star may have occupied alluvial habitats in Orange County as far downstream as Santiago Canyon (Craig 1934; Mason 1945; Zembal and Kramer 1984). No individuals have been located in Orange County during recent decades, and this subspecies was considered extirpated from Riverside County as well (Zembel and Kramer 1985). However, woolly-star has again been detected within Riverside County just downstream of the San Bernardino-Riverside County border (CFWO GIS internal database 2004). At the present time, the majority of the plants of this subspecies occur within the reaches of the Santa Ana River floodplain in San Bernardino County (CFWO internal GIS database 2004). A disjunct occurrence of this subspecies remains in Lytle Creek within the Santa Ana River floodplain (52 Federal Register 36268).

Threats

This subspecies continues to be threatened by floodplain modifications that alter hydrology and eliminate or impair habitat function such as flood control construction (*e.g.*, dams and levees); flood control management (clearing for channel maintenance, construction of flood control structures); off-road vehicle activity; farming; sand and gravel mining; and competition with aggressive non-native species such as European grasses and river cane (Zembal and Kramer 1985; Burk *et al.* 1989; 52 Federal Register 36268). Historically, sheep grazing was used to reduce vegetation cover within the Santa Ana River floodplain in Riverside County, a practice that results in compacted soils, an increase in soil nitrogen content in what are typically nitrogen-poor soils, and heavy weed cover.

Conservation Needs

Maintenance of floodplain processes including flooding with sediment deposition are required to sustain the pioneer alluvial fan habitat upon which woolly-star depends and to disperse seeds. As individual plants may live only 5-10 years, successful dispersal and recruitment are critical demographic components to persistence and recovery of this subspecies. This subspecies is disturbance oriented and responds well to localized disturbance such as flooding and possibly to other ground disturbing activities such as mowing (Formal Section 7 Consultation for Disposal and Reuse of the Former Norton Air Force Base, FWS-SB-1723.10). As this species is undoubtedly naturally flood-dispersed, a downstream distribution of individuals is expected where appropriate habitat remains. However, available habitat downstream of existing occurrences is highly compromised by existing development, flood control devices, and sand and gravel mining operations. In addition, protection from destructive disturbances such as off-highway vehicle use is recommended.

Environmental Baseline

Our database contains four records of woolly-star in western Riverside County. Within the Plan Area, woolly-star is known from only three locations in the Santa Ana River floodplain between South Riverside Avenue and Mission Boulevard (CFWO GIS internal database 2004); the fourth location is upstream from these and outside the Plan Area. Two of these occurrences of woolly-star are located near Market Street in the City of Riverside, west of Fairmont Park and contain fewer than 10 individual plants (Dudek 2003; Species Accounts). These two occurrences are within existing PQP Lands (*i.e.*, existing Core A). The third occurrence was located in 2000 on a remnant sandy alluvial terrace surrounded by urban (likely commercial) development and disturbed, ruderal habitat (CFWO GIS internal database 2004). This occurrence is outside the MSHCP Conservation Area.

The total number of woolly-star plants detected within Riverside County are estimated at less than 20 individuals (A. Sanders, Curator, UCR Herbarium, pers. comm. to N. Ferguson, CFWO September 4, 2003). One additional location has been documented within the Plan Area in the Vail Lake area (CFWO GIS internal database 2004). However, Vail Lake is well outside the historic range of the subspecies and without current verification, we cannot consider this report to be accurate (A. Sander, Herbarium Curator, UCR, pers. comm. to N. Ferguson, CFWO September 4, 2003).

Woolly-star occurs in unconsolidated sandy and gravelly soils, rock mounds and boulder fields (Zemba and Kramer 1985) within the alluvial fan floodplain of the Santa Ana River. The typical vegetation community is characterized as Riversidean alluvial fan sage scrub (51 Federal Register 12181). As woolly-star is a perennial plant, occurrences are expected to persist in known locations for the lifespan of the adult plants, unless a large-scale flood event scours out the habitat.

The primary vegetation type used to model habitat for this species was Riversidean alluvial fan sage scrub within the 100-year floodplain of the Santa Ana River. Based on this analysis, the Plan Area includes approximately 2,468 acres of modeled habitat for the woolly-star. Approximately 728 acres (29 percent) of this modeled habitat is within existing PQP Lands.

Effects of the Action

Direct Effects

The Plan Area includes approximately 2,468 acres of modeled habitat for the woolly-star. The loss of 754 acres (31 percent) of this modeled habitat is anticipated over the 75 year permit term due to impacts from development or other Covered Activities. About 728 acres (29 percent) of modeled woolly-star habitat is within existing PQP Lands and approximately 987 acres (40 percent) of this habitat will be within the Additional Reserve Lands. Therefore, we anticipate that approximately 69 percent of the modeled habitat for the Santa Ana River woolly-star will be conserved or remain within the Plan Area.

The proposed Covered Activities include the construction or modification of the following roadways and bridges: SR-71, I-15, River and Schleisman roads, Hamner Avenue, Mission and Van Buren boulevards, and Market Street (MSHCP, Section 3, pp. 3-32). No further project information is included in the MSHCP. However, given the current alignment of these roadways, we anticipate that some of the proposed construction or modifications may result in an increase in the number of bridges spanning the Santa Ana River floodplain within or adjacent to the MSHCP Conservation Area. Two of the three known occurrences of woolly-star within the Plan Area occur within existing PQP Lands. Development activities outside of the MSHCP Conservation Area may result in the loss of the third occurrence of woolly-star in the Plan Area through destruction of habitat.

Because the woolly-star is not widely distributed within the Plan Area, specific conservation objectives are provided in the MSHCP (Section 9, Table 9.2, pp. 9-139) to ensure that known populations of the woolly-star and suitable habitat for this species will persist. The Plan states that at least three known occurrences of woolly-star along the Santa Ana River within the Plan Area will be conserved (Section 9, Table 9.2, pp. 9-139). Therefore, this conservation goal is dependent upon either inclusion of the currently-known third location or the future detection and inclusion of at least one additional occurrence within the MSHCP Conservation Area.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands including surveys for the woolly-star. Cooperative management and monitoring are anticipated on PQP Lands for the benefit of woolly-star. Surveys for the woolly-star will be conducted at least every eight years to verify occupancy at a minimum of 75 percent of known locations (Section 5, Table 5.8, pp. 5-77). If a decline in the distribution of the woolly-star is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP. Other management actions described in Section 5, Table 5.2 of the MSHCP will help maintain woolly-star habitat, such as managing the natural river bottom and banks within 500 feet of the Santa Ana River to allow for changes in species distribution over time and preventing alteration of hydrology and floodplain dynamics. Implementation of these management actions will help to avoid and minimize adverse effects to woolly-star. As we know of no other proposals to accommodate future distribution of woolly-star and possibly to increase its distribution within Riverside County, we believe that the proposed management and monitoring activities will significantly increase the likelihood that this species will persist and possibly increase its distribution within the Plan Area.

Indirect Effects

The woolly-star within the MSHCP Conservation Area could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These include the indirect effects described in the “General Effects” section of this biological opinion. For example, changes to the hydrology and sediment flow within the Santa Ana River floodplain could destroy or reduce habitat quality and/or alter the flood flows necessary for seed dispersal and the recruitment of young plants. However, we anticipate that these indirect effects will be offset by the inclusion of approximately 987 acres of modeled habitat in the Additional Reserve Lands and the beneficial result of the management actions outlined in Sections 5 and 9 of the

MSHCP that are discussed above. Proposed management entities are the Riverside County Parks District and Open Space District, the Corps, the Orange County Water District, and the California Parks and Recreation Department.

Conclusion

We anticipate the proposed action will directly and indirectly affect the woolly-star as described in the analyses above, including the loss of 31 percent of its modeled habitat in the Plan Area. Implementation of the management and monitoring measures identified in the Plan will reduce the impacts to this species. The woolly-star is anticipated to persist within the remaining 69 percent of its modeled habitat within both the PQP Lands and the Additional Reserve Lands. We anticipate that these areas will be monitored and managed cooperatively to benefit this species.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the woolly-star. We reached this conclusion because only one known occurrence of woolly-star on private property could be directly affected through implementation of the MSHCP. Within its current range, the primary distribution of woolly-star occurs in San Bernardino County. Previously considered extirpated in Riverside County, the occurrences recently detected within the Plan Area represent improvement in the status and distribution of woolly-star (*i.e.*, new occurrences within its historic range). Therefore, we consider that the proposed management and protection of modeled habitat within the MSHCP Conservation Area will benefit woolly-star. In addition, surveys related to monitoring and management of the species may discover additional occurrences of woolly-star in the MSHCP Conservation Area. Thus, impacts to this species and its modeled habitat, when viewed in conjunction with the protection and management of the MSHCP Conservation Area, are not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Slender-horned spineflower (*Dodecahema leptoceras*)

Status of the Species

Listing Status

The slender-horned spineflower was federally listed as endangered on September 28, 1987 (52 Federal Register 36265). No critical habitat was designated. No recovery plan has been prepared. The species was listed as endangered by the State of California in January 1982.

Species Description

Dodecahema leptoceras (Gray) Rev. & Hardham (slender-horned spineflower) is a winter germinating, spring-flowering annual plant. A monospecific genus in the buckwheat family (Polygonaceae), slender-horned spineflower is a small, ephemeral, low spreading annual that is difficult to detect from less than 15 feet away. The species is only readily detectable in the spring, when in flower or shortly thereafter. Vegetatively the plant consists of a basal rosette

from 3 and 10 centimeters in diameter (Hickman 1993b). The leaves and bracts turn bright red by the time flower cluster appear. The species has white flowers with a pinkish-red midvein, 1.2 to 2 millimeters in length, which produce brown or black single-seed achenes, 1.7 to 2 millimeters long. Achenes lack any specialized dispersal structure but may be carried across the substrate by sheet flows during heavy rains. Multiple flowers are borne in clusters within an involucre. The involucre of slender-horned spineflower have six ascending and six descending awns; a characteristic that separates them from closely related taxa in the genera *Chorizanthe* and *Centrostegia* (Reveal and Hardham 1989a).

Habitat affinities

Slender-horned spineflower is generally associated with old-formation alluvial benches and floodplain terraces in washes and lower slopes of mountains below 610 meters (2,000 feet) in soft chaparral and alluvial scrub vegetation. Alluvial scrub, found in certain floodplain systems in southern California, comprises an open vegetation community of drought-deciduous and evergreen shrubs and is characterized by porous, infertile soils subject to periodic intense flooding and erosion associated with the outwash environment. The species generally inhabits openings in intermediate and mature Riversidean alluvial fan sage scrub, where disturbance from flooding (characterized by flood flows, scouring, and deposition of Entisol-type alluvium) is less frequent. Adequate alluvial scrub habitat and active fluvial processes are important to maintain habitat. Prigge *et al.* (1993) found that the ideal habitat appears to be a terrace or bench that receives overbank deposits every 50 to 100 years. Spatially distinct groups of individuals dot terraces within occupied alluvial wash systems and little is known about their historic dispersal to current locations.

At most sites, slender-horned spineflower is found in sandy soil in association with mature alluvial scrub (Reveal and Hardham 1989a; Rey-Vizgirdes 1994). In the Vail Lake area, the species is associated with gravel soils of Temecula arkose deposits in open chamise chaparral (Boyd and Banks 1995; Gordon-Reedy 1997). Soils are moderately compacted alluvium with a high silt content and a loose top layer of decomposed granitics (Ferguson 1999). Cryptogamic crusts are frequently present in areas occupied by slender-horned spineflower (Boyd and Banks 1995). These crusts on the soil surface are composed of associations of bryophytes (mosses), algae, lichens, and some xerophytic liverworts (Harper and Marble 1988). Cryptogamic crusts enable soils to retain moisture and may help suppress invasion by non-native plant species (Boyd and Banks 1995).

Perennial vegetative cover is fairly low (*e.g.*, less than 50 percent) in areas supporting slender-horned spineflower (52 Federal Register 36266), although vegetative cover of annuals and cryptogamic crusts can be 100 percent (Ferguson 1999). The species occurs in open areas within a plant community characterized by old California Juniper, Yerba Santa, mountain mahogany, Yucca, and other low-statured annuals such as sun-cups, gold fields, *Eriophyllum multicauli*, stork's bill, and *Plantago* spp. (52 Federal Register 36266; Ferguson 1999).

Life history

The slender-horned spineflower is a spring annual that typically germinates in late February or early March in response to winter rains (Ferguson 1999). Plants begin flowering in late spring and continue into early summer until heat and drought induce senescence. The number of plants germinating and surviving to reproduction varies considerably from year to year depending on the amount and timing of rainfall and the onset of a local climate conditions known as a “Santa Ana.” Santa Ana conditions are characterized by hot, dry winds and high temperatures. Significant mortality of slender-horned spineflower individuals has been noted following the onset of a Santa Ana; successful establishment and survivorship to reproduction often does not occur in years with inadequate rainfall or multiple Santa Ana events (Ferguson 1999).

The species is protandrous (*i.e.*, anther development precedes stigma development), a mechanism that promotes cross fertilization. Genetic data analyses indicate that although the species is self-compatible, it has an average outcrossing rate consistent with a mixed mating pattern where the degree of outcrossing is greater than the degree of inbreeding (Ferguson *et al.* 1996). Small native bees, wasps and occasionally ants have been observed visiting slender-horned spineflower; however, only a single wasp species, *Plenoculus davisii*, has been identified as a pollinator (Ferguson 1999). The plant is likely pollinated by a variety of species.

After flowering, the plants die back, become brittle and typically disintegrate. Unlike related genera *Chorizanthe* and *Centrostegia* whose species bear 10 awns per involucre, the involucre of *D. leptoceras* has 12 awns. The presence of awns suggests that involucre and, hence, seeds may be animal-dispersed. However, dispersal outside of known distribution is not frequently observed, as indicated by its limited distribution and by recent field work (Ferguson 1999). Therefore, it is more probable that dispersal of involucre and/or seeds occurs rarely and during large-scale flood events.

Occurrences of slender-horned spineflower within individual drainage basins have been called “metapopulations” or a set of populations in which individual occurrences or “demes” of the species would be subject to frequent loss as a result of localized extinction and frequent replacement as a result of recolonization. If a true metapopulation dynamic exists for slender-horned spineflower, we would expect to see recolonization of suitable, unoccupied habitat. However, this has not been observed within the past decade (Ferguson 1999; M. Meyer, Plant Ecologist, California Department of Fish and Game, Region 5, pers. comm. to N. Ferguson CFWO, October 10, 2003). Therefore, either the time-scale over which these dynamics may be observed is long or habitat conditions have modified to the extent that recolonization is no longer occurring. Indeed, a short-term decline in apparent persistence has been noted in several locations such as Big Tujunga Wash and in areas of the Santa Ana Wash with no successful recolonization detected (Ferguson 1999).

Status and distribution

Slender-horned spineflower is endemic to southwestern cismontane California, ranging from central Los Angeles County east to San Bernardino County, and south to southwestern Riverside County in the foothills of the Transverse and Peninsular Ranges, at 200 to 700 meters (656 to

2,296 feet) in elevation (Hickman 1993b). Historically, the species was reported to occur in many of the alluvial systems on the coastal side of the transverse range in Los Angeles and San Bernardino counties, and at the base of the interior slopes of the Agua Tibia mountains in Riverside County (52 Federal Register 362666). Many of these alluvial fans coalesced into extensive bajada to form a nearly continuous skirt along these mountains.

Most historic collections of slender-horned spineflower have been extirpated (52 Federal Register 36266). Only 8 of some 35 previously known areas still support slender-horned spineflower, including 2 localities in Los Angeles County (Bee Canyon and Big Tujunga Wash), 2 in San Bernardino County (the Santa Ana River wash and Cajon Wash) and 4 areas in western Riverside County (Reveal and Hardham 1989a; Rey-Vizgirdes 1994; CNDDDB 2003).

Within western Riverside County, this species is known from a single location in the San Jacinto River wash; at least two locations within Bautista Creek, a single location in the Temescal Wash at Indian Creek, and multiple locations in the Arroyo Seco and Kolb Canyon drainages in the Agua Tibia Wilderness/Vail Lake area. While the single occurrence in the San Jacinto River wash is one of the largest single occurrences in terms of spatial extent, the multiple occurrences in the Vail Lake area cover the greatest geographic area of any remaining populations within the County and species range (1994-1999, N. Ferguson, CFWO, personal observations). In addition, studied occurrences within the Vail Lake area exhibited the greatest constancy over three years in reproductive output relative to other occurrences studied within San Bernardino and Los Angeles counties (Ferguson 1999).

Threats

The primary threats to slender-horned spineflower are loss of habitat through urbanization, sand and gravel mining, flood control projects, and associated hydrological and fluvial geomorphological changes to the alluvial systems that maintain this characteristic habitat type (52 Federal Register 36266). Off road vehicle activity and invasion of exotic species are also grave threats to some occurrences. The increasing cover of exotic annual grasses is primarily of concern in the Santa Ana Wash (Ferguson 1999). Off-road vehicle use and other recreational activities can result in disturbance to soils crusts, increased weediness, and to trampling of plants.

Within the Plan Area, slender-horned spineflower continues to be threatened by development projects on private property around Vail Lake, sand and gravel mining in Bautista Creek and the Jacinto River, and in the continued trend of habitat loss due to encroaching urban development with attendant flood control measures. As this species is likely flood-dispersed, both sand and gravel mining and the existing and potential flood control modifications in downstream areas reduce the number of available dispersal sites for flood-borne seeds. The effects of off-road vehicle use to slender-horned spineflower are primarily evident in the occupied stretch of the San Jacinto River, and target shooting is a common activity in Bautista Creek within the Forest Service boundary where this species occurs (1994-1999, N. Ferguson, CFWO, personal observations). In addition, on private lands adjacent to wildland areas, fire suppression and brush clearing activities are significant threats to individual occurrences (August 2000, site visits

with Forest Service Burned Area Emergency Recovery Team; J. Stephenson and N. Ferguson, CFWO).

Conservation Needs

Long-term habitat protection that allows for downstream dispersal of slender-horned spineflower (*e.g.*, undeveloped flood plain terraces along the edges of watercourses in occupied habitat) is paramount to maintaining this species within the Plan Area in the future. Where occurrences span ownership and/or jurisdictional boundaries (*e.g.*, private property and Forest Service lands) attention should be given to maintaining a hydrological connection between up- and downstream portions of an occurrence to allow for seed dispersal and hence, gene flow.

The Service coordinates extensively with the Forest Service fire-fighting team when suppression or fire fighting activities need to occur within sensitive habitat on Forest Service lands. Coordination with private landowners on fire-suppression activities is also necessary. Anecdotal evidence suggests that some moderate level of ground disturbance is necessary to enhance, and possibly create, occupied habitat for this species.

Future management should include controlled studies to understand requirements for the establishment of new occurrences of this species. Given the potential for great numbers of seeds to be expended in such an effort, seeds for reestablishment efforts should come primarily from occurrences not deemed essential for survival and recovery of the species.

Environmental Baseline

Our database includes 19 records of slender-horned spineflower in the Plan Area from the Vail Lake, San Jacinto River, Bautista Creek and Temescal Creek areas, of which we consider 16 likely to be extant as described below. In addition, we have knowledge of an occurrence on private lands in the Temescal Wash area. However, this location does not appear in our database.

Vail Lake: There are 13 records of slender-horned spineflower within the Vail Lake area dispersed over the Agua Tibia Mountains, Riverside Lowlands, and San Jacinto Foothills bioregions. These were recorded over a seven year time-frame (*i.e.*, from 1989 through 1995), and some may be duplicates of each other. However, the spatial extent of any occurrence of slender-horned spineflower is typically small, and the species is anticipated to colonize new areas when seeds are dispersed during storm events. The Vail Lake area retains the most natural fluvial conditions of all the remaining locations supporting the slender-horned spineflower, so we consider dispersal within the watershed to new locations to be a likely occurrence. Therefore, despite close proximity of point locations, we consider all to be extant until new information proves otherwise.

San Jacinto River and Bautista Creek: There are four records of slender-horned spineflower within the San Jacinto River and Bautista Creek area; three of which we consider extant. One of these occurrences is not considered reliable as it is mapped in an area converted to residential and/or agricultural use (*i.e.*, the City of Hemet) and is not within any modeled habitat for this

species. One large occurrence occurs on private land within the San Jacinto River floodplain (*i.e.*, the Eastern Municipal Water District). Two occurrences are documented in Bautista Creek.

Temescal Creek: Our database includes two records of slender-horned spineflower near Temescal Creek within the Santa Ana Mountain and Riverside Lowlands bioregions that may not represent extant occurrences (*i.e.*, Alberhill, Alberhill Creek east of Lake Elsinore) as these areas were not considered occupied at the time of listing nor have they been documented in subsequent literature regarding species distribution (*e.g.*, CNDDDB 2004; Rey-Vizgardez 1994). The database records contain no attribute regarding the surveyor(s) who documented these records. Neither record is located within modeled habitat for slender-horned spineflower.

However, an occurrence in Temescal Wash at Indian Creek that does not occur in our database may be extant as it occurs in a sandy alluvial wash on private land that has not undergone recent development (M. Meyer, Plant Ecologist, California Department of Fish and Game, Region 5, pers. comm. to N. Ferguson CFWO, October 10, 2003). Without further surveys, we cannot be certain of the number of records for slender-horned spineflower within the Temescal Wash drainage area.

The primary vegetation types used to model habitat for the slender-horned spineflower in the Plan Area were chaparral and Riversidean alluvial fan sage scrub vegetation types within the San Jacinto Foothills and the Agua Tibia Mountains bioregions and between 200 and 700 meters (656 and 2,296 feet) in elevation. Based on this analysis, the Plan Area includes 10,381 acres of modeled habitat for the slender-horned spineflower. Approximately 3,419 acres (33 percent) of this modeled habitat is within existing PQP Lands.

Effects of the Action

Direct Effects

The Plan Area includes 10,381 acres of modeled habitat for slender-horned spineflower. There are 3,170 acres (30 percent) of modeled habitat outside the MSHCP Conservation Area; of that 2,666 acres (26 percent of total modeled habitat) occur within the Narrow Endemic Plant Species Survey Areas (NEPSSA) 1 and 5 (Figure 6-1, pp. 6-30). The slender-horned spineflower is considered a Narrow Endemic Plant Species. Until such time that the Additional Reserve Lands are assembled and conservation objectives for this species are met, surveys will be conducted as part of the project review process for public and private projects where suitable habitat for slender-horned spineflower is present within NEPSSA 1 and 5. Populations detected as a result of survey efforts will be avoided according to the procedures outlined in the Additional Survey Needs and Procedures (Section 6.1.3 of the Plan; *i.e.*, 90 percent of portions of property with long-term conservation value will be avoided until the species conservation objectives are met). For those locations found to contain large numbers of individuals or otherwise determined to be important to the overall conservation of the species, the Plan allows flexibility to acquire these locations for inclusion into the Additional Reserve Lands (Section 6, pp. 6-40).

Within the 2,666 acres of modeled habitat outside of the MSHCP Conservation Area, but within the NEPSSA for slender-horned spineflower (26 percent of total modeled habitat), we anticipate

that up to 10 percent of the area with long-term conservation value for this species (as discussed above) will be lost to individual projects. One of our database records for slender-horned spineflower is outside of the MSHCP Conservation Area but within NEPSSA 5. None of our database records for slender-horned spineflower are outside of the MSHCP Conservation Area but within NEPSSA 1. If the occurrence of slender-horned spineflower known from NEPSSA 5 or other occurrences within NEPSSA 1 or 5 are confirmed to contain large numbers of individuals or otherwise determined to be important to the overall conservation of the species, the Plan allows flexibility to acquire these locations for inclusion into the Additional Reserve Lands (Section 6 pp. 6-70).

Slender-horned spineflower could also be subject to impacts associated with development and other proposed Covered Activities within 441 acres of modeled habitat that is outside of the MSHCP Conservation Area and outside of the NEPSSA for Nevin's barberry (4 percent of total modeled habitat). The presumed-extant location of slender-horned spineflower along Indian Creek in Temescal Wash is located outside of the MSHCP Conservation Area and outside of NEPSSA 1 and 5. This occurrence is on private land. The putative occurrence at Alberhill is neither within the MSHCP Conservation Area, NEPSSA, nor modeled habitat for slender-horned spineflower.

Because the slender-horned spineflower is not widely distributed within the Plan Area, specific conservation objectives are provided in the MSHCP (Section 9, Table 9.2, pp. 9-140) to ensure that suitable habitat and known populations of the slender-horned spineflower will persist. The Plan states that at least 8,350 acres of habitat suitable for the species within the Temescal Canyon, Bautista Canyon, upper San Jacinto River, Agua Tibia Wilderness, and Vail Lake areas will be included within the MSHCP Conservation Area. In addition, at least 15 known occurrences of the species at 11 different localities will be included within the MSHCP Conservation Area (See Table 9-2, pp. 140 for a list of the 11 localities). The total number of documented occurrences that we consider reliable total 15 and occur in only three localities; the San Jacinto River, Bautista Creek or Canyon, and in the Agua Tibia Wilderness/Vail Lake areas.

Based on our analysis, approximately 3,419 acres (33 percent) of the modeled slender-horned spineflower habitat occur within PQP Lands and 3,855 acres (37 percent) occur within the Additional Reserve Lands. Thus, the MSHCP Conservation Area will include 7,274 acres (70 percent) of the modeled slender-horned spineflower habitat in the Plan Area. Sixteen of the database records of slender-horned spineflower presumed extant occur within the MSHCP Conservation Area including 13 in the Vail Lake area, 1 in the San Jacinto River, and 2 in Bautista Creek. The MSHCP Conservation Area also includes the putative occurrence of slender-horned spineflower at Alberhill, east of Lake Elsinore.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands including surveys for slender-horned spineflower. Cooperative management and monitoring are anticipated on PQP Lands for the benefit of this species. Surveys for slender-horned will be conducted at least every eight years to verify occupancy of 75 percent of known locations. If a decline in the distribution of slender-horned spineflower is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP.

Other management actions described in Section 5, Table 5.2 of the MSHCP will help maintain slender-horned spineflower habitat, such as management and/or prevention of alteration of hydrology and floodplain dynamics, off-road vehicle use, sand and gravel mining, trampling, and competition from non-native plants. Reserve Managers will ensure habitat support functions within the MSHCP Conservation Area by maintaining and enhancing floodplain processes at Arroyo Seco and Kolb Creeks, Temescal Wash at Indian Creek, central Bautista Creek, and the San Jacinto River. Implementation of these management actions will help to avoid and minimize adverse effects to slender-horned spineflower. Overall, the proposed management and monitoring that will result from Plan implementation is anticipated to enhance existing protection of slender-horned spineflower on existing PQP Lands, provide protection to occurrences on private lands that will be included in the MSHCP Conservation Area, and to provide a mechanism for conservation and protection of up to 90 percent of any new occurrences of this species detected within the NEPSSA.

The only proposed Covered Activity within the Vail Lake/Agua Tibia Wilderness area is the eventual widening of SR-79. Since this proposed project falls within the NEPSSA for slender-horned spineflower, we anticipate that the Narrow Endemic Plant Species Avoidance and Minimization measures (Section 6, pp. 6-38) will be implemented as part of this project.

Indirect Effects

Slender-horned spineflower could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These include the indirect effects described in the “General Effects” section of this biological opinion. Occupied habitat for this species occurs within active alluvial flood plains. We expect that some private development activities may occur adjacent to occupied sites and that additional urban runoff will result and attendant flood control measures may be constructed. Implementation of the guidelines, processes and policies, and the management provisions of the MSHCP will help to reduce indirect effects to this species. We also anticipate that compliance with management objectives discussed above to maintain necessary alluvial processes will further reduce indirect effects to this species.

Conclusion

We anticipate the proposed action will affect slender-horned spineflower as described in the analyses above, including the total loss of up to 4percent of its modeled habitat. An additional 26 percent of slender-horned spineflower modeled habitat outside the MSHCP Conservation Area will be subject to surveys within NEPSSA 1 and 5. Once the conservation objectives for slender-horned spineflower have been met, avoided areas, which have not been otherwise conserved, may be impacted. We anticipate that occurrences determined to be important to the overall conservation of the species will be considered for inclusion in the Additional Reserve Lands and that some of the avoided areas may be maintained as open space habitat. Implementation of the avoidance, minimization, and mitigation measures identified in the Plan will further reduce the indirect impacts to slender-horned spineflower. This species is anticipated to persist within the remaining 70 percent of its modeled habitat within both the PQP

Lands and the Additional Reserve Lands. We anticipate that these areas will be monitored and managed cooperatively to benefit this species.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of slender-horned spineflower. We reached this conclusion because 70 percent of the modeled habitat for the species will be included in the MSHCP Conservation Area, including some of the largest remaining populations and the areas of greatest importance to the species within the Plan Area: Vail Lake, Bautista Creek, and the San Jacinto River. The Plan will also result in the conservation of large blocks of habitat that are suitable for the species within these areas as well as within the Temescal Wash area. In addition, required surveys for slender-horned spineflower may result in newly discovered occurrences being included in the MSHCP Conservation Area. Thus, impacts to this species and its modeled habitat, when viewed in conjunction with the protection and management of the MSHCP Conservation Area, are not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of slender-horned spineflower throughout its range.

Spreading navarretia (*Navarretia fossalis*)

Status of the Species

Listing Status

Spreading navarretia was listed as threatened on October 13, 1998 (63 Federal Register 54975). Critical habitat has not been designated for this species. The Recovery Plan for Vernal Pools of Southern California was completed in September 1998 and included spreading navarretia (Fish and Wildlife Service 1998b).

Species Description

Spreading navarretia, a member of *Polemoniaceae* (phlox family), is a low, mostly spreading or ascending, annual herb, 10 to 15 centimeters (4 to 6 inches) tall. The lower portions of the stems are mostly glabrous (bare). The leaves are soft and finely divided, 1 to 5 centimeters (0.4 to 2 inches) long, and spine-tipped when dry. The flowers are white to lavender white with linear petals and are arranged in flat-topped, compact, leafy heads. The fruit is an ovoid, 2-chambered capsule (Day 1993; Moran 1977).

There are approximately 30 species in the genus *Navarretia*, several of which occur within the range of spreading navarretia. Of these, two occur in habitat suitable for spreading navarretia, and these are needleleaf navarretia (*Navarretia intertexta*) and prostrate navarretia (*Navarretia prostrata*). Spreading navarretia can be confused with, and has been misidentified as, prostrate navarretia (Moran 1977). Spreading navarretia is distinguished by its linear or narrowly ovate corolla lobes, erect habit, cymose inflorescences, the size and shape of the calyx, and the position of the corolla relative to the calyx (Day 1993; Fish and Wildlife Service 1998j).

Habitat Affinities

Spreading navarretia is primarily associated with vernal pools (Day 1993; Fish and Wildlife Service 1998j). This species occasionally occurs in ditches and other artificial depressions, which often occur in degraded vernal pool habitat (Moran 1977). Spreading navarretia also occurs in vernal pools in alkali grassland habitat along the San Jacinto River in Riverside County (Bramlet 1993a).

Life History

Spreading navarretia flowers from May through June. No studies have been conducted for this species regarding reproduction. Specific data regarding pollinators and seed viability are lacking. The fruit of this species consists of indehiscent capsules (2 to 3 millimeters long) containing 5 to 25 seeds. The seeds become mucilaginous when wet (Moran 1977). Dispersal in this species has not been studied. After fruiting, this species fades rapidly and can be difficult to detect late in the dry season or in dry years. The number of individuals of spreading navarretia at a given population site varies annually in response to the timing and amount of rainfall and temperature.

Status and Distribution

Spreading navarretia is distributed from northwestern Los Angeles County and western Riverside County, south through coastal San Diego County, California to northwestern Baja California, Mexico. It is found at elevations between 30 and 1,300 meters (Day 1993; Munz 1974; CNPS 2001; CNDDDB 2003). Spreading navarretia is declining throughout much of its range (Reiser 1996). Fewer than 30 populations exist in the United States. Nearly 60 percent of the known populations are concentrated in three locations: Otay Mesa in southern San Diego County, along the San Jacinto River in western Riverside County, and near Hemet in Riverside County (U.S. Fish and Wildlife Service 1998b). The two largest populations occur in Riverside County and have been estimated to support 375,000 and 100,000 individuals. However, each of these populations occupies less than 3 hectares (8 acres) of habitat. Most of the populations contain fewer than 1,000 individuals and occupy less than 0.5 hectares (1 acre) of habitat. The Service estimates that less than 120 hectares (300 acres) of habitat in the United States is occupied by this species (Fish and Wildlife Service 1998j). In Mexico, spreading navarretia is known from fewer than 10 populations clustered in three areas: along the international border, on the plateaus south of the Rio Guadalupe, and on the San Quintin coastal plain (Moran 1977).

Threats

Spreading navarretia is threatened by habitat destruction and fragmentation from urban and agricultural development, pipeline construction, alteration of hydrology and floodplain dynamics, excessive flooding, channelization, off-road vehicle activity, trampling by cattle and sheep, weed abatement, fire suppression practices (including discing and plowing), and competition from alien plant species (Fish and Wildlife Service 1998b). Within the Plan Area, spreading navarretia has been subjected to loss or degradation of habitat due to urban development, conversion to agriculture, off-road vehicle use, and grazing. The species has been

affected indirectly by alterations in hydrology, invasion of non-native species, and deleterious effects resulting from habitat fragmentation and adjoining urban land uses.

Conservation Needs

The conservation needs of spreading navarretia include managed conservation of known occurrences in Los Angeles, San Diego, Orange, and Riverside counties in a manner that provides for long-term viability of the occurrences at these locations. Any newly discovered locations should be conserved in the same manner. Western Riverside County is important to the species continued survival and recovery because this area includes some of the largest remaining known localities for the species, the most inland extent of the species' range, and the largest remaining valley vernal pool in southern California, which is occupied by the species. Actions that would modify the hydrology supporting the species habitat or increase the likelihood of deleterious effects from any identified threat should be avoided.

Recovery efforts necessary for the survival and recovery of spreading navarretia are addressed in the Recovery Plan for Vernal Pools of Southern California (Fish and Wildlife Service 1998b). The Recovery Plan points out the importance of three locations for this species that are within the Plan Area: the San Jacinto River, Santa Rosa Plateau, and Temecula areas. The Recovery Plan also states that fewer than 30 populations exist in the United States and that nearly 60 percent of these are concentrated in three locations, including the San Jacinto River and the Hemet area. The Recovery Plan states that existing vernal pools and their associated watersheds within the Hemet complexes that contain spreading navarretia or any other vernal pool species should be secured from further loss and degradation in a configuration that maintains habitat functions and species viability.

Environmental Baseline

Within the Plan Area, spreading navarretia has been documented in the Skunk Hollow Pool, a 33-acre vernal pool at the Barry Jones Wetland Mitigation Bank (CNDDDB occurrence 43); a vernal pool on Mesa de Burro at the Santa Rosa Plateau (CNDDDB occurrence 44); the Salt Creek Vernal Pool Complex west of the City of Hemet (CNDDDB occurrence 24; Recon 1995); the Scott Pool, a 0.36-acre vernal pool located just northeast of the intersection of Scott Road and Menifee Road (CNDDDB occurrence 42; LSA Associates Inc. 2002a); the Wickerd Pool, a 3-acre vernal pool located at the intersection of Lindenberger Road and Wickerd Road (LSA Associates Inc. 2002a); near Vail Lake 0.5 mile east of Los Caballos Road, south of SR-79 (CNDDDB occurrence 45); in alkali soils along the San Jacinto River extending from just west of Mystic Lake south to the Perris Valley Airport (CNDDDB occurrences 17, 22, 23, 27, 28, 33, 36, 38, and 39); and the Madison Pool, a pool located northwest of the intersection of Madison Avenue and Murrieta Hot Springs Road in Murrieta (R. Riefner, Glenn Lukos Associates, pers. comm. to S. Brown, Fish and Wildlife Service, 2003).

There is documentation of actions affecting spreading navarretia within the Plan Area. The Scott Pool has recently been heavily impacted by discing, several pipeline projects, and the installation of a telephone pole. This pool also falls within the proposed project footprint for the Scott Road Improvement Project (Amec Earth and Environmental, Inc. 2002). A sewer pipeline was

installed through the middle of the Wickerd Pool in 2002 (K. Hackett, Eastern Municipal Water District, pers. comm. to S. Parry, Fish and Wildlife Service, 2002; Albert A. Webb Associates 2001). Effects to approximately 0.45 acres of potential habitat for spreading navarretia along Davis Road in the San Jacinto Valley were addressed in the Formal Section 7 Consultation for the Inland Feeder Project. While no mature individuals were affected due to the avoidance of vernal pools and wetland areas, the species was observed in the vicinity of the project and the project may have affected spreading navarretia seeds in the seed bank of the impact area. A 74-acre parcel occupied by the species was purchased for inclusion in the San Jacinto Wildlife Area to offset the effects of the action. The Barry Jones Wetland Mitigation Bank, comprising 140 acres and including the 33-acre Skunk Hollow Pool and 107 acres of the pool's watershed, was established in 1997 to serve as off-site compensatory mitigation for unavoidable impacts to wetland habitats (Center for Natural Lands Management 1997).

Actions affecting the populations of spreading navarretia within the Salt Creek Vernal Pool Complex, where the species is locally common, include degradation by human activities such as dry land farming and alterations in hydrology. The Stowe Pool, part of the Salt Creek Vernal Pool Complex, and occupied by 300,000 spreading navarretia plants in 1992, has been disturbed by discing, sheep grazing, and the invasion of non-native grasses (Patterson 1998; CNDDDB 2003). The southern colony of CNDDDB occurrence 24, part of the Salt Creek Vernal Pool Complex, which included 75,000 plants in 1991, occurs within a cow pasture (CNDDDB 2003).

The Santa Rosa Plateau Ecological Reserve, comprising approximately 9,000 acres and including the pool occupied by spreading navarretia, was assembled between 1983 and 1991 and is being managed by The Nature Conservancy, the Fish and Wildlife Service, the California Department of Fish and Game, the Riverside County Parks and Open Space District, and the Metropolitan Water District of Southern California (Dangermond & Associates, Inc. 1991; Metropolitan Water District of Southern California *et al.* 1991). The Santa Rosa Plateau vernal pools are threatened by adjacent urban development and by the invasion of non-native grasses. Houses have been constructed across the road from the Santa Rosa Plateau Ecological Reserve and within the watershed of Mesa de Colorado vernal pools. Run-off from the residential property can flow into the vernal pools through culverts or over the road (C. Bell, The Nature Conservancy, pers. comm. to S. Brown, Fish and Wildlife Service, August 20, 2003). While the pool known to be occupied by spreading navarretia is located on Mesa de Burro and is not threatened by adjacent urban development, further survey work is necessary to determine the extent of the species' range on the Santa Rosa Plateau.

Spreading navarretia CNDDDB occurrences 22 and 23 along the San Jacinto River have been subjected to sheep grazing, and occurrence 22 has also been impacted by off-road vehicle use (CNDDDB 2003). CNDDDB occurrence 28 has been impacted by bulldozing (CNDDDB 2003). The San Jacinto Wildlife Area, comprising approximately 10,000 acres, was assembled between 1981 and the present, beginning with approximately 4,800 acres conserved as mitigation for the State Water Project, and continuing with funding provided by a number of voter approved bond measures (T. Paulek, California Department of Fish and Game, pers. comm. to S. Brown, Fish and Wildlife Service, 2003). The San Jacinto Wildlife Area includes CNDDDB spreading navarretia occurrences 27, 33, 36, 37, and 38 and may include part of record 28.

Ephemeral pools have been documented within the Plan Area that have not had surveys conducted for spreading navarretia including Palomar Pool, Antelope Pool, Field Pool, Keller Pool, Bundy Canyon Complex, George Complex, Skylark Pool, Lakeshore Pool, Wildlife Pools, Clay Complex, Garbani Pool, Auld Pool, Eastridge Pool, Field Pool, and many pools within the Salt Creek Vernal Pool Complex located southwest of the City of Hemet.

Vernal pools in and around the Santa Rosa Plateau have not had thorough surveys conducted for vernal pool endemic species. Some records of vernal pool species exist for these pools; however, thorough surveys need to be completed before the extent of the ranges of vernal pool associated species on the Santa Rosa Plateau can be determined. There are five mesas with basalt flow soils suitable for vernal pools in and around the Santa Rosa Plateau Ecological Reserve. Mesa de Burro and Mesa de la Punta both fall within the Santa Rosa Plateau Ecological Reserve. Mesa de Colorado is located on the southwest edge of the Reserve and extends beyond the boundaries of the Reserve. Redonda Mesa and Avenaloca Mesa are both outside of the Reserve and have not been surveyed for vernal pools or vernal pool species. Lathrop and Thorne (1983) reported 13 vernal pools totaling 53.18 acres on Mesa de Colorado, Mesa de Burro, and Mesa de la Punta at the Santa Rosa Plateau. In the vicinity of the Santa Rosa Plateau Ecological Reserve, there are two pools located south of Avocado Mesa Road on Mesa de Colorado. These pools are not included in the 13 vernal pools reported by Lathrop and Thorne (1983). One pool is on private property, and the other falls within the boundary of the Santa Rosa Plateau Ecological Reserve. These two pools have not been surveyed for vernal pool associated species C. Bell, The Nature Conservancy, pers. comm. to S. Brown, Fish and Wildlife Service, 2003). Spreading navarretia was collected from a pool on Mesa de Burro. This collection was originally misidentified as *Navarretia intertexta* (Spencer 1993). Further survey work is necessary to determine the extent of the species' distribution on the Santa Rosa Plateau.

This office has conducted a formal section 7 consultation for the Clayton Ranch Development, including the Clayton Pool (Fish and Wildlife Service 2003c). This consultation addressed the coastal California gnatcatcher and the Riverside fairy shrimp. Spreading navarretia was observed on the property when Riverside fairy shrimp cysts were collected after consultation had been concluded (T. Bomkamp, Glenn Lukos Associates, pers. comm. to S. Brown, Fish and Wildlife Service, 2003). Through the reinitiated consultation, project proponents have provided their proposal to salvage spreading navarretia seeds and introduce them into the two Clayton Ranch Proposed Pools. An off-site pool, the Schleuniger Pool, also will be restored, conserved and managed in perpetuity (Fish and Wildlife Service 2003c). In the event that spreading navarretia does not occur in the Schleuniger Pool, Clayton Ranch project proponents have agreed to introduce some of the salvaged spreading navarretia seeds into the Schleuniger Pool.

The vernal pool model was used to capture potential habitats supporting spreading navarretia. The vernal pool model included these parameters within the Riverside Lowlands and the Santa Ana Mountains bioregions: 1) vernal pools and playas and 2) clayey soils (Altamont, Auld, Bosanko, Claypit, and Porterville), alkali soils (Willows, Traver, and Domino), and Santa Rosa Plateau basalt flow soils. Based on our analysis, 42,349 acres of modeled habitat, with the potential to harbor vernal pools suitable for the spreading navarretia, occur within the Plan Area. We were unable to include additional soil types that harbor vernal pools, such as Murrieta stony

clay loam, in our model because we do not have access to digital overlays mapping the extent of these soil types in the Plan Area.

Effects of the Action

Direct effects

The Plan Area includes 42,349 acres of modeled habitat for spreading navarretia. There are 25,832 acres (61 percent) of modeled habitat outside the MSHCP Conservation Area; of that 24,046 acres (57 percent of total modeled habitat) occur within the Narrow Endemic Plant Species Survey Areas (NEPSSA) 1, 2, 3, 3a, 4, and 9 (Figure 6-1, pp. 6-30). The spreading navarretia is considered a Narrow Endemic Plant Species. Until such time that the Additional Reserve Lands are assembled and conservation objectives for this species are met, surveys will be conducted as part of the project review process for public and private projects where suitable habitat for spreading navarretia is present within NEPSSA 1, 2, 3, 3a, 4, and 9.

Populations detected as a result of survey efforts will be avoided according to the procedures outlined in the Additional Survey Needs and Procedures (section 6.1.3 of the Plan; *i.e.*, 90 percent of portions of property with long-term conservation value will be avoided until the species conservation objectives are met). For those locations found to contain large numbers of individuals or otherwise determined to be important to the overall conservation of the species, the Plan allows flexibility to acquire these locations for inclusion into the Additional Reserve Lands (pp. 6-40).

The Skunk Hollow Pool and the single pool known to be occupied by the species within the Santa Rosa Plateau Ecological Reserve are protected by existing conservation and management agreements and are included in the Plan as PQP Lands. We do not anticipate any effects to the Santa Rosa Plateau Ecological Reserve Pools and their watersheds from the MSHCP. The Field Pool and its watershed are also identified by the Plan as within PQP Lands. The Plan proposes the construction of Butterfield Stage Road as a Covered Activity, and this road construction project has the potential to affect the Skunk Hollow Pool and Field Pool. The Plan states that construction of the road will be consistent with the requirements of the Assessment District 161 Habitat Conservation Plan, which requires that the design and location of the road be determined in consultation with our office. Thus, we anticipate that any potential impacts to the Skunk Hollow Pool and Field Pool and their watersheds will be addressed through close coordination and consultation with this office.

Within the 24,046 acres of modeled habitat outside of the MSHCP Conservation Area, but within the NEPSSA for spreading navarretia (57 percent of total modeled habitat), we anticipate that up to 10 percent of the area with long-term conservation value for this species (as discussed above) will be lost to individual projects.

Spreading navarretia will be subject to impacts associated with development and other proposed Covered Activities within 1,786 acres of modeled habitat that is outside of the MSHCP Conservation Area and outside of the NEPSSA for spreading navarretia (4 percent of total modeled habitat).

For example, there are two known populations of spreading navarretia that are located outside of the MSHCP Conservation Area and outside of the NEPSSA, Madison Pool, and Clayton Pool. In addition, the following documented pools have not been surveyed for spreading navarretia and are located outside of the MSHCP Conservation Area and outside of NEPSSA: Palomar Pool, Eastridge Pool, 4 to 5 pools in the George Complex, Garbani Pool, Auld Pool, Banning Complex, Pechanga Pool, Bundy Canyon Complex, and Clay Complex.

There is a single known population of spreading navarretia for which we do not have precise enough location information to determine whether the population will be conserved within the MSHCP Conservation Area. This is the population near Vail Lake located approximately 0.5 miles east of Los Caballos Road, and 0.5 mile south of SR-79; the exact location for this population is unknown. The general area within a quarter mile of this location includes a number of different land designations including lands that are outside of the MSHCP Conservation Area, PQP Lands, lands that are located within the Criteria Area and will be conserved within the Additional Reserve Lands, Rural Mountainous Lands and lands that are located within NEPSSA Survey Area 5, which is not a survey area for the spreading navarretia. The majority of the lands within a quarter mile of this location are located outside of the MSHCP Conservation Area and/or on Rural Mountainous Lands. As noted above, because the species is associated with vernal pools, we anticipate that implementation of the Riparian/Riverine Areas and Vernal Pools policy will help maintain habitat for some populations outside of the MSHCP Conservation Area and outside of the NEPSSA for this species.

Two locations where spreading navarretia occur that are protected in part by existing conservation agreements are the Salt Creek Vernal Pool Complex and the San Jacinto River floodplain. Part of the Salt Creek Vernal Pool Complex is conserved within the 45.42-acre Upper Salt Creek Wetlands Preserve. The entire Salt Creek Vernal Pool Complex has not been surveyed for this species; however there are records for the species throughout this area, and two of the largest populations for the species occur within the complex. The Stowe Pool (also known as the north colony of CNDDDB occurrence 24) and a part of the Salt Creek Vernal Pool Complex were occupied by 300,000 spreading navarretia plants in 1995; the south colony of CNDDDB occurrence 24 was occupied by 75,000 spreading navarretia plants in 1995 (Recon 1995).

The MSHCP proposes three Covered Activities that have the potential to impact the Salt Creek Vernal Pool Complex, including the spreading navarretia population in the Stowe Pool/CNDDDB Occurrence 24. These Covered Activities are: 1) the expansion of Stowe Road to an urban arterial with a 152-foot right-of-way and its extension to the east through the vernal pool complex; 2) the expansion of Florida Avenue/SR-74 to an expressway with a 196-foot right-of-way; and 3) the expansion of SR-79 to an expressway with a 196-foot right-of-way.

Species-specific objectives 1, 2, and 5, for the spreading navarretia address the proposed conservation of populations of spreading navarretia within the Plan Area. Within the upper Salt Creek area west of Hemet, the MSHCP proposes to conserve vernal pool and playa habitat, known locations of the species, and the vernal pools of upper Salt Creek and the floodplain along Salt Creek. Therefore, for the purposes of this analysis, we anticipate that the three proposed road improvement projects will be designed so that the Salt Creek Vernal Pool Complex and its watershed will not be impacted from the proposed road improvement projects, including but not

limited to, the roads themselves, culverts under the roads, and the fuel modification zones for the roads.

Part of the floodplain of the San Jacinto River has been conserved within the 10,000-acre San Jacinto Wildlife Area, including spreading navarretia CNDDDB occurrences 27, 33, 36, 37, 38, and possibly part of 28. The entire San Jacinto River floodplain has not been surveyed for spreading navarretia; however there are many widely distributed records for the species within the floodplain.

The MSHCP proposes a Covered Activity, the San Jacinto River Flood Control Project, that may threaten populations of spreading navarretia in the lower San Jacinto River. The County Flood Control District proposes to implement unspecified flood control measures, possibly including channelization, along a stretch of the San Jacinto River that extends for greater than 10 miles between the Ramona Expressway and the mouth of Railroad Canyon. Eleven spreading navarretia occurrences, including approximately 7,773 individuals were documented between the Ramona Expressway and Interstate 215 in 2000 (Glenn Lukos Associates Inc., 2000b). CNDDDB occurrences 17 (1,425 plants documented in 1995), 22 (550 plants documented in 1991), 23 (10,100 plants documented in 1991), 28 (20 plants documented in 1990), and 39 (an undocumented number of plants observed in 1992) are located between the Ramona Expressway and the mouth of Railroad Canyon.

In species-specific objectives 1, 2, and 4, the MSHCP addresses the proposed conservation of spreading navarretia within the floodplain of the San Jacinto River. The Plan proposes to conserve vernal pool and playa habitat in this area consistent with Objective 1 and known locations of the species within this area consistent with Objective 2. Objective 4 indicates floodplain processes will be maintained along the river to provide for the distribution of the species to shift over time as hydrologic conditions and seed bank sources change. Objective 4 also states that the San Jacinto River Flood Control Project will be consistent with certain conservation criteria including conserving land and providing hydrology for the continued survival of spreading navarretia. Those lands may be outside of the San Jacinto River area if the Wildlife Agencies determine that such acreage provides the same or greater conservation value and acreage to the MSHCP conservation Area (MSHCP, page 7-60).

Because the spreading navarretia is not widely distributed within the Plan Area, specific conservation objectives are provided in the MSHCP (Section 9, pp. 9-142) to ensure that suitable habitat and known populations of the spreading navarretia will persist. The Plan states that at least 6,900 acres of vernal pool and playa habitat suitable for the species within the San Jacinto River, Mystic Lake and Salt Creek areas will be included within the MSHCP Conservation Area. In addition, at least 13 known locations of the species at Skunk Hollow, the Santa Rosa Plateau, the San Jacinto Wildlife Area, the floodplain of the San Jacinto River, and upper Salt Creek west of Hemet will be included within the MSHCP Conservation Area. Also, the floodplain processes of the San Jacinto River and the floodplain along Salt Creek from Warren Road to Newport Road and the vernal pools in Upper Salt Creek west of Hemet will be maintained in order to allow for the distribution of the species to shift over time as hydrologic conditions and seed bank sources change.

Approximately 8,831 acres (21 percent) of the modeled spreading navarretia habitat occur within PQP Lands and 7,686 acres (18 percent) occur within the Additional Reserve Lands. Thus, the MSHCP Conservation Area will include 16,517 acres (39 percent) of the modeled spreading navarretia habitat in the Plan Area. As indicated above, this species will also benefit from implementation of the Riparian/Riverine Area and Vernal Pools policy.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands including surveys for spreading navarretia. Cooperative management and monitoring is anticipated on PQP Lands. Surveys for spreading navarretia will be conducted at least every eight years to verify occupancy of 75 percent of known locations. If a decline in the distribution of spreading navarretia is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP. Other management actions described in Section 5, Table 5.2 of the MSHCP will help maintain spreading navarretia habitat, such as management and/or prevention of alteration of hydrology and floodplain dynamics, farming, fire and fire suppression activities, off-road vehicle use, grazing and competition from non-native plants. Implementation of these management actions will help to avoid and minimize adverse effects to spreading navarretia.

Indirect Effects

Spreading navarretia could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These generally include the indirect effects discussed in the “General Effects” and the “Generalized Effects Analysis for Vernal Pools” sections of this biological opinion. Implementation of the Guidelines Pertaining to the Urban/Wildlands Interface policy, Riparian/Riverine Area and Vernal Pools policy, and the management provisions listed above will help to reduce the indirect effects to this species.

Conclusion

We anticipate the proposed action will directly and indirectly affect spreading navarretia as described in the analyses above, including the loss of up to 4 percent of its modeled habitat. An additional 57 percent of spreading navarretia modeled habitat outside the MSHCP Conservation Area will be subject to surveys within NEPSSA 1, 2, 3, 3a, 4 and 9. Once the conservation objectives for spreading navarretia have been met, avoided areas, which have not been otherwise conserved, may be impacted. We anticipate that occurrences determined to be important to the overall conservation of the species will be considered for inclusion in the Additional Reserve Lands and that some of the avoided areas may be maintained as open space habitat. In addition, this species occurs within vernal pools, a habitat type that is afforded protected throughout the Plan Area by the Riparian/Riverine Areas and Vernal Pools policy. Vernal pools will be mapped throughout the Plan Area and avoided if feasible. If avoidance is not feasible, a determination of Biologically Equivalent or Superior Preservation must demonstrate that the proposed action will provide equal or better conservation than avoidance of the occupied habitat. This species is anticipated to persist within areas conserved through implementation of the Narrow Endemic Plant Species and Riparian/Riverine Areas and Vernal Pools policies, as well as the remaining 39 percent of its modeled habitat within both the PQP Lands and the Additional Reserve Lands.

The MSHCP will further offset the proposed impacts to this species through management and monitoring actions within the Reserve. We anticipate that conserved areas will be monitored and managed cooperatively to benefit this species. One of the management actions proposed that may benefit the species is the enhancement of historic or vestigial vernal pools within Core Areas for the Riverside fairy shrimp, which has been observed to co-occur with spreading navarretia within the Plan Area. This proposed enhancement may benefit spreading navarretia by increasing the quality of the habitat that is conserved for this species and by allowing the expansion of populations within the Reserve through the enhancement of historic or vestigial vernal pools that do not currently provide habitat for the species.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of spreading navarretia. We reached this conclusion because the Salt Creek Vernal Pool Complex and San Jacinto River populations, which are of great importance to the species within the Plan Area, will be conserved. In addition, the Narrow Endemic Plant Species and Riparian/Riverine Area and Vernal Pools policies together provide for the conservation of the species throughout the Plan Area. Thus, impacts to this species and its modeled habitat, when viewed in conjunction with the protection and management of the MSHCP Conservation Area, are not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of spreading navarretia throughout its range.

Thread-leaved brodiaea (*Brodiaea filifolia*)

Status of the Species

Listing Status

Thread-leaved brodiaea was listed as endangered by the State of California in January 1982 and was federally listed as threatened on October 13, 1998 (63 Federal Register 54975). At the time of the Federal listing, the Service determined that it was not prudent to designate critical habitat. A recovery plan is currently in preparation.

Species Description

Thread-leaved brodiaea is a perennial herb in the Lily family (Liliaceae) with dark-brown, fibrous-coated corms. The flower stalks (scapes) are 2 to 4 dm tall with several narrow leaves that are shorter than the scape. The bell-shaped flowers are violet in color (Munz 1974), bloom from March to June (CNPS 2001), and are arranged in a loose umbel. The fruit is a capsule (Munz 1974; Keator 1993; Fish and Wildlife Service 1998h).

Thread-leaved brodiaea is one of 13 species of the genus *Brodiaea*, a genus largely restricted to California (Keator 1993). Thread-leaved brodiaea belongs to the subgenus *Filifoliae*, a small group of three species (Niehaus 1971). Thread-leaved brodiaea can be distinguished from other species of *Brodiaea* that occur within its range (*B. orcuttii*, *B. jolonensis*, and *B. terrestris* spp.

kernensis) by its narrow, pointed staminodia, rotate perianth lobes (i.e, a saucer-shaped flower), and a thin perianth tube, which is split by developing fruit (Niehaus 1971; Munz 1974).

Habitat Affinities

This species typically occurs on gentle hillsides, valleys, and floodplains in semi-alkaline mudflats, vernal pools, mesic southern needlegrass grassland, mixed native-nonnative grassland and alkali grassland plant communities in association with clay, or alkaline silty-clay soils. Localities occupied by this species are frequently intermixed with, or near, vernal pool complexes (CNDDDB 2003; Fish and Wildlife Service 1998h).

Life History

The annual growth cycle of this species begins with the above-ground appearance of a few grass-like leaves from each corm. The corms function similarly to bulbs in storing water and nutrients during the dormant season (Smith 1997). While corms are the principal means of perpetuation from one growing season to another (Niehaus 1971), the species also sets seeds. Thread-leaved brodiaea blooms from March through June (CNPS 2001). Upon maturity, the ovaries' three lobes split, revealing many small (2 to 2.5 millimeters long) black seeds (Munz 1974). The seeds are then dispersed as wind rattles the capsules and releases the seeds (Smith 1997).

Brodiaea are self-incompatible, and pollination between individuals must take place in order to produce seed. A broad spectrum of insects visit *Brodiaea* flowers, but only tumbling flower beetles (Mordellidae) and sweat bees (Helictidae) were found to transport pollen between flowers (Niehaus 1971). The introduction of non-native honeybees, which tend to be species-generalists, may have increased the potential for hybridization (Fish and Wildlife Service 1998h). The Miller Mountain population in San Diego County, which occupies about 45 percent of the total occupied habitat for thread-leaved brodiaea, may represent a hybrid swarm between thread-leaved brodiaea and *B. orcuttii* (Boyd *et al.* 1992). Fire suppression that allows a dominant cover of introduced European annuals to be present may limit sexual reproduction. Sexual reproduction may occur in "pulses" when exotic cover is reduced (S. Moray, California Department of Fish and Game, *in litt.*, 1995).

Individuals require several years to mature. The total number of individuals within a population is difficult to estimate. Frequently, only a fraction of the mature individuals flower in a given year (Taylor and Burkhart 1992). The size and extent of populations of brodiaea within suitable habitat also vary in response to the timing and amount of rainfall, as well as temperature patterns.

Status and Distribution

Thread-leaved brodiaea is endemic to southwestern cismontane California, ranging from the foothills of the San Gabriel Mountains at Glendora (Los Angeles County), east to Arrowhead Hot Springs in the western foothills of the San Bernardino Mountains (San Bernardino County), and south through eastern Orange and western Riverside counties to Carlsbad and just south of

Lake Hodges in northwest San Diego County, California (Munz 1974; Keator 1993; CNDDDB 2003). This species occurs from 40 to 1220 meters elevation (CNPS 2001).

At the time of the listing in 1998, 48 populations of thread-leaved brodiaea had been reported, with 9 populations having been extirpated, mostly from San Diego County, and 39 populations were presumed extant. About half of the extant populations occurred in northern San Diego County or the Santa Rosa Plateau in southwestern Riverside County. Over its entire range, the species occupied about 825 acres of suitable habitat at the time of the listing, with fewer than 2,000 individuals being observed at most populations. Most of these populations each occupied less than 13 acres.

Between 11,650 and 17,900 individual plants have been estimated from populations found in Orange County on Rancho Mission Viejo (up to 5,500 plants), Aliso-Woods Park (up to 3,000 plants), Talega and Forster Ranch developments (up to 9,250 plants) and at the Arroyo Trabuco golf course (up to 150 plants) (Orange County Southern Subregion 2003). The populations on Rancho Mission Viejo and Aliso-Wood Park are extant, and the population at Arroyo Trabuco was avoided during golf course project construction. The populations at Talega and Forster Ranch developments were transplanted; at Forster Ranch approximately 2,245 blooming brodiaea were documented from transplantation of the approximately 5,100 to 9,000 corms impacted (Natural Resource Consultants 2001). The 250 transplanted corms at Talega have also bloomed, but are still in the early stages of success evaluation. In Los Angeles County, two locations in Glendora and San Dimas have been detected, with up to 6,000 plants found at the San Dimas location. In San Bernardino County, two populations of thread-leaved brodiaea are presumed extant at Waterman Canyon (a few dozen plants in 1993) and Arrowhead Spring (1,000 plants in 1993) (CNDDDB 2003).

In San Diego County, thread-leaved brodiaea has been reported from Camp Pendleton, Oceanside, Carlsbad, Vista, San Marcos and unincorporated areas in the northern portion of the county; nearly 25 percent of the extant populations occur within the Multiple Habitat Conservation Program (MHCP) of Oceanside, San Marcos and Carlsbad. The MHCP anticipates conservation of 27 percent of potentially suitable habitat and may conserve 55 of 70 locations within the focused planning area. The largest population of 342,000 individuals was found in San Marcos in San Diego County on a isolated 40-acre parcel; this population falls within an area of San Marcos where conservation planning has been deferred and would require a Major Amendment to the MHCP (SANDAG 2003). There are approximately 22 general locations of thread-leaved brodiaea on Camp Pendleton, with up to 2,000 individuals at some locations (Dudek 1993). The largest extant population in Riverside County is about 30,000 individuals on about 38 acres on the Santa Rosa Plateau (Fish and Wildlife Service 1998h).

Threats

This species and its habitat are threatened by habitat destruction and fragmentation from urban and agricultural development, pipeline construction, alteration of hydrology and floodplain dynamics, excessive flooding, channelization, off-road vehicle activity, trampling by cattle and sheep, weed abatement, fire suppression practices (including discing and plowing), and competition from alien plant species (Fish and Wildlife Service 1998h).

Conservation Needs

Thread-leaved brodiaea is associated with the alkaline silty-clay soils and other clay soil associations. The presence of undisturbed or minimally disturbed soils is a significant factor in the long-term persistence of this species. Conservation of remaining high quality habitat is necessary to ensure the long-term survival of the species; therefore, the species requires protection from urbanization, conversion of undisturbed or minimally disturbed areas to farming or grazing, and discing for weed and fire control.

In addition to habitat conservation, thread-leaved brodiaea needs the persistence of hydrologic processes that maintain the successional state of alkali playa, grasslands and vernal pool habitats. Preservation of hydrologic processes in occupied habitat and suitable habitat is essential to conservation of this species. The species also would benefit from the presence and persistence of native insect pollinators.

Environmental Baseline

Thread-leaved brodiaea is associated with clay, or alkaline silty-clay soils and are frequently intermixed with, or near, vernal pool complexes. Thread-leaved brodiaea also generally occurs in grasslands, vernal pools and playa habitats and on lands that may be subject to agricultural practices. While there may be appropriate soils, we did not include agricultural lands in our analysis since agricultural practices of discing and grazing likely limit the ability of the species to persist in those locations. Our dataset intersected clay and alkali soils series with grassland and playa/vernal pool habitats within the Bioregions of the San Jacinto Foothills, Santa Ana Mountains and Riverside Lowlands, which resulted in approximately 11,482 acres of modeled habitat for the species. About 3,866 acres of this modeled habitat are within PQP Lands.

Based on information provided in the MSHCP and confirmed by our dataset, there are two core areas for this species in the Plan Area; one is along the San Jacinto River between Mystic Lake and Canyon Lake and the other is on the Santa Rosa Plateau. Most of the known occurrences are found in these two core areas; other known occurrences are noted west of Hemet in the Upper Salt Creek drainage. These areas are detailed below. Additional locations of thread-leaved brodiaea along I-60 in Moreno Valley and adjacent to Prado Basin both north and south of the Santa Ana River have been reported. However, the Prado Basin and Moreno Valley locations have not been verified by positive survey results for the species.

San Jacinto River: The location at Goetz Road [Element of Occurrence 1 (“EO1”); CNDDDB 2003] associated with the San Jacinto River floodplain is possibly extirpated since the species was last seen there in 1930 and the area has been in agriculture since at least the 1980s. However, suitable soils, and potentially corms, may persist there despite agricultural practices. Should the species persist at the Goetz Road site, continued agricultural practices may preclude emergence of leaves and flowering stalks and destroy corms. This privately owned area is likely subject to continued farming or to development in the future.

Just east of Perris Valley Airport are locations both north and south of Case Road on about 45 acres of floodplain habitat where 25 plants were found in 1990 and 50 in 1996; in 2000, 367

plants were south and 52 were north of the road (EO2; CNDDDB 2003). The area east of Perris Airport is privately owned and subject to occasional off-road vehicle use and illegal dumping (CNDDDB 2003); the site may also be subject to development in the future.

Another location of 115 plants on approximately 6 acres is associated with disturbed alkali grassland northeast of I-215 near San Jacinto Avenue (EO65; CNDDDB 2003). This population should be considered separate from those near Perris Valley Airport as they occur in differing habitats (D. Bramlet, pers. comm. to J. Terp, Fish and Wildlife Service, 2003). The location northeast of I-215 at San Jacinto Road is subject to discing on a regular basis and is also grazed by sheep. In addition, sludge and green waste compost have been spread on the site (CNDDDB 2003). The ownership of this area is not known but is likely private and therefore subject to continued farming or development in the future.

A Railroad Canyon population of thread-leaved brodiaea north of Kabian County Park occurs on about 17 acres; over 1,500 plants were observed there in 1990 in a mixed annual grassland (EO25; CNDDDB 2003); over 3,000 plants were detected in that area in 2000 (Glenn Lukos Associates, 2000b). The population in Railroad Canyon is at risk from the proposed San Jacinto River Flood Control Project. That project includes channelization of the river, which may result in changes in floodplain processes essential to the species persistence at that location.

In the southern portion of the San Jacinto Wildlife Area, 518 plants were seen in 1992 and 2,580 plants in 1995 on about 36 acres in annual grassland and alkali scrub habitat (EO27; CNDDDB 2003). In the northern portion of the San Jacinto Wildlife Area on about 15 acres, 900 plants were seen in 1995 and 45 plants were seen in 1996 in annual grassland adjacent to alkali playa habitat (EO 43; CNDDDB 2003).

Santa Rosa Plateau: There are several populations of thread-leaved brodiaea on the Santa Rosa Plateau on either side of Tenaja Road, on Mesa de Colorado, near the Santa Rosa Ranch, and north of Tenaja Road. The Tenaja Road populations (EO3 and EO31) are not quantified; however, Mesa de Colorado (EO5) had about 31,725 plants in 1990 and Santa Rosa Ranch (EO30) had about 480 plants in 1990 and 400 in 1992 (CNDDDB 2003). Two other populations are mapped west of Santa Rosa Plateau; the Squaw Mountain (EO29) population is on about 29 acres and had about 20 plants in 1991 and the Redondo Mesa (EO52) population had about 60 plants in 1996 (CNDDDB 2003). An additional datapoint from UCR is located south and/or southwest of these locations on the Plateau near the San Diego and Riverside county line.

Hemet: The Upper Salt Creek drainage west of Hemet (EO26) had about 50 thread-leaved brodiaea plants in 1991; however, no acreage for the population was estimated (CNDDDB 2003). The area is crossed by roadways that, if altered (widened or realigned), could change the topography and thereby negatively affect the hydrologic integrity of the pool complexes and introduce exotic invasive species.

The Fish and Wildlife Service has issued three non-jeopardy biological opinions on thread-leaved brodiaea in Riverside County. In 1995, an internal biological/conference opinion was issued for temporary impacts to thread-leaved brodiaea on less than 1 percent of 25 acres of vernal pool habitat from construction of a boardwalk in the vernal pool area. In 1998, an opinion

was issued to the U.S. Army Corps of Engineers for the Metropolitan Water District's Inland Feeder Project for impacts to thread-leaved brodiaea on 241 acres that could contain alkali playa/grassland/sink and vernal pools. In 2001, the Cleveland National Forest livestock grazing program (including portions of the national forest in Riverside County) was assessed and impacts to thread-leaved brodiaea on 163 acres of Forest Service lands were anticipated to be temporary.

Effects of the Action

Direct Effects

The Plan Area includes approximately 11,482 acres of modeled habitat for thread-leaved brodiaea. There are 3,231 acres (28 percent) of modeled habitat outside the MSHCP Conservation Area; of that, approximately 1,296 acres (11 percent of total modeled habitat) occur within the Criteria Area Species Survey Areas (CASSA) 1, 2, 3, 3a and 4 (Figure 6-2, pp. 6-64). The thread-leaved brodiaea is considered an Additional Survey Needs and Procedures species. Until such time that the Additional Reserve Lands are assembled and conservation objectives for this species are met, surveys for thread-leaved brodiaea will be conducted where suitable habitat is present for the species within CASSA 1, 2, 3, 3a and 4. Populations detected as a result of survey efforts will be avoided according to the procedures outlined in the Additional Survey Needs and Procedures (section 6.3.2 of the Plan; *i.e.*, 90 percent of portions of property with long-term conservation value will be avoided until the species conservation objectives are met). For those locations found to contain large numbers of individuals or otherwise determined to be important to the overall conservation of the species, the Plan allows flexibility to acquire these locations for inclusion into the Additional Reserve Lands (pp. 6-70).

Within the 800 acres of modeled habitat that is outside the MSHCP Conservation Area, but within the CASSA for thread-leaved brodiaea (7 percent of total modeled habitat), we anticipate that up to 10 percent of the area with long-term conservation value for the species (as discussed above) will be lost to individual projects, including all individual plants within the project footprint.

Thread-leaved brodiaea will be subject to impacts associated with proposed residential, commercial, urban, and agricultural development within 2,035 acres (18 percent) of modeled habitat that are outside of the MSHCP Conservation Area and outside of the CASSA for the thread-leaved brodiaea. Thus, all individual thread-leaved brodiaea plants and populations persisting in these areas are anticipated to be impacted over the 75-year permit term as a result of the proposed development. This includes two of the unconfirmed locations (one north of Prado Basin and one south of I-60 in Moreno Valley), and the UCR location south of the PQP Lands on the Santa Rosa Plateau. However, the UCR location on the Santa Rosa Plateau falls within an area zoned rural mountainous, and therefore this location may persist because of the lower intensity development associated with this designation.

Because the thread-leaved brodiaea is not widely distributed within the Plan Area, specific conservation objectives are provided in the MSHCP (pp. 9-144) to ensure that suitable habitat and known populations of the thread-leaved brodiaea will persist. The Plan states that within the

MSHCP Conservation Area, core areas for at least 11 of the 12 known occurrences of the thread-leaved brodiaea in Riverside County will either remain on PQP Lands or be conserved within the Additional Reserve Lands. In addition, at least 6,900 acres of grassland and playa/vernal pool habitat within the San Jacinto River, Mystic Lake and Salt Creek areas will be included within the MSHCP Conservation Area. Floodplain areas along the San Jacinto River will be included in this acreage total to preserve floodplain processes important to the survival of the thread-leaved brodiaea. Salt Creek floodplain in its existing condition (from Warren Road to Newport Road) and vernal pools in Upper Salt Creek will be included within the MSHCP Conservation Area and floodplain processes maintained to provide for persistence of the species. We anticipate that implementation of the Riparian/Riverine Area and Vernal Pools policy will assist in providing some protection to this species' habitats by avoiding and/or minimizing direct impacts to riparian, riverine, and vernal pool habitats.

Based on our dataset, it appears that more than the 6,900 acres of alkali playa and vernal pool habitat proposed for inclusion in the MSHCP Conservation Area will remain in the Plan Area. Approximately 3,866 acres of modeled habitat fall within PQP Lands, and 4,384 acres fall within the Additional Reserve Lands. Thus, the MSHCP Conservation Area will include 8,250 acres (72 percent) of the modeled thread-leaved brodiaea habitat in the Plan Area. The area along the San Jacinto River and at Upper Salt Creek will be conserved by the Plan and the area on Santa Rosa Plateau on PQP Land will remain. Additional locations of thread-leaved brodiaea may also be conserved indirectly through efforts to meet the species-specific objective of conserving 6,900 acres of alkali playa and vernal pool habitat within the MSHCP Conservation Area.

One of the 11 known locations of thread-leaved brodiaea to be included within the MSHCP Conservation Area was not captured by our interpretation of the conservation criteria for the cell group, nor by the cell group boundary itself. The Squaw Mountain population appears to fall both inside and outside the Southwest Area Plan, subunit 7, cell group J. The criteria for that cell group indicates that 35 to 45 percent of the cell group would be conserved, focusing in the southern portion of the cell group. The Squaw Mountain population west of the Santa Rosa Plateau PQP Land falls outside of that interpretation, and a portion lies outside the cell group boundary. The Plan has sufficient flexibility to allow the criteria for that cell group to be adjusted. Thus, we anticipate that at least some portion of the Squaw Mountain population will be included in the Additional Reserve Lands in order to meet the conservation objectives for the species.

In addition to 11 known locations of thread-leaved brodiaea to be included, it also appears that another population, described after the MSHCP documents were prepared (EO65 northeast of I-215 near San Jacinto Avenue; CNDDDB 2003), will fall within the MSHCP Conservation Area. One unverified location in southern Prado Basin also falls within PQP Lands.

The population in Railroad Canyon is at risk from the San Jacinto River Flood Control Project. We assume that this population will not be impacted by this proposed Covered Activity unless criteria in section 7.3.7 of the Plan are met. The criteria include the conservation of the two populations downstream of I-215 (at Case Road and Railroad Canyon) and may transplant one of those populations, presumably the Railroad Canyon population of over 3,000 plants. The species would be translocated from the project impact site to a suitable receiver site in accordance with a

mitigation and monitoring program that includes success criteria and requirements to ensure that the population has been established. Should the San Jacinto River Flood Control project be implemented, we anticipate that some corms may be damaged during salvage and not all transplanted corms will survive. However, based on our experience with translocation of the species at other sites in Orange and San Diego counties, we anticipate that any reduction in the population size will be minimized through implementation of appropriate transplantation techniques such that the distribution of this species will be maintained in the Plan Area.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands including surveys for the thread-leaved brodiaea. Cooperative management and monitoring is anticipated on PQP Lands. Surveys for the thread-leaved brodiaea will be conducted at least every 8 years to verify occupancy at a minimum of 75 percent of the known locations. If a decline in the distribution of thread-leaved brodiaea is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP. Other management actions described in Section 5 of the MSHCP will help maintain habitat and populations of thread-leaved brodiaea within core areas, such as preventing alteration of hydrology and floodplain dynamics, off-road vehicle use, grazing and competition from non-native plants. Implementation of these management actions will help to avoid and minimize adverse effects to thread-leaved brodiaea.

Indirect Effects

Thread-leaved brodiaea could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These generally include the indirect effects discussed in the “General Effects” section of this biological opinion. Implementation of the Guidelines Pertaining to the Urban/Wildlands Interface, Riparian/Riverine Area and Vernal Pools policy, and the management provisions listed above will help to reduce the indirect effects to this species. As a result of the measures incorporated into the MSHCP, we anticipate few indirect impacts to this species.

Conclusion

We anticipate the proposed action will affect the thread-leaved brodiaea as described in the analysis above, including the total loss of 21 percent of its modeled habitat in the Plan Area. An additional 11 percent of thread-leaved brodiaea modeled habitat outside the MSHCP Conservation Area will be subject to surveys within CASSA 1, 2, 3, 3a, and 4 (Figure 6-2, pp.64). Once the conservation objectives for thread-leaved brodiaea have been met, avoided areas, which have not been otherwise conserved, may be affected. We anticipate that occurrences determined to be important to the overall conservation of the species will be considered for inclusion in the Additional Reserve Lands and that at least some of the avoided areas may be maintained as open space habitat. Implementation of the avoidance, minimization and mitigation measures identified in the Plan will further reduce impacts to this species. This species is anticipated to persist within the remaining 72 percent of its modeled habitat within both the PQP Lands and the Additional Reserve Lands. These lands include large, contiguous habitat blocks that support 76 percent of the known occurrences of the species in the Plan Area.

We anticipate that these areas will be monitored and managed cooperatively to benefit the thread-leaved brodiaea.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the thread-leaved brodiaea. We reached this conclusion because 78 percent of the thread-leaved brodiaea modeled habitat and 76 percent of the documented occurrences will be protected or will remain within the MSHCP Conservation Area. In addition required surveys for thread-leaved brodiaea may result in newly discovered occurrences being included in the MSHCP Conservation Area, and management actions will address maintenance and enhancement of hydrologic processes that may be important to the species. Thus, impacts to this species and its modeled habitat, when viewed in conjunction with the protection and management of the MSHCP Conservation Area, are not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Vail Lake ceanothus (*Ceanothus ophiochilus*)

Status of the Species

Listing Status

Vail Lake ceanothus was listed as endangered by the State of California in January 1994 and was federally listed as threatened on October 13, 1998 (63 Federal Register 54956). No critical habitat has been proposed, and the Service has not prepared a recovery plan for this species.

Species Description

Vail Lake ceanothus in the Buckthorn family (Rhamnaceae), is a rounded, divaricately branched (widely-forked) shrub, 1.2–1.5 meters (4-5 feet) tall. The leaves are opposite, thick, 3–7 millimeters (0.12-0.27 inch) long and less than 2.5 millimeters (0.1 inch) wide. The stipules are corky. Fruits are 3–3.5 millimeters (0.12-0.14 inch) in diameter, and usually hornless. Vail Lake ceanothus is differentiated from other species of *Ceanothus* in the area by its opposite, narrow leaves, pale green below, blue flowers, and hornless fruits. This species grossly resembles *Adenostoma fasciculatum* (chamise), the co-dominant shrub in its habitat. Outside of the flowering period, it is difficult to differentiate Vail Lake ceanothus from surrounding chamise (63 Federal Register 54957).

Habitat Affinities

Vail Lake ceanothus is restricted to dry habitats on ridgetops and north to northeast-facing slopes in chamise chaparral. Plants are restricted to nutrient-poor (*i.e.*, phosphorous-deficient) and shallow soils such as gabbro (mineral) or metavolcanic bedrock, which may allow them to maintain reproductive isolation (63 Federal Register 54957). Occurrences are reported in drier areas on ridgetops and north-to northeast-facing slopes within chamise chaparral and also along the edges of creeks and in dry canyons (Stephenson and Calcarone 1999). A symbiotic

relationship between the species *Ceanothus* and the nitrogen-fixing actinomycete fungus, *Frankia*, and other endo- and ectomycorrhizae fungi have been documented as widespread (C. Schmidt as cited in Dudek 2001, page P-114).

Chaparral habitats in the interior foothill region of southern California area dense shrub associations of moderate height dominated by chamise, California lilac, red berry, manzanita, California scrub oak, sugarbush, laurel sumac, toyon, California buckwheat, and black sage (63 Federal Register 54957). Chaparral occurs on many different soil types; however, Vail Lake ceanothus is restricted to clay soils derived from the parent soil materials described above (63 Federal Register 54957).

Life History

Vail Lake ceanothus is an evergreen, perennial shrub. The species produces umbel-like clusters of pale blue (rarely pinkish lavender) flowers from mid-February to March. The seed capsules mature from late May to mid-June and are readily detectable year-round (63 Federal Register 54957). Published literature regarding pollinators is not available for this species.

Vail Lake ceanothus lacks a burl and appears to recover from fire by seed germination (63 Federal Register 54957). The seed pods of this genus mature from late-May to mid-June, building up tension as they ripen and flinging their seed in all directions as the pods dehisce (Smith 1994).

The species is capable of hybridizing with *C. crassifolius* when they co-occur. At the time of listing it was thought that occurrences of this species on private land at Vail Lake and on Forest Service land in the adjacent Agua Tibia Wilderness area contained some hybrid individuals, but many of the plants were too immature to assess the degree of hybridization (63 Federal Register 54957). Based upon extensive field experience, Steve Boyd (Rancho Santa Ana Botanic Garden) believes that the occurrence with the least amount of genetic introgression (or hybridization) is at Little Oak Mountain, south of Vail Lake dam; smaller occurrences on the edge of the Cleveland National Forest are more prone to hybridization (S. Boyd, Rancho Santa Ana Botanic Garden, Herbarium Curator, pers. comm. to N. Ferguson, CFWO, September 18, 2000).

Status and Distribution

Vail Lake ceanothus is endemic to southwestern Riverside County, and all known occurrences are within the Plan Area. This species was first described from a collection made west of Vail Lake in the Oak Mountain area in 1989 (63 Federal Register 54957). At the time of listing, Vail Lake ceanothus was found in only three sites scattered along borders of creeks and dry canyons from near Vail Lake in southern Riverside County (*i.e.*, Oak Mountain) and just south of Vail Lake in the Agua Tibia Wilderness Area of the Cleveland National Forest (63 Federal Register 54957). The occurrence in the Oak Mountain area contained approximately 3,000 to 5,000 plants and occupied about 8 hectares or 20 acres within a 16-hectare (40-acre) area of seemingly suitable habitat on privately-owned land. There are some hybrid individuals in this occurrence (63 Federal Register 54957). The remaining two occurrences are on land managed by the Forest

Service south of SR-79, and over 4,000 plants exist in a 12-hectare (30-acre) area of the Agua Tibia Wilderness Area (63 Federal Register 54957).

Threats

Although this species occurs in rugged, relatively inaccessible terrain, occurrences are threatened by habitat destruction and alteration from urban development, wildfire suppression activities and altered fire regime, and hybridization (Stephenson and Calcarone 1999). The occurrence on private land near Vail Lake is threatened by the development of a planned community and was also partly graded during creation of a fuel break during recent fires (S. Boyd, Rancho Santa Ana Botanical Garden, Herbarium Curator, pers. comm. to N. Ferguson, CFWO, September 18, 2000).

Alteration of the natural fire regime is a threat to this species; it requires fire for seed germination and does not re-sprout vegetatively following fire (Stephenson and Calcarone 1999). Short fire-return intervals can prevent plants from reaching reproductive maturity and producing seed prior to the next fire, leading to a gradual depletion of the soil seed bank (63 Federal Register 54957). Although the current average fire-return interval in the Cleveland National Forest is approximately 40 to 50 years (K. Winter, USFS, pers. comm. to N. Ferguson, CFWO, October 14, 2003), portions of the population of Vail Lake ceanothus were burned in the 1990 Pechanga Fire, and the stands that did not burn in this fire were burned in the 1989 Vail Fire (K. Winter, USFS, internal document prepared for the USFS Burned Area Emergency Recovery team, August 16, 2000).

In addition, mechanical destruction of plants has occurred during fire fighting activities. An occurrence of Vail Lake ceanothus in the Agua Tibia Wilderness has been repeatedly graded to create fuel breaks (site visits with USFS Burned Area Emergency Recovery Team; J. Stephenson and N. Ferguson, CFWO, August 2001); however, subsequent re-sprouting of this species is anticipated (K. Winter, USFS, internal document prepared for the USFS Burned Area Emergency Recovery team, August 16, 2000,). Grading for fire breaks and edge effects appear to facilitate hybridization (A. Sanders, Curator of the Herbarium, UCR, pers. comm. to N. Ferguson, CFWO, October 10, 2003). Although hybridization is a natural phenomenon common among the species of *Ceanothus*, no strategy has yet been developed to address the effects of hybridization on the persistence of the species (63 Federal Register 54958).

Conservation Needs

As the species is so narrowly distributed, does not appear to regenerate at a rate that has exceeded the known loss of individuals, and because reproduction can be negatively influenced by an increase in the natural fire regime, the creation of large blocks of conserved habitat that capture the edaphic characteristics described above is advised. Conserved habitat should include enough of the surrounding chaparral and sage scrub habitat to maintain the area's natural fire ecology (*i.e.*, it must be large enough so that unburned habitat remains following wildfires). Therefore, a sufficiently large conservation area is necessary to provide a functional buffer to off-set the effects of increased urbanization and/or public access to occupied areas (*e.g.*, increased proximity to ignition triggers and grading for structure protection from wildfire).

Long-term habitat protection and coordination with landowners on fire-suppression activities are also necessary. The Service coordinates extensively with the Forest Service fire-fighting team when suppression or fire fighting activities need to occur within sensitive habitat.

Environmental Baseline

Our database includes 14 point-locations for Vail Lake ceanothus in the Plan Area that have been documented since 1987 (CFWO GIS internal database 2004). These point locations contain a total of 62 records that represent either multiple herbarium specimens collected over time from the same location or multiple records within a geographic area that is best defined as a polygon (*e.g.*, the CNDDDB database). As discussed above, at the time of listing, only three occurrences were thought extant. The 14 point-locations in our database have been recorded over a 5-year period (*i.e.*, from 1998 - 1993) by multiple observers, and it is not possible to discern whether these individual point locations represent distinct occurrences of the species or are separate observations of a single occurrence over its spatial distribution. However, it appears that there are two disjunct distributions of Vail Lake ceanothus, one to the north (*i.e.*, at Oak Mountain) and one to the south of SR-79 (*i.e.* in the Agua Tibia Wilderness Area).

Oak Mountain: Four records of Vail Lake ceanothus occur in this area; three are either partially overlapped or in very close proximity to each other and likely represent the spatial extent of one occurrence.

Agua Tibia Wilderness: Ten records occur within this area; eight are within existing PQP Lands.

The primary vegetation type used to model habitat for the Vail Lake ceanothus was chaparral within the Narrow Endemic Species Survey Area in the Vail Lake and Agua Tibia Wilderness bioregions. Based on this analysis, approximately 16,466 acres of modeled habitat for Vail Lake ceanothus occurs within the Plan Area. Approximately 8,783 acres (53 percent) of this modeled habitat is within existing PQP Lands.

Effects of the Action

Direct Effects

The Plan Area includes 16,466 acres of modeled habitat for Vail Lake ceanothus. There are 3,679 acres (22 percent) of modeled habitat outside the MSHCP Conservation Area; of that 1,988 acres (12 percent of total modeled habitat) occur within the Criteria Area Species Survey Area (CASSA) 5 (Figure 6-2, pp. 6-64). Vail Lake ceanothus is considered an Additional Survey Needs and Procedures species. Until such time that the Additional Reserve Lands are assembled and conservation objectives for this species are met, surveys will be conducted as part of the project review process for public and private projects where suitable habitat for Vail Lake ceanothus is present within CASSA 5. Populations detected as a result of survey efforts will be avoided according to the procedures outlined in the Additional Survey Needs and Procedures (section 6.3.2 of the Plan; *i.e.*, 90 percent of portions of property with long-term conservation value will be avoided until the species conservation objectives are met). For those locations

found to contain large numbers of individuals or otherwise determined to be important to the overall conservation of the species, the Plan allows flexibility to acquire these locations for inclusion into the Additional Reserve Lands (pp. 6-70).

Within the 1,988 acres of modeled habitat outside of the MSHCP Conservation Area, but within the CASSA for Vail Lake ceanothus (22 percent of total modeled habitat), we anticipate that up to 10 percent of the area with long-term conservation value for this species (as discussed above) will be lost to individual projects. All known point-locations of Vail Lake ceanothus that are outside of the MSHCP Conservation Area occur within CASSA 5 (*i.e.*, Oak Mountain records). If occurrences of Vail Lake ceanothus within CASSA 5 are confirmed to contain large numbers of individuals or otherwise determined to be important to the overall conservation of the species, the Plan allows flexibility to acquire these locations for inclusion into the Additional Reserve Lands (Section 6 pp. 6-70).

Vail Lake ceanothus could also be subject to impacts associated with development and other proposed Covered Activities (*e.g.*, single-family home development and possibly the construction of Future Facilities) within 1,691 acres of modeled habitat that is outside of the MSHCP Conservation Area and outside of the CASSA for Vail Lake ceanothus (10 percent of total modeled habitat). However, our database contains no records of Vail Lake ceanothus outside of the MSHCP Conservation Area that are also outside of the CASSA for the Vail Lake ceanothus.

Because Vail Lake ceanothus is not widely distributed within the Plan Area, specific conservation objectives are provided in the MSHCP (Section 9, pp. 9-145) to ensure that suitable habitat and known populations of Vail Lake ceanothus will persist. The Plan states that at least three core locations supporting Vail Lake ceanothus within approximately 13,290 acres in the Vail Lake area and the Agua Tibia Wilderness Area will be included within the MSHCP Conservation Area. The development of this conservation area is anticipated to mitigate the additional fire hazards potentially introduced into habitat supporting Vail Lake ceanothus following Plan implementation.

Based on our analysis, approximately 8,783 acres (53 percent) of modeled habitat for Vail Lake ceanothus occur within PQP Lands and 4,004 acres (24 percent) occur within the Additional Reserve Lands. Thus, the MSHCP Conservation Area will include 12,787 acres (78 percent) of the modeled Vail Lake ceanothus habitat in the Plan Area. All records of Vail Lake ceanothus within the Agua Tibia Wilderness Area occur within the MSHCP Conservation Area and, as discussed above, those records of this species in the Oak Mountain area that are outside of the MSHCP Conservation Area are within CASSA 5.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands including surveys for Vail Lake ceanothus. Cooperative management and monitoring is anticipated on PQP Lands. Surveys for Vail Lake ceanothus will be conducted at least every eight years to verify occupancy of 75 percent of known locations. If a decline in the distribution of Vail Lake ceanothus is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP. Other management actions described in Section 5 of the MSHCP,

such as addressing competition with non-native plant species, controlling flood control activities and taking steps to prevent the alteration of the natural fire regime, will help maintain habitat for Vail Lake ceanothus. Implementation of these management actions will help to avoid and minimize adverse effects to Vail Lake ceanothus.

Indirect Effects

Vail Lake ceanothus could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These generally include the indirect effects discussed in the “General Effects” section of this biological opinion. Implementation of the guidelines, processes and policies, and the management provisions of the MSHCP will help to reduce the indirect effects to this species, including effects from increased development, greater road use (e.g., SR-79), and an increase in fire ignition sources.

Conclusion

We anticipate the proposed action will directly and indirectly affect Vail Lake ceanothus as described in the analyses above, including total loss of up to 10 percent of its modeled habitat. An additional 12 percent of Vail Lake ceanothus modeled habitat outside the MSHCP Conservation Area will be subject to surveys within CASSA 5. Once the conservation objectives for Vail Lake ceanothus have been met, avoided areas, which have not been otherwise conserved, may be impacted. We anticipate that occurrences determined to be important to the overall conservation of the species will be considered for inclusion in the Additional Reserve Lands and that at least some of the avoided areas may be maintained as open space habitat. Implementation of the avoidance, minimization, and mitigation measures identified in the Plan will further reduce the impacts to Vail Lake ceanothus. This species is anticipated to persist within the remaining 78 percent of its modeled habitat within both the PQP Lands and the Additional Reserve Lands. We anticipate that these areas will be monitored and managed cooperatively to benefit this species.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service’s biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of Vail Lake ceanothus. We reached this conclusion because approximately 78 percent of Vail Lake ceanothus modeled habitat and the majority of the documented occurrences will be protected or will remain within the MSHCP Conservation Area. In addition, CASSA surveys for Vail Lake ceanothus may result in newly discovered occurrences being included in the MSHCP Conservation Area. Thus, impacts to this species and its modeled habitat, when viewed in conjunction with the protection and management, are not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of Vail Lake ceanothus throughout its range.

SPECIES BY SPECIES EVALUATIONS - UNLISTED

AMPHIBIANS**Coast range newt** (*Taricha tarosa tarosa*)Status of the Species*Listing Status*

The coast range newt is a Species of Special Concern designated by the California Department of Fish and Game. This species is not federally listed.

Species Description

The coast range newt (2.75-3.5 inches) is brownish-color above and light yellow to orange below. Newts of the genus *Taricha* form a monophylitic group of three species (Riemer 1958). There are two subspecies of *Taricha tarosa*, including the coast range newt (*T. t. tarosa*).

Habitat Associations

The coast range newt typically occurs along low-elevation streams mostly near the coast (Stephenson 1999). This species generally prefers rocky canyons that contain streams with well developed pools (Fisher and Case 1997b). The coast range newt breeds in ponds, reservoirs, and slow moving streams but spends much of the year away from water in terrestrial habitats (grassland, woodland and forest) (Stebbins 1985; Stephenson 1999). Terrestrial individuals seek cover under surface objects such as rocks and logs, or in mammal burrows, rock fissures, or human-made structures such as wells. Aquatic larvae find cover beneath submerged rocks, logs, debris, and undercut banks.

Life History

The coast range newt has been found to be active in all hours of the day (Marshall *et al.*, 1990). Much of its daily activity revolves around feeding, both in aquatic and terrestrial habitats. Typically, newts feed on earthworms, insects, snails and other small invertebrates (Stebbins, 1972). Hanson *et al.* (1994) reported the stomach contents of a single female newt captured in the Santa Monica Mountains. They found several insects including two coleopterans, 11 lepidopteran, and one plecopteran; five conspecific newt larvae and an intact nestling bird. Additionally, newts are known to cannibalize their own or conspecific's egg masses (Marshall *et al.* 1990). The study conducted by Marshall *et al.* (1990) determined that the majority of intraspecific oophagy occurred in the female newt.

The mating season for the coast range newt occurs between January and May, depending on location (Stebbins 1962; Twitty 1942). The reproductive cycle begins with males migrating in large numbers to the breeding area. The preferred breeding and oviposition sites of coast range newts are the largest and deepest pools and slow-moving runs available in streams (Gamradt and

Kats 1997). Prior to entering the water, males undergo physiological changes which adapt them to aquatic life and acquire secondary sex characteristics (*i.e.*, skin becomes engorged with fluid and loses its rough texture, becoming highly vascularized; the tail develops a broad blade; and the cloacal lips become enlarged). Attractants released into the water by the female's skin attract males (Twitty 1955). Movement also attracts attention at close range. Several males may be attracted to a single female, especially during the early part of the breeding season. At times a single female may become entangled in a compact mass of 20 or more males. Breeding occurs 24 hours a day (Marshall *et al.* 1990). After fertilization, females ovideposit 7-30 eggs (Brame 1968) attaching them to the aquatic substrate. A female may take several weeks to deposit a single clutch (Marshall *et al.* 1990). In a study conducted by Gamradt and Kats (1997), 89 percent of egg masses observed were oviposited in pools and 9.5 percent were oviposited in runs of a stream in the Santa Monica Mountains.

Newt larvae have the ability to recognize the chemical cues of conspecific and native predators with which they have coevolved (*i.e.*, snakes, raccoons, birds, coyotes, foxes) (Diamond 1996; Kats *et al.* 1994), but apparently this defense is ineffective against introduced predators such as mosquitofish and crayfish (Gamradt and Kats 1996). The newt also has the ability to repel some predators with toxic glands on its skin and eggs (Brodie *et al.* 1974).

Coast range newts are more resistant to desiccation due to their large bladder capacity, thick skin, high temperature tolerance, and frequent behavior of maintaining body contact with the substrate (Cohen 1952; McFarland 1955; Brattstrom 1963; Brown and Brown 1980). Their natural life span ranges from 10-15 years and they are very site tenacious (Twitty 1942).

The movement ecology of the coast range newt is essentially unknown. However, Stebbins (1951) found that newts travel great distances relative to their body size (>1 km) during migrations between breeding sites and terrestrial habitats. Additionally, electronically tagged newts have been found to return within a few meters of capture sites in subsequent years (Gamradt and Kats 1997).

Status and Distribution

The coast range newt ranges along the western coast of California from Humboldt County to San Diego County (Tan and Wake 1995). The known elevation range of this taxon extends from near sea level to 1,830 meters (6,000 feet). Populations in southern California appear to exhibit a high level of historic fragmentation. Coast range newt populations have been depleted in southern California, including extirpation of the southern most populations in San Diego County.

Threats to Species

The coast range newt is threatened by large-scale historical commercial exploitation coupled with the loss and degradation of stream habitats, especially in Riverside and other south coastal counties (Jennings and Hayes 1994). The breeding habitat of this taxon has been severely degraded over much of its range, largely due to a shift in sedimentation dynamics that has resulted in more filling and less scouring of pools (Jennings and Hayes 1994).

The greatest threat to *T. t. torosa* is the introduction of crayfish and mosquito fish, as these exotic species are apparently unaffected by the potent neurotoxin produced by coast range newts. Data collected by Gamradt *et al.* (1997) indicates that aggression by crayfish directly affects newt behavior, breeding, and egg mass production.

Gamradt and Kats (1996) conducted a study on the effect of introduced predators on the western newt in the Santa Monica Mountains. Of the ten streams surveyed, three had mosquitofish and/or crayfish and contained no California newt eggs, larvae or adults. The remaining seven streams all contained California newts. In laboratory studies, they found that both predators preyed on newt eggs and larvae and that newt breeding behavior may be altered by predator presence, preventing successful mating and oviposition. Additionally, they found that in 1995, one stream was cleansed of crayfish by heavy rains. The following spring, the stream contained newt eggs where no evidence of newt presence was detected previously.

Wildfire is another threat to the western newt. Gamradt and Kats (1997) studied the effects of chaparral wildfire on coast range newts in a Santa Monica Mountain stream. They found major changes in stream morphology following the 1993 wildfire. The preferred habitat of the newt (pools and runs) was drastically reduced by landslides and sediment loads. The result was a drastic reduction in the amount of suitable habitat for oviposition. This likely occurred at two spatial scales: available oviposition microsites were covered with sediment, and pool area decreased (Gamradt and Kats 1997). The following spring, the post-fire area contained less than 20 percent runs and pools; and approximately 1/3 the number of egg masses as compared to pre-fire surveys. Three years after the post-fire survey, the number of egg masses observed increased from 51 (1994) to 67 (1996), a possible indication that recovery had begun.

Conservation Needs

This species needs suitable breeding sites in the form of ponds or slow-flowing streams that are devoid of exotic predators. In addition, core terrestrial habitats associated with aquatic breeding sites need to be protected out to a distance of between 159 to 290 meters from aquatic habitats to account for various life history requirements of the species (Semlitsch and Bodie 2003). Habitat needed by the coast range newt for reproduction, development, and survival is dependent on the dynamic nature of aquatic systems. Therefore, conservation will be achieved when breeding habitats are created and/or maintained naturally by fluctuating hydrological, geological, and ecological processes. In regulated bodies of water where natural processes are interrupted, water management regimes and land use practices appropriate to maintain habitat suitability must be executed into the future. Habitat protection and restoration must be achieved by controlling non-native predators, managing flows in ways that are beneficial for coast range newts, controlling erosion and sedimentation, replanting wetland vegetation, and increasing connectivity of habitat between known breeding areas.

Environmental Baseline

For purposes of our analysis, modeled primary habitat includes all portions of streams and habitat within 328 feet (100 m) of the streams, water, and playas and vernal pool habitat within the Santa Ana Bio-region. Modeled secondary habitat includes chaparral, coastal sage scrub,

woodlands and forest, riparian scrub, grassland, and Riversidean alluvial fan sage scrub greater than 328 feet (100 m) from any streams in the Santa Ana Bio-region. Modeled primary habitat within the Plan Area totals approximately 21,524 acres, of which 13,801 acres (64 percent) occur in PQP Lands. Modeled secondary habitat totals approximately 98,424 acres, of which 65,237 (66 percent) occur in PQP Lands. Combining both primary and secondary habitats, there are 119,948 acres of modeled habitat in the Plan Area, of which 79,039 acres (66 percent) occur in PQP Lands.

The coast range newt is thought to only occur within the Santa Ana Mountains within the Plan Area and has reportedly suffered marked population declines in southern California due to human activity (Stebbins 2003). Stephenson and Calcarone (1999) report it from DeLuz, Tenja, and San Mateo Creeks in the Plan Area. It is also known to be present on the Santa Rosa Plateau Ecological Reserve. Habitat loss and degradation has occurred within the Santa Ana Mountains Bioregion largely between the Cleveland National Forest and the San Diego County line to the southeast. An urban area exists between the Cleveland National Forest and the Santa Rosa Plateau Ecological Reserve, and there is a large expanse of agriculture to the south of the Santa Rosa Plateau.

We have no records of coast range newts in our database; however, a total of 23 records were reported in the Plan, but only one of these sightings was recorded after 1990. The MSHCP states that locations within the Plan Area were in the following areas: lands adjacent to the Cleveland National Forest southeast of Lake Elsinore, along SR-74, southwest of Corona, southeast of Lake Norconian and west of I-15, on the Cleveland National Forest, and at the Santa Rosa Plateau. Currently, there is a lack of information on the status of the coast range newt in the Plan Area.

Effects of the Action

Direct Effects

An estimated 35,021 acres (29 percent) of modeled coast range newt habitat within the Plan Area could be affected, through degradation or destruction during the 75-year permit term, including an estimated 6,155 acres (29 percent) of modeled primary habitat and 28,866 acres (29 percent) of modeled secondary habitat. We anticipate that some coast range newts in these areas will be injured or killed as a result of habitat loss/degradation and activities such as grading and construction. However, coast range newts are site tenacious. They also apparently travel between their terrestrial and breeding habitats along the same route each year. Individual newts or populations of newts within rural mountainous areas may survive and reproduce if their terrestrial habitat is not lost to development and there is no barrier on the route to their breeding habitat. Approximately 29,660 acres (85 percent) of the non-conserved modeled habitat for the coast range newt are designated as rural/mountainous land. Coast range newts may also persist in areas avoided through implementation of the Riparian/Riverine Areas and Vernal Pools policy. Additional losses may occur due to vehicle strikes because of the construction of new roads and road expansions during the permit term.

The MSHCP will conserve approximately 1,568 acres (7 percent) of modeled primary habitat and 4,320 acres (4 percent) of modeled secondary habitat. Together with the PQP Lands, 71

percent of the modeled primary habitat and 71 percent of the modeled secondary habitat will be conserved or will remain in the Plan Area. The MSHCP Conservation Area will include one core area, the Santa Ana Mountains Bioregion.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands including surveys for the coast range newt. Cooperative management and monitoring are anticipated on PQP Lands. Reserve Managers will maintain ecological processes within occupied habitat and appropriate new areas within the MSHCP Conservation Area. At a minimum, these areas will include the Santa Rosa Plateau, San Mateo Wilderness Area of the Cleveland National Forest, Squaw Mountain, Avenacola Mesa, Redondo Mesa, Alamos Canyon, and surrounding areas. Reserve Managers will determine if successful reproduction is occurring within the MSHCP Conservation Area once a year for the first five years after permit issuance and then as determined by the RMOC, but not less frequently than every eight years. The ecological processes and breeding population(s) would be maintained as a result of management measures with regard to alteration of hydrology and flood control, non-native plant species, mining, human collection, and predation (Section 5, Table 5.2). If a decline in the distribution of the coast range newt at occupied areas is documented, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP.

Management actions to benefit the coast range newt (*e.g.*, hydrological maintenance, exotic vegetation removal, habitat manipulation) or other Covered Species may result in impacts, including death, to a small number of individual coast range newts. It is anticipated that any impacts to coast range newts from management actions will be minimized by adherence to appropriate survey protocols and other guidelines described in Section 7.4 of the MSHCP.

Indirect Effects

The coast range newt could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These include the indirect effects described in the “General Effects” section of this biological opinion. The coast range newt will be particularly susceptible to impacts associated with urban runoff. The Riparian/Riverine Areas and Vernal Pools policy and the Guidelines Pertaining to Urban/Wildlands Interface will help minimize the effects of urban runoff on the coast range newt.

Conclusion

We anticipate the proposed action will directly and indirectly affect the coast range newt as described in the analyses above, including the loss of 29 percent of its modeled habitat in the Plan Area. We anticipate that this species will persist in the remaining 71 percent of the modeled habitat within both the existing PQP Lands and Additional Reserve Lands. Together these lands form a system of large, contiguous habitat blocks that are inter-connected within the Plan Area. We anticipate that these areas will be monitored and managed cooperatively to benefit this species.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the coast range newt. We reached this conclusion because the majority of the modeled habitat for the coast range newt is in the MSHCP Conservation Area and impacts associated with loss of this species' modeled habitat, when viewed in conjunction with the protection and management of the MSHCP Conservation Area, is not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Amount or Extent of Take

We anticipate the take of all coast range newts within up to 35,021 acres of habitat outside of the MSHCP Conservation Area. A small, but undeterminable, number of coast range newts are anticipated to be taken as a result of management actions. Take will be in the form of harm, death, and injury. This level of take is not likely to result in jeopardy to the coast range newt.

Western spadefoot toad (*Spea* [*Scaphiopus*] *hammondii*)

Status of the Species

Listing Status

The western spadefoot toad (*Spea* [*Scaphiopus*] *hammondii*) is designated as a Species of Special Concern by the California Department of Fish and Game. This species is not federally listed.

Species Description

Spea hammondii was previously in the genus *Scaphiopus*, but it is currently recognized as a species of the genus *Spea*. This species is 4 to 6.5 centimeters long, dusky-green or gray on its dorsal side, whitish on its ventral side and has pale gold eyes with vertical pupils. The hind feet each have a wedge-shaped glossy black spade used for burrowing (Stebbins 1985).

Habitat Associations

Western spadefoot toads occur in both upland and adjacent ephemeral/intermittent pool habitat, depending on their life stage. Adult western spadefoot toads use uplands for foraging, burrowing and estivating. Upland habitat types include coastal sage scrub, chaparral, alluvial fans, washes, floodplains, and grasslands (Stebbins 1985). Grasslands and mixed grassland/coastal sage scrub habitat are found to be the most commonly used by this species (Holland and Goodman 1998a, Stebbins 1985). Ephemeral/intermittent pools found within or adjacent to suitable upland habitat are used for reproduction and metamorphosis. A variety of ephemeral/intermittent pools can be used for breeding including vernal pools, road ruts, man-made ponds or any other rain-filled pools or ponds (Brown 1966, 1967 as cited in Jennings and Hayes 1994; CNDDDB 1997). The required water temperature for reproduction is between 48 to 86 degrees Fahrenheit. Pool duration must persist for more than 35 days (*i.e.*, 4 to 5 days for eggs to hatch and at least 30 days for larval development) with standing water for successful metamorphosis (Morey 1998,

Feaver 1971). Additionally, Holland and Goodman (1998a) reported that the species is “also present in wash and riparian habitats where it may breed in close proximity to both arroyo and California toads.” For successful reproduction and metamorphosis, pools need to be free of non-native predators such as bullfrogs, mosquito fish, and other introduced fish species (Jennings and Hayes 1994).

Soil and burrow characteristics for the western spadefoot toad are poorly understood. It is believed that this species prefers soils that are sandy or gravelly for burrowing (Stebbins 1985). Though not specifically observed for this taxon, soil characteristics of burrow refuge sites may become fairly hard and compact during the period of summer estivation (Jennings and Hayes 1994, Ruibal *et al.* 1969). According to Stebbins (1985), this species had been observed utilizing small mammal burrows. However, its not known how and when this species may use these burrows (Jennings and Hayes 1994).

Life History

The western spadefoot toad is primarily terrestrial, spending 8 to 10 months of the year estivating in underground burrows (Dimmitt and Ruibal 1980b; Jennings and Hayes 1994; Holland and Goodman 1998a; Storey *et al.* 1999). Adults become surface active and emerge from their burrows following relatively warm rains in late winter to spring and fall (Jennings and Hayes 1994); typically they emerge from January through March; however, they may emerge in any month between October and April if rain thresholds are met (Stebbins 1972; Morey and Guinn 1992; Jennings and Hayes 1994; Holland and Goodman 1998a). Emergence from dormancy depends on low frequency sound caused by rainfall events. This species is primarily nocturnal (Holland and Goodman 1998a).

Breeding generally occurs during winter or spring, within quiet streams or temporary pools, (Stebbins 1985), and during rainy nights (Ziener *et al.* 1988). To locate mates, *Scaphiopus* uses vocalizations. “Their voices are audible for a great distance and are important in bringing the sexes together for breeding in arid [environments] where the number, location, and suitability of breeding sites is uncertain” (Stebbins 1985). The western spadefoot toad can form large, highly vocal, breeding aggregations (Jennings and Hays 1994). Breeding females will find a vernal pool or other suitable pool habitat to deposit her eggs. Eggs are deposited in irregular small clusters and attached to vegetation or pieces of detritus in shallow temporary pools or in pools in ephemeral stream courses (Stebbins 1985; Jennings and Hayes 1994). It is reported that complete larval development in the lab can rapidly occur within three weeks after hatching (Holland and Goodman 1998a) but may last up to 11 weeks (Feaver 1971; Jennings and Hayes 1994). Western spadefoot toads in the wild, however, rarely, if ever, complete larval development in pools that dry up sooner than 30 days after embryos hatch (Morey 1998). Western spadefoot toad larvae respond to the reduction of water volume in pools by accelerating metamorphosis (Denver *et al.* 1998) presumably to metamorphose into toadlets before the pool dries up. According to Morey (1998), pool duration influences the age and body mass of toadlets at metamorphosis. Morey (1998) found that western spadefoot toad larvae from longer lasting pools tend to be larger at metamorphosis than larvae from shorter lasting pools. Being a larger juvenile is an important life history trait related to higher terrestrial fitness in temperate amphibians (Morey 1998).

Once western spadefoot toads emerge from the pool they will move into adjacent uplands for foraging and estivation. Estivation sites occur within burrows adjacent to potential breeding sites. A study conducted by Ruibal *et al.* (1969) concluded that the distribution of burrows is not random, but rather is grouped. Burrows are approximately 2.8 feet in depth; however, shallower burrows are also used (*e.g.*, 4 centimeters deep) during the rainy season (Stebbins 1972; Ruibal *et al.* 1969). Burrows are often constructed by the toad digging backwards using the spades on the back feet resulting in loose soil filling the hole and concealing the toad. Western spadefoot toads will also utilize small subterranean mammal burrows (Kellogg 1932; Bragg 1944; Pearson 1955; Wasserman 1958; Stebbins 1985). The western spadefoot toad is able to survive the long duration of time in underground burrows by absorbing water through its skin from the soil and maintaining an osmotic concentration equal to the soil moisture tension (Ruibal *et al.* 1969).

Data is lacking on the population structure, movement ecology, and colonization abilities of western spadefoot toads. Jennings and Hayes (1994) consider a metapopulation structure to be likely for this species. In addition, home range and density estimates are unknown due to the secretive and sporadic ecology of the species. However, Zeiner *et al.* (1988) found that after transforming in the late spring, juvenile western spadefoot toads disperse after a short period of time and likely do not move far from their breeding pool during the year. Most above ground movement occurs during rainy nights (Zeiner *et al.* 1988).

In general, western spadefoot tadpoles are algae and detritus feeders, but they will occasionally eat fairy shrimp, mosquitos, and smaller tadpoles. Studies generated by Pfennig (1990) showed that while most western spadefoot toad tadpoles remain omnivorous detritus feeders, there is a tendency for some tadpoles to become carnivorous and even cannibalistic. Tadpoles that leave their natal area were found to be most likely to engage in cannibalism. Tadpoles may compete for food resources or space with other amphibian larvae such as western toad and Pacific treefrog. Adult spadefoot toads, in general, are known to consume butterfly and moth larvae, beetles, termites, ants, crickets, flies, earthworms, and other invertebrates (Dimmitt and Ruibal 1980a; Jennings 1994; Morey and Guinn 1992; Stebbins 1972; Whitaker *et al.* 1977).

Status and Distribution

The western spadefoot toad ranges from the “Great Valley, bordering foothills, and Coast Ranges south of San Francisco Bay, California, into northwestern Baja California” (Stebbins 1985). Myers (1944) documented the range of the western spadefoot toad occurring west of the Sierran-desert range axis. Its known elevation range extends from near sea level to 4,470 feet (Zeiner *et al.* 1988). Approximately 80 percent of the western spadefoot toad’s habitat in southern California and approximately 30 percent of its habitat in northern California has been developed or converted to uses incompatible with its survival (Jennings and Hayes 1994).

Threats

The western spadefoot toad is susceptible to a wide variety of threats due to its wide ranging status in California and reliance on both seasonal pools and terrestrial habitat to complete its life cycle. Destruction and degradation of suitable habitat, primarily from urbanization and agriculture, is the primary threat to this species. In Riverside County, the loss of vernal pool

habitat is estimated at nearly 100 percent (58 Federal Register 41384). In addition, approximately 59 percent of the coastal sage scrub in Riverside County was eliminated between 1945 and 1990 (58 Federal Register 16741), and 60 percent of the coastal sage scrub stands in the Riverside-Perris Plain (*i.e.*, mapped circa 1930) were either heavily degraded by exotic annual grasses or entirely replaced by them by 1990 (Minnich and Dezzani 1998).

Habitat modifications from urban development, water projects, and irrigated agriculture have fragmented and reduced the size of California's vernal pool ecosystems (59 Federal Register 48136). These types of modifications may contribute toward a changing distribution of pool duration (hydroperiod) within natural vernal pool complexes (Morey 1998). Pools may be impacted to the extent where the pool duration is either shortened (*e.g.*, filled in, resulting in reduced water capacity) or extended (*e.g.*, runoff increases pool depth). Size and somatic condition of metamorphs, which have been linked to fitness for other temperate amphibians, is reportedly correlated to pool duration for the western spadefoot toad (Morey 1998). If the pool duration is shortened, then there may not be enough time allowed for larvae to fully metamorphose before the pool dries up. If the pool duration is extended, this creates an environment that is more habitable for exotic predators. Modified pools that are larger, deeper, and longer enduring are favorable to exotic species, including bullfrogs (Morey 1998; Fisher and Shaffer 1996).

Development within the watershed can also affect water and habitat quality. As watersheds are developed, the amount of impervious surface increases, resulting in an increase of sediments containing organic matter, pesticides, fertilizers, heavy metals and other debris into streams and wetlands (Environmental Protection Agency 1993 as cited in Fish and Wildlife Service 2002b). The decrease in water quality can have profound negative impacts on native amphibians and other wetland vertebrates.

Urban and suburban developments contribute to habitat fragmentation and create barriers to western spadefoot toad dispersal. Roads, in particular, fragment habitat and render the western spadefoot toad highly susceptible to road mortality. Holland and Goodman (1998a) reported that during normal overland movements, this species crosses and even aggregates on roads at night after rain events. In addition, they found that mortality on a single mile of road may exceed 10 to 20 animals per night. Roads also cause destruction of suitable habitat, which can limit dispersal and isolate populations; they also increase human contact and pollute (*e.g.*, runoff) the biotic environment of the western spadefoot toad.

Routine road maintenance, trail development, and facilities construction associated with parks and other public lands, in or adjacent to western spadefoot toad habitat can degrade habitat quality (61 Federal Register 25813). Use of public recreational areas can also degrade habitat for the western spadefoot toad by trampling vegetation, adults, eggs, and larvae. Additionally, off-road vehicles can damage riparian vegetation, increase siltation in pools, compact soils, disturb pools, and crush toads.

The western spadefoot toad is vulnerable to anthropogenic activities that may alter its behavior. Work completed by Dimmitt and Ruibal (1980) showed that the vibration caused by an electric motor consistently induced 100 percent emergence from dormancy under very arid conditions.

Additionally, Zeiner *et al.* (1988) indicated that artificial irrigation may elicit advertisement (reproductive) vocalizations during any month.

The continued placement of mosquito fish in rain pools by mosquito abatement programs threatens western spadefoot toad populations (Jennings and Hayes 1994). Bullfrogs emigrating into rain pool breeding sites also pose a threat (Hayes and Warner 1985; Morey and Guinn 1992). Mosquito fish and bullfrogs are thought to be significant predators of native amphibian eggs and larvae including the western spadefoot toad (Fisher and Shaffer 1996). Although the western spadefoot toad was found to survive and breed within these modified habitats, they were often absent in pools that had been invaded by exotic fish and bullfrogs (Morey 1998). In addition, wetlands adjacent to undeveloped areas are more likely to have larger populations of native amphibians than those within highly urbanized watersheds (Richter and Azous 1997 as cited in Fish and Wildlife Service 2002b).

Native predators of western spadefoot toad larvae and post-metamorphs include the California tiger salamander, garter snake, great blue heron, and raccoon (Childs 1953; Feaver 1971, as cited in Jennings and Hayes 1994). Once the western spadefoot toad has metamorphosed, they are likely to escape predators and competitors (Zeiner *et al.* 1988) because they are no longer confined to pools and can seek refuge within their burrows.

Additional threats to the western spadefoot toad include sheep and other livestock grazing (*e.g.*, trampling of eggs and larvae, manure, lowering of pool water levels) (Holland and Goodman 1998a), agriculture practices, mining, fire, and projects which impact fluvial processes in potential burrowing areas (MSHCP). These threats can cause direct mortality or destroy, degrade, and fragment habitat resulting in the extirpation or reduction in reproductively viable populations.

Conservation Needs

The conservation needs for this species are important for maintaining viable populations throughout the Plan Area. These needs include conserving known populations; conserving both suitable wetland (pools) and adjacent upland habitat with adequate buffers to ensure successful breeding, estivating and overland movement; maintaining landscape connectivity between breeding areas; maintaining natural hydrological and ecological processes; removing land use practices that are detrimental to the species and its habitat; maintaining water quality free of pollutants; and reducing and/or eliminating the overall threats to the species. Since dispersal distance, home range size, and population dynamics are not well understood, large areas of suitable habitat should be conserved in a configuration that provides connectivity among breeding populations and ensures enough habitat with buffers to capture ecological processes that the western spadefoot toad may depend upon. In addition, due to the decline of remaining suitable breeding habitat for the western spadefoot toad within the Plan Area, potential breeding locations need to be identified, managed, and regularly surveyed to monitor reproductive success and potential threats.

Since the western spadefoot toad likely occurs as a metapopulation, populations of the western spadefoot toad must be geographically distributed in a manner that allows for the continued

existence of viable metapopulations, despite fluctuations in the status of individual subpopulations, throughout the Plan Area. The amount of additional habitat needed for population connectivity, recolonization, and dispersal needs to be determined, protected, and managed for this species.

Another conservation need to ensure populations remain viable is to maintain movement corridors. While there appears to be a lack of information regarding the use of wildlife crossings by the western spadefoot toad, it may be possible that wildlife crossings will be used by this species. While studies should be conducted to determine the utility of crossings for the western spadefoot toad, the addition of wildlife crossings, including culverts and underpasses, should be considered for roadways that fragment suitable habitat and/or cause mortality. In addition, barriers should be installed along roadways to ensure western spadefoot toads do not cross open roadways. The installation of wildlife crossings and installation of fencing/barriers is particularly important along existing roadways where mortality from road strikes occurs, in situations where roads parallel occupied habitat, and for new roads that may occur in the vicinity of occupied habitat. In addition, since vehicular mortality is a significant yet avoidable cause of western spadefoot toad decline, roads should be designed to avoid suitable habitat and remain as distant as possible from occupied areas. When practical, roads that occur in proximity to occupied habitat should be closed during times of overland movement, particularly immediately after rain events, to avoid high mortality (Holland and Goodman 1998a).

Additional conservation needs include removal of grazing animals from suitable habitat, restricting public access to occupied and necessary habitat (*e.g.*, dispersal habitat), and calculated fire management practices to avoid mortality. The removal of non-native species, especially mosquito fish and bullfrogs, from breeding habitat will be particularly important for sustaining western spadefoot toad populations throughout the Plan Area.

Defining additional or more specific conservation needs for the western spadefoot toad will require a greater understanding of the species life history, population structure, necessary ecological processes, and threats than what is provided by the available literature.

Environmental Baseline

Based on our dataset the western spadefoot toad is distributed throughout the Riverside Lowlands and San Jacinto Foothills Bioregions in the Plan Area. The primary vegetation types used to model habitat for this species were playas and vernal pools (breeding habitat); and coastal sage scrub, grassland, chaparral, and Riversidean alluvial fan sage scrub (upland habitat), up to 1,500 meters in elevation. Based on this analysis, the Plan Area supports approximately 7,074 acres of modeled breeding habitat and approximately 666,282 acres of modeled upland habitat for the western spadefoot toad. Approximately 2,713 acres of modeled breeding habitat and 238,775 acres of modeled upland habitat occur within PQP Lands. Because western spadefoot toads need specific microhabitat features that were not captured in our model, such as adjacency of ephemeral pools to suitable upland habitat, pools absent of bullfrogs and exotic fish, and sandy/gravelly soils, modeled habitat likely overestimates the extent of suitable habitat for this species. Fifteen of the 31 observations (48 percent) in our dataset were located within PQP Lands.

All potential habitat for the western spadefoot toad within the Plan Area has not been surveyed. According to our dataset, there are 31 recent (post 1988) observations for the western spadefoot toad within the Plan Area. These occurrences are found in the vicinity of Diamond Valley Reservoir, Lake Skinner (including the area between Diamond Valley Reservoir and Lake Skinner), Lake Matthews/Estelle Mountain, Alberhill, Lake Perris, San Jacinto Wildlife Area, Antelope Valley to Murrieta Hot Springs, Motte-Rimrock Reserve, Banning/Beaumont, San Jacinto River, and within the Santa Margarita Ecological Reserve. An additional location was noted at Lee Lake (B. Ortega in MSHCP); however, this location has not been verified by our office. While no discernable “core” or “key” populations have been identified in the Plan Area, what can be noted are a few lightly clustered areas that include Lake Skinner to Diamond Valley Reservoir, Antelope Valley to Murrieta Hot Springs, Lake Perris, and Lake Mathews.

Effects of the Action

Direct Effects

The Plan Area includes 7,074 acres of modeled breeding habitat and 666,282 acres of modeled upland habitat for the western spadefoot toad. Western spadefoot toads will be subject to impacts associated with development and other proposed Covered Activities over the 75-year permit term within 985 acres (14 percent) of modeled breeding habitat and 297,016 acres (45 percent) of modeled upland habitat, which encompasses 8 of the 31 (26 percent) western spadefoot toad observations in our dataset. It is anticipated that most western spadefoot toads outside the Conservation Area will be injured or killed as a result of habitat loss and activities such as grading, construction, water diversion/flood control projects, fill of aquatic habitat, and other urban and agricultural activities, although some may survive in areas avoided as a result of the Riparian/Riverine Areas and Vernal Pools policy.

To offset the loss of western spadefoot toad habitat within the Plan Area, implementation of the MSHCP will conserve and manage areas containing modeled habitat for the western spadefoot toad. Conserved habitat within the Additional Reserve Lands will include 3,377 acres (48 percent) of modeled wetland habitat and 130,492 acres (20 percent) of modeled upland habitat that encompass 8 of the 31 (26 percent) western spadefoot toads observations in our dataset. Another 2,713 acres (38 percent) of modeled wetland habitat and 238,775 acres (36 percent) of modeled upland habitat will remain within PQP Lands. PQP Lands encompass 15 of the 31 (48 percent) western spadefoot toads observations in our dataset. In total, 86 percent of the modeled wetland habitat and 55 percent of the modeled upland habitat for the western spadefoot toad will be conserved or remain in the Plan Area. This modeled habitat includes 74 percent of the western spadefoot toad observations in our dataset.

The MSHCP proposes at least six Core Areas to support the western spadefoot toad within the MSHCP Conservation Area; however, only five Core Areas were identified. These areas are the Santa Rosa Plateau, San Jacinto River, Salt Creek, Skunk Hollow (approximately 10 acres), and Hemet (approximately 100 acres). The MSHCP also proposes to conserve “additional breeding habitat” in the form of isolated pools or creeks at Lake Skinner-Diamond Valley Lake, Lake Mathews-Estelle Mountain, San Jacinto Wildlife Area-Lake Perris, the Badlands, Potrero Valley, the Banning Bench, Sage/Vail Lake, San Jacinto Mountains, and Anza Valley (pp. A-63).

The Permittees will implement management and monitoring practices within the Additional Reserve Lands including surveys for the western spadefoot toad. Cooperative management and monitoring is anticipated on PQP Lands. Surveys for the western spadefoot toad will be conducted at least every eight years to verify occupancy and distribution at a minimum of 75 percent of the currently occupied areas. In addition, successful reproduction will be maintained at a minimum of 75 percent of the conserved breeding locations as measured by the presence or absence of tadpoles, egg masses, or juvenile toads once every eight years (Objective 4, pp. A-63). If a decline in the distribution of the western spadefoot toad is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP.

General Management Measures described in Section 9, Table 9.2, for the western spadefoot toad include maintaining or improving habitat quality at all locales within the MSHCP Conservation Area by preserving the watersheds and hydrological processes within the vernal pools, temporary ponds, and drainages that support potential habitat and by selectively rehabilitating or revegetating all such areas that are currently fragmented or otherwise degraded (*e.g.*, invasion of exotic plants and animals). Reserve managers will maintain a program to enhance and/or create primary habitat within the MSHCP Conservation Area. The MSHCP also recommends that management address threats from increased roads, including limiting roads or providing toad walls and culverts for safe dispersal, exotic species invasion, and destruction of habitat.

Other management actions described in Section 5.0, Table 5.2 and Section 7.0 (Guidelines Pertaining to the Urban/Wildlands Interface) of the MSHCP, such as maintaining natural hydrological and ecological processes, controlling unauthorized public access and off-road vehicle use, limiting livestock access from entering watercourses, limiting recreational use in certain areas, managing for urban-related predators, removing exotic vegetation and aquatic species, and managing for other specific threats to the species will help maintain habitat and populations of the western spadefoot toad within MSHCP Conservation Area. In addition, we anticipate that implementation of the Riparian/Riverine Areas and Vernal Pool Areas policy will assist in providing some protection to this species' habitat by avoiding and/or minimizing direct impacts to riparian, riverine, and vernal pool habitats.

The MSHCP seeks to include 10,000 acres of New Agricultural Lands within the Criteria Area, of which, approximately 5,000 acres are anticipated to occur within areas considered desirable for conservation under the Criteria. Because the MSHCP is committed to taking specific management actions to reduce the threats from farming and grazing activities within western spadefoot toad habitat (MSHCP, Page 5-14), we assume that these management actions will include the removal of farming and grazing activities in areas that are managed for the western spadefoot toad or are essential for their conservation. With implementation of these management practices, we anticipate that the threat from past or ongoing agricultural practices and New Agricultural Lands will be removed from occupied and potential western spadefoot toad habitat within the Additional Reserve Lands.

Management activities, such as prescribed burning, pitfall trapping, and trail maintenance could result in death or injury to western spadefoot toads. Management actions to benefit the western spadefoot toad (*e.g.*, hydrological maintenance, exotic vegetation removal, habitat manipulation)

or other Covered Species may also result in impacts, including death, to a small number of individual western spadefoot toads. It is anticipated that any impacts to western spadefoot toads from management actions will be minimized by adherence to appropriate survey/trapping protocols and other guidelines described in Section 7.4 of the MSHCP.

Indirect Effects

The western spadefoot toad could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These include the indirect effects described in the “General Effects” section of this biological opinion. Because of their susceptibility to mortality and fragmentation due to roads, the western spadefoot toad is likely to be vulnerable to indirect effects (*e.g.*, increased vehicle strikes) associated with roads. The Guidelines for Construction of Wildlife Crossing in Section 7 associated with new and expanded roadways could potentially help minimize the impact of roads on habitat connectivity and western spadefoot mortality. In addition, because of the western spadefoot toads’ susceptibility to changes in hydrological processes (*e.g.*, hydroperiodicity) and water quality, it is likely to be vulnerable to indirect effects associated with changes in the hydrological regime of its aquatic habitat. Implementation of the Riparian/Riverine Areas and Vernal Pools policy, the Guidelines Pertaining to the Urban/Wildlands Interface, and the management provisions listed above will help to reduce these indirect effects to this species.

Conclusion

We anticipate that the proposed action will directly and indirectly affect the western spadefoot toad as described in the analyses above, including the loss of 14 percent of modeled breeding habitat and 45 percent of modeled upland habitat in the Plan Area. Implementation of the avoidance, minimization, and mitigation measures identified in the Plan will reduce the impacts to this species. We anticipate that this species will persist in the remaining 86 percent of modeled breeding habitat and 55 percent of modeled upland habitat within both the existing PQP Lands and the Additional Reserve Lands. Together these lands form a system of large, contiguous habitat blocks that are inter-connected within the Plan Area. We anticipate that these areas will be monitored and managed cooperatively to benefit this species.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service’s biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the western spadefoot toad. We reached this conclusion based on the widespread distribution of the western spadefoot toad in the Plan Area and because the impacts associated with loss of this species’ modeled habitat, when viewed in conjunction with the protection and management of the MSHCP Conservation Area, is not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Amount or Extent of Take

We anticipate the take of all western spadefoot toads within up to 298,000 acres of modeled western spadefoot toad habitat outside of the MSHCP Conservation Area. A small, but

undeterminable, number of western spadefoot toads are anticipated to be taken as a result of management actions. Take will be in the form of harm, death, and injury. This level of take is not likely to result in jeopardy to the western spadefoot toad.

BIRDS¹

American bittern (*Botaurus lentiginosus*)

Status of the Species

Listing Status

The American bittern is listed on the Federal Birds of Conservation Concern (2002) but is not listed under the Federal Endangered Species Act or by the State of California.

Species Description

The American bittern is a brown, medium-sized bird with a boldly striped neck . It is the smallest of the four species of *Botaurus* bitterns.

Habitat Affinities

In California, the American bittern is found almost exclusively in emergent habitat of freshwater marshes and vegetated borders of ponds and lakes (Grinnell and Miller 1944). It may occasionally occur in sparsely vegetated wetlands and in tidal marshes (Gibbs *et al.* 1992). It typically nests in dense, emergent vegetation such as cattails, sedges, or reeds (Gibbs *et al.* 1992). It usually hides and roosts solitarily in tall, dense, emergent vegetation, on the ground, or near the ground on a log, stump, or on emergent plants. It does not normally perch in trees. It feeds in marshes, meadows, and along the edges of shallow ponds (Terres 1980). It will inhabit wetlands of all sizes but is more abundant on larger wetlands.

Life History

The American bittern can be active day or night year-round but is mostly crepuscular and nocturnal (Zeiner *et al.* 1990a). It stands motionless and waits for prey, or stalks very slowly (Kushlan 1976a). It eats mainly insects, amphibians, fish, crayfish, and small mammals but also snakes, some invertebrates, and birds.

The nest of the American bittern is a platform of matted, emergent aquatics, other herbaceous stems, sticks and/or leaves, usually in shallow water, but sometimes floating, or on the ground. The timing of courtship and nest-building is unknown but eggs or young have been reported

¹ With the exception of mountain quail, potential take of nests, eggs, or young was not evaluated for Covered bird species due to required compliance by the Permittees with the Migratory Bird Treaty Act of 1918 prohibition on the take of active nests.

April to July (Cogswell 1977). It is probably monogamous and possibly polygynous. It is basically a solitary nester but is often in the vicinity of other pairs. The clutch size is usually 3-5 eggs, with a range of 2-6 eggs. It is single-brooded. Incubation is about 24 days. The semi-altricial, downy hatchlings are tended solely by the female and remain in the nest about 2 weeks. Ages at first flight, independence, and first breeding of the American bittern are unknown (Palmer 1962). The American bittern is thought to undergo extensive, post-breeding dispersal (Gibbs *et al.* 1992).

Territory size of the American bittern is unknown but is probably used mainly for courtship, copulation, and nesting (Palmer 1962). In a slough in Saskatchewan, less than 16 hectares (40 acres) in extent, there were 5 nests of the American bittern (Bent 1926). Distances between nests have been as little as 18 meters (57 feet) in Michigan (Middleton 1949), 37 meters (120 feet) in Iowa (Provost 1947), and 46 meters (150 feet) in Minnesota (Vesall 1940).

Status and Distribution

American bitterns breed locally from southeastern Alaska eastward to Newfoundland southward to southern California and Virginia; they have also bred (at least formerly) on the Mexican plateau. The species winters from British Columbia eastward to northern Florida south through (at least) Mexico and Cuba (AOU 1998).

Zeiner *et al.* (1990a) describe the distribution, abundance, and seasonality of the American bittern in California as widely distributed in winter in fresh emergent wetlands, primarily west of the Sierra Nevada. In the Central Valley, it is fairly common October to April, and uncommon to rare the rest of the year; although it breeds there. It is less common on the coastal slope, and no longer breeds regularly south of Monterey County (Garrett and Dunn 1981). In the Imperial Valley and along the Colorado River, it is fairly common October to April, rare through the summer, and may breed at the northern end of the Salton Sea. In the northeast plateau and east of the Sierra Nevada crest south to Lake Tahoe, it is rare from May to August. It is rare August to May in saline emergent wetlands along the coast. Elsewhere in the lowlands, it is a rare transient and local winter resident (Cogswell 1977; McCaskie *et al.* 1979; Garrett and Dunn 1981).

American bitterns were historically more common and widespread in coastal southern California (Garrett and Dunn 1981). As early as the 1940's, Grinnell and Miller (1944) noted that the loss of habitat coincided with diminishing numbers and distribution of American bitterns. Within coastal southern California, the species is primarily a winter visitor, with nesting occurring infrequently in the coastal plain (Garrett and Dunn 1981). The small breeding population in the lowlands may be nonmigratory; it may be augmented during October to April by migrants, probably from north of California and from the northeastern plateau, which is deserted in winter by this species (Zeiner *et al.* 1990a).

Threats

The primary threats to the American bittern are the loss of wetland habitat due to human development and habitat degradation, partially due to contamination, siltation, and eutrophication (Gibbs *et al.* 1992). Changes in wetland isolation and stabilized water regimes may also seriously erode habitat quality for bitterns (Gibbs *et al.* 1992). Other potential threats to the American bittern include human disturbance (*i.e.*, recreational boating), invasion of wetland habitat by non-native plant species, and acid rain (Gibbs *et al.* 1992). Overgrazing of emergent vegetation is also detrimental to the species (Arbib 1979). Specific threats within the Plan Area include the degradation and destruction of habitat as a result of water conservation projects, the maintenance of water polishing ponds, and the creation and maintenance of open-water waterfowl habitat in freshwater marsh environments.

Conservation Needs

Due to the significant loss of wetlands in southern California, a primary conservation need of this species is maintaining wetland foraging and nesting habitat. Although, anecdotal observations of the species have been made in the Prado Basin and San Jacinto Wildlife Area/Mystic Lake area in recent years, systematic surveys of the species have not been conducted in suitable habitats throughout a majority of the Plan Area. American bitterns are secretive birds that may escape detection in the absence of intensive, focused surveys. Focused surveys of potential breeding locales are essential in conserving this species due to the rarity and sensitivity of breeding (and wintering) areas. American bitterns would benefit from the conservation and restoration of vegetated freshwater marsh habitats throughout the Plan Area.

Environmental Baseline

American bittern nesting and foraging habitat occurs within the Riverside Lowlands, San Jacinto Foothills, and Desert Transition Bioregions of the Plan Area. Potential nesting and foraging habitat for the American bittern occurs near emergent habitat of freshwater marshes and vegetated borders of ponds and lakes. The habitat model for the American bittern was created by capturing the following vegetation types that occur below an elevation of 4,922 feet (1,500 meters): meadows and marshes and cismontane alkali marsh habitats. Based on this analysis, the Plan Area supports approximately 604 acres of modeled habitat for the American bittern. Approximately 236 acres (39 percent) of the modeled habitat occur within PQP Lands, including the Prado Basin/Santa Ana River. American bitterns usually hide and roost in tall, dense, emergent vegetation, on or near the ground on a log, stump, or on emergent plants. However, American bitterns only occasionally occur in sparsely vegetated wetlands and tidal marshes (Gibbs *et al.* 1992). Thus, the modeled habitat for the American bittern likely overestimates the amount of suitable nesting and foraging habitat within the Plan Area.

There are eight documented occurrences for the American bittern in the Plan Area. Sixty-three percent (5 of the 8) of the records for this species occur within PQP Lands. Potential breeding areas include Lake Mathews/Estelle Mountain, Lake Perris, Lake Skinner/Diamond Valley Lake, Canyon Lake, Prado Basin/Santa Ana River, San Jacinto Wildlife Area/ Mystic Lake area, Collier Marsh, and Lake Elsinore. Although the species was detected in the Prado Basin during

the spring 2003 migration window, no birds were detected in summer of 2003 within the Prado Basin (Pat Tennant and Dharm Pellegrini, Orange County Water District, pers. comm., July 29, 2003) and no breeding was documented in the Plan Area in 2003.

A large percentage of American bittern habitat is located on PQP Lands. Currently managed under a multiple use policy, populations of American bitterns are subject to a variety of wildlife management activities that could reduce or remove localities from a reserve. For example, alterations in flooding cycles on the San Jacinto Wildlife Area could alter existing wetland habitat. In Prado Basin, maintenance of water polishing ponds and creation of open-water duck habitat could modify potential breeding habitats. Similarly, the Eastern Municipal Water District has proposed to develop 320 acres of permanent wetlands on the eastern edge of the Mystic Lake area using reclaimed and storm water (EMWD 1994). There is a concern that this development would alter the inundation cycle for wetland and alkali playa habitat already established around the margins of Mystic Lake (Bramlet 1996).

Effects of the Action

Direct Effects

The Plan Area includes 604 acres of modeled habitat for the American bittern. Loss of 189 acres (31 percent) of this modeled habitat is anticipated over the 75-year permit term, which encompasses 2 of the 8 (25 percent) American bittern observations in our dataset. Loss of 189 acres of American bittern habitat distributed over the Plan Area is not anticipated to result in direct mortality of adult birds. However, loss of foraging and nesting habitats to development will cause American bitterns to disperse in search of other wetland habitats and experience increased competition for the remaining suitable habitat. Birds forced to disperse may also experience decreased fitness due to increased energy and time spent locating new habitats, and they may be subjected to increased rates of predation and injury. If clearing of habitat occurs near the initiation of the breeding season, the search for and establishment of a new breeding site may result in an overall reduction in reproductive output. Thus, loss of breeding and foraging habitat may impact overall population numbers of the American bittern within the Plan Area over the long term by reducing the number of areas suitable for use as foraging and nesting sites.

The MSHCP will conserve and manage of 179 acres (30 percent) of modeled habitat for the American bittern within Additional Reserve Lands. Another 236 acres (39 percent) of modeled habitat will remain in PQP Lands. Most (5 of 8 or 63 percent) of the American bittern observations in our dataset were recorded in PQP Lands. In total, 69 percent of the modeled habitat for the American bittern will be conserved or will remain in the Plan Area. This modeled habitat includes 75 percent of the American bittern observations in our dataset.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands including surveys for the American bittern. Cooperative management and monitoring are anticipated on PQP Lands. Surveys for the American bittern will be conducted at least every eight years to verify occupancy at a minimum of 50 percent of the known and future-identified locations. If a decline in the distribution of the American bittern is documented below

this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP.

Reserve Managers will enhance and/or create additional habitat and/or nesting areas in the Prado Basin/Santa Ana River, Collier Marsh, Temecula Wash, Temecula Creek, Lake Perris, Lake Skinner, Lake Mathews, San Jacinto Wildlife Area/Mystic Lake, and Vail Lake. Reserve Managers will also identify, protect, and buffer nest sites in the MSHCP Conservation Area. A 100-meter buffer will be established around existing and future-identified nesting and foraging locations in the MSHCP Conservation Area. Reserve managers will also ensure habitat support functions within the MSHCP Conservation Area by maintaining, preserving, or enhancing hydrological processes, specifically seasonal flows in the Santa Ana River. Particular management emphasis will be given to grazing, recreation and hunting activities, as well as pesticide use (Section 5, Table 5.2).

The MSHCP will benefit American bitterns by conserving known and historic breeding locations, linking core areas with nearby suitable foraging habitat, and managing breeding colonies within the MSHCP Conservation Area. The MSHCP Conservation Area will be managed to: (1) preserve the quality of wetland associated foraging areas; (2) improve the potential and suitable emergent wetland habitat within the Prado Basin, Santa Ana River, and other major wetland areas; (3) monitor the potential breeding locations; and (4) protect any existing and future documented nest sites by providing buffers around them.

Indirect Effects

The American bittern could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These include the indirect effects described in the “General Effects” section of this biological opinion. In particular, maintaining the hydrological processes and water quality standards (*e.g.*, controlling sedimentation and other pollutants) of freshwater marsh and cismontane alkali habitats will be important to sustaining American bitterns in the MSHCP Conservation Area. Implementation of the Riparian/Riverine Area and Vernal Pools policy and the Urban/Wildlands Interface policy will help minimize the indirect effects of the Covered Activities on foraging and breeding habitat for the American bittern.

Conclusion

We anticipate the proposed action will directly and indirectly affect the American bittern as described in the analyses above, including the loss of 31 percent of its modeled habitat in the Plan Area. Implementation of the avoidance, minimization, and mitigation measures identified in the Plan will reduce the impacts to this species. We anticipate that this species will persist in the remaining 69 percent of its modeled habitat within both the existing PQP Lands and the Additional Reserve Lands. Together these lands form a system of large, contiguous habitat blocks that are inter-connected within the Plan Area. We anticipate that these lands will be monitored and managed cooperatively to benefit this species.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service’s biological

opinion that the action, as proposed, is not likely to jeopardize the continued existence of the American bittern. We reached this conclusion because the impacts to American bittern reproduction and loss of this species' habitat, when viewed in conjunction with protection and management of the MSHCP Conservation Area, is not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Amount or Extent of Take

The loss of up to 189 acres of modeled nesting and foraging habitat for the American bittern in the Plan Area will not result in mortality of adult birds; however, for some individuals, reproduction may be impaired or life expectancy shortened. Due to the difficulty in quantifying the number of American bitterns that will be harmed over the 75-year permit term, the Service is quantifying the take as the number of acres of American bittern habitat that will be impacted in the Plan Area as a result of the proposed action. We anticipate that up to 189 acres of breeding and foraging habitat within the Plan Area will become unsuitable for the American bittern as a result of the proposed action. Take will be in the form of harm and injury. This level of take is not likely to result in jeopardy to the American bittern.

Bell's sage sparrow (*Amphispiza belli belli*)

Status of the Species

Listing Status

The Bell's sage sparrow is not listed under the Federal Endangered Species Act or by the State of California. It is considered a Species of Special Concern by the California Department of Fish and Game and is a Fish and Wildlife Service migratory non-game bird of management concern.

Species Description

The Bell's sage sparrow, a subspecies of the sage sparrow, is a medium, relatively long-tailed member of the Emberizidae family.

Habitat Affinities

The Bell's sage sparrow is found in dry chaparral and coastal sage scrub habitats. In cismontane California, it frequents chaparral dominated by chamise and coastal scrub dominated by sage. Other coastal scrub plant species associated with Bell's sage sparrow include California sagebrush, bitterbrush, and California buckwheat as well as mixed brush and cactus patches in arid washes (Grinnell and Miller 1944). The preference for chamise chaparral appears to occur only in the more northern parts of its range. Bell's sage sparrow seeks cover in fairly dense stands in chaparral and scrub habitats in breeding season, and they forage on the ground beneath and between shrubs. It uses similar habitat structure in the winter; however, the habitat may be in more arid, open shrub habitats (Zeiner *et al.* 1990a).

Vertical structure, habitat patchiness, and vegetation density may be more important in habitat selection by Bell's sage sparrow than the specific shrub species, however, it is closely associated with sagebrush throughout most of its range (Wiens and Rotenberry 1981). The sage sparrow is often missing from what appears to be suitable habitat, so other unknown habitat characteristics may be important (Martin and Carlson 1998).

Life History

The Bell's sage sparrow is a secretive bird that is diurnally active year-round (Zeiner *et al.* 1990a). It feeds mostly on insects, spiders, and seeds while breeding, switching to grasshoppers in the late breeding season (Rotenberry 1980), and mostly on seeds in winter. It also feeds on green foliage. Sage sparrows predominantly forage on the ground, mostly by gleaning from the ground and low foliage of shrubs (Zeiner *et al.* 1990a).

Territory size of the sage sparrow is highly variable (0.9 to 8.1 acres) depending on local environmental conditions (Rich 1980; Reynolds 1981; Wiens *et al.* 1986). For Bell's sage sparrow, the territories in San Diego and Riverside counties varied from 1.85 to 14 acres (Lovio 1993). Wiens *et al.* (1985) reported sage sparrow territories generally were smaller in areas with more grass and sagebrush and larger in the more heterogeneous areas dominated by spine bearing shrubs. Territories rapidly expanded in size at low population densities; however, they minimally changed at intermediate to high densities (Wiens *et al.* 1985). Males show strong site tenacity to the breeding territory, even if the habitat is greatly modified (Ehrlich *et al.* 1988).

Bell's sage sparrow may have two broods per nesting season (Ehrlich *et al.* 1988). The nest is located on the ground beneath a shrub, or in a shrub usually 0.5 to 1.0 foot above ground, but up to 2.8 feet. It breeds from late March to mid-August with a peak in May and June. The clutch size is 3-5 eggs, usually 3 or 4 eggs. Incubation is typically 13-16 days, and the altricial young fledged in 9-11 days (Harrison 1978; Reynolds 1981; Ehrlich *et al.* 1988). Young Bell's sage sparrow have been recorded 212 to 2,538 feet from the nest site by the following spring (Martin and Carlson 1998).

In sagebrush habitat in Mono County, Weston and Johnston (1980) reported sage sparrow densities ranged from 27-85 individuals per 40 hectares (100 acres). Sage sparrow populations exhibit substantial yearly fluctuations in population size, the cause of which is not clear (Rotenberry 1980; Wiens *et al.* 1986; Rotenberry and Wiens 1991). Variations in clutch size have been most strongly correlated with predation, and in some cases, predation was by snakes and Townsend's ground squirrels (Rotenberry and Wiens 1989). The sage sparrow shows an approximate one year time lag in response to habitat changes which may be due to the site tenacity of the breeding individuals.

Status and Distribution

The Bell's sage sparrow occurs as a nonmigratory resident in the coastal ranges of California from Sonoma County south, on the western slope of the central Sierra Nevada mountains, and into northwestern Baja California (Bent 1968a). This once common species (Hoffman 1927) has more recently been termed uncommon to fairly common but local in the dry chaparral and sage

scrub foothills of southern California (Garret and Dunn 1981). The MSHCP similarly states that the Bell's sage sparrow may occur in extant stands of coastal sage scrub and chaparral throughout the Plan Area with a wide but sparse and patchy distribution.

However, because of the dense habitat and general tendency of this subspecies to stay on or near the ground, Bell's sage sparrow is more difficult to detect than other sage sparrow taxa (Bent 1968a). Further, no systematic surveys throughout the Plan Area have been conducted. One adjudged center of abundance in the late 1970s was in western Riverside County from the Jurupa Mountains east to the vicinities of Sunnymead and Beaumont (Garrett and Dunn 1981).

Threats

The primary threat to the Bell's sage sparrow is loss and fragmentation of coastal sage scrub habitat due to development activities and agriculture. Fragmentation of shrubland habitats has the potential to affect the Bell's sage sparrow (Bolger *et al.* 1997b); birds apparently are more likely to remain in an area that has high shrub cover, low disturbance, combined with large patch size (Knick and Rotenberry 1995). Additionally, long-term fire suppression alters the pattern of natural plant succession and allows communities to reach tall, dense shrublands which probably reduces the availability of sage sparrow habitat for breeding (Martin and Carlson 1998). Too frequent fires, however, can kill native plants, deplete seed reservoirs of grasses and shrubs, and cause an increase in exotic annual plant species (Martin and Carlson 1998), which also likely decreases habitat quality for the sage sparrow.

Conservation Needs

Focused surveys during the spring (when birds are actively vocalizing) to assess population numbers would greatly improve our knowledge of the relative status and distribution of this species in the Plan Area. Data pertaining to local population source/sink dynamics, effects of fragmentation, and nesting requirements are also needed; this information is incomplete or lacking for this subspecies (Barbara Carlson, University of California, Motte-Rimrock Reserve, pers. comm., 1998). However, based on current knowledge of the species, it appears that conservation of large blocks of suitable breeding and linkage habitats throughout the Plan Area with minimized fragmentation is essential.

Environmental Baseline

The Bell's sage sparrow is patchily distributed throughout modeled habitat in the Plan Area. There are 245 records for the Bell's sage sparrow in our dataset. The primary vegetation types used to model habitat for this species were chaparral, desert scrub, and coastal sage scrub in the Riverside Lowlands, San Jacinto Foothills, Santa Ana Mountains, and Desert Transition Bioregions. Based on this analysis, the Plan Area supports approximately 414,814 acres of modeled habitat for the Bell's sage sparrow. Approximately 139,621 acres of this modeled habitat occurs within PQP Lands. Modeled habitat likely overestimates the amount of suitable habitat in the Plan Area because the Bell's sage sparrow occurs in only certain portions of the habitat types included (*e.g.*, Bell's sage sparrow is found primarily in open chaparral as opposed

to mature chaparral). Forty-one of 245 observations (17 percent) in our dataset were located within PQP Lands.

Effects of the Action

Direct effects

The Plan Area includes 414,814 acres of modeled nesting and foraging habitat for the Bell's sage sparrow. Bell's sage sparrow will be subject to impacts associated with development and other proposed Covered Activities over the 75-year permit term within 175,119 acres (42 percent) of this modeled habitat. It is anticipated that most of the breeding and foraging habitat for Bell's sage sparrow in these areas will be lost as a result of development. Some birds may be able to disperse to adjacent habitats, particularly rural mountainous areas where development impacts are anticipated to occur at a slower rate and at lower densities. Approximately 72,213 acres (41 percent) of the non-conserved modeled habitat for the Bell's sage sparrow are designated as rural/mountainous land. However, displaced birds that are unable to locate suitable habitat will experience increased rates of predation or otherwise die or be injured due to loss of their foraging, breeding, and sheltering habitat.

Due to the limited information on the distribution of Bell's sage sparrow in the Plan Area, conservation of the species is based on maintaining large blocks of breeding habitat with adequate linkages. The MSHCP will conserve and manage 100,075 acres (24 percent) of modeled habitat for the Bell's sage sparrow within Additional Reserve Lands, including 31 of the 245 (13 percent) records for the species in our dataset. Approximately 139,621 acres of modeled habitat will remain in PQP Lands, including 41 of the 245 (17 percent) records in the Plan Area. In total, 58 percent of the modeled habitat for the Bell's sage sparrow will be conserved or remain in the Plan Area. This modeled habitat includes 29 percent of the Bell's sage sparrow observations in our dataset.

At least 12 Core Areas will support the Bell's sage sparrow within the MSHCP Conservation Area, including the Jurupa Mountains, Lake Mathews-Estelle Mountain, Wasson Canyon, Sedco Hills, Hogbacks, Lake Skinner/Diamond Valley Lake, Vail Lake/Wilson Valley/Aguanga, Tule Valley, Lakeview Mountains, Lake Perris, Badlands, and Box Springs Mountains. The Core Areas will be connected by habitat linkages and areas important for dispersal including the Jurupa Mountains, Reche Canyon, and San Timeteo Creek areas.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands, including surveys for the Bell's sage sparrow. Cooperative management and monitoring are anticipated on PQP Lands. Surveys for the Bell's sage sparrow will be conducted at least every eight years. Coastal sage scrub will be maintained within 10 percent of the baseline value within the Core Areas identified in Objective 1 of the Species Account. If a decline in the distribution of the Bell's sage sparrow is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP.

The Bell's sage sparrow will benefit from the General Management Measures described in Section 5, Table 5.2 of the MSHCP, which include evaluation and maintenance of coastal sage scrub within 10 percent of its baseline value, management of fire frequency, and predation by domestic animals in the MSHCP Conservation Area.

Management actions to benefit the Bell's sage sparrow or other Covered Species (*e.g.*, prescribed burning, exotic vegetation removal, habitat manipulation) may result in impacts to a small number of individual Bell's sage sparrows. It is anticipated that any impacts to Bell's sage sparrows from management actions will be minimized by adherence to appropriate survey protocols and other guidelines described in Section 7.4 of the MSHCP.

Indirect Effects

The Bell's sage sparrow could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These include the indirect effects described in the "General Effects" section of this biological opinion. Implementation of the Urban/Wildlands Interface policy will help reduce the effects of adjacent development on linkages connecting Bell's sage sparrow Core Areas.

Conclusion

We anticipate the proposed action will directly and indirectly affect the Bell's sage sparrow as described in the analyses above, including the loss of 42 percent of its modeled habitat in the Plan Area. Implementation of the avoidance, minimization, and mitigation measures will reduce the impacts to this species. We anticipate that this species will persist in the remaining 58 percent of its modeled habitat within both the existing PQP Lands and the Additional Reserve Lands. Together these lands form a system of large, contiguous habitat blocks that are interconnected within the Plan Area. We anticipate that these areas will be monitored and managed cooperatively to benefit this species.

After reviewing the current status of this species, the environmental baseline for the Plan Area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the Bell's sage sparrow. We reached this conclusion based on the anticipated widespread distribution of the Bell's sage sparrow within suitable habitat in the Plan Area and because the impacts to Bell's sage sparrow reproduction and this species' habitat loss, when viewed in conjunction with protection and management of the MSHCP Conservation Area, are not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Amount or Extent of Take

Because of the large area covered, it will be difficult to quantify the number of Bell's sage sparrows that will be taken as a result of the proposed action over the 75-year permit term. Therefore, the Service is quantifying incidental take as the number of acres of modeled habitat that will be impacted in the Plan Area as a result of the proposed action.

We anticipate that up to 175,119 acres of modeled habitat within the Plan Area will become unsuitable for the Bell's sage sparrow as a result of the proposed action. Additionally, a small, but undeterminable, number of Bell's sage sparrows are anticipated to be taken as a result of management actions.

Take will be in the form of harm, death, and injury. This level of take is not likely to result in jeopardy to the Bell's sage sparrow.

Black swift (*Cypseloides niger*) - breedingStatus of the Species*Listing Status*

The black swift is a Fish and Wildlife Service Migratory Non-game Bird of Management Concern and is considered a California Species of Special Concern by the California Department of Fish and Game. It is not listed under the Federal Endangered Species Act.

Species Description

The black swift is the largest swift breeding in North America. It is a fast-flying swift with long, pointed wings and slightly notched tail.

Habitat Affinities

Five ecological features that describe the majority of black swift nest sites include the presence of water, high relief, inaccessibility, darkness and unobstructed flyways (Knorr 1961). The black swift nests, roosts, and rests in moist locations, usually associated with water, on sea cliffs above the surf, or on cliffs, behind or adjacent to waterfalls, in deep canyons (Bent 1940; Lack 1956; Marín 1997). There are no known nest sites on intermittent streams (Foerster and Collins 1990). It nests in a location that provides complete protection from rain, wind and sunshine, such as in a deep, dark crevice, in a cave, or under an overhang (Michael 1927; Bent 1940). The nest is constructed of mud mixed with moss, ferns, seaweed, or other plant materials (Bent 1940). During the breeding season it ranges widely to forage aerially over many habitats (Zeiner *et al.* 1990a).

Life History

The black swift is diurnally active (Zeiner *et al.* 1990a). It feeds on flying insects and arthropods, especially winged reproductive ants (Collins and Landy 1968; Foerster 1987; Marín 1999), captured in sustained, long-distance foraging flights, usually high in the air. It often pursues insects in updrafts associated with cliffs or storm fronts (Udvardy 1954). Other food items include caddis flies, mayflies, crane flies, flesh flies, midges, beetles, termites, aphids, bees, wasps, and spiders (Terres 1980).

The breeding season of the black swift lasts from early June to late August with the peak egg-laying period in mid-June (Lack 1956; Marín 1999). It nests singly and semicolonially when multiple nest sites are available; several (2-3 and up to 15) nests are often found near each other at suitable nest sites (Knorr 1961; Foerster 1987; Foerster and Collins 1990; Marín 1997; Marín and Sanchez 1998). Nest sites are reused from year to year, often by the same individuals (Collins and Foerster 1995). The black swift lays only one large egg per year (Knorr 1961; Harrison 1978; Marín 1997). Incubation lasts 24-27 days. The altricial young leave the nest at about 45 days (Hunter and Baldwin 1962), but the nestling period is probably highly variable as in other swifts (Lack 1956).

Territoriality has not been reported for this species. The territory is presumably limited to the nest site (Zeiner *et al.* 1990a). The home range of the black swift is thought to be very large but has not been measured (Bent 1940; Grinnell and Miller 1944). Black swifts may travel long distances in a short period of time in the summer (>100 miles), possibly related to weather conditions and seasonal cyclones (Udvardy 1954).

Status and Distribution

The black swift breeds from southeastern Alaska, south through Mexico and Central America to Costa Rica, east to Colorado and in the West Indies. Known nesting localities are sparsely distributed within the breeding range and include approximately 80 specific sites in British Columbia, Alberta, Oregon, California, Colorado, Montana, Utah, Arizona, New Mexico, Mexico, Costa Rica and Dominica (Lowther and Collins 2002). The winter range of the black swift is not precisely known but is presumed to include portions of north and west South America and the West Indies (Lowther and Collins 2002). It occurs in highest abundance in the Pacific Northwest regions and coastal British Columbia (Terres 1980).

In southern California the black swift breeds very locally in the Sierra Nevada Mountains, San Gabriel Mountains, San Bernardino Mountains, and San Jacinto Mountains and in coastal bluffs and mountains from San Mateo County south probably to San Luis Obispo County (Zeiner *et al.* 1990a). The species seems to avoid arid regions, such as the Great Basin, southern deserts, and Central Valley. In California, it breeds up to 2,300 meters in elevation (Small 1994). It is noted rarely and irregularly outside the breeding range, mostly west of the Great Basin and southern deserts (Knorr 1961).

Threats

The main threats to the black swift are related to the narrow requirements for the nesting location and the relatively few situations available within the range of the black swift that satisfy these requirements. Possible disturbances to waterfall nesting areas within the Plan Area could be a result of recreational pursuits (*e.g.*, hiking, rock climbing, spelunking, mountain biking), mining, road or trail construction, water diversions, and developments. Rock climbing can remove lichens, mosses and other hydrophilic plants needed in the building of nests, and climbing at waterfalls could disturb incubation, brooding, and foraging of swifts (Colorado Partners in Flight 2000). Because waterfalls are popular recreation sites, the Forest Service has reported that

management attention is necessary to ensure that black swift nest sites are not disturbed (Stephenson and Calcarone 1999).

Conservation Needs

Conservation of black swift in the Plan Area will require protection of the few known nesting areas from disturbance by recreational activities, mining, road or trail construction, water diversions and other development. Because two of the current nest site locations are on private inholdings within the San Bernardino National Forest, conservation of the sites will depend on the cooperation of the individual land owners. Other potential nesting sites that have been identified in the San Jacinto Mountains, but are not currently occupied (Foerster and Collins 1990), should remain undisturbed and available for future use by black swifts.

Environmental Baseline

The black swift is expected to occur in the San Jacinto Mountains and San Bernardino Mountains from early May through September (Garrett and Dunn 1981). Formerly reported to be fairly common (at best) locally within California and a likely breeder in both the San Bernardino Mountains and San Jacinto Mountains (Grinnell and Miller 1944), the black swift was more recently described as a rare and local summer resident in foothill canyons within southern California (Garrett and Dunn 1981). Historic nesting localities within the Plan Area likely included the north fork of the San Jacinto River in the San Jacinto Mountains (Garrett and Dunn 1981). The amount of historic potential black swift breeding habitat is unknown, but potential waterfall nest sites are currently not abundant and may represent a limiting resource for this species in the Plan Area (Foerster and Collins 1990).

All of the known waterfall nest sites in the Plan Area can be characterized as having water, high relief, inaccessibility, darkness and unobstructed flyways (Foerster and Collins 1990). The total available breeding habitat that meets these specifications for the black swift in the Plan Area is not currently known. Thus, we did not generate a vegetation-based model for this species because vegetation alone does not appear to be predictive of the known nesting locations in southern California. The primary vegetation community surrounding four out of six black swift nest sites in southern California is chaparral (Foerster and Collins 1990). The remaining two nest sites are surrounded by mixed conifer forest (Foerster and Collins 1990). The Plan Area contains 434,910 acres of chaparral and montane woodland vegetation types, which is a gross overestimate of where suitable nesting sites may occur. In addition, the total available foraging habitat in the Plan Area cannot be predicted because foraging occurs aerially, apparently incidental to the vegetation community below.

Black swift nests have been reported in the Plan Area from the San Jacinto Mountains in the north fork of the San Jacinto River at Lawler Falls and Four Falls and at Upper Strawberry Grotto, the latter representing the southernmost known nesting site in California (CNDDDB 2003). Foerster (1987) found a minimum of seven pairs nesting in a cave at Lawler Falls in 1985 and 1986. Marín (1997, 1999) researched the same nest site in 1990, 1991, and 1992 and also found a minimum of 7 pairs, still banded from Foerster's study. Our dataset includes a 1995 record from this location. On May 30, 2003, several black swifts were reported over Lawler Lodge

(SBVAS 2003). The data suggests that this nest site likely remains active. During periods of low water flow, pools of water below the nesting site are readily accessible by the public via an informal trail from Highway 243 (Charles Collins, Department of Biology, CSU, Long Beach, pers. comm., November 19, 2003).

A probable nest site was identified by Foerster and Collins (1990) at Four Falls, about 8 km downstream of Lawler Falls. The north fork of the San Jacinto River was identified in the MSHCP as a potential nesting site that was to be included in the MSHCP Conservation Area. Based on our review of the REMAP Area Plan (Section 3.3.12 of the MSHCP), the Lawler Falls and Four Falls nesting locations, on the north fork of the San Jacinto River, fall outside of the MSHCP Conservation Area. The Four Falls nest site is on the property of the Lake Hemet Municipal Water District (Foerster and Collins 1990). These falls are inaccessible to the public and therefore no recreational activities occur in the vicinity of the nest site.

Foerster and Collins (1990) reported a single nest in 1985 and 1986 in two different locations at Upper Strawberry Grotto. These sites are on PQP Lands within the San Bernardino National Forest, just below Idyllwild. Strawberry Creek feeds the Idyllwild Water District and has been known to run completely dry during low water years (Brennan 2002). The absence of water at the Upper Strawberry Grotto nest sites may make these sites uninhabitable by the black swift.

Foerster and Collins (1990) also identified apparently suitable, but unoccupied, waterfalls within the PQP Lands in San Bernardino National Forest at upper and lower Fuller Mill Creek Falls, Marion Mountain Creek Falls, and Lower Strawberry Grotto. The MSHCP identifies an additional breeding location at Tahquitz Falls, which is outside of the Plan Area, and has no recently recorded nesting activity.

Our dataset includes two records of black swift occurrences in the Prado Basin. Although the occasional midsummer presence of foraging birds during the last 15 years within the Prado Basin suggests the possibility of local breeding, this supposition has not been confirmed. Despite the presence of up to 12 birds within the Prado Basin during the species' spring migration window, no summering birds were detected in 2003 (Pat Tennant and Dharm Pellegrini, Orange County Water District, pers. comms., July 29, 2003).

Effects of the Action

Direct effects

Based on surveys of 50 waterfalls in southern California, Foerster and Collins (1990) identified three black swift nest sites and four potential nest sites in the Plan Area. More extensive surveys of waterfalls in the Plan Area may result in the discovery of additional suitable breeding habitat. Two of the three known black swift breeding sites in the Plan Area, Lawler Falls and Four Falls, occur outside of the MSHCP Conservation Area.

The pools of water below Lawler Falls are accessed by the public (Charles Collins, Department of Biology, CSU, Long Beach, pers. comm., November 19, 2003), but the nest sites behind the falls are not easily reachable. Since banding activities began in the mid 1980's, no loss or

abandonment of a nest from human activities has been documented. Of the seven active nests at Lawler Falls, we do not anticipate the injury or death of adult birds or nestlings from recreational activities.

Four Falls, owned by the Hemet Lake Water District is behind locked gates, and we do not expect any impacts to this site from the recreating public. At both Lawler and Four Falls, we do not have any information that indicates these sites are vulnerable to a construction or water project that would diminish the value of these sites for breeding black swifts.

The breeding site at Upper Strawberry Grotto and the four potential nest sites mentioned above are on PQP Lands within the San Bernardino National Forest. Although the large open rocks around the Upper Strawberry Grotto nesting location appear to be frequented by the public, the nesting sites are not easily accessible, and we do not anticipate direct impacts here from recreational activities. However, we expect that access to all of these sites will be managed and controlled, particularly trail systems (Section 5, Table 5.2), to minimize any potential for direct impacts from recreation.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands, including surveys for the black swift. Cooperative management and monitoring are anticipated on PQP Lands. Surveys for the black swift will be conducted at least every eight years to verify occupancy at a minimum of 75 percent of the known locations. If a decline in the distribution of the black swift is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP. In addition, the black swift will benefit from the General Management Measures described in Section 5 of the MSHCP, which provides for identification and management of specific threats to the species at known nesting locations.

Indirect Effects

The black swift could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These impacts include the indirect effects described in the “General Effects” section of this biological opinion. The black swift will benefit from implementation of the Riparian/Riverine Areas and Vernal Pools policy provided that the policy helps to maintain natural water volumes at nest sites.

Conclusion

We anticipate the proposed action will directly and indirectly affect the black swift as described in the analyses above. Implementation of the avoidance, minimization, and mitigation measures will reduce the impacts to this species. We anticipate that this species will persist at three known nesting locations in the Plan Area and has the potential to expand into four currently unoccupied nesting locations. We anticipate that these areas will be monitored and managed cooperatively to benefit this species.

After reviewing the current status of this species, the environmental baseline for the Plan Area, the effects of the proposed action, and the cumulative effects, it is the Service’s biological

opinion that the action, as proposed, is not likely to jeopardize the continued existence of the black swift. We reached this conclusion based on the inaccessibility of the black swift breeding sites within the Plan Area and because the impacts associated with implementation of the Plan, when viewed in conjunction with protection and management of the MSHCP Conservation Area, are not anticipated to result in a reduction in the numbers, reproduction, or distribution of this species throughout its range.

Amount or Extent of Take

Because the black swift is known to nest in inaccessible locations and because of the wetland and species avoidance and minimization measures incorporated into the Plan, we anticipate that zero (0) black swifts will be taken as a result of the proposed action. This level of take is not likely to result in jeopardy to the black swift.

Black-crowned night heron (*Nycticorax nycticorax*) (Breeding Rookeries)

Status of the Species

Listing Status

The black-crowned night heron is not listed under the Federal Endangered Species Act or by the State of California.

Species Description

The black-crowned night heron is a medium-sized, stocky heron with a comparatively short neck and legs. The body length averages 58 to 72 centimeters, with the females slightly smaller than the males. The adult has distinctive coloring, with black cap, upper back and scapulars; gray wings, rump and tail; and white to pale gray underparts. The bill is stout and black, and the eyes are red (Davis 1993).

Habitat Affinities

Black-crowned night herons occur, during breeding and wintering periods, in many types of wetland areas including swamps, streams, rivers, margins of pools, ponds, lakes, lagoons, tidal mudflats, fresh, brackish, and salt water ecosystems and even use man-made ditches, canals, reservoirs, and wet agricultural fields (Davis 1993). They prefer shallow, weedy pond margins, creeks, and marshes for foraging (Davis 1993). In inland areas, most colonies are associated with large wetlands. These wetland areas, if they rely on rainfall, may have varying water levels. Therefore, black-crowned night-herons may fluctuate in their usage of such inland areas (Davis 1993). They nest and roost in dense-foliaged trees, not always near water, and in dense, fresh or brackish emergent wetlands (Grinnell and Miller 1944). They use a broad spectrum of habitat types for nesting, and nest from ground level to 160 feet in height (Palmer 1962). Most breeding colony sites are on islands, in swamps, or over water, suggesting that site selection may be related to predator avoidance. Black-crowned night herons often rests on piers and pilings (Zeiner *et al.* 1990a).

Life History

The black-crowned night-heron feeds mostly nocturnally and crepuscularly, but sometimes diurnally (Terres 1980; Zeiner *et al.* 1990a). By feeding at night, it avoids competition with day herons using the same habitat (Kushlan 1973). It feeds opportunistically on a wide variety of foods including leeches, earthworms, aquatic and terrestrial insects including moths, prawns and crayfish, mussels, squid, freshwater and marine fish, amphibians, lizards, snakes, rodents, birds, eggs, carrion, plant materials, and garbage (Bent 1926; Kushlan 1978). It usually hunts solitarily in shallow water, waiting motionlessly or, less commonly, stalking its prey slowly (Kushlan 1976b). Sometimes it vibrates its bill to lure or flush prey. Adults typically defend their feeding territory.

The black-crowned night-heron is gregarious during all seasons. It is a monogamous, colonial nester that may nest in the same tree with most North American day herons and several species of ibises. It constructs a nest, usually a platform of sticks, from available trees or vegetation. The breeding season is variable depending on geographic location and commences earlier in southern latitudes such as Florida. In northeastern California, Cogswell (1977) reported the breeding season for black-crowned night herons was April to August. The incubation period is 24-26 days, with a clutch size is 3-4 eggs, sometimes five eggs. The semi-altricial, downy young are tended by both parents. They fly first at six weeks but are not independent until some time later. A few breed at 1 year, but most do not breed until 2-3 years of age (Palmer 1962; Harrison 1978). Many year-old black-crowned night herons return to the vicinity of their natal colony, but many are also widely dispersed and can end up thousands of miles from the natal area (Davis 1993). Mortality rates are 61 percent for first year birds and 31 percent for adults. There are banding recoveries for birds aged 15 years to 21 years (Davis 1993). Observed or suspected predators of young or eggs include raccoons, muskrats, owls, gulls, crows, and jays.

Status and Distribution

Black-crowned night herons breed in the western hemisphere from British Columbia eastward to Nova Scotia southward locally through the Americas to southern South America. The species winters locally from Washington to New England southward throughout the remainder of the breeding range (American Ornithologists' Union 1998). The distribution of the species is generally determined by the suitable wetland habitat for feeding.

Zeiner *et al.* (1990a) summarized the distribution, abundance, and seasonality of the black-crowned night heron within California as a fairly common, year-long resident in lowlands and foothills throughout most of California, including the Salton Sea and Colorado River areas, and very common locally in large nesting colonies. It is a common nesting species on the northeastern plateau of California from April to August. It is uncommon in the northwestern part of the state, and rare in northeastern California in midwinter. It is an uncommon transient and a rare species in winter in the southern deserts, and rare on the Channel Islands. It is seldom seen in the mountains but formerly nested at Big Bear Lake in the San Bernardino Mountains. (Cogswell 1977; McCaskie *et al.* 1979; Garrett and Dunn 1981). The species occurs locally throughout southern California as a year-round resident, except for mountainous and desert areas (Garrett and Dunn 1981).

Black-crowned night heron populations may be declining in some areas, and in other areas they may have stabilized and are slowly increasing from past declines (Erwin 1978; Ogden 1978; Buckley and Buckley 1980). Grinnell and Miller (1944) reported that within the State of California, the black-crowned night-heron was historically abundant but was greatly depleted by the 1940s. Regional habitat destruction and persecution were considered the primary factors in the species' decline (Gallagher 1997). Citizens also reported that the felling of trees, supporting heron nests in Orange County, resulted in a loss of nests and breeding sites. Within western Riverside, historic breeding locations include the San Jacinto Wildlife Area/Mystic Lake area and Lake Elsinore.

Threats

The primary threats to black-crowned night herons are habitat destruction, including drainage of wetlands for development and agriculture, development along coastal marshes, and increased human disturbance/usage of islands (Davis 1993). Contamination (*i.e.*, DDE, PCBs, organochlorines, heavy metals) has been a problem in the past and may still be an issue in areas of the West and South (Custer *et al.* 1983; Ohlendorf and Marois 1990; Fleming *et al.* 1984). Environmental contaminants and disease have contributed to die-offs of herons, as is evidenced by recent massive die-offs of water-associated species at the Salton Sea (Fish and Wildlife Service, Carlsbad, CA unpublished data). Human disturbance of nesting colonies in Quebec resulted in nest abandonment, predation of eggs, and reduced late-season nesting (Tremblay and Ellison 1979).

Conservation Needs

The primary need of this species is to conserve the remaining active rookery in the Prado Basin. In addition, the historic nesting areas, which include the San Jacinto Wildlife Area/Mystic Lake area and Lake Elsinore, need to be preserved. Foraging habitat in close proximity to nesting areas is needed as well.

Due to the significant loss of wetlands in southern California, a primary conservation need of this species is maintaining wetland foraging and nesting habitat. The Service's Chesapeake Bay Field Office (2001) recommends protection of wetland foraging sites within 15-20 kilometers of great blue heron colonies, a species with similar requirements to the black-crowned night heron, to ensure prey availability. In addition, habitat suitability models for the great blue heron suggest that the recommended disturbance-free zone around a potential nest site is 250 meters on land or 150 meters on water (Short and Cooper 1985). Houses, roads, and similar disturbances should not occur within this zone; activities, like dredging, timbering, and mechanized agriculture, should not occur in the exclusion zone from February through August. Lastly, additional surveys are also necessary to determine any other potential nesting locales.

Environmental Baseline

Black-crowned night heron nesting and foraging habitat occurs within all Bioregions of the Plan Area. Known foraging habitat and potential nesting habitat for the black-crowned night heron occurs near large lakes, reservoirs, and drainages that support open water habitat within the Plan

Area. Therefore, the habitat model for the black-crowned night heron was created by capturing the following vegetation types that occur within 9,843 feet (3,000 meters) of open or standing water: meadows and marshes, cismontane alkali marsh, playas and vernal pools, and riparian scrub, woodland, and forest. Based on this analysis, the Plan Area supports approximately 18,541 acres of modeled habitat for the black-crowned night heron. Approximately 8,985 acres (48 percent) of the modeled habitat occur within PQP Lands, including the Prado Basin/Santa Ana River.

A large percentage of the habitats in the Prado Basin are riparian woodland and upland habitats that encompass a variety of land uses that do not provide suitable habitat for black-crowned night herons. In addition, breeding black-crowned night herons do not use open water habitats for foraging unless secure nesting sites are located nearby. Thus, the modeled habitat for the black-crowned night heron likely overestimates the amount of suitable nesting and foraging habitat within the Plan Area.

Potential breeding areas include Lake Mathews, Lake Perris, Lake Skinner, Canyon Lake, Prado Basin/Santa Ana River, San Jacinto Wildlife Area/ Mystic Lake area, Collier Marsh area, and Lake Elsinore. Because focused black-crowned night heron surveys have not been conducted within the Plan Area, the local breeding status of the species remains essentially unknown. Up to 10 pairs of black-crowned night herons, however, have bred within the Prado Basin in recent years (James Pike, Service Volunteer Field Biologist, pers. comm., 1998), and the rookery was active within the Prado Basin during the 2003 breeding season (Dharm Pellegrini, Orange County Water District, pers. comm., July 29, 2003).

Most PQP Lands are currently managed under a multiple use policy, and consequently, populations of black-crowned night herons are subject to a variety of wildlife management activities that could reduce or remove localities from a reserve. For example, alterations in flooding cycles on the San Jacinto Wildlife Area could alter existing wetland habitat. In Prado Basin, maintenance of water polishing ponds and creation of open-water habitat for waterfowl could modify potential breeding habitats. Similarly, the Eastern Municipal Water District has proposed to develop 320 acres of permanent wetlands on the eastern edge of the Mystic Lake area using reclaimed and storm water (EMWD 1994). There is a concern that this development would alter the inundation cycle for wetland and alkali playa habitat already established around the margins of Mystic Lake (Bramlet 1996).

Effects of the Action

Direct effects

The Plan Area includes 18,541 acres of modeled nesting and foraging habitat for the black-crowned night heron. Loss of 3,175 acres (17 percent) of this modeled habitat is anticipated over the 75-year permit term, which encompasses 44 of the 78 (56 percent) black-crowned night heron observations in our dataset. A 17 percent loss of black-crowned night heron habitat distributed over the Plan Area is not anticipated to result in direct mortality of adult birds. However, loss of foraging and nesting habitats to development will cause black-crowned night herons to disperse in search of other wetland habitats and experience increased competition for

the remaining suitable habitat. Birds forced to disperse may also experience decreased fitness due to increased energy and time spent locating new habitats and be subjected to increased rates of predation and injury. If clearing of habitat occurs near the initiation of the breeding season, the search for and establishment of a new breeding site may result in an overall reduction in reproductive output. Thus, loss of breeding and foraging habitat may impact overall population numbers of the black-crowned night herons within the Plan Area over the long term by reducing the number of areas suitable for use as foraging and rookery sites.

Because the only known black-crowned night heron rookery currently exists within PQP Lands, no active nests are anticipated to be harmed as a result of planned development. Because most of the modeled habitat for the black-crowned night heron is in the MSHCP Conservation Area, it is likely that any new rookery sites established within the Plan Area during the permit term will be located within the Conservation Area. The MSHCP did not anticipate take of active black-crowned night heron nests (Section 9, Table 9.2).

The MSHCP will conserve and manage of 6,381 acres (34 percent) of modeled habitat for the black-crowned night heron within Additional Reserve Lands. Another 8,985 acres (48 percent) of modeled habitat will remain in PQP Lands. Many (31 of 78 or 40 percent) of the black-crowned night heron observations in our dataset were recorded in PQP Lands. In total, 83 percent of the modeled habitat for the black-crowned night heron will be conserved or remain in the Plan Area. This modeled habitat includes 44 percent of the black-crowned night heron observations in our dataset.

Six open water habitats and one drainage will support black-crowned night herons within the Plan Area, including Lake Mathews, Diamond Valley Lake, Lake Skinner, Lake Elsinore, Vail Lake, Lake Perris, the Prado Basin/Santa Ana River, and the wetland habitats within Prado Basin/Santa Ana River.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands, including surveys for the black-crowned night heron. Cooperative management and monitoring is anticipated on PQP Lands. Surveys for the black-crowned night heron will be conducted at least every eight years to verify occupancy at a minimum of 75 percent of the known or future-identified locations. If a decline in the distribution of the black-crowned night heron is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP.

Reserve Managers will enhance and/or create additional nesting areas in the Prado Basin/Santa Ana River, Collier Marsh, Lake Skinner, Lake Mathews, San Jacinto Wildlife Area/Mystic Lake, and Vail Lake. Reserve Managers will also identify, protect, and buffer nest sites in the MSHCP Conservation Area. A 100-meter buffer will be established around the existing and future-identified nesting locations in the MSHCP Conservation Area. Reserve Managers will also ensure habitat support functions within the MSHCP Conservation Area by maintaining hydrological processes, specifically seasonal flows in the Santa Ana River (Section 5, Table 5.2).

The MSHCP will conserve known and historic black-crowned night heron breeding locations, link core areas with nearby suitable foraging habitat, and manage breeding colonies within the Conservation Area. The Conservation Area will provide adequate habitat for foraging during nomadic visits to the area and migratory stopovers, as well as foraging during the breeding season. The Conservation Area will be managed to: 1) preserve the quality of wetland associated foraging areas; 2) improve the potential and suitable emergent wetland habitat within the Prado Basin, Santa Ana River, and other major wetland areas; 3) monitor the potential breeding locations; and 4) protect any existing and future documented nest sites by providing buffers around them.

Indirect Effects

The black-crowned night heron could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These impacts include the indirect effects described in the “General Effects” section of this biological opinion. In particular, maintaining the hydrological processes and water quality standards (*e.g.*, controlling sedimentation and other pollutants) of open water and wetland habitats will be important in conserving black-crowned night heron habitat within the MSHCP Conservation Area. Implementation of the Riparian/Riverine Area and Vernal Pools policy and the Urban/Wildlands Interface policy will help minimize the indirect effects of the Covered Activities on foraging and breeding habitat for the black-crowned night heron.

Conclusion

We anticipate the proposed action will directly and indirectly affect the black-crowned night heron as described in the analyses above, including the loss of 17 percent of its modeled habitat in the Plan Area. Implementation of the avoidance, minimization, and mitigation measures will reduce the impacts to this species. We anticipate that this species will persist in the remaining 83 percent of its modeled habitat within both the existing QQP Lands and the Additional Reserve Lands. Together these lands form a system of large, contiguous habitat blocks that are interconnected within the Plan Area. We anticipate that these areas will be monitored and managed cooperatively to benefit this species.

After reviewing the current status of this species, the environmental baseline for the Plan area, the effects of the proposed action, and the cumulative effects, it is the Service’s biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the black-crowned night heron. We reached this conclusion based on the widespread distribution and nomadic nature of the black-crowned night heron within the Plan Area and because the impacts associated with loss of this species’ habitat, when viewed in conjunction with protection and management of the MSHCP Conservation Area, are not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Amount or Extent of Take

The loss of up to 3,175 acres of nesting and foraging habitat for the black-crowned night heron in the Plan Area will not result in direct mortality of adult birds; however, for some individuals, reproduction may be impaired or life expectancy shortened. Due to the difficulty in quantifying the number of individual black-crowned night herons that will be harmed over the 75-year permit term, the Service is quantifying the take as the number of acres of modeled habitat that will be impacted in the Plan Area as a result of the proposed action. We anticipate that up to 3,175 acres of nesting and foraging habitat within the Plan Area will become unsuitable for the black-crowned night heron as a result of the proposed action. Take will be in the form of harm and injury. This level of take is not likely to result in jeopardy to the black-crowned night heron.

Burrowing owl (*Speotyto cunicularia*)

Status of the Species

Listing Status

The burrowing owl is a Fish and Wildlife Service migratory non-game bird of management concern and is listed on the Federal Birds of Conservation Concern list (2002). It is considered a California Species of Special Concern by the California Department of Fish. It is not listed under the Federal Endangered Species Act.

Species Description

The burrowing owl is a small, ground-dwelling owl. It has been variously placed in the monotypic genus *Speotyto* or in *Athene*, where it has three congeners (Haug *et al.* 1993). Comparison with other karyotypes in the literature suggests that the burrowing owl should be in a separate genus, *Speotyto*, as has been done for a number of years, although it is frequently still referred to as *Athene* (Haug *et al.* 1993).

Habitat Affinities

The burrowing owl occurs in shortgrass prairies, grasslands, lowland scrub, agricultural lands (particularly rangelands), prairies, coastal dunes, desert floors, and some artificial, open areas as a year-long resident (Haug *et al.* 1993). They may also occur in forb and open shrub stages of pinyon-juniper and ponderosa pine habitats (Zeiner *et al.* 1990a). They require large, sparsely vegetated, open expanses on gently rolling or level terrain with an abundance of active small mammal or desert tortoise burrows for roosting and nesting cover. They may occasionally also dig their own burrows in soft, friable soil and may also use pipes, culverts, and nest boxes where burrows are scarce (Robertson 1929).

Life History

The burrowing owl is semi-colonial and probably the most gregarious owl in North America. The species is primarily diurnal with crepuscular hunting habits (Thomsen 1971). Burrowing

owls perch in different locations to thermoregulate, perching in open sunlight in early morning, and moving to shade or to their burrow when hot (Coulombe 1971). The birds are relatively opportunistic foragers (Haug *et al.* 1993) and feed on invertebrates, such as beetles, and small mammals, such as *Peromyscus* spp. and *Microtus* spp. (Thomsen 1971; Marti 1974). They may also feed on reptiles, birds, and carrion. During the breeding season, there are significant declines in the percentage of vertebrate prey in the diet and increases in invertebrate prey (Haug *et al.* 1993). Burrowing owls hunt by using short flights, running along the ground, hovering, or by using an elevated perch from where prey is spotted.

Breeding occurs from March through August, with a peak in April and May. The burrowing owl usually nests in an old burrow of a ground squirrel, or other small mammal, or may dig its own burrow in soft soil. The clutch size is 6 to 11 eggs, with an average of 7 to 9 eggs. Young emerge from the burrow at about two weeks, and they fly by about four weeks (Zarn 1974). Martin (1973) reported burrowing owls to have a mean reproductive success of 4.9 young per pair. In southern California, the apparent survival rates are 30 percent for juveniles and 81 percent for adults (Thomsen 1971). One banded burrowing owl survived to 8 years 8 months of age (Kennard 1975). Their home range varies from 0.1 to 4 acres (mean is 2 acres) with an average distance between burrows of 133 meters (Thomsen 1971; Martin 1973). Territory size is directly proportional to habitat and burrow availability.

Diurnal activities are often restricted to within 250 meters of the nest burrow (Haug *et al.* 1993). However, nocturnal foraging activities extended out much farther and average home range sizes have been measured at 596 acres (2.41 square kilometers) in an agricultural area in Saskatchewan (Haug and Oliphant 1990). However, another study found that burrowing owl home ranges averaged 20 acres on North Island NAS in Coronado (Fish and Wildlife Service, unpublished data). Home ranges in this study were directly influenced by the placement of lights around the facility that the owls used to forage for insects. California Department of Fish and Game recommends the avoidance of a minimum of 6.5 acres of foraging habitat surrounding each occupied burrow (CDFG 1995).

Predators of burrowing owls include prairie falcons, red-tailed hawks, Swainson's hawks, ferruginous hawks, northern harriers, golden eagles, foxes, coyotes, and domestic dogs and cats (Martin 1973). Fleas, lice, and mites are common ectoparasites.

Status and Distribution

The burrowing owl breeds from southern interior British Columbia (nearly extirpated), southern Alberta, southern Saskatchewan (extirpated from portion of province), and southern Manitoba (extirpated from portion of province), south through eastern Washington, central Oregon, and California to Baja California, east to western Minnesota, northwestern Iowa, eastern Nebraska, central Kansas, Oklahoma, eastern Texas, and Louisiana, and south to central Mexico. The winter range is much the same as the breeding range, except that most burrowing owls apparently vacate the northern areas of the Great Plains and Great Basin (Haug *et al.* 1993). The burrowing owl winters south regularly to El Salvador (American Ornithologists' Union 1983).

The burrowing owl is present on the larger offshore islands and is found at elevations as high as 1,600 meters in Lassen County. In California, burrowing owls are restricted to the central valley extending from Redding south to the Grapevine, east through the Mojave Desert and west to San Jose, the San Francisco Bay area, the outer coastal foothills area which extends from Monterey south to San Diego, and the Sonoran desert (Grinnell and Miller 1944). It is a resident in the open areas of the lowlands over much of southern California (Garrett and Dunn 1981).

The burrowing owl was formerly common in appropriate habitats throughout California. Population numbers have markedly declined in recent decades (Zeiner *et al.* 1990a). The number of burrowing owl breeding pairs in central western and southern California has drastically declined in the last 50 years (DeSante and Ruhlen 1995). Statewide surveys during the period from 1986 to 1991 resulted in the discovery of up to a 52 percent decrease in population groups and up to a 27 percent decrease in the number of breeding pairs of owls (DeSante *et al.* 1997, Klute *et al.* 2003). The species appears to be seriously threatened with extirpation from central western and southern California because of the extent and intensity of the development (DeSante and Ruhlen 1995). Christmas Bird Count data in California from 1959-1988 (Klute *et al.* 2003) reveal a -1.2 mean percent change in population size per year ($p < 0.05$).

Outside of the Plan Area, only a handful of small populations still persist: one in Orange County and possibly two in San Diego County, while coastal Los Angeles County has seen the species extirpated during the breeding season (Unitt 1984, Garrett and Dunn 1981, Hamilton and Willick 1996). Within these three counties, the total number of breeding pairs likely does not exceed 25 (Hamilton and Willick 1996; Unitt 1984).

Threats

The primary threats to burrowing owls include the loss of natural habitat due to urban development and agriculture and exposure to pesticides, such as Carbofuran (Hjertaas *et al.* 1995; James and Fox 1987, cited in Haug *et al.* 1993). Pesticides may reduce the availability of their primary prey and may have secondary adverse effects through contamination. Carbofuran has been demonstrated to have negative impacts on the species and some populations maintain, at least periodically, substantial body burdens of persistent pesticides that may inhibit reproduction (Klute *et al.* 2003). Other threats include the loss of burrowing mammal colonies (due to rodenticides or other means), the crushing of owl burrows by heavy equipment and ground maintenance machinery, collisions with vehicles (Haug *et al.* 1993), and shooting. Owl survival can also be adversely affected by disturbance from humans and pets (CDFG 1995, Thomsen 1971).

Conservation Needs

Given the apparent rarity of the species in the southern California, conservation of this species depends on the protection and management of extant burrowing owl colonies or populations within the Plan Area. Prudent management and conservation measures should enable, or drive, the increased growth of individual colonies by providing for additional or enhanced foraging or nesting habitat to maximize reproductive success and facilitate the dispersal of individual birds.

As this species appears to have evolved as a colonial species in association with burrowing mammal communities, protection of these communities is essential. Colonies should also be buffered from human disturbance as burrowing owls are sensitive to human impacts. Active management, including the construction of artificial burrows, and the preservation of significant foraging areas, is also necessary for the burrowing owl to persist long-term in the urban landscapes of southern California.

Large publicly managed lands need to be evaluated for their ability to support burrowing owl populations in order to assess the burrowing owl's viability in California (Klute *et al.* 2003). Per a survey conducted by DeSante *et al.* (1997, cited in Klute *et al.* 2003), approximately 91 percent of the burrowing owls in California occur on private lands. Focused surveys should be conducted during the breeding season (April - July) and include provisions to document the relative breeding success of those populations detected.

Environmental Baseline

Focused surveys for the burrowing owl have not been conducted within the Plan Area. However, recent burrowing owl nesting localities include the area east of I-215 on March Air Reserve Base, the Perris Reservoir area, east of Skinner Reservoir, the upper Menifee Valley, the Mystic Lake/San Jacinto Wildlife area, west of San Jacinto reservoir, the Lake Skinner area, the area around Diamond Valley Lake, along Santa Gertrudis Creek, the playa west of Hemet, the Lakeview Mountains, the Lake Mathews/Estelle Mountain Reserve, Sycamore Canyon Regional Park, and the Prado Basin area (U .S. Fish and Wildlife Service unpublished data, California Science and Engineering Associates 1996). A minimum of six pairs of burrowing owls with 20 young were observed within the Prado/Chino Basins during the 2003 breeding season (Bonnie Nash, Orange County Water District, pers. comm., 2003). These birds are likely part of the larger, increasingly important, population of burrowing owls within northwestern Riverside County and adjacent southwestern San Bernardino County.

Given the precipitous decline of this species in cismontane southern California (Grinnell and Miller 1944; Sexton and Hunt 1979; Garrett and Dunn 1981; Hamilton and Willick 1996), it is likely that preferred habitat patches (*e.g.*, dry, level grasslands and open areas with suitable nesting substrates) within a large majority of the Plan Area do not accommodate the species in the numbers that it did in past years (Grinnell and Miller 1944).

Within the Plan Area, modeled habitat for the burrowing owl includes grassland, agricultural land (field cropland), and playas/vernal pools within the Riverside Lowlands Bioregion. Based on this analysis, the Plan Area supports approximately 210,423 acres of modeled habitat for the burrowing owl. Approximately 25,611 acres (12 percent) of modeled habitat occur within PQP Lands. Due to the habitat preferences of this species for dry, level grasslands and open areas with suitable nesting substrates, the modeled habitat likely overestimates the amount of suitable nesting and foraging habitat within the Plan Area. There are a total of 98 observations of burrowing owls within the Plan Area. Of those 98 observations, 12 records (12 percent) are within PQP Lands.

Effects of the Action

Direct Effects

The Plan Area includes 210,423 acres of modeled habitat for the burrowing owl. Up to approximately 164,910 acres (78 percent) of this modeled habitat could be impacted over the 75-year permit term; however, implementation of the avoidance and minimization measures outlined below will significantly reduce the amount of impact to suitable and occupied habitat.

The burrowing owl is considered an Additional Survey Needs and Procedures Species. Until such time that the Additional Reserve Lands are assembled and conservation objectives for this species are met, surveys for the burrowing owl will be conducted according to accepted protocol as part of the project review process for public and private projects where suitable habitat is present for the species within the survey area for the burrowing owl (Burrowing Owl Survey Area, MSHCP Section 6, Figure 6-4). All modeled habitat for this species occurs within the Burrowing Owl Survey Area. Within the Burrowing Owl Survey Areas, active nests will not be taken. Populations detected as a result of survey efforts within the Survey Area will be avoided according to the procedures outlined in the Additional Survey Needs and Procedures (Section 6.3.2 of the Plan; *i.e.*, 90 percent of portions of property with long-term conservation value will be avoided until the species conservation objectives are met). For those locations found to contain large numbers of individuals or otherwise determined to be important to the overall conservation of the species, the Plan allows flexibility to acquire these locations for inclusion into the Additional Reserve Lands (Section 6, pp. 6-70).

If burrowing owls are detected on a project site within the Burrowing Owl Survey Area and the site is within the Criteria Area, at least 90 percent of the area with long-term conservation value will be included in the MSHCP Conservation Area. If burrowing owls are detected on a project site within the Burrowing Owl Survey Area and the site is outside the Criteria Area, avoidance and minimization measures will be implemented as follows.

If the site contains or is part of an area that supports less than 35 acres of suitable burrowing owl habitat or the survey reveals that the site and the surrounding area supports fewer than three pairs of burrowing owls, then the onsite burrowing owls will be passively or actively relocated following accepted protocols. However, if the site (including adjacent areas) supports three or more pairs of burrowing owls, supports 35 acres of suitable burrowing owl habitat, and is non-contiguous with MSHCP Conservation Area lands, at least 90 percent of the area with long-term conservation value and burrowing owl pairs will be conserved onsite. Translocation sites for the burrowing owl will be created in the MSHCP Conservation Area for the establishment of new colonies.

Burrowing owl relocation is still very experimental and published results have been mixed (*e.g.*, Smith and Belthoff 2001). Burrowing owls have been shown to use artificial burrows successfully (Belthoff and Smith 2003), especially where populations are already located, but the establishment of new populations may be more difficult. The successful relocation of individuals into the MSHCP Conservation Area will likely take time and experimentation before it is successful. Consequently, we anticipate that not all burrowing owls will survive the

relocation efforts and that occupied habitat will be lost in those areas that support fewer than three pairs of burrowing owls and less than 35 acres of suitable habitat.

Once the species-specific conservation objectives for the burrowing owl have been met, the survey and conservation requirements above will be eliminated. However, pre-construction presence/absence surveys for the burrowing owl within the Burrowing Owl Survey Area where suitable burrowing habitat is present will be required for all Covered Activities through the life of the permit. If these surveys document burrowing owl presence, take of nests will not be allowed, but passive relocation will occur when owls are present outside the nesting season.

Birds forced to disperse due to passive relocation efforts (use of one-way doors and collapse of burrows) may experience decreased fitness due to increased energy and time spent locating new habitats and competition for the remaining suitable habitat. Displaced birds that are unable to locate suitable habitat will experience increased rates of predation or otherwise die or be injured due to loss of their foraging, breeding, and sheltering habitat. Thus, despite the measures described above, the proposed action will result in the loss of habitat for the burrowing owl and likely result in mortality of adult birds due to relocation efforts and the loss of their foraging, breeding, and sheltering habitats.

To offset the loss of burrowing owl habitat within the Plan Area, the MSHCP will conserve and manage 19,902 acres (9 percent) of modeled habitat for this species within the Additional Reserve Lands. An additional 25,611 acres (12 percent) of modeled habitat for the burrowing owl will remain in PQP Lands. In total, 45,513 acres (22 percent) of the modeled habitat for the burrowing owl will be conserved within the MSHCP Conservation Area. Additional occupied habitat areas both within and outside of the Criteria Areas but inside the Burrowing Owl Survey Area will also be conserved according to the proposed survey requirements. Of the 98 observations of burrowing owls in the Plan Area, a total of 27 observations (28 percent) are within the MSHCP Conservation Area (15 within the Additional Reserve Lands and 12 within PQP Lands).

The MSHCP Conservation Area contains at least five Core Areas and interconnecting linkages for the burrowing owl. The MSHCP Conservation Area includes the known nesting locations of the burrowing owl at Lake Perris, Mystic Lake/San Jacinto Wildlife area, Lake Skinner area, the area around Diamond Valley Lake, playa west of Hemet, Lakeview Mountains, Lake Mathews/Estelle Mountain Reserve and Sycamore Canyon Regional Park. As outlined in species-specific conservation Objective 2, the Core Areas should support a combined total breeding population of approximately 120 burrowing owls with no fewer than five pairs in any one Core Area.

Indirect Effects

The burrowing owl could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These impacts include the indirect effects described in the “General Effects” section of this biological opinion. The burrowing owl is vulnerable to mortality due to traffic on the existing roads within the MSHCP Conservation Area, as well as any future roadways planned in or adjacent to this area. The use of pesticides within or adjacent

to the MSHCP Conservation Area may result in adverse indirect effects to owls foraging in those fields. In addition, burrowing owl nest locations adjacent to residential areas within the Plan Area may experience losses in productivity due to human disturbance and activities. Implementation of the Urban/Wildlands Interface policy will help minimize the indirect effects of the Covered Activities on the burrowing owl.

Conclusion

We anticipate the proposed action will directly and indirectly affect the burrowing owl as described in the analyses above including the loss of up to 78 percent of its modeled habitat in the Plan Area. Despite the potential loss of significant areas of modeled foraging and breeding habitat, we anticipate that the burrowing owl will be able to persist within the Plan Area in the remaining 22 percent of its modeled habitat and in other areas both within and outside the Criteria Area that are avoided as a result of the required survey and conservation requirements. The MSHCP Conservation Area forms a system of large, contiguous habitat blocks that are interconnected within the Plan Area. We anticipate that the MSHCP Conservation Area will be monitored and managed cooperatively to benefit the burrowing owl.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the burrowing owl. We reached this conclusion because implementation of the survey and conservation requirements, including the species-specific conservation objectives, will provide for persistence of the burrowing owl and its habitat within the Plan Area. Thus, impacts to this species and its modeled habitat, when viewed in conjunction with the protection and management of the MSHCP Conservation Area, are not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Amount or Extent of Take

Because of the large area covered and because the chances are low of discovering a dead or injured burrowing owl as a direct result of habitat loss or relocation efforts, it will be difficult to quantify the number of birds that will be impacted as a result of the proposed action over the 75-year permit term. Therefore, the Service is quantifying the take as the number of acres of modeled habitat that will be impacted in the Plan Area as a result of the proposed action. We anticipate that up to 164,910 acres of modeled habitat will become unsuitable for the burrowing owl as a result of the proposed action. The trapping and/or capturing and handling of burrowing owls in association with relocation efforts is anticipated and authorized by this take statement.

Take will be in the form of harm, death, and injury. This level of take is not likely to result in jeopardy to the burrowing owl.

Cactus wren (*Campylorhynchus brunneicapillus*)Status of the Species*Listing Status*

The coastal cactus wren is listed on the Federal Birds of Conservation Concern (2002). It is considered a California Species of Special Concern by the California Department of Fish and Game. It is not listed under the Federal Endangered Species Act.

Species Description

The coastal cactus wren is one of eight subspecies of cactus wren (*C. brunneicapillus*). The cactus wren is a very large, desert dwelling wren. The upper parts of the bird are brownish, and it has a distinct supercilium, white streaked back, and its wings and tail are heavily barred with black and white. *C. b. couesi* may be difficult to distinguish between the other eight subspecies.

Taxonomic affiliation of the populations in California have been under debate (Bancroft 1923, Rea and Weaver 1990). Both a coastal and interior population exist in the state, historically connected through the San Geronio Pass in Riverside County (Rea and Weaver 1990). The coastal range of *C. b. couesi* is now geographically disjunct from interior desert populations as a result of urbanization of the corridor along the San Geronio Pass (Rea and Weaver 1990). The coastal population is also unique in that it occurs exclusively within the coastal sage scrub plant community. The Checklist of North American Birds (AOU 1998) currently recognizes all California populations of the cactus wren as *Campylorhynchus brunneicapillus couesi*, inclusive of both the coastal and interior segments.

Habitat Affinities

The coastal cactus wren is an obligate, nonmigratory resident of the coastal sage scrub plant community (as defined by Westman 1983 and O'Leary 1990). The cactus wren, in general, frequents deserts and other arid terrain with thickets, patches, or tracts of larger, branching cacti, stiff-twigged, thorny shrubs, and small trees (Grinnell and Miller 1944). It is closely associated with three species of cacti and occurs almost exclusively in thickets of cholla and prickly pear dominated stands of coastal sage scrub below 457 meters in elevation on mesas and lower slopes of the coast ranges (Proudfoot *et al.* 2000). Although, the cactus wren lives over a wide range from Texas to the Pacific ocean, it is limited to regions with thorny shrubs and trees that offer nesting sites (Terres 1980).

Characteristic shrubs associated with habitat occupied by the cactus wren and within the coastal sage scrub community include California buckwheat, coastal sagebrush, several sages and scattered shrubs approaching tree-size, such as laurel sumac, and lemonadeberry (Garrett and Dunn 1981; Unitt 1984; Rea and Weaver 1990). Thickets of xeric vegetation may provide cover and thermal relief.

Life History

The cactus wren is a year-long, diurnally active species. The cactus wren is primarily insectivorous and forages on the ground and in low vegetation for insects and other small invertebrates, as well as, cactus fruits and other fruits, seeds and nectar (Bent 1968b; Anderson and Anderson 1973). Foraging behavior is often regulated by heat stress (Ricklefs and Hainsworth 1968), necessitating retreat from exposed sites into shade of shrubs and trees. The cactus wren generally forages on the ground, turning over fallen leaves and other debris in search of insects. It also searches bushes and probes tree bark housing insects. Foliage-gleaning may increase with insect abundance and habitat complexity (Proudfoot *et al.* 2000).

The cactus wren usually nests and roosts in cactus. The nest is usually built in cholla or other large, branching cactus, in yucca, or in a stiff-twigged, thorny shrub or small tree. The nest is an intricate, woven cylinder, usually placed horizontally 1.2 to 1.5 meters (4 to 5 feet) above the ground (Anderson and Anderson 1957). It breeds from March into June. The clutch size is 4-5 eggs, with a range of 3-7 eggs (Harrison 1978). Two broods per season is common. Incubation is 15-18 days, by the female only (Anderson and Anderson 1960). The altricial nestlings fledge at 17-23 days, with an average of 21 (Hensley 1959; Anderson and Anderson 1960). The young may return to roost in the nest after fledging. The young become independent at about one month after leaving the nest; sometimes the young help feed the young of later broods (Harrison 1978).

The species is generally considered to have low dispersal capabilities, but there is little information available (Ogden Environmental and Energy Services 1993b). In Arizona, of 55 nestlings banded, 41 dispersed from the natal site by 45 days post-fledging. Males remain near the natal site, usually dispersing only as far as parental territorial behavior dictate (Proudfoot *et al.* 2000). The home range may be the same as the territory (Anderson and Anderson 1963). In Arizona, Anderson and Anderson (1963) reported an average territory size of 1.9 hectares (4.8 acres), varying from 1.2-2.8 hectares (2.9-6.9 acres). The cactus wren may maintain its territory year-round (Anderson and Anderson 1963) as it is not migratory (Zeiner *et al.* 1990a). Anderson and Anderson (1973) report an overall adult survival rate of 50.6 percent during a six year study. One banded adult was retrapped when it was four years old (Terres 1980). Domestic cats, roadrunners, snakes, and loggerhead shrikes prey on adults and nestlings (Anderson and Anderson 1973).

Status and Distribution

The cactus wren is a resident species from southern California south to southern Baja California, southern Nevada, southwestern Utah, western and south central Arizona, southern New Mexico, and central Texas south to Mexico (Terres 1980). Zeiner *et al.* (1990a) describe the distribution, abundance, and seasonality of the cactus wren in California as a locally common resident in the Mojave and Colorado deserts, north from the Mexican boundary to Inyo and Kern counties. The coastal population is found in arid parts of westward-draining slopes from San Diego County northwest to Ventura County. It frequents desert succulent shrub, Joshua tree, and desert wash habitats. Historically, cactus wrens within coastal areas were found on the coastal slopes and lowlands of southern California in arid and semiarid regions with abundant cacti (Grinnell 1898;

Grinnell and Miller 1944; Unitt 1984). As early as 1944, authorities noted that loss of habitat had greatly reduced the historic range of this species (Grinnell and Miller 1944).

Threats

The primary threats to the cactus wren are habitat loss and fragmentation from urbanization and agricultural development. An increasing pattern of habitat fragmentation and isolation of populations decreases dispersal ability and inter-population connections of the cactus wren and reduces the overall genetic viability of the species (Ogden Environmental and Energy Services 1993b). Cactus wrens that are confined to isolated patches of habitat in urbanizing areas are subject to increased levels of predation pressures as reductions in the populations of keystone predators are replaced by higher population levels of smaller predators and domestic animals (*e.g.*, Crooks and Soule 1999). As a result of competition from invasive plant competition, grazing, weather patterns, and other natural and human-influenced disturbances, the reestablishment of cactus patches essential to this species may take many years.

This species is especially vulnerable to stochastic events, especially wildland fires. Because of its narrow habitat requirements, sedentary behavior, and low dispersal characteristics, cactus wrens are subject to loss by fires and, if they disperse, may not find suitable habitat to survive. Intense fires may actually kill cactus plants and eliminate habitat for the cactus wren. Controlled studies in adjacent Orange County indicate that a formerly large population of cactus wrens in the San Joaquin Hills is recovering very slowly from the effects of the 1993 Laguna Beach fire, which “. . . consumed cactus patches across large swaths of the San Joaquin Hills . . .” (Hamilton 2003).

Conservation Needs

Conservation should be focused on all remaining populations. Any and all populations subsequently discovered should be evaluated for their potential to sustain and recover the species within the Plan Area. The preservation of habitats and the implementation of measures to ensure the maintenance and ultimate expansion of component cactus patches would appear to be a high priority at all managed sites. Minnich and Dezzani (1998) documented widespread type-conversion of coastal sage scrub stands into grasslands dominated by exotic annuals. All sites should be managed to control the spread of exotic species.

Maintaining cactus wren habitat within the MSHCP Conservation Area will necessitate fire management strategies that reduce the frequency of fires within coastal sage scrub habitats. Minnich and Dezzani’s study revealed that a significant area where coastal sage scrub is still persisting is the gabbro-based soils of the southern part of the Riverside County in the vicinity of Aguanga. This area corresponds to concentrations of cactus wren locations in our database and is an area that contains large amounts of Additional Reserve Lands. The future of cactus wrens in the Plan Area may depend on management strategies focused on conserving coastal sage scrub communities with cactus patches in the zone of habitat from Aguanga in the south, up through Wilson Valley, and north through the Badlands.

Environmental Baseline

About 100 to 110 pairs of the coastal cactus wren are estimated to occur in Riverside County (Robert McKernan, San Bernardino Natural History Museum, San Bernardino California, pers. comm., 1998). Within the Plan Area, the cactus wren is found along the eastern flank of the Santa Ana Mountains from the vicinity of Corona to Alberhill and Lake Mathews. The species additionally occurs from the City of Riverside east to the Box Springs Mountains and the Badlands, and south along the western flank of the San Jacinto Mountains to the City of San Jacinto. As stated in the Plan, more populations potentially occur within the Badlands, Box Springs Mountains, Lake Mathews-Estelle Mountain Reserve, Motte-Rimrock Reserve, Lake Valley, Aguanga, Anza, and Temecula areas.

Our model for the cactus wren includes desert scrub, Riversidean alluvial fan sage scrub, and coastal sage scrub within the Riverside Lowlands and San Jacinto Foothills bioregions of the Plan Area. Based on this model, approximately 136,018 acres of potential habitat for the cactus wren occur within the Plan Area. The model does not take into account specific locations of cactus patches where cactus wrens would be localized; therefore, its utility in assessing the effects of the Plan is limited. Of this modeled habitat, 27,333 acres (20 percent) occur within PQP Lands. Of the 80 total records for the cactus wren in our dataset for the Plan Area, six (8 percent) occur within PQP Lands.

Effects of the Action

Direct Effects

The Plan Area includes 136,018 acres of modeled nesting and foraging habitat for the cactus wren. The cactus wren will be subject to impacts associated with development and other proposed Covered Activities over the 75-year permit term within 62,679 acres (46 percent) of this modeled habitat. Approximately 48 (60 percent) out of 80 point locations will be outside of the MSHCP Conservation Area, including 20 of 34 high precision point locations. It is anticipated that most of the breeding and foraging habitat for cactus wren in these areas will be lost as a result of development. Some birds may be able to survive in adjacent rural mountainous areas where development impacts are anticipated to occur at a slower rate and at lower densities. Approximately 20,069 acres (32 percent) of the non-conserved modeled habitat for the cactus wren are designated as rural/mountainous land. However, cactus wrens have low dispersal capabilities and displaced birds that are unable to locate suitable habitat will experience increased rates of predation or otherwise die or be injured due to loss of their foraging, breeding, and sheltering habitat.

To offset the loss of cactus wren habitat, the MSHCP will conserve and manage 46,006 acres (34 percent) of modeled habitat for the species within the Additional Reserve Lands. Another 27,333 acres (20 percent) of modeled habitat for the cactus wren will remain within PQP Lands. In total, approximately 73,339 acres (54 percent) of the modeled habitat will be conserved or remain in open space. Thirty-two out of 80 (40 percent) of the known occurrences for the cactus wren in the Plan Area occur in the MSHCP Conservation Area, including 14 out of 34 (41 percent) high precision point localities. However, it appears that 10 of these high precision point

localities are located in urbanized areas and may already be lost. Thus, we estimate that 14 out of 24 (58 percent) of high precision point localities will be conserved.

The Plan identifies 11 of 12 Core Areas and interconnecting linkages for the cactus wren to be included in the MSHCP Conservation Area, including Chino Hills, Badlands, Box Spring Mountains, Lake Mathews-Estelle Mountain area, Alberhill, Motte-Rimrock area, Lake Perris/Bernasconi Hills, Lake Skinner, Vail Lake, Wilson Valley, and Aguanga. The twelve core areas identified in the plan are difficult to identify given the minimal survey data that is available. There are few areas that support a grouping of more than a few mapped records of cactus wrens. The two areas that support the largest clusters (seven points each) are the Badlands and the Aguanga area. Both of these areas are well conserved by the Plan, consisting of large acreages of preserved habitat connected to adjacent preserve areas by wide linkages. A third area with a cluster of four points is the Wilson Valley area south of Hemet. These three areas together account for a significant number of the mapped cactus wren locations in the available databases, and are well conserved and interconnected with one another. The Chino Hills Core Area, which consists of only 270 acres of habitat and no mapped cactus wren locations, does not appear to be substantiated.

Each Reserve Manager responsible for a Core Area identified for the cactus wren will evaluate the condition of cactus patches within the Core Area and maintain a program to enhance and/or create cactus patches, the preferred micro habitat. Within the Core Area, the Reserve Managers will keep the areal extent of cactus patches within 10 percent of that present at baseline surveys. In addition, Reserve Managers will maintain occupancy of at least 80 percent of the cactus wren habitat determined to be occupied using existing information and baseline surveys. Particular management emphasis will be given to fire and fire suppression activities, grazing, farming, competition from non-native species, and habitat fragmentation and transition.

Management actions to benefit cactus wrens or other Covered Species (*e.g.*, prescribed burning, exotic vegetation removal, habitat manipulation) may result in impacts to a small number of individual cactus wrens. It is anticipated that any impacts to cactus wrens from management actions will be minimized by adherence to appropriate survey protocols and other guidelines described in Section 7.4 of the MSHCP.

Indirect Effects

The cactus wren could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These include the indirect effects described in the “General Effects” section of this biological opinion. In southern California, effects of fragmentation have been shown to decrease the number of resident bird species, decrease the diversity of small rodents, and decrease the diversity and cover of native plant species (Soulé *et al.* 1988; Bolger *et al.* 1991; Alberts *et al.* 1993; Bolger *et al.* 1997b). These alterations to the species assemblage, especially the reduction in native plant species diversity and cover, will decrease the quality of the habitat for cactus wrens over time. This will occur as the arthropod abundance and diversity declines in correlation with the decline in their native plant hosts, decreasing the food supply of the insectivorous cactus wrens.

The fragmentation of natural habitats in the Plan Area will also negatively affect the quality of remaining habitat by facilitating the invasion of natural communities by exotic plant and animal species. Invasive, alien plants may include weedy annual plants such as ripgut grass and filaree. These plants alter the species composition and structure of the habitat, which may make it less suitable to the cactus wren.

Invasive ant species such as the Argentine ant are known to be abundant in residential areas and invade habitat edges (Suarez *et al.* 1998). This species alters the native arthropod community, significantly reducing their diversity and abundance (Bolger *et al.* 2000). Any reduction in arthropod numbers related to invasion by Argentine ants as a result of the project is likely to reduce food resources for arthropod predators, including the cactus wren.

The increased percentage of residential housing adjacent to Core Areas poses the risk that human caused fires may increase in frequency. It will be an important management strategy to identify and minimize this risk through appropriate fire management practices.

Conclusion

We anticipate the proposed action will directly and indirectly affect the cactus wren as described in the analyses above, including the loss of 46 percent of its modeled habitat in the Plan Area. Implementation of the avoidance, minimization, and mitigation measures identified in the Plan will reduce the impacts to this species. We anticipate that this species will persist in the remaining 54 percent of its modeled habitat within both the existing PQP Lands and the Additional Reserve Lands. In particular, the Additional Reserve Lands proposed for the Aguanga Area, Wilson Valley, and Badlands will form an interconnected series of core populations that will persist with appropriate management. Together these lands form a system of large habitat blocks within the Plan Area. We anticipate that these lands will be monitored and managed cooperatively to benefit this species.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the cactus wren. We reached this conclusion because the impacts to cactus wren reproduction and loss of this species' habitat, when viewed in conjunction with protection and management of the MSHCP Conservation Area, are not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Amount or Extent of Take

Because of the large area covered, it will be difficult to quantify the number of cactus wrens that will be taken as a result of the proposed action over the 75-year permit term. Therefore, the Service is quantifying incidental take as the number of acres of modeled habitat that will be impacted in the Plan Area as a result of the proposed action. We anticipate that up to 62,679 acres of modeled habitat within the Plan Area will become unsuitable for the cactus wren as a result of the proposed action. Additionally, a small, but undeterminable, number of cactus wrens are anticipated to be taken as a result of management actions.

Take will be in the form of harm, death, and injury. This level of take is not likely to result in jeopardy to the cactus wren.

California horned lark (*Eremophila alpestris actia*)Status of the Species*Listing Status*

The California horned lark is considered a Species of Special Concern by the California Department of Fish and Game and is not a federally listed species.

Species Description

The California horned lark is one of 21 subspecies of the horned lark (*Eremophila alpestris*) (AOU 1957). The horned lark is a small, ground-dwelling bird with occipital feather tufts that look like horns. It is the only member of the family Alaudidae that is native to North America.

Habitat Affinities

The horned lark occurs in open, generally barren habitats, tends to avoid forested areas and prefers the bare ground to grasses taller than a few centimeters (Beason 1995). This species may inhabit areas of short or sparse vegetation such as shortgrass prairies, deserts, brushy flats, alpine habitat, shrub-steppe, agricultural lands (Beason 1995) and coastal strands (Unitt 1984, 2002). Horned larks use the same habitats during spring and fall migrations and winter as during breeding, although they may increase their use of beaches and sand dunes during spring and fall migrations (Beason 1995).

Grinnell and Miller (1944) reported the California horned lark typically occurring on level or rolling, sloping short-grass prairie; otherwise, "bald" hills, montane meadows, open coastal plains, fallow grain fields, alkali flats. Within southern California, they breed in open fields, (short) grasslands, and rangelands (Garrett and Dunn 1981; Hamilton and Willick 1996).

Life History

Horned larks forage on the ground in either bare areas or agricultural fields with short vegetation (Beason 1995). In the winter, they feed primarily on seeds. During the breeding season, they consume seeds but feed insects to their young. During the spring and fall, they consume insects.

Horned lark individuals are monogamous within a breeding season but do not form long-term pair bonds (Beason 1995). The horned lark breeds from March through July, with peak activity in May. Breeding horned lark individuals may find an area to be suitable for nesting in early spring, but by late spring or early summer, the vegetation may be too tall. As a result, birds may abandon the area or forego further nesting (Beason 1995). When the pair finds a suitable nesting area, they nest solitarily. The horned lark builds a grass-lined nest in a depression on open ground. The clutch size varies from 2 to 5 eggs (Beason 1995). Incubation is 10-14 days and the altricial young are tended by both parents. The young leave the nest at 9-12 days and can fly

3-5 days later (Harrison 1978). Horned larks frequently raise 2 broods per season (Bent 1942). The breeding success rate (fledglings per nest) of the horned lark varies from 23 to 72 percent (Beason 1995).

Territories are maintained during the breeding season and vary in size from 0.3 to 5.1 hectares, depending on population densities and habitat (Beason 1995). In the winter, horned larks form flocks that vary in size from a few to several hundred birds.

Mammals including house cats, raccoons, weasels, and other small mammals are known to predate on eggs, nestlings, fledglings and adult horned larks (Beason 1995). Birds, such as falcons, owls, and shrikes are believed to predate on adults and fledglings. American crows and western meadowlarks may predate on nests (Beason 1995). Horned larks can be parasitized by brown-headed cowbirds, particularly during the second breeding stage (Beason 1995).

Status and Distribution

The horned lark has a holarctic distribution, ranging from the Arctic south to central Asia and Mexico with outlying populations in Morocco and Colombia. It occurs from sea level to elevations of 4,000 meters. In general, the northernmost populations are migratory, moving south during the winter into remaining areas of the breeding range. There are also southward movements into areas south of the breeding range, particularly in the southeastern United States (Beason 1995). According to Zeiner *et al.* (1990a), after the breeding season, this species can become gregarious and form large flocks that forage and roost together.

The historic breeding range for the California horned lark ranged from northern coastal California, extending eastward into the central valley and south into Mexico (Grinnell and Miller 1944). Similarly, the California horned lark is currently known to reside in the coastal region of California, including the San Joaquin Valley, and south to northern Baja California (Beason 1995). Zeiner *et al.* (1990a) describe the California horned lark as a common to an abundant, year-long resident of California. During winter, the number of horned larks within southern California inland lowlands are greatly augmented by birds from outside the region (Garrett and Dunn 1981). However, the extent to which these numbers reflect migration and concentrations of local breeders is unknown (Unitt 1984).

The current distribution and abundance of remaining major population centers for the California horned lark is not well known. Similarly, the distribution of this species within southern California is moderately known. Within San Diego County, the California horned lark is generally uncommon and its distribution is patchy reflecting the fragmentation of its habitat (Unitt 2002). Warner Valley is currently the primary population center in San Diego County and the upper basin of Lake Cuyamaca and Santa Maria Valley have substantial numbers of California horned larks (Unitt 2002). California horned larks are less common in San Bernardino County as compared to Riverside County, where this species may be most abundant in the Big Bear area (Stephen Myers, AMEC Earth and Environmental, pers. comm., 2003). Information on remaining population centers in Orange, Los Angeles and Ventura counties is not readily available.

Threats

Habitat loss and degradation threaten the California horned lark throughout its range. This species is a ground dweller and, therefore, susceptible to any habitat destruction or degradation activities. Horned larks colonize areas cleared or graded for development but are forced to leave when construction begins (Unitt 2002). Although specific threats to the species have not been addressed within the Plan Area, the primary range-wide threats (*i.e.*, habitat destruction and fragmentation) likely apply to the Plan Area as well. In Orange County, habitat destruction has significantly reduced the county's nesting and wintering numbers (Hamilton and Willick 1996).

The horned lark is considered a serious crop pest in certain parts of California, including southern California. After a depredation permit is obtained, this species can be controlled under the general supervision of the county agricultural commissioner (Clark and Hygnstrom 1994). Additional threats include pesticides, specifically Carbofuran and Fenthion, that have reportedly been shown to poison and kill horned larks (Beason 1995). In addition, the Plan reports that 44 percent of nest failures at several Illinois airports have been attributed to mowing airport grasslands that are occupied by horned larks (Kershner and Bollinger 1996).

Conservation Needs

The California horned lark uses the same habitats during winter and spring/fall migrations as it does during the breeding season (Beason 1995). Therefore, large areas of open habitat including grasslands, open fields, and similar open habitats that could potentially support groups of breeding and foraging California horned larks need to be conserved. Similarly, the ecological processes necessary to maintain suitable habitat should be conserved. Focused surveys are necessary to identify regionally important breeding and wintering concentrations of California horned lark within the Plan Area. Once identified, these areas should be conserved, managed, and maintained to provide optimum grassland or open, sparsely vegetated shrub habitat conditions for the species. Additional conservation needs include researching the California horned lark breeding distribution and the potentially negative effects of pesticides to the species.

Environmental Baseline

No focused surveys have been conducted for the California horned lark within the Plan Area and information on important breeding localities are unavailable. However, based on our dataset, there are 242 observations for the California horned lark within the Plan Area.

California horned larks are most heavily concentrated within the Prado Basin, Domenigoni Valley, Rawson Canyon, Mystic Lake/San Jacinto Wildlife Area, Wasson Canyon area, Moreno Valley/March ARB, and Murrieta/Murrieta Hot Springs area (L. R. Hays, Fish and Wildlife Service, pers. obs., 2003; Michael Patten, Riverside County Editor for American Field Notes and Past Secretary, California Bird Records Committee, pers. comm., 1998). Our dataset identifies other localities in addition to the above-mentioned areas, including Aguanga/Sage, Temecula, Lake Elsinore, and the vicinity of Santa Rosa Plateau. The only recent data pertaining to the breeding status of the species is derived from observations within the Prado Basin, where a few

pairs bred during the 2003 breeding season (Dharm Pellegrini, Orange County Water District, pers. comm., 2003).

Agricultural field croplands, cismontane alkali marsh, grassland, playas/vernal pools, and Riversidean alluvial fan sage scrub, and coastal sage scrub habitats in all bioregions of the Plan Area were used to model habitat for the California horned lark. Based on this analysis, the Plan Area supports 408,404 acres of modeled habitat for this species. Approximately 69,250 acres (17 percent) of this modeled habitat occurs on PQP Lands. Because California horned larks need specific microhabitat features, such as open areas, modeled habitat likely overestimates the extent of suitable habitat available for this species in the Plan Area.

Effects of the Action

Direct Effects

The Plan Area includes 408,404 acres of modeled breeding and foraging habitat for the California horned lark. The loss of 263,858 acres (65 percent) of this habitat is anticipated over the 75-year permit term, which encompasses 171 out of the 242 (70 percent) California horned lark observations in our dataset. Some birds may be able to disperse to adjacent habitats, particularly rural mountainous areas where development impacts are anticipated to occur at a slower rate and at lower densities. Approximately 38,871 acres (15 percent) of the non-conserved modeled habitat for the California horned lark are designated as rural/mountainous land. However, displaced birds that are unable to locate suitable habitat may experience increased rates of predation or otherwise die or be injured due to loss of their foraging, breeding, and sheltering habitat. Loss of this breeding and wintering habitat may impact population numbers of the California horned lark within the Plan Area over the long term by reducing the number of areas suitable for use as foraging and breeding sites.

To offset the loss of California horned lark breeding and foraging habitat within the Plan Area, the MSHCP will conserve and manage 75,297 acres (18 percent) of the modeled habitat for the California horned lark within the Additional Reserve Lands. Approximately 69,250 acres (17 percent) of modeled habitat will remain in PQP Lands, encompassing 17 percent of the horned lark observations in our dataset. In total, 35 percent of the modeled habitat for the California horned lark will be conserved or remain in the Plan Area. This modeled habitat includes 29 percent of the horned lark observations in our dataset.

According to the Plan, at least three Core Areas and a portion of a fourth Core Area that support the California horned lark will be included in the MSHCP Conservation Area (Section 9, pp. 9-62). The Plan identifies the Prado Basin/Santa Ana River (grasslands), Mystic Lake/San Jacinto Wildlife Area, Wasson Canyon and a portion of Murrieta/Murrieta Hot Springs as Core Areas for California horned lark. As stated in the MSHCP, other locations (not Core Areas) including Lake Elsinore grasslands, Santa Rosa Plateau, and Wilson Valley will also be conserved. Based on our analysis, additional areas within the MSHCP Conservation Area where this species may be found include the vicinity of Diamond Valley Reservoir, Rawson Canyon, and Lake Skinner.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands, including surveys for the California horned lark. Cooperative management and monitoring are anticipated on PQP Lands. Surveys for the California horned lark will be conducted at least every eight years to verify occupancy at a minimum of 75 percent of known locations. If a decline in the distribution of the California horned lark is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP. In addition, Reserve Managers will manage known and future occurrences of the California horned lark by avoiding or minimizing threats to this species, including habitat destruction, habitat fragmentation, and pesticide use (Section 5, Table 5.2).

Management actions to benefit the California horned lark or other Covered Species (*e.g.*, mowing, prescribed burning, exotic vegetation removal, habitat manipulation) may result in impacts to a small number of individual California horned larks. It is anticipated that any impacts to California horned larks from management actions will be minimized by adherence to appropriate survey protocols and other guidelines described in Section 7.4 of the MSHCP.

Indirect Effects

The California horned lark could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These impacts include the indirect effects described in the “General Effects” section of this biological opinion. Implementation of the Riparian/Riverine Area and Vernal Pools policy and the Urban/Wildlands Interface policy will help minimize the indirect effects of the Covered Activities on foraging and breeding habitat for the California horned lark.

Conclusion

We anticipate the proposed action will directly and indirectly affect the California horned lark as described in the analyses above, including the loss of 65 percent of its modeled habitat in the Plan Area. Implementation of the avoidance, minimization, and mitigation measures will reduce the impacts to this species. We anticipate that this species will persist in the remaining 35 percent of its modeled habitat within both the existing PQP Lands and the Additional Reserve Lands. Together these lands form a system of large, contiguous habitat blocks that are interconnected within the Plan Area. We anticipate that these areas will be monitored and managed cooperatively to benefit this species.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service’s biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the California horned lark. We reached this conclusion based on the widely scattered distribution of the California horned lark in the Plan Area and the extent of its range throughout the coastal regions of California. Thus, the impacts associated with loss of this species’ habitat, when viewed in conjunction with protection and management of the MSHCP Conservation Area, are not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Amount or Extent of Take

Due to the difficulty in quantifying the number of California horned larks that will be impacted over the 75-year permit term, the Service is quantifying the take as the number of acres of modeled habitat that will be impacted in the Plan Area as a result of the proposed action. We anticipate that up to 263,858 acres of modeled habitat within the Plan Area will become unsuitable for the California horned lark as a result of the proposed action. Additionally, a small, but undeterminable, number of California horned larks are anticipated to be taken as a result of management actions.

Take will be in the form of harm, death, and injury. This level of take is not likely to result in jeopardy to the California horned lark.

California spotted owl (*Strix occidentalis occidentalis*)

Status of the Species

Listing Status

The California spotted owl is listed on the Federal Birds of Conservation Concern (2002). It is considered a California Species of Special Concern by the California Department of Fish and Game. It is not listed under the Federal Endangered Species Act. The northern and the Mexican spotted owl (*S. o. caurina* and *S. o. lucida*) are both federally-listed as threatened species.

Species Description

The California spotted owl, 1 of 3 subspecies of spotted owl (*S. occidentalis*) (AOU 1957), is a medium-sized brown owl with white spots.

Habitat Affinities

The California spotted owl uses habitats for nesting, roosting, or foraging that have structural components of old forests, including large diameter at breast height, decadent trees (trees with cavities, broken tops, etc.), high density of trees, multi-layered canopy/complex structure, high canopy cover, and logs (Gutiérrez *et al.* 1992; LaHaye *et al.* 1997; North *et al.* 2000 as cited by Fish and Wildlife Service 2003). At low elevations (sea level to 1,000 meters), the California spotted owl occupies habitats dominated by hardwoods, primarily oak and oak-conifer woodlands. At higher elevations, up to 2,700 meters (8,500 feet) it inhabits areas dominated by conifers (Stephenson 1991; Gutiérrez *et al.* 1995). Its foraging habitat appears more variable than its nesting habitat and includes both intermediate-aged and older forested habitats within a home range (Gutiérrez *et al.* 1995). The forests occupied by the California spotted owl are less fragmented than random forest areas (Moen 1994).

Roost selection appears to be related closely to thermoregulatory needs; the species is intolerant of high temperatures (Weathers *et al.* 2001). It tends to roost higher in the forest canopy during winter and lower during summer. It will move short distances during the day to change its

roosting position in response to changes either in ambient temperature or exposure to direct sunlight.

Life History

The California spotted owl exhibits year-long, nocturnal activity (Forsman 1976). Its primary prey are the dusky-footed woodrat and the flying squirrel (Verner *et al.* 1992a). It also eats pocket gophers, mice, broad-footed moles, diurnal squirrels, insects, voles, birds, and lagomorphs. It usually searches from a perch and swoops or pounces on prey in vegetation or on the ground. It may cache excess food. It forages in late seral stage forests significantly more often than in younger aged stands. Stand attributes include large diameter trees, multiple vegetation strata, and high live-conifer basal area (Gutiérrez *et al.* 1995).

The spotted owl usually nests in dense, multi-layered, older portions of the forest with relatively high canopy closure. It nests in a tree or snag cavity or in a broken top of a large tree though it may also use platforms (*i.e.*, mistletoe brooms, abandoned raptor or raven nests, squirrel nests, debris accumulations) (Forsman *et al.* 1984; Gutiérrez *et al.* 1992). The spotted owl is monogamous and breeds from early March through June, with a peak in April and May. It has one brood per year. The clutch size is 1-4 eggs, usually 2. The female incubates and broods the young, and the male feeds the female and the young. As the young become older, and after fledging, both the male and female will feed the young directly. Spotted owls are considered sub-adults until they are three years old. Sub-adults (less than three years old) may breed; however, they fledge young less frequently than adults. The pair may use the same breeding site for 5 to 10 years but may not breed every year (Forsman 1976).

In the San Bernardino Mountains, LaHaye *et al.* (1997) reported nest productivity was greatest in lower elevation oak/big-cone Douglas-fir habitat and was quantified as 1.7 fledglings per successful nest. Nest stands were characterized by greater variation in tree size, higher canopy closure, and greater basal area of large trees compared with random points. These lower elevation habitats are believed to be productive because of high woodrat densities (the owl's primary prey in the San Bernardino Mountains) in the surrounding chaparral (Stephenson and Calcarone 1999). In general, the juvenile survival rate is low, and adult survival rate is relatively high for the California spotted owl (LaHaye *et al.* 1992).

Juveniles disperse from the natal areas in September and October (Gutiérrez *et al.* 1995). Dispersal studies of the California spotted owl population in the San Bernardino Mountains found juvenile owls dispersed 0.4 to 36.4 kilometers (LaHaye *et al.* 2001). In general, spotted owls have a strong fidelity to the nest site (Gutiérrez *et al.* 1995). California spotted owls, particularly in the Sierra Nevada, are known to migrate by altitude, moving to lower elevations in the winter (Gutiérrez *et al.* 1992). The California spotted owl in the San Gabriel Mountains, however, has also often been located at the lower elevations at the base of the mountains during annual Christmas bird counts (Verner *et al.* 1992b). California spotted owls in southern California are believed to function as a metapopulation with separate subpopulations connected by infrequent but persistent interchange of individual owls (Verner *et al.* 1992b; LaHaye *et al.* 1994; Stephenson and Calcarone 1999).

Home range sizes of the California spotted owl are extremely variable. These differences are apparently related to elevation and dominant prey species. The largest home ranges are at the highest elevations and are associated with a diet of flying squirrels. The home range is larger in the non-breeding season (Zabel *et al.* 1992). The median annual home range size for California spotted owls ranges from 3.3 to 25.2 square kilometers for pairs and 2.8 to 75.7 square kilometers for individuals (Gutiérrez *et al.* 1995).

Great horned owls and Northern goshawks are predators of young spotted owls (Forsman *et al.* 1984). The spotted owl will actively defend the nest site from common ravens, northern goshawks, Cooper's hawks, and great horned owls.

Status and Distribution

The spotted owl species as a whole is distributed in western North America and Mexico. It is fairly evenly distributed throughout the northern part of its range but has a more patchy distribution in southern California, the southwestern United States, and Mexico. It is found from sea level to as high as 1,200 meters elevation in the northern part of its range and to about 2,700 meters in the southwestern United States (Gutiérrez *et al.* 1995).

The California spotted owl ranges from the southern Cascade Range and northern Sierra Nevada from Pit River, Shasta County, California south through the remainder of the western Sierra Nevada and Tehachapi Mountains to Lebec, Kern County (Zeiner *et al.* 1990a). The California spotted owl is found sparsely east of the Sierra Nevada crest. It occurs in the California coastal ranges from Monterey County south to Santa Barbara County, and in the Transverse Ranges and Peninsular Ranges south to Sierra San Pedro Martir in northern Baja California (Gutiérrez *et al.* 1995).

Zeiner *et al.* (1990a) summarize the distribution, abundance, and seasonality of the California spotted owl within California as an uncommon, permanent resident in suitable habitat within its range. It may move downslope in winter along the eastern and western slopes of the Sierra Nevada and in other areas within its distribution. The California spotted owl occurs in all of the major mountain ranges in the southern California national forest lands although some ranges support very few pairs (Stephenson and Calcarone 1999). The California spotted owl within southern California is clustered in disjunct mountain and foothill areas where suitable habitat exists, and these clusters are generally surrounded by large areas of unsuitable habitat (Stephenson and Calcarone 1999).

A minimum of 3,050 individuals have been detected between 1970 and 1992 within the range of the California spotted owl (Gutiérrez *et al.* 1995). A total of 1,008 pairs and 436 single birds are known to occur in the Sierra Nevada, and 598 individuals are known from 15 other populations (Gutiérrez *et al.* 1995). The population size of the California spotted owl in southern California has been estimated to be 578 pairs (Standiford *et al.* 1994). However, it is important to note that the effects to the California spotted owl in southern California due to the recent, catastrophic Grand Prix and Old Wildfires has not been incorporated into population numbers or into our status and baseline information, since complete information is not yet available. The largest subpopulation of the California spotted owl within the southern California area is the 200-plus

territories in the San Bernardino and San Gabriel mountains. Although the Cajon Pass separates these two mountain ranges, habitat is generally continuous and only six miles separate the easternmost San Gabriel territory from the westernmost San Bernardino territory (Stephenson and Calcarone 1999).

Threats

The loss of habitat due to clear felling of forests, and degradation of habitat owing to even-aged tree management are serious threats to the California spotted owl (Gutiérrez *et al.* 1995). Extensive loss of habitat in all three subspecies' ranges has occurred. Secondary losses of habitat include urban and suburban expansion, water development in riparian corridors, agricultural development, fuelwood/oak harvest, reservoir development and mining (Gutiérrez *et al.* 1995). Wildfires, particularly in areas where fire has been suppressed for decades, can destroy spotted owl habitat. Other threats include shooting and collision with automobiles.

Conservation Needs

The conservation of the species depends on the protection of nesting and foraging areas that includes the maintenance of old-growth conditions (intact large trees), monitoring of populations, and buffering known nest sites from disturbance. Prey availability may be a conservation concern and should be considered as a possible factor in any future declines in California spotted owl populations. The conservation of low-elevation live oak and bigcone Douglas-fir dominated habitats, which may “. . . explain the continued persistence of small spotted owl populations in each southern California mountain range,” has been proposed as a high management priority (Stephenson and Calcarone 1999). Because some subpopulations could be effectively isolated (Stephenson and Calcarone 1999), the conservation of populations in all mountain ranges would appear to be prudent and necessary. Consistent with this hypothesis and according to the Plan, the current California spotted owl interim conservation plan in southern California (as devised by interested scientists and wildlife managers) provides for the protection of all known owl sites on Federal forest land.

Environmental Baseline

The species is primarily found in the Plan Area within Forest Service lands located within the San Jacinto Mountains. Locales where owls have been detected include: Hall Canyon, North Fork of the San Jacinto River, Stone Creek, Logan Creek, Pinewood, Fuller Ridge, Dark Canyon, Strawberry Creek, Marion Creek, Hurkey Creek, South Fork San Jacinto River, and Lion Canyon (MSHCP, Volume II-B, p. B-111).

Although there are only five records of the California spotted owl in the University of California-Riverside database records for the Plan Area from 1987 and 1995, the San Jacinto Ranger District of the Forest Service conducted surveys between 1988 and 1994 and detected an average of 10 pairs (range 8-14), six singles (range 3-9), and six juveniles (ranges 1-10) during that period of time (MSHCP, Volume II-B, p. B-116). Twenty recent California spotted owl observations within the San Jacinto Ranger District area have been mapped (Stephenson and Calcarone 1999).

Modeled habitat for this species included montane coniferous forest and woodlands and forests. According to the model, the Plan Area supports approximately 54,119 acres of appropriate oak and broadleaved upland forest habitat or montane coniferous forest habitat within the San Bernardino Mountains and San Jacinto Mountains bioregions. However, only an unknown subset of this total acreage would qualify as habitat for the species. In this regard, California spotted owls in western Riverside County or southern California typically are found within relatively high-elevation coniferous areas, and there is often (Stephenson and Calcarone 1999) or always (Garrett and Dunn 1981) a well-developed hardwood (*e.g.*, canyon oak) component within occupied habitat. A total of 39,894 acres (74 percent) of the modeled habitat are within PQP Lands.

Although an assessment of the threats to the species within the Plan Area has not been done, there is little evidence to suggest that the large majority of range-wide threats do not apply to western Riverside County. Habitat loss and fragmentation from development, forest management practices, and fire in particular could impact the California spotted owl within the Plan Area. Maintaining the low-elevation live oak and bigcone Douglas-fir dominated habitats appears to be especially important to maintaining California spotted owls in southern California. This habitat is vulnerable to stand-replacing fires that come in from nearby chaparral (Stephenson and Calcarone 1999).

Effects of the Action

Direct Effects

The California spotted owl will not be considered a Covered Species Adequately Conserved by the MSHCP until a MOU is executed with the Forest Service that addresses management of this species on Forest Service land.

The Plan Area includes 54,119 acres of modeled habitat for the California spotted owl. If the MOU with the Forest Service is signed, the loss of 12,905 acres (24 percent) of this modeled habitat is anticipated over the 75-year permit term. With the low density of spotted owls in the Plan Area, loss of 12,905 acres of California spotted owl habitat distributed over the Plan Area is not anticipated to result in direct mortality of adult birds. However, loss of foraging and nesting habitats to development will cause California spotted owls in impacted areas to disperse in search of other habitats. Some may be able to disperse to rural mountainous areas where development impacts are anticipated to occur at a slower rate and at lower densities.

Approximately 3,904 acres (30 percent) of the non-conserved modeled habitat for the California spotted owl are designated as rural/mountainous land. Birds forced to disperse may experience increased competition for the remaining suitable habitat or decreased fitness due to increased energy and time spent locating new habitats. They may also be subjected to increased rates of predation and injury. If clearing of habitat occurs near the initiation of the breeding season, the search for and establishment of a new breeding site may result in an overall reduction in reproductive output. Thus, loss of breeding and foraging habitat may impact overall population numbers of the California spotted owl within the Plan Area over the long term by reducing the number of areas suitable for use as foraging and nesting sites.

The MSHCP will conserve and manage 1,321 acres (2 percent) of modeled habitat for the California spotted owl within Additional Reserve Lands. Another 39,894 acres (74 percent) of modeled habitat will remain in PQP Lands. In total, 41,214 acres (76 percent) of the modeled habitat for the California spotted owl will be included in the MSHCP Conservation Area.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands including surveys for the California spotted owl. If the MOU with the Forest Service is signed, additional monitoring and management would occur in habitat for the California spotted owl within Forest Service lands included in the MSHCP Conservation Area. Surveys for the California spotted owl will be conducted at least every eight years to verify occupancy at a minimum of 75 percent of the known and future-identified locations. If a decline in the distribution of the California spotted owl is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP.

Reserve Managers will manage microhabitat (*i.e.*, old-growth forest) and integrate monitoring and management programs for the California spotted owl. Reserve managers will manage the known nesting locations and potential nesting habitat (*e.g.*, habitat that consists of large blocks of mature forest with large trees and snags for nesting; dense, multi-layered canopy cover for roost seclusion; and a permanent water source, consistent with the species' needs) within the San Jacinto, San Bernardino, and Santa Ana mountains. Particular management emphasis will be given to fire and fire suppression activities, alteration of hydrology, farming, mining, logging and firewood harvesting (Section 5, Table 5.2).

Management actions to benefit California spotted owls or other Covered Species (*e.g.*, hydrological maintenance, prescribed burning, habitat manipulation) may result in impacts to a small number of individual California spotted owls. It is anticipated that any impacts to California spotted owls from management actions will be minimized by adherence to appropriate survey protocols and other guidelines described in Section 7.4 of the MSHCP.

Indirect Effects

The California spotted owl could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These include the indirect effects described in the "General Effects" section of this biological opinion. Because of their susceptibility to habitat loss due to wildfire, the California spotted owl is likely to be vulnerable to indirect effects associated with roads and other developments that increase urban interface with habitat areas.

Conclusion

We anticipate the proposed action will directly and indirectly affect the California spotted owl as described in the analyses above, including the loss of 24 percent of its modeled habitat in the Plan Area. Implementation of the avoidance, minimization, and mitigation measures identified in the Plan will reduce the impacts to this species. We anticipate that this species will persist in the remaining 76 percent of its modeled habitat within both the existing PQP Lands and the

Additional Reserve Lands. Together these lands form a system of large habitat blocks within the Plan Area. We anticipate that these lands will be monitored and managed cooperatively to benefit this species. After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the California spotted owl. We reached this conclusion because the impacts to California spotted owl reproduction and loss of this species' habitat, when viewed in conjunction with protection and management of the MSHCP Conservation Area, which supports the major breeding locations for this species in the Plan Area, are not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Amount or Extent of Take

Due to the low density of spotted owls in the Plan Area, the loss of up to 12,905 acres of nesting and foraging habitat for the California spotted owl in the Plan Area is not expected to result in direct mortality of adult birds; however, for some individuals, reproduction may be impaired or life expectancy shortened. Due to the difficulty in quantifying the number of California spotted owls that will be taken over the 75-year permit term, the Service is quantifying the take as the number of acres of California spotted owl habitat that will be impacted in the Plan Area as a result of the proposed action. We anticipate that up to 12,905 acres of breeding and foraging habitat within the Plan Area will become unsuitable for California spotted owls as a result of the proposed action. Additionally, a small, but undeterminable, number of California spotted owls are anticipated to be taken as a result of management actions.

Take will be in the form of harm and injury. This level of take is not likely to result in jeopardy to the California spotted owl.

Cooper's Hawk (*Accipiter cooperii*)

Status of the Species

Listing Status

The Cooper's hawk is considered a Species of Special Concern by the California Department of Fish and Game but is not federally listed.

Species Description

The Cooper's hawk is a medium-sized hawk with short, rounded wings and a long, rounded tail. The sexes are similar in plumage, but males are generally more brightly colored than females (Rosenfield and Bielefeldt 1993). Their back and upper wing coverts are brown to blue-gray in adults, and medium brown with some white mottling and rufous feather edging in juveniles (Rosenfield and Bielefeldt 1993). The Cooper's hawk is 1 of 3 species of the genus *Accipiter*.

Habitat Affinities

The Cooper's hawk is found in deciduous, mixed, and evergreen forests and deciduous stands of riparian habitat (Rosenfield and Bielefeldt 1993). This species will nest in a partially concealed and shaded areas in the main crotch or horizontal branch of a variety of tree species (Rosenfield and Bielefeldt 1993). It often uses patchy woodlands and edges with snags for perching (Beebe 1974). Migrant and wintering birds are generally less selective in their choice of habitats and may be found with regularity in developed (*e.g.*, suburban) areas; however, Zeiner *et al.* (1990a) noted that this species is seldom found in areas without dense tree cover or patchy woodland habitat. Within California, Cooper's hawks use dense stands of live oak, riparian deciduous, or other forest habitats near water most frequently (Zeiner *et al.* 1990a).

Life History

The Cooper's hawk is diurnally active throughout the year (Zeiner *et al.* 1990a). It primarily feeds on birds, sometimes taking fish, small mammals, reptiles and amphibians (Terres 1980). The Cooper's hawk hunts in broken woodland and habitat edges, catching prey in the air, on the ground, and in vegetation. It uses cover to hide, attack, and approach prey but will also soar and make low, gliding search flights (Zeiner *et al.* 1990a). After catching its prey, the Cooper's hawk may fly to a water source to drown the prey (Terres 1980).

Both sexes are usually present on the nest area by mid to late March (Meng 1951, Rosenfield 1991). In California, the first eggs are generally laid in April (Asay 1987). Pairs will often renest if the initial clutch is lost in early incubation or before (Rosenfield and Bielefeldt 1993). Nests are generally located on a horizontal limb of a pine or hardwood, near the trunk or in the crotch of a hardwood tree species, usually 3-18 meters above the ground and occasionally in the old nest of a crow (Harrison 1978). Clutch size ranges from 1-7, but is usually 3-5 (Rosenfield and Bielefeldt 1993). Eggs are incubated mostly by the female for approximately 24 days (Terres 1980). Young fledge at 27-30 days but will return to the nest for prey deliveries and roosting for at least 10 days (Reynolds and Wight 1978). Age of first breeding is generally 2 years or older (Rosenfield and Bielefeldt 1993).

Although it is mostly a year-long resident, some Cooper's hawks from more northern areas, migrate into California. The Cooper's hawk may also move downslope and south from areas of heavy snow and return to the general nesting area in the spring (Zeiner *et al.* 1990a). Adult birds frequently reoccupy nesting areas and may reuse the same nest for multiple years (Call 1978), but they typically build a new nest in the same area (Rosenfield and Bielefeldt 1993).

Seasonal home range size of the Cooper's hawk has been estimated at 784 hectares with a daily home range averaging 231 hectares (Murphy *et al.* 1988). It may require a minimum of 6 hectares (15 acres) of suitable, undisturbed timber for nesting (Call 1978). Rosenfield *et al.* (1995) found a nesting density of 1 pair per 331 hectares in a long-term study in rural Wisconsin. Nest sites of the Cooper's hawk within stands of oaks are located approximately 2.7 kilometers (1.6 miles) apart and thus are distributed widely but sparsely within woodland habitat (Zeiner *et al.* 1990a).

Mortality rates have been estimated as 72 percent to 78 percent in the first year, and 34 percent to 37 percent thereafter (Rosenfield and Bielefeldt 1993). The maximum reported age for a Cooper's hawk is 12 years (Rosenfield and Bielefeldt 1993). Eggs may be depredated by raccoons and rarely by American crow (Rosenfield and Bielefeldt 1993). Adults may be depredated by great horned owl, red-tailed hawk, and northern goshawk (Rosenfield and Bielefeldt 1993). Cooper's hawks may compete, to a limited extent, with sharp-shinned hawks and northern goshawks (Beebe 1974). Though the northern goshawk is a potential competitor, niche overlap is reduced by using different habitats, different species and sizes of prey, and by foraging in different zones (Bosakowski *et al.* 1992). The Cooper's hawk is more of a generalist, having a greater niche width than both sharp-shinned hawks and goshawks.

Status and Distribution

Cooper's hawks breed from British Columbia eastward to Nova Scotia and southward to northern Mexico and Florida (American Ornithologists' Union 1983). Its breeding range is from sea level to above 2,700 meters. Cooper's hawks are present year-round nearly throughout California, except along the Colorado River and in desert areas, where the species is reportedly extirpated as a nester but is generally a transient and winter visitor (Garrett and Dunn 1981). Although the Cooper's hawk breeds in southern California and has a year-round resident population, it also occurs in the region as a spring and fall migrant and as a winter resident (Garrett and Dunn 1981). The Cooper's hawk winter range overlaps its breeding range except that northernmost populations are believed to be migratory (Palmer 1988) or partially migratory (Rosenfield and Bielefeldt 1993). In addition, the non-breeding portion of the winter range extends from the southern most parts of the U.S. down into most of Mexico (Rosenfield and Bielefeldt 1993).

This species was once considered a common nester throughout California and was described as ". . . varyingly common, to even abundant, for a raptor, in autumn in favorable territory . . ." (Grinnell and Miller 1944). Southern California's breeding population reportedly has been ". . . much reduced in recent decades, especially in lowland areas where much riparian woodland has been destroyed . . ." (Garrett and Dunn 1981). As a result, Cooper's hawk nesting areas are now reportedly restricted to mountainous woodlands and open forests (Garrett and Dunn 1981). A serious decline occurred in the 1970s during the nesting season probably due to eggshell thinning resulting from pesticides (Terres 1980).

Threats

As stated in the Plan, habitat destruction, mainly in lowland riparian areas, may be the main threat to Cooper's hawk, although direct or indirect human disturbance at nest sites can be equally detrimental (Remsen 1978; Boal and Mannan 1998). In addition, timber harvesting may alter the suitability of nesting and foraging habitats for Cooper's hawk, but more study is needed to conclude with certainty that this activity is negatively impacting this species (Reynolds 1989).

In addition, contaminants other than DDE (*e.g.*, dieldrin, PCB's, mercury, and other heavy metals) have also been found in eggs but with unknown effects (Snyder *et al.* 1973; Pattee *et al.* 1985). A few recent cases of organophosphate poisoning have been reported (Rosenfield *et al.* 1991) but the effects on the population is unclear, as are the consequences of pesticide use in

Mexico for birds wintering there (Reynolds 1989). Collisions with cars have been documented, but the magnitude of this threat is unclear (Keran 1981).

Conservation Needs

The Cooper's hawks would benefit from the conservation of relatively undisturbed woodland, including deciduous, mixed, and evergreen forests and deciduous stands of riparian habitats throughout the Plan Area. Within these habitats, this species prefers dense tree stands for cover to capture prey and close proximity to water to drown prey, if needed. The conservation of known and future breeding locations of Cooper's hawk within the above habitats is needed for this species to persist in the Plan Area. In addition, hydrological and other ecological processes necessary to maintain suitable habitat should be preserved.

Environmental Baseline

Within the Plan Area, Cooper's hawks reportedly may be found nearly throughout in appropriate woodland habitats (Michael Patten, Riverside County Editor for American Field Notes and Past Secretary, California Bird Records Committee, pers. comm. to L. Hayes, Fish and Wildlife Service, 1998).

According to our dataset, there are 202 recent (post 1988) records for Cooper's hawks within the Plan Area. These observations are throughout the Plan Area but include the Santa Ana River and Prado Basin, Wasson Canyon, Lake Elsinore, San Timoteo Canyon, vicinity of Lake Skinner/Diamond Valley Reservoir, Aguanga Valley/Sage, vicinity of Santa Rosa Plateau and vicinity of Alessandro Hills. These locations represent both breeding and foraging sites for Cooper's hawks within the Plan Area.

As stated in the Plan, important breeding populations include a large concentration in the Prado Basin and contiguous reaches of the Santa Ana River. The Cooper's hawk population within the Prado Basin apparently has increased during the course of 17 years of habitat and species conservation efforts and monitoring at that locale (L. R. Hays, Fish and Wildlife Service, pers. obs.). This species was reported to be "abundant" within the Prado Basin as a result of the 2003 Prado Basin monitoring survey (Dharm Pellegrini, Orange County Water District, pers. comm. 2003). Although informal surveys in the Prado Basin and contiguous reaches of the Santa Ana River likely have been adequate in recent years, surveys of similar intensity have not been conducted in other woodland areas throughout the remainder of the study area.

Riparian scrub, woodland, forest; woodlands and forests; and montane coniferous forest habitats were used to model habitat within the Plan Area for Cooper's hawk. Based on this analysis, the Plan Area supports 72,466 acres of modeled habitat for this species. Approximately 47,968 acres (66 percent) of this modeled habitat occurs on existing PQP Lands.

Effects of the Action

Direct effects

The Plan Area includes 72,466 acres of modeled nesting and foraging habitat for the Cooper's hawk. Loss of 18,680 acres (26 percent) of this modeled habitat is anticipated over the 75-year permit term, although some habitat for this species may remain in areas avoided as a result of the Riparian/Riverine Areas and Vernal Pools policy. Loss of this modeled habitat encompasses 146 of the 202 (72 percent) observations in our dataset. While this constitutes a large proportion of the total observations for the species in the Plan Area, the observations in our dataset represent general records and do not identify the type or activity of the observation (*e.g.*, nest, pair, foraging, flight, etc.). Effects to the species are better explained in terms of overall habitat loss.

A 26 percent loss of Cooper's hawk habitat distributed over the Plan Area is not anticipated to result in direct mortality of adult birds. Loss of foraging and nesting habitats to development will cause Cooper's hawk to disperse in search of other wooded habitats. Some may disperse to rural/ mountainous areas where development impacts are anticipated to occur at a slower rate and at lower densities. Approximately 5,173 acres (28 percent) of the non-conserved modeled habitat for the Cooper's hawk are designated as rural/mountainous land. However, birds forced to disperse may experience increased competition for the remaining suitable habitat or decreased fitness due to increased energy and time spent locating new habitats. Loss of perch and nesting trees may preclude the establishment of nesting sites, especially since this species is known to reoccupy the same nesting area year after year (Rosenfield and Bielefeldt 1993). Thus, loss of nesting and foraging habitat may impact population numbers of the Cooper's hawk within the Plan Area over the long term by reducing the number of areas suitable for use as foraging and nesting sites.

The MSHCP will conserve and manage 5,818 acres (8 percent) of modeled habitat for the Cooper's hawk within the Additional Reserve Lands. Another 47,968 acres (66 percent) of modeled habitat will remain in PQP Lands. In total, 74 percent of the modeled habitat for the Cooper's hawk will be conserved or remain in the Plan Area. This modeled habitat includes 56 of the 202 (28 percent) observations of the Cooper's hawk in our dataset.

According to the Plan, the MSHCP Conservation Area will include at least 10 Core Areas that reportedly support Cooper's hawk within the Plan Area. These Core Areas include Vail Lake, Prado Basin/Santa Ana River, San Timoteo Canyon, Temescal Wash, Wasson Canyon, Temecula Creek, Murrieta Creek, Wilson Valley, San Bernardino National Forest and Cleveland National Forest. Reserve Managers will evaluate the condition of the riparian vegetation within the Core Areas and maintain a program to enhance and/or create riparian habitat within these Areas. Hydrological processes within the drainages that support the potential habitat for this species will be maintained, and all potential habitat areas that are currently fragmented or otherwise degraded (*i.e.* exotic plant and animal infestations) will be selectively rehabilitated or revegetated (Section 5, Table 5-2).

As stated in Section 5 (pp. 5-6) of the Plan, within the MSHCP Conservation Area, existing known or newly observed active Cooper's hawk nests will be conserved. Any nesting locations

found in the future within the MSHCP Conservation Area will be managed by Reserve Managers. Particular management emphasis will be given to species-specific threats including habitat destruction and degradation, timber harvesting, pesticide use and human disturbance at nest sites.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands, including surveys for the Cooper's hawk. Cooperative management and monitoring are anticipated on PQP Lands. Surveys for the Cooper's hawk will be conducted at least every eight years to verify occupancy at a minimum of 75 percent of the known or future-identified locations. If a decline in the distribution of the Cooper's hawk is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP.

Indirect Effects

The Cooper's hawk could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These include the indirect effects described in the "General Effects" section of this biological opinion. In particular, maintaining the hydrological processes and water quality standards (*e.g.*, controlling sedimentation and other pollutants) of riparian habitats and nearby open water will be important in conserving Cooper's hawk habitat within the MSHCP Conservation Area. This species will benefit from implementation of the Riparian/Riverine Area and Vernal Pools policy and the Urban/Wildlands Interface policy, which will help minimize the indirect effects of the Covered Activities on foraging and breeding habitat for the Cooper's hawk.

Conclusion

We anticipate the proposed action will directly and indirectly affect the Cooper's hawk as described in the analyses above, including the loss of 26 percent of its modeled habitat in the Plan Area. Implementation of the avoidance, minimization, and mitigation measures identified in the Plan will reduce the impacts to this species. We anticipate that this species will persist in the remaining 74 percent of its modeled habitat within both the existing PQP Lands and Additional Reserve Lands. Together these lands form a system of large, contiguous habitat blocks that are inter-connected within the Plan Area. We anticipate that these lands will be monitored and managed cooperatively to benefit this species.

After reviewing the current status of this species, the environmental baseline for the Plan area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the Cooper's hawk. We reached this conclusion based on the widespread distribution of the Cooper's hawk in the Plan Area and because the impacts associated with loss of this species' habitat, when viewed in conjunction with protection and management of the MSHCP Conservation Area, is not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Amount or Extent of Take

The loss of up to 18,680 acres of nesting and foraging habitat for the Cooper's hawk in the Plan Area is not likely to result in direct mortality of adult birds; however, for some individuals, reproduction may be impaired or life expectancy shortened. Due to the difficulty in quantifying the number of Cooper's hawk impacted by the proposed action over the 75-year permit term, the Service is quantifying the take as the number of acres of habitat that will be impacted in the Plan Area as a result of the proposed action. We anticipate that 18,680 acres of modeled nesting and foraging habitat within the Plan Area will become unsuitable for Cooper's hawk as a result of the proposed action. Take will be in the form of harm and injury. This level of take is not likely to result in jeopardy to the Cooper's hawk.

Double-crested cormorant (*Phalacrocorax auritus*)

Status of the Species

Status

The double-crested cormorant is considered a Species of Special Concern by the California Department of Fish and Game and is not a federally listed species.

Species Description

The double-crested cormorant is a large, dark cormorant. Its length is between 29 and 36 inches. It is black with no white flank patches; the legs and feet are also black. The double-crest is visible during the breeding season.

Habitat Affinities

The double-crested cormorant is a common inhabitant of seacoasts and inland waters, rarely observed out of sight of land. It occupies diverse aquatic habitats in all seasons, such as lakes, rivers, reservoirs, estuaries, or ocean (Zeiner *et al.* 1990a). In addition to aquatic foraging habitats, it requires suitable places for daytime resting or loafing and nighttime roosts (Hatch and Weseloh 1999). Between foraging bouts, it uses daytime resting perches, such as rocks, sandbars, pilings, and trees. Daytime resting areas may be used for nighttime roosting; however, these areas are typically more remote and used by larger numbers of birds (Hatch and Weseloh 1999). Double-crested cormorants nest in colonies established at sites safe from ground predators and close to feeding areas such as small rocky or sandy islands, bridges, abandoned docks, and trees in or near water (Meier 1981; Hatch and Weseloh 1999). They require a considerable length of water, or an elevated perch, for a labored and lengthy take-off.

Life History

Double-crested cormorants are strictly piscivorous (Robertson 1974; Cogswell 1977; Neuman *et al.* 1997) and thus require lakes, rivers, reservoirs, estuaries, or the ocean for foraging. They are opportunistic foragers with more than 250 species of fish from more than 60 families

reported as prey (Hatch and Weseloh 1999). Supply of prey can dictate occurrence of cormorants (Blackwell and Krohn 1997). In areas where fish populations are augmented (*e.g.*, trout stocking), feeding is affected. For example, cormorants were found eating mainly suckers before trout stocking, but trout-consumption increased from 17 percent to 60 percent after stocking (Derby and Lovvorn 1997).

Foraging, interspersed with resting, occurs mainly in daylight hours (Blackwell and Krohn 1997). The double-crested cormorant forages by diving under the water and pursuing prey. It generally feeds in shallow, open water, close to shore. It may feed over sandy bottoms or between rocks and in beds of sea grass or kelp (Hatch and Weseloh 1999). It prefers water less than 9 meters (30 feet) deep with a rocky or gravel bottom, but may catch fish as deep as 22 meters (72 feet). The double-crested cormorant sometimes feeds cooperatively in flocks of up to 600 individuals, often with pelicans (Zeiner *et al.* 1990a). It usually forages within 8-16 kilometers (5-10 miles) of the roost or nest colony (Palmer 1962).

Throughout the year, the double-crested cormorant is generally very gregarious and typically forms dense nocturnal roosts, diurnal loafing areas, and breeding colonies (Hatch and Weseloh 1999). It only defends a small territory around its nest during the breeding season. The breeding season extends from April to July or August, but begins in January at the Salton Sea and Colorado River. Within nesting colonies, nests are regularly spaced at about 0.6-2.0 meters (Hatch and Weseloh 1999). The cormorant usually breeds first at three years, but sometimes at two years. It is monogamous and nests in colonies of a few to hundreds of pairs. It is single-brooded with a clutch size of 3-4 eggs (range is 2-7 eggs). Incubation is 24.5-29 days. The altricial young are tended by both parents.

Status and Distribution

Double-crested cormorants breed from Alaska eastward to Newfoundland southward, in isolated colonies, to northern Mexico, Florida and western Caribbean (Hatch and Weseloh 1999). The species winters from Alaska eastward to New England southward to California, Mexico, Florida, Belize, Bahamas, and Cuba, but is absent from the northernmost portion of the breeding range (American Ornithologists' Union 1998; Hatch and Weseloh 1999).

Zeiner *et al.* (1990a) summarized the distribution, abundance, and seasonality of the double-crested cormorant within California as a year-long resident along the entire coast of California and on inland lakes, and seasonally increases in population size as migrant populations winter in the area. During August to May, it is fairly common to locally very common along the coast and in estuaries and salt ponds; it is uncommon in marine subtidal habitats from San Luis Obispo County south, and very rare to the north. In the same season, it is fairly common at the Salton Sea and Colorado River reservoirs and rare to fairly common in lacustrine and riverine habitats of the Central Valley and coastal slope lowlands. It is less common in the summer, except it is locally common near nesting colonies. In southern California, the species is considered a year-round resident (Garrett and Dunn 1981). Although double-crested cormorants are present in suitable habitats throughout southern California, rookeries are extremely scarce away from the Salton Sea, the Colorado River, and Channel Islands (Garrett and Dunn 1981).

Numbers and range of the double-crested cormorant were greatly reduced by the early twentieth century, probably from widespread direct persecution and some loss of inland habitats from agricultural clearances (Hatch and Weseloh 1999). The species declined further in the mid-twentieth century due to pesticides. Marked reductions in numbers and inland breeding colonies in California were noted as early as the early 1940's (Grinnell and Miller 1944). In recent years, the double-crested cormorant numbers have increased in some areas due to an increase in reservoirs, a decrease in direct killing, and lowered mortality from pesticides (Hatch and Weseloh 1999). The number of breeding birds on the west coast continues to grow; however, these numbers have not reached pre-DDT levels (Small 1994).

Threats

Threats to the double-crested cormorant include habitat loss, environmental contaminants (such as persistent pesticides), shooting and trapping, entanglement with fishing gear, and human disturbance at nest and roost sites (*i.e.*, boating). The double-crested cormorant has long been perceived as a pest and competitor by commercial and recreational fisherman and subject to extensive persecution. Currently, the species is controlled (shot or harassed) at aquaculture facilities. Many nesting colonies in California were abandoned after human disturbance and habitat destruction (Remsen 1978).

Predation on eggs and young by gulls and crows is also considered an important factor in declining nest success (Ellison and Cleary 1978; Siegel-Causey and Hunt 1981). In Quebec, increased predation by gulls on eggs and young also caused nest abandonment (Ellison and Cleary 1978). In addition to human disturbance and nest predation, the double-crested cormorant is also affected by Newcastle disease.

In western Riverside County, habitat loss, environmental contaminants, disease, and inadvertent and intentional human disturbances may affect habitat and rookery establishment in the Prado Basin. In the nearby Salton Sea, environmental contaminants and disease triggered a recent, massive die-off of the double-crested cormorant (Fish and Wildlife Service, unpublished data).

Conservation Needs

The conservation of double-crested cormorant rookeries requires the protection of undisturbed nesting areas and adjacent feeding areas. In addition, the elimination of environmental contaminants and identification of triggers for disease must be addressed. The management of the only known breeding population in the Prado Basin needs to continue to include strict measures to minimize disturbance during nesting and foraging. Human persecution must be addressed.

Environmental Baseline

Potential breeding areas include Lake Mathews, Lake Perris, Lake Skinner, Canyon Lake, and Lake Elsinore. The only known rookery within the Plan Area is located within the Prado Basin/Santa Ana River, where approximately 40 breeding pairs were recorded in 1998 (James Pike, pers. comm., 1998). This rookery was still active within the Prado Basin during the 2003

breeding season (Dharm Pellegrini, Orange County Water District, pers. comm., July 29, 2003). The Prado Basin colony and a rookery of equivalent size on Orange County Water District lands at the Anaheim Lakes in Orange County are apparently the only two breeding areas in the Los Angeles Basin (Gallagher 1997, see also Garrett and Dunn 1981). In 2001, a large congregation of double-crested cormorants roosted at Canyon Lake on private lands (Loren Hays, Fish and Wildlife Service, pers. comm, 2003). There are numerous large trees around the lake that provide suitable roosting places and could also support nests.

Known foraging habitat and potential nesting habitat for the double-crested cormorant occurs near large lakes, reservoirs, and drainages that support open water habitats within the Plan Area. Therefore, the habitat model for the double-crested cormorant includes open water in all bioregions and wetland vegetation within the Prado Basin and Santa Ana River drainage: riparian scrub, coast live oak, woodland, Arundo/riparian forest, coastal and valley freshwater marsh, mule fat scrub, southern cottonwood/willow riparian, and southern willow scrub. Based on this analysis, the Plan Area supports approximately 17,473 acres of modeled habitat for the double-crested cormorant. Approximately 14,191 acres (81 percent) of the modeled habitat occur within PQP Lands, including the Prado Basin/Santa Ana River. A large percentage of the habitats in Prado Basin are riparian woodland and upland habitats that encompass a variety of land uses that do not provide suitable habitat for double-crested cormorant. In addition, breeding double-crested cormorants do not use open water habitats for foraging unless secure nesting sites are located nearby. Thus, the modeled habitat likely overestimates the extent of suitable nesting and foraging habitat for this species.

Effects of the Action

Direct Effects

The Plan Area includes 17,473 acres of modeled breeding and foraging habitat for the double-crested cormorant. Loss of 1,693 acres (10 percent) of this habitat is anticipated over the 75-year permit term, which encompasses 41 of the 83 (49 percent) double-crested cormorant observations in our dataset, as well as the roosting site at Canyon Lake. A 10 percent loss of cormorant habitat distributed over the Plan Area is not anticipated to result in direct mortality of adult birds. However, loss of foraging and nesting habitats to development will cause double-crested cormorant to disperse in search of other open water habitats and experience increased competition for the remaining suitable habitat. Birds forced to disperse may also experience decreased fitness due to increased energy and time spent locating new habitats. Loss of roost sites, nesting trees, and foraging habitat may preclude the establishment of new double-crested cormorant rookeries. Thus, loss of nesting and foraging habitat may impact population numbers of the double-crested cormorant within the Plan Area over the long term by reducing the number and distribution of areas suitable for use as foraging and nesting sites. The only known rookery in western Riverside County will not be negatively impacted by implementation of the Plan.

To offset the loss of double-crested cormorant habitat within the Plan Area, the MSHCP will conserve and manage 1,589 acres (9 percent) of modeled habitat for this species within the Additional Reserve Lands. Another 14,191 acres (81 percent) of modeled habitat for the double-crested cormorant will remain in PQP Lands. Many (36 of 83 or 43 percent) of the double-

crested cormorant observations in our dataset were recorded from PQP Lands. In addition, 6 of the 83 (7 percent) of the observations for this species occur within Additional Reserve Lands. In total, 90 percent of the modeled habitat, including 48 percent (42 of the 83) of the observations in our dataset for the double-crested cormorant, will be conserved or remain in the Plan Area.

Six open water habitats and one drainage will support double-crested cormorants within the Plan Area, including Lake Mathews, Diamond Valley Lake, Lake Skinner, Lake Elsinore, Vail Lake, Lake Perris, the Prado Basin/Santa Ana River, and the wetland habitats within Prado Basin/Santa Ana River.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands, including surveys for the double-crested cormorant. Cooperative management and monitoring are anticipated on PQP Lands. Surveys for the double-crested cormorant will be conducted at least every eight years to verify occupancy at a minimum of 75 percent of the known locations. If a decline in the distribution of the double-crested cormorant is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP. Reserve Managers will ensure habitat support functions within the MSHCP Conservation Area by maintaining, preserving, and/or enhancing hydrological processes in Lake Mathews, Diamond Valley Lake, Lake Skinner, Lake Elsinore, Vail Lake, Lake Perris, Mystic Lake, and Prado Basin/Santa Ana River. Reserve Managers will manage the known double-crested cormorant rookery in the Santa Ana River drainage/Prado Basin, as well as future rookeries within the MSHCP Conservation Area. Particular management emphasis will be given to pesticide use, flood control measures and habitat destruction, and human persecution (Section 5, Table 5.2).

The MSHCP will conserve double-crested cormorants by conserving known and historic breeding locations, linking core areas with nearby suitable foraging habitat, and managing breeding colonies within the Conservation Area. The Conservation Area will be managed to: (1) preserve the quality of wetland associated foraging areas; (2) improve the potential and suitable emergent wetland habitat within the Prado Basin, Santa Ana River, and other major wetland areas; (3) monitor the potential breeding locations; and (4) protect any existing and future documented nest sites by providing buffers around them.

Indirect Effects

The double-crested cormorant could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These include the indirect effects described in the “General Effects” section of this biological opinion. In particular, maintaining the hydrological processes and water quality standards (*e.g.*, controlling sedimentation and other pollutants) of open water and wetland habitats will be important to sustaining double-crested cormorants in the MSHCP Conservation Area. Implementation of the Riparian/Riverine Area and Vernal Pools policy and the Urban/Wildlands Interface policy will help minimize the indirect effects of the Covered Activities on foraging and breeding habitat for the double-crested cormorant.

Conclusion

We anticipate the proposed action will directly and indirectly affect the double-crested cormorant as described in the analyses above, including the loss of 10 percent of its modeled habitat in the Plan Area. Implementation of the avoidance, minimization, and mitigation measures identified in the Plan will reduce the impacts to this species. We anticipate that this species will persist in the remaining 90 percent of the modeled habitat within both the existing PQP Lands and the Additional Reserve Lands. Together these lands form a system of large, contiguous habitat blocks that are interconnected within the Plan Area. We anticipate that these lands will be monitored and managed cooperatively to benefit this species.

After reviewing the current status of this species, the environmental baseline for the Plan area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the double-crested cormorant. We reached this conclusion based on the widespread distribution of the double-crested cormorant in the Plan Area and because the impacts to double-crested cormorant reproduction and the loss of this species' habitat, when viewed in conjunction with protection and management of the MSHCP Conservation Area, are not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Amount or Extent of Take

The loss of up to 1,693 acres of breeding and foraging habitat for the double-crested cormorant in the Plan Area will not result in the direct mortality of adult birds; however, for some individuals, reproduction may be impaired or life expectancy shortened. Due to the difficulty in quantifying the number of double-crested cormorants that will be taken over the 75-year permit term, the Service is quantifying the take as the number of acres of double-crested cormorant habitat that will be impacted in the Plan Area as a result of the proposed action. We anticipate that up to 1,693 acres of breeding and foraging habitat within the Plan Area will become unsuitable for double-crested cormorants as a result of the proposed action.

Take will be in the form of harm and injury. This level of take is not likely to result in jeopardy to the double-crested cormorant.

Downy woodpecker (*Picoides pubescens*)

Status of the Species

Listing Status

The downy woodpecker is not listed under the Federal or State Endangered Species Acts.

Species Description

The downy woodpecker is the smallest (145-170 millimeters total length) and one of the most widespread of North American woodpeckers. Upperparts are black with white stripes on the head, above and below the eye and white spots on the wingfeathers. The tail is black and underparts are white. Adult male and female are similar in size and plumage, except the male has a red patch on the nape. The juvenile male has a red patch on the forehead but not on the nape (Jackson and Ouellet 2002).

Habitat Affinities

The downy woodpecker generally occurs in open, deciduous, especially riparian, woodlands throughout its range in both breeding and winter seasons (Jackson and Ouellet 2002). It is less abundant in coniferous forests except when associated with a deciduous understory (Jackson and Ouellet 2002). Within southern California, the downy woodpecker generally inhabits deciduous woodlands (especially willow), mixed oak and deciduous growth, orchards, suburban plantings, and occasionally in conifers (Garrett and Dunn 1981). The highest densities of this species are reached in deciduous woodlands that include small trees with low canopy heights (Foss 1994; Winternitz 1998). Abundance of downy woodpeckers has been correlated with occurrence of large snags and logs (Stark *et al.* 1998). Foraging occurs on the surfaces and shallow subsurfaces of live and dead trees and tall weeds in open woods, suburban yards and parks (Jackson and Ouellet 2002).

Downy woodpeckers dig cavities for nesting and roosting in deciduous trees (Zeiner *et al.* 1990a). This species is characterized as a relatively weak excavator therefore preferring to nest in dead trees or dead tops of live trees or to use extremely soft woods (Harestad and Keisker 1989).

Nest cavities are excavated in a snag or dead branch 1.3 to 15 meters (4-50 feet) above the ground, in trees at least 23 centimeters (9 inches) in diameter at breast height (Bent 1939; Lawrence 1967). Nest cavities are not reused (Jackson and Ouellet 2002).

Life History

The downy woodpecker consumes insects, other arthropods, fruits, seeds, some cambium tissue, and sap (Jackson and Ouellet 2002). Beal (1911) reported 76 percent of its diet was animal matter primarily composed of beetles, ants, caterpillars, and other larvae. The downy woodpecker probes, pecks, gleans for insects and occasionally hawks insects (Bent 1939). Unlike some other woodpecker species, downy woodpeckers forage on a variety of foods over a large winter home range and do not re-visit cache locations (Volman *et al.* 1997).

During breeding the male and female form a pair bond that typically lasts through the fall. Breeding occurs from late March to early September with peak nesting activity from May to June. As with most woodpeckers, courtship includes the male drumming on dry, resonant limbs to attract a female (Bendire 1895). The average clutch is 4-5 eggs; the range is 3-7 eggs. The incubation period is 12-13 days. Both parents incubate and care for the altricial young. Usually one brood is raised per year (Dawson 1923). Nesting success is probably high. Ritchison (1999)

suggest a 70-85 percent success rate. There is no data on mean longevity. During winter, downy woodpeckers form a loose social structure where male-female associations may occur and individuals are generally seen with two or three conspecifics.

Predators of the downy woodpecker, or its eggs, include hawks, owls, snakes, squirrels, rats, and domestic cats (Jackson and Ouellet 2002). There is little information on home range and/or territory size; however in Ontario, Lawrence (1967) observed two downy woodpecker breeding territories of 2.0 and 3.2 hectares (5 and 9 acres).

Status and Distribution

Downy woodpeckers are resident in appropriate habitats from western and central Alaska eastward to Newfoundland southward to southern California and southern Florida (AOU 1998). Some populations migrate or withdraw to southward areas from the northern part of the range in the fall and winter. Otherwise, the species tends to descend from the higher mountains to winter within lower elevation habitat (Terres 1980).

According to Zeiner *et al.* (1990a), the downy woodpecker is a common, year-long resident in California, below 1,800 meters (5,900 feet) and is absent from southern California desert regions. In southern California, the downy woodpecker is present from Los Angeles County southward and eastward locally through San Bernardino County and Riverside County, south to the vicinity of Temecula, and into northern San Diego County (Garrett and Dunn 1981). The species primarily occurs in the lowlands and foothills and is generally absent in mountainous areas but is known to occur within the montane regions in low numbers (Garrett and Dunn 1981).

Grinnell and Miller (1944) considered the downy woodpecker locally common in California but declining due to loss of riparian woodlands and snags. Garrett and Dunn (1981) considered it fairly common from Los Angeles or Ventura counties northwards but extending uncommonly and very locally south to extreme northern San Diego County. Unitt (1984) reported it was never common in southern California, but was declining, likely due to habitat destruction and fragmentation.

Threats

The primary threats to the downy woodpecker in the Plan Area are destruction and fragmentation of suitable nesting and foraging habitat. In particular, the loss of open wooded areas with large snags for nesting would have a negative impact on the species. A variety of primary and secondary cavity nesters will compete with downy woodpeckers for nest and roost cavities; thus there is potential for a shortage of snags and tree cavities (Jackson and Ouellet 2002).

Conservation Needs

Because the downy woodpecker is mainly found in riparian woodlands, the hydrological processes that maintain this habitat needs to be preserved, especially within the Santa Ana River Basin where the majority of recorded observations for this species occur. In addition, known

and future nesting locations should be protected along with preferred nesting micro-habitat (*i.e.*, groups of large snags).

Environmental Baseline

Downy woodpeckers primarily occur in the lowlands and foothills of the Plan Area and are generally absent in mountainous areas; however, they are occasionally recorded to 6,562 feet (2,000 meters) in the San Bernardino Mountains (Garrett and Dunn 1981). Nesting and foraging habitat for the downy woodpecker occurs within all Bioregions of the Plan Area. The primary vegetation types used to model habitat for this species were riparian scrub, woodland, forest and woodlands and forests. Based on this analysis, the Plan Area supports approximately 45,464 acres of modeled habitat for the downy woodpecker. Approximately 27,604 acres (61 percent) of the modeled habitat occurs within PQP Lands. Because the species' microhabitat associations (*i.e.*, riparian/woodland areas with appropriate large snags for nesting and roosting) are not distributed throughout all of the potential vegetation communities, modeled habitat likely overestimates the extent of suitable habitat for this species within the Plan Area.

No species-specific distribution surveys for the downy woodpecker have been conducted in the Plan Area. The information available indicates that the species is sparsely distributed throughout the Plan Area within suitable habitat. The majority of the observations occur in riparian areas along creeks and reservoirs. Main concentrations of records occur on PQP Lands along the Santa Ana River from SR-60 to the Prado Basin. In 2003, the downy woodpecker was deemed to be common within the Prado Basin (Dharm Pellegrini, Orange County Water District, pers. comm., July 29, 2003). Additional occurrences on PQP Lands include the San Jacinto Wildlife Area, Lake Skinner Recreation Area, Bogart County Park and March Air Reserve Base.

Outside of PQP Lands our dataset includes several observations of downy woodpecker in the vicinity of the UCR campus area west of Box Springs, along the Temescal Wash, along the Temecula Creek/Vail Lake area and in Mockingbird Canyon, north of Lake Mathews. Other specific geographic locations recorded in our dataset include: Alberhill Creek, Woodcrest, Dawson Canyon, Tule Canyon, the Badlands, Murrieta Hot Springs, and Wilson Creek. Based on information in the MSHCP downy woodpeckers have been recorded at Murrieta Creek and at Railroad Canyon. Additional locations identified in the MSHCP (Motte-Rimrock Reserve, Potrero Creek, San Timoteo Creek, San Jacinto River, Lake Mathews) were not included in our dataset due to the age or the precision level of the records.

Effects of the Action

Direct Effects

The Plan Area includes 45,464 acres of modeled nesting and foraging habitat for the downy woodpecker. Downy woodpeckers will be subject to impacts associated with development and other proposed Covered Activities over the 75-year permit term within 12,059 acres (27 percent) of this modeled habitat, which encompasses 40 of the 68 (59 percent) downy woodpecker observations in our dataset. It is anticipated that most of the breeding and foraging habitat for the downy woodpecker in these areas will be lost as a result of development, although some

habitat for this species may remain in areas avoided as a result of the Riparian/Riverine Areas and Vernal Pools policy. Adult birds may be able to disperse to adjacent habitats, particularly rural mountainous areas where development impacts are anticipated to occur at a slower rate and at lower densities. Approximately 5,131 acres (43 percent) of the non-conserved modeled habitat for the downy woodpecker are designated as rural/mountainous land. However, displaced birds that are unable to locate suitable roosting cavities will experience increased rates of predation or otherwise die or be injured due to loss of their sheltering habitat. The loss of suitable nesting and roosting cavities may also impact population numbers of the downy woodpecker within the Plan Area over the long term by increasing competition for the remaining suitable habitat.

To offset the loss of downy woodpecker habitat within the Plan Area, the MSHCP will conserve and manage 5,800 acres (13 percent) of modeled habitat for the downy woodpecker within Additional Reserve Lands. Another 27,604 acres (61 percent) of modeled habitat will remain in PQP Lands. In total, 73 percent of the modeled habitat for the downy woodpecker will be conserved or remain in the Plan Area. The MSHCP Conservation Area will include suitable microhabitat (groups of large snags) within potential nesting habitat for the downy woodpecker, as stated in the species-specific objectives for this species.

The modeled habitat encompasses only 81 percent of the downy woodpecker observations in the Plan Area. Twenty-eight out of the sixty-eight (41 percent) recent records from our dataset will be included within the MSHCP Conservation Area; 5 (7 percent) of these occurrences will be conserved within Additional Reserve Lands, and 23 (34 percent) of these occurrences will remain within PQP Lands.

Five Core Areas will support the downy woodpecker in the MSHCP Conservation Area at Prado Basin/Santa Ana River Area, Temescal Wash, Alberhill Creek, Vail Lake and Temecula Creek. In addition, other large habitat blocks that support locations and/or contain potential habitat for this species will also be conserved or remain in the Plan Area including: San Timeteo Creek, the Badlands, Portrero, Wilson Valley, Lake Perris/San Jacinto Wildlife Area, Lake Matthews-Estelle Mountain, Sycamore Canyon Regional Park, Lake Skinner and riparian habitat and drainages within the Cleveland National Forest and San Bernardino National Forest. The MSHCP Conservation Area will also provide adequate habitat linkages between Core Areas for this species and will include smaller drainages that may support small numbers of the downy woodpecker.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands, including surveys for the downy woodpecker. Cooperative management and monitoring are anticipated on PQP Lands. Surveys for the downy woodpecker will be conducted at least every eight years to verify occupancy at a minimum of 75 percent of the known locations. If a decline in distribution of the downy woodpecker is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9-2 of the MSHCP.

Reserve managers will ensure habitat support functions by maintaining, preserving, and/or enhancing hydrological processes of the Prado Basin/Santa Ana River. Reserve managers will

also manage known and future identified nesting localities and protect micro-habitat (*i.e.*, groups of large snags) in potential nesting habitat. Particular management emphasis will be directed toward preventing habitat destruction (*e.g.*, cattle grazing) and fragmentation (MSHCP Section 5, Table 5-2). These measures and the other general management actions described in Section 5 of the MSHCP will help maintain habitat and reduce threats to the downy woodpecker.

Indirect Effects

The downy woodpecker could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These impacts include the indirect effects described in the “General Effects” section of this biological opinion. In particular, maintaining the hydrological processes and water quality standards (*e.g.*, controlling sedimentation and other pollutants) of wetland habitats will be important to sustaining downy woodpeckers in the MSHCP Conservation Area. Implementation of the Riparian/Riverine Areas and Vernal Pools policy and the Urban/Wildlands Interface policy will help minimize the indirect effects of the Covered Activities on foraging and breeding habitat for the downy woodpecker.

Conclusion

We anticipate the proposed action will directly and indirectly affect the downy woodpecker as described in the analyses above, including the loss of 27 percent of its modeled habitat in the Plan Area. Implementation of the avoidance, minimization, and mitigation measures will reduce the impacts to this species. We anticipate that this species will persist in the remaining 73 percent of its modeled habitat within both the existing PQP Lands and the Additional Reserve Lands. Together these lands form a system of large, contiguous habitat blocks that are interconnected within the Plan Area. We anticipate that these areas will be monitored and managed cooperatively to benefit this species.

After reviewing the current status of this species, the environmental baseline for the Plan area, the effects of the proposed action, and the cumulative effects, it is the Service’s biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the downy woodpecker. We reached this conclusion because most of this species modeled habitat occurs within PQP Lands and because the impacts associated with loss of this species’ habitat, when viewed in conjunction with protection and management of the MSHCP Conservation Area, are not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Amount or Extent of Take

Because downy woodpeckers are cavity nesters, and the number of suitable nesting snags within potential habitat is not known, it will be difficult to quantify the number of individuals that will be taken as a result of the proposed action over the 75-year permit term. Therefore, the Service is quantifying the take as the number of acres of modeled habitat that will be impacted in the Plan Area as a result of the proposed action. We anticipate that up to 12,059 acres of nesting and foraging habitat within the Plan Area will become unsuitable for downy woodpeckers as a result

of the proposed action. Take will be in the form of harm, death, and injury. This level of take is not likely to result in jeopardy to the downy woodpecker.

Ferruginous hawk (*Buteo regalis*)

Status of the Species

Listing Status

The ferruginous hawk (*Buteo regalis*) is a Fish and Wildlife Service migratory non-game bird of management concern and is considered a California Species of Special Concern by the California Department of Fish and Game. It is not listed under the Federal Endangered Species Act.

Species Description

The largest member of the genus *Buteo* in North America, the ferruginous hawk is a massive, broad-winged hawk with a large head, wide gape, and robust chest. Both a light and dark morph occur in the species, with dark morph individuals estimated at 1 to 10 percent of the population (Schmutz and Schmutz 1981; Bechard and Schmutz 1995).

Habitat Affinities

The ferruginous hawk is an occupant of open dry country and will perch on badger mounds or hillocks when trees or posts are not available. It requires large, open tracts of grasslands, sparse shrub, or desert habitats with elevated structures (boulders, creek banks, low cliffs, trees, large shrubs etc.) for nesting (Bechard and Schmutz 1995). In the breeding season, it occurs in grasslands, sagebrush country, saltbush-grease-wood shrublands, and the periphery of western pinyon-juniper and other forests (Olendorff 1993).

The species winters in open terrain from grassland to desert, particularly where prairie dogs, lagomorphs, or pocket gophers are abundant. In California, it sometimes roosts communally in groups of up to 24 birds in the winter (Olendorff 1993).

Life History

The ferruginous hawk hunts throughout the day from early morning to late afternoon but may exhibit more crepuscular activity in some regions, often depending on the activity of their primary prey. It hunts from perches and the ground, as well as aerially and by hovering. Its choice of main prey varies by location. West of the continental divide, it primarily consumes lagomorphs, while it mainly eats ground squirrels and prairie dogs to the east (Olendorff 1993). It may also eat mice, birds, reptiles, and amphibians. Population trends may follow lagomorph population cycles.

The ferruginous hawk roosts on cliffs, haystacks, utility structures, the ground, and in trees, singly or in pairs. In winter, it typically roosts in groups of 6-12 and spends most of the daylight hours perched (Bechard and Schmutz 1995; Plumpton and Andersen 1997). The ferruginous

hawk nests in trees and shrubs, cliffs, utility structures, and ground outcrops (Bechard and Schmutz 1995). Nests are built of stems, sticks, twigs, and debris. Ferruginous hawks are monogamous (Bechard and Schmutz 1995). Egg laying begins in April (Weston 1969; Olendorff 1973), and average clutch size ranges from 2-4 eggs, but it can range from 1-8 depending on prey abundance. The incubation period is about 28 days. The young fledge at 38-50 days (Olendorff 1973; Smith and Murphy 1973), and an average of 2.9 chicks fledge per breeding per year (Bechard and Schmutz 1995).

Banding information on the ferruginous hawk from the 1970's to 1980's suggests a first year mortality rate of about 65 percent, although this is now thought to be an overestimate. Other estimates of adult mortality are approximately 25 percent. Maximum potential longevity is 20 years (Bechard and Schmutz 1995). Potential predators include the great horned owl, corvids, coyotes, badgers, and foxes.

Dispersal of the ferruginous hawk after fledging may vary from 25 kilometers to as far as 1,700 kilometers. Little is known about fidelity to breeding sites and to the winter home range by migratory individuals (Bechard and Schmutz 1995). Sedentary individuals typically remain near the breeding territory year round. The ferruginous hawk may defend its territory during the breeding season but is not territorial in the winter. Home ranges for the species were estimated at 5.9 km² and 7.6 km², with the latter area for breeding males (Bechard and Schmutz 1995).

Status and Distribution

The ferruginous hawk breeds from British Columbia locally eastward to southwestern Manitoba generally southward to Nevada and Texas. It winters from central and southern parts of the breeding range southward to Baja California and northern mainland Mexico (AOU 1998).

The ferruginous hawk broadly occupies areas where it was reported historically (Bechard and Schmutz 1995). Its range has retracted at the edge in Alberta, Saskatchewan, and Manitoba during the early 1900s due to agriculture and invasion of aspen into remaining prairie habitats (Bechard and Schmutz 1995). Historically, the ferruginous hawk wintered in the Los Angeles area. Christmas Bird Count data show increases in birds wintering in the eastern portion of its range and in California during the 1980s owing to loss of wintering habitat in the Great Plains (Bechard and Schmutz 1995).

Zeiner *et al.* (1990a) describe the distribution, abundance, and seasonality of the ferruginous hawk in California as an uncommon winter resident and migrant at lower elevations and open grasslands in the Modoc Plateau, Central Valley, and Coast Ranges. It generally arrives in California in September and departs by mid-April. In southwestern California, the ferruginous hawk is a fairly common winter resident of grasslands and agricultural areas but does not breed there (Garrett and Dunn 1981).

Threats

Continuing threats to the ferruginous hawk include habitat destruction and fragmentation. In Orange County, so much habitat has been destroyed there is only habitat for about 10 birds per

year (Hamilton and Willick 1996). Other threats may include cultivation, grazing, shooting, poisoning and controlling small mammals, collisions with automobiles and power-lines, disturbance at the nest site, and mining (Olendorff 1993; Bechard and Schmutz 1995). Artificial disturbances, created to mimic land development, caused 33 percent of disturbed nests to be deserted and fledging success to be significantly lower compared to undisturbed nests. A minimum buffer zone of 0.25 kilometers around nests should be sufficient to prevent nest desertion if intermittent or brief human disturbance is necessary (White and Thurow 1985).

Conservation Needs

Large blocks of open habitat supporting known and potential foraging locations are needed to maintain a wintering population. Foraging habitats for the ferruginous hawk need to contain an adequate source of prey, especially ground squirrels, gophers, jackrabbits and cottontail rabbits.

This species may exist compatibly in urban open space grasslands, as long as prey populations persist (Berry, *et al.* 1998). In winter, the species is behaviorally flexible and tolerant of human disturbance and alteration of landscapes providing that an adequate prey base is available (Plumpton and Anderson 1997).

Environmental Baseline

The ferruginous hawk is an opportunistic predator that may forage in open habitats throughout the Plan Area, including agricultural land (field croplands), grassland, playas and vernal pools, coastal sage scrub, cismontane alkali marsh, desert scrubs, peninsular juniper woodland and scrub, and Riversidean alluvial fan sage scrub. The breeding range for this species does not extend into California. (AOU 1998). The above habitats within the Riverside Lowlands and San Jacinto Foothills Bioregions were used to model habitat for the ferruginous hawk within the Plan Area. We found that the Plan Area supports approximately 361,398 acres of modeled habitat for this species. Fifteen percent (54,872 acres) of the modeled habitat occurs within PQP Lands.

According to our dataset, there are 57 recent (post 1988) records for ferruginous hawk within the Plan Area. These known locations generally include Lake Perris/San Jacinto Wildlife Area, Lake Skinner/Diamond Valley Reservoir, Murrietta Hot Springs, Moreno Valley and Hemet.

Effects of the Action

Direct Effects

The Plan Area includes 361,398 acres of modeled foraging habitat for the ferruginous hawk. Loss of 234,978 acres (65 percent) of this modeled habitat is anticipated over the 75-year permit term, which encompasses 42 of the 57 (74 percent) observations in our dataset. Loss of foraging habitats to development will cause ferruginous hawk to disperse in search of other open foraging habitats and experience increased competition for the remaining suitable habitat. Birds forced to disperse may also experience decreased fitness due to increased energy and time spent locating new habitats. Ferruginous hawks do not breed in the Plan Area but are known to be common winter visitors. Therefore, loss of modeled habitat will not impact ferruginous hawk breeding

habitat or breeding individuals. However, a 65 percent loss of foraging habitat is likely to reduce the overall numbers of wintering ferruginous hawks that can be supported by remaining habitats in the Plan Area.

The MSHCP will conserve and manage 71,548 acres (20 percent) of modeled habitat for the ferruginous hawk within the Additional Reserve Lands. Another 54,872 acres (15 percent) of modeled habitat will remain within PQP Lands. In total, 126,420 acres (35 percent) of the modeled habitat for the ferruginous hawk will be conserved or remain in the Plan Area. This modeled habitat includes 15 of the 57 (26 percent) observations of the ferruginous hawk in our dataset. As stated in the Plan, the MSHCP Conservation Area will include areas with suitable habitat, specifically including 2,690 acres at Mystic Lake/San Jacinto Wildlife Area and 5,520 acres of riparian habitat at Prado Basin/Santa Ana River within the Plan Area.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands, including surveys for the ferruginous hawk. Cooperative management and monitoring are anticipated on PQP Lands. Surveys for the ferruginous hawk will be conducted at least every eight years to verify occupancy at a minimum of 75 percent of the known or future-identified locations. If a decline in the distribution of the ferruginous hawk is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP. In addition, the ferruginous hawk will benefit from the General Management Measures described in Section 5 of the MSHCP, which provide for control of unauthorized public access, maintenance of existing habitat, including control of invasive weeds, and management of specific threats to the species.

Indirect Effects

The ferruginous hawk could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These impacts include the indirect effects described in the “General Indirect Effects” section of this biological opinion. Implementation of the Urban/Wildlands Interface policy will help minimize the indirect effects of the Covered Activities on foraging habitat for the ferruginous hawk.

Conclusion

We anticipate the proposed action will directly and indirectly affect the ferruginous hawk as described in the analyses above, including the loss of 65 percent of its modeled habitat in the Plan Area. Implementation of the avoidance, minimization, and mitigation measures identified in the Plan will reduce the impacts to this species. We anticipate that this species will be able to persist in the remaining 35 percent of the modeled habitat within both the existing PQP Lands and Additional Reserve Lands. Together these lands form a system of large, contiguous habitat blocks that are inter-connected within the Plan Area. We anticipate that these lands will be monitored and managed cooperatively to benefit this species.

After reviewing the current status of this species, the environmental baseline for the Plan area, the effects of the proposed action, and the cumulative effects, it is the Service’s biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the

ferruginous hawk. We reached this conclusion based on the widespread distribution of the species in North America and because the species only winters and does not breed in the Plan Area. Thus, the impacts associated with loss of this species' wintering habitat, when viewed in conjunction with protection and management of the MSHCP Conservation Area, is not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Amount or Extent of Take

Due to the difficulty in quantifying the number of ferruginous hawks impacted by the proposed action over the 75-year permit term, we are quantifying the take as the number of acres of habitat that will be impacted in the Plan Area as a result of the proposed action. We anticipate that up to 234,978 acres of modeled foraging habitat within the Plan Area will become unsuitable for the ferruginous hawk as a result of the proposed action. We anticipate that zero (0) ferruginous hawks will be taken as a result of the proposed action. This level of take is not likely to result in jeopardy to the ferruginous hawk.

Golden Eagle (*Aquila chrysaetos*)

Status of the Species

Listing Status

The golden eagle receives Federal protection under the Migratory Bird Treaty Act of 1918, as amended, and the Bald Eagle Protection Act of 1940, as amended. The golden eagle is not listed under the Federal Endangered Species Act of 1973. The golden eagle is a Species of Special Concern and is considered a Fully Protected Species by the California Department of Fish and Game.

Species Description

The golden eagle is 30 to 40 inches long, with a wing span of 80 to 88 inches, large bill and feathered legs extending to talons (National Geographic Society 1987). It is named for the coloring of its head and neck, which varies from tawny to golden brown. The rest of the body is dark brown, and the underside of the tail may have a white base. Females are larger than males. Immature golden eagles appear similar in color as to adults, but with a large white patch at the base of the primaries and a white tail with a dark terminal band.

Habitat Affinities

Johnsgard (1990) identifies the essential components of eagle habitat as a favorable nest site (cliff or large tree), a dependable food supply (medium to large mammals and birds), and broad expanse of open country for foraging. Within southern California, the species prefers grasslands, brushlands (coastal sage scrub and sparse chaparral), deserts, oak savannas, open coniferous forests, and montane valleys (Garrett and Dunn 1981). Nesting commonly occurs on cliffs and rock outcroppings; however, eagles will also nest in large trees including oaks, sycamores,

redwoods, pines and eucalyptus (Polite and Pratt 1990). Nesting is primarily restricted to rugged, mountainous country (Garrett and Dunn 1981). Secluded cliffs with overhanging ledges and large trees are used for cover (Zeiner *et al.* 1990a). During the winter season, golden eagles are found in shrub-steppe vegetation and may use wetlands, river systems and estuaries in the coastal areas (Terres 1980). They are typically not found in heavily forested areas or on the immediate coast and are almost never detected in urban areas (Grinnell and Miller 1944; Garrett and Dunn 1981)

Life History

In late winter and early spring, golden eagles commonly engage in nuptial displays consisting of aerial maneuvers, carrying material to the nest and vocalizing (Hickman 1968). They breed from late January through August, with a peak in March through July (Polite and Pratt 1990). Nests are constructed by both sexes (Bergo 1987) and may or may not be occupied the year they are built (Dixon 1937). Eggs are usually laid in February or March, although occasionally as late as May. The clutch size is between one and three eggs and is usually two eggs (McGahan 1968). Incubation normally lasts 43-45 days, and young fledge from the nest between 65-70 days (Beebe 1974). Parental care continues into August and family groups remain together into November (Scott 1985). The young often appear near the nest site in the early part of the following breeding season and sometimes frequent a nest site for several years before they finally breed at about four years of age (Brown and Amadon 1968).

Golden eagles are opportunistic foragers, eating mainly lagomorphs and rodents in addition to other mammals, birds, reptiles, and some carrion (Olendorff 1976). In southern California, the prey of golden eagles is made up predominantly of the California ground squirrel (*Citellus beecheyi*) and the Audubon cottontail (*Sylvilagus auduboni*) (Hoechlin 1976). The diet is most varied in the non-breeding season. Foraging takes place over large areas of grassland and open chaparral or coastal sage scrub. Golden eagles soar 98-297 feet above the ground in search of prey, or make low, quartering flights, often 23-26 feet above ground (Polite and Pratt 1990). Hunting in pairs is common with one member of the pair chasing the prey to exhaustion and the other swooping down to kill the prey (Terres 1980).

The size of home range is related to density and availability of prey and the openness of the terrain. A territory is estimated to average 36 square miles in southern California (Dixon 1937) and 48 square miles in northern California (Smith and Murphy 1973). Home range is probably the same as territory (Zeiner *et al.* 1990a). Although total home range can be very large, individuals tend to focus on a smaller core area within the total home range (Marzluff *et al.* 1997). Golden eagles defend nest areas from conspecifics and appear to defend part of their home range; however, there can be substantial overlap between the home ranges of adjacent pairs (Scott 1985).

Status and Distribution

Golden eagles are found throughout the United States and Canada, ranging from southern Alaska to central Mexico. They are sparsely distributed throughout most of California, occupying primarily mountain and desert habitats. Formerly considered common within suitable habitats in

California (Grinnell and Miller 1944), they have more recently been described as uncommon throughout much of California (Garrett and Dunn 1981; Polite and Pratt 1990). Within California, golden eagles occupy habitats at elevations from sea level up to 11,500 feet (Grinnell and Miller 1944).

In California, the golden eagle population tends to increase in size in winter months because of the influx of migrants (Grinnell and Miller 1944; Weathers 1983; Unitt 1984). No recent population estimates are available, but the winter population was estimated at 5,000 by Olendorff *et al.* (1981). Thelander (1974) estimated 500 breeding pairs nested in California. The golden eagle avoids urbanized areas and, therefore, has almost certainly declined in Riverside County and California as a whole within the past century due to loss of large unfragmented habitat areas (Grinnell and Miller 1944).

Threats

Threats to the golden eagle include habitat loss and alteration, human disturbance of nest areas, poaching, and electrocution from power distribution lines (Remsen 1978; Olendorff *et al.* 1981). The loss or fragmentation of foraging habitat may impair essential behavioral activity such as breeding, feeding, and sheltering. Eagles may desert their nest in early incubation if disturbed by humans (Thelander 1974). In a study of golden eagles in San Diego County, there was a significant correlation between nest abandonment and areas that contained 50 or more dwellings within a 1.6 kilometer radius of the nest (Scott 1985). Electrocution by small distribution lines mainly affects juveniles and birds flying in windy or stormy weather (Olendorff *et al.* 1981). Recent advances have been made in the design of power poles to avoid electrocution (APLIC 1996), but measures have not necessarily been implemented in areas where the poles pose a threat.

Conservation Needs

The conservation of the golden eagle depends on the protection of breeding locations and foraging habitats. Conserved lands in appropriate landscapes should be managed to provide secure breeding, foraging, and roosting areas for the golden eagle. This management includes creating adequate buffers around known nesting sites. Management also should include retrofit of power poles with electrocution protection devices.

Environmental Baseline

The golden eagle has been observed throughout the Plan Area with the exception of high elevation densely forested areas. Current nest site locations include Temecula Gorge, in the hills east of Sun City, in the hills north of Aguanga west of SR-371, Elsinore Peak, Rawson Canyon, Double Butte, Mesa de Burro on the Santa Rosa Plateau, on a transmission line in San Timoteo Canyon (likely nest), and possibly in the Box Springs Mountains and on Arlington Mountain. However, the nest sites in the Box Springs Mountains and on Arlington Mountain appear to be abandoned (LaPré 2002).

Habitat for the golden eagle exists throughout the Plan Area in woodlands and forests, coastal sage scrub, desert scrub, Riversidean alluvial fan sage scrub, grasslands, and playa and vernal pools. The habitat model for the golden eagle was created by capturing undeveloped lands within these primary vegetation types. While the species may use sparse chaparral for foraging, the Plan Area has not been mapped to distinguish between sparse and dense chaparral, thus this plant community is not included within the modeled habitat. Based on this analysis, the Plan Area supports approximately 334,982 acres of modeled habitat for the golden eagle. Approximately 81,464 acres (24 percent) of that total are within PQP Lands.

Effects of the Action

Direct Effects

The Plan Area includes 334,982 acres of modeled nesting and foraging habitat for the golden eagle. Loss of 177,814 acres (53 percent) of this modeled habitat is anticipated over the 75-year permit term, which encompasses 76 (70 percent) of the 109 observations in our dataset. While this constitutes a large proportion of the total observations for the species in the Plan Area, the observations in our dataset are primarily of birds in flight since the species is wide ranging and has large territories. Thus, the observations represent general records and do not identify the type or activity of the observation (*e.g.*, nest, pair, foraging, flight, etc.). Effects to the species are better explained in terms of overall habitat loss and protection of nesting locations.

While the loss of golden eagle habitat distributed over the Plan Area is not anticipated to result in the death of adult golden eagles, the loss of habitats to development will cause birds to disperse in search of other habitats and experience increased competition for the remaining suitable habitat. Some may disperse to rural/ mountainous areas where development impacts are anticipated to occur at a slower rate and at lower densities. Approximately 42,765 acres (24 percent) of the non-conserved modeled habitat for the golden eagle are designated as rural/mountainous land. However, birds forced to disperse may experience decreased fitness due to increased energy and time spent locating new habitats. Thus, loss of nesting and foraging habitat may impact population numbers of the golden eagle within the Plan Area over the long term by reducing the number of areas suitable for use as foraging and nesting sites.

The following known nesting locations will be protected within the MSHCP Conservation Area: Temecula Gorge, the hills north of Aguanga west of SR-371, Elsinore Peak, Rawson Canyon, Mesa de Burro, and San Timoteo Canyon. These nest sites and any future nest sites found within the MSHCP Conservation Area will have a one-mile buffer established around the nest sites. Although the Sun City, Arlington Mountain, Box Springs Mountains, and Double Butte nesting locations are not included within the MSHCP Conservation Area, they have not been recently documented as being active, and no take of active nest sites will be permitted.

The golden eagle breeds from January through August, with a peak in activity from March to July. Incubation of the eggs usually lasts 43-45 days. Eaglets fledge between 65 and 70 days. Because the golden eagle is a Fully Protected Species in the State of California, no direct take of golden eagles or active nests is anticipated during the breeding season either inside or outside of the Criteria Area. However, habitat clearing and associated construction actions outside the

Criteria Area early during the breeding season of the golden eagle may result in disruption of normal breeding activities (nest site selection, pair formation, etc.).

The MSHCP will conserve and manage 75,704 acres (23 percent) of modeled habitat for the golden eagle within the Additional Reserve Lands. Another 81,464 acres (24 percent) of modeled habitat will remain in PQP Lands. In total, 157,168 acres (47 percent) of the modeled habitat for the golden eagle will be conserved or remain in the Plan Area. This modeled habitat includes 33 of 109 (30 percent) of the golden eagle observations in our dataset.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands, including surveys for the golden eagle. Cooperative management and monitoring is anticipated on PQP Lands. Surveys for the golden eagle will be conducted at least every eight years to verify continued use and successful reproduction at a minimum of 75 percent of the known or future-identified locations in the MSHCP Conservation Area. If a decline is documented below this threshold, then management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP.

Indirect Effects

The golden eagle could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These impacts include the indirect effects described in the “General Effects” section of this biological opinion. Implementation of the Riparian/Riverine Area and Vernal Pools policy and the Urban/Wildlands Interface policy will help minimize the indirect effects of the Covered Activities on foraging and breeding habitat for the golden eagle.

Conclusion

We anticipate the proposed action will directly and indirectly affect the golden eagle as described in the analyses above, including the loss of 53 percent of its modeled habitat in the Plan Area. Implementation of the avoidance, minimization, and mitigation measures identified in the Plan will reduce the impacts to this species. We anticipate that this species will be able to persist in the remaining 47 percent of the modeled habitat within both the existing PQP Lands and Additional Reserve Lands. Together these lands form a system of large, contiguous habitat blocks that are inter-connected within the Plan Area. We anticipate that these lands will be monitored and managed cooperatively to benefit this species.

After reviewing the current status of this species, the environmental baseline for the Plan area, the effects of the proposed action, and the cumulative effects, it is the Service’s biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the golden eagle. We reached this conclusion because the impacts associated with loss of this species’ habitat, when viewed in conjunction with protection and management of the MSHCP Conservation Area, is not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Amount or Extent of Take

The loss of up to 177,814 acres of nesting and foraging habitat for the golden eagle in the Plan Area is not likely to result in direct mortality of adult birds; however, for some individuals, reproduction may be impaired or life expectancy shortened. Due to the difficulty in quantifying the number of birds impacted by the proposed action over the 75-year permit term, we are quantifying the take as the number of acres of habitat that will be impacted in the Plan Area as a result of the proposed action. We anticipate that 177,814 acres of nesting and foraging habitat within the Plan Area will become unsuitable for the golden eagle as a result of the proposed action.

Take will be in the form of harm and injury. This level of take is not likely to result in jeopardy to the golden eagle.

Grasshopper Sparrow (*Ammodramus savannarum*)

Status of the species

Listing Status

The grasshopper sparrow is not listed under the Federal or State Endangered Species Acts. It is a Fish and Wildlife Service Migratory Non-game Bird of Management Concern.

Species Description

The grasshopper sparrow is a small, flatheaded sparrow with a deep bill, cream colored breast, dark crown, back streaked with chestnut-rust and black and yellow wing edges (Vickery 1996). Coloration varies among subspecies and cryptic behavior in the winter may make it difficult to distinguish the grasshopper sparrow from other *Ammodramus* sparrows (Vickery 1996). The juvenile of this species has a band of streaks across the breast.

Habitat Affinities

The grasshopper sparrow generally prefers moderately open grasslands and prairies with patchy bare ground for foraging. However, they select different components of vegetation depending on the grassland ecosystem. They occupy lush areas with shrub cover in the arid grassland of the southwest and west but select sparser vegetation in the east and midwest (Vickery 1996). During the winter, grasshopper sparrows may migrate from the breeding grounds and occupy weedy fields with scattered trees (Dunning 1989). They will use abandoned croplands that are dominated by grassy plant species.

Grasshopper sparrows in California breed and winter on slopes and mesas containing grasslands of varying compositions (Grinnell and Miller 1944; Garrett and Dunn 1981). The species frequents dense, dry or well-drained grassland, especially native grassland with a mix of grasses and forbs for foraging and nesting. Apparently, thick cover of grasses and forbs is essential for concealment. They require fairly continuous native grassland areas with occasional taller stems

for breeding areas (Garrett and Dunn 1981). Nests are built from grasses and forbs in a slight depression in the ground or hidden at the base of an overhanging clump of grasses or forbs (Bent 1968a; Zeiner *et al.* 1990a). Grasshopper sparrows use a variety of forb species for singing perches and choose them predominantly on the basis of their height rather than the specific plant species (Payne *et al.* 1998).

Life History

The grasshopper sparrow feeds primarily on insects and grass and forb seeds. There is a large proportion of grasshoppers in the diet, with most capture attempts aimed at the grasshopper thorax (Vickery 1996). Seeds make up a larger portion of the diet during the winter (Vickery 1996). The grasshopper sparrow searches for insect prey on the ground and in low foliage within relatively dense grasslands, sometimes scraping in the litter.

Breeding takes place from early April to mid-July, with a peak in May and June. Males establish territories ranging from 0.3 to 1.7 hectares (0.8 to 4.3 acres) per pair (Wiens 1969; Kendeigh 1941; Smith 1963). The clutch size usually is 4 or 5 eggs, sometimes 3 or 6, with the second clutch generally being smaller (Vickery 1996). Two to three broods may be raised per year. Incubation is approximately 11-12 days, by the female alone. The altricial young are tended by the female predominantly while the male reacts to predators near the nest and provides food for the young. Adult and juvenile nonparental attendants also are known to feed the young. The nonparental attendants may make 9 to 50 percent of the provisioning visits to the nests (Vickery 1996).

The young leave the nest at about nine days, although they are still unable to fly (Harrison 1978). The young of the first brood have usually dispersed from the natal territories when the adults are feeding the nestlings of the second brood (Vickery 1996). Most grasshopper sparrows will migrate south from the breeding area in August or September although fall migrants have been recorded in late September and early October on the Farallon Islands (DeSante and Ainley 1980). Migration takes place at night (Vickery 1996). Grasshopper sparrows may winter in mixed flocks with other sparrow species; however, they do not occur in conspecific flocks for wintering (Dunning 1989).

Status and Distribution

The grasshopper sparrow breeds from eastern Washington eastward to southern Maine southward to southern California, northernmost Mexico and Virginia. The species has a disjunct distribution through the more western portion of the United States and is not present within the mountainous and desert regions. It occurs in the areas east of the Rocky Mountains from Canada to the southern states as a breeding resident, wintering south into Florida and Mexico. It is a year round resident in the western states and in the southern portions of the southeastern states (Vickery 1996).

Grasshopper sparrows winter from California to North Carolina south through Middle America to Costa Rica (AOU 1998). In southern California, the species occurs locally in appropriate habitats west of the deserts and has nested to 1,500 meters in the San Jacinto Mountains (Garrett

and Dunn 1981). It appears to be very rare to absent from the region in the winter but may be overlooked (Garrett and Dunn 1981). The subspecies that breeds in California is *A. s. perpallidus*.

Zeiner summarized the distribution, abundance, and seasonality of the grasshopper sparrow for California as an uncommon and local, summer resident and breeder in foothills and lowlands west of the Cascade-Sierra Nevada crest from Mendocino and Trinity counties south to San Diego County. The species also has been found in Pete's Valley, Lassen County and Shasta Valley, Siskiyou County. It is secretive in the winter and may occur more regularly than indicated by infrequent records, chiefly in coastal southern California (Grinnell and Miller 1944; McCaskie *et al.* 1979; Garrett and Dunn 1981).

Populations of the grasshopper sparrow, especially the eastern most and western most subspecies, have declined by 69 percent across the United States since the late 1960s. More specifically, Breeding Bird Survey data show an annual decline of 3.9 percent throughout North America with an annual decline of 4.5 percent in the western United States between 1966 and 1994 (Vickery 1996). In Illinois, the loss of prairie habitat is responsible for earlier population declines (Vickery 1996).

In southern California, the grasshopper sparrow was formerly more widespread through the Riverside area to Beaumont (Garrett and Dunn 1981). The species likely does not occur in Los Angeles County except for some potentially small unknown populations, and suitable habitat in San Diego County is diminishing rapidly with urban development of the coastal lowland (Small 1994; Garrett and Dunn 1981; Unitt 1984). Similarly, grassland habitats in Orange County are rapidly being lost to urban development. Remaining population centers for this species in southern California include undeveloped portions of coastal southern Orange County and Camp Pendleton, Lake Hodges and Mission Trails Regional Park in San Diego County, and scattered sites throughout the Plan Area.

Threats

Continuing threats to the species include habitat loss, degradation, and fragmentation. Grazing in western North America has had a negative impact on this species (Vickery 1996). Garrett and Dunn (1981) concluded that the grasshopper sparrow has declined as a breeder in recent decades because of development of open hilly areas that include its preferred habitat. Brown-headed cowbird parasitism does occur but is generally considered low (Vickery 1996).

Predation appeared to be the major cause of nest failure in one population of the grasshopper sparrow (Perkins *et al.* 1998). Predation rates appear to be highest for nests placed in smaller grassland areas (less than 15 hectares) and for areas adjacent to edges composed of wooded areas (Burger *et al.* 1994).

Although threats to the species in western Riverside County have not been specifically studied, the list of range-wide threats mentioned above likely apply to the Plan Area including the degradation, fragmentation, and destruction of habitat as a result of suburban development and the construction and operation of associated infrastructure.

Conservation Needs

Focused surveys during the spring (when birds are actively vocalizing) to assess population numbers would greatly improve our knowledge of the relative status and distribution of this species in the Plan Area. This sparrow requires large contiguous blocks of native and non-native grasslands with minimized fragmentation and specific management actions. Fire and mowing are management tools that could be used to maintain suitable habitat (Vickery 1996). In addition to the conservation of existing habitat, restoring degraded or disturbed areas to grassland may benefit the grasshopper sparrow.

Environmental Baseline

Although no Plan Area assessments of the status and distribution of the grasshopper sparrow have been completed, the species apparently occurs within the western Riverside County in select, scattered habitat areas within the lowlands. Database records are relatively sparse but indicate the species primarily occurs within the central portion of the Plan Area in the Prado Basin Area, the Lake Perris area, south to the Temecula Valley and east to Lake Skinner (Cooper 2001). The Core Areas appear to include the Prado Basin, Santa Rosa Plateau, Lake Skinner/Diamond Valley Lake area, Lake Mathews-Estelle Mountain, Wasson Canyon, and Murrieta Hot Springs area (MSHCP, Volume II-B, page B-231).

The primary vegetation types used to model habitat for this species were non-native grassland and valley/foothill grassland within the Riverside Lowlands, Santa Ana Mountains, and San Jacinto Foothills Bioregions. Based on this analysis, the Plan Area supports 118,653 acres of modeled habitat for the grasshopper sparrow. Approximately 19,549 acres (16 percent) of this modeled habitat occurs within PQP Lands. Because the grasshopper sparrow prefers grasslands with a considerable variety of plant species containing thick cover (Grinnell and Miller 1944) or fairly continuous native grassland with occasional taller weedy stems or shrubs (Garrett and Dunn 1981), modeled habitat likely overestimates the extent of suitable habitat available for this species in the Plan Area.

Effects of the Action

Direct Effects

The grasshopper sparrow will not be considered a Covered Species Adequately Conserved by the MSHCP until the MSHCP Conservation Area includes at least 8,000 acres in 7 Core Areas from the following locations: 1) Prado Basin; 2) Lake Skinner/Diamond Valley Lake/Johnson Ranch area; 3) Lake Mathews-Estelle Mountain; 4) Badlands; 5) Box Springs; 6) Santa Rosa Plateau/Tenaja; 7) Kabian Park; 8) Steele Peak; 9) Sycamore Canyon; 10) Potrero Valley; and 11) Mystic Lake/San Jacinto Wildlife Area. Three of the 7 Core Areas will consist of a minimum of 2,000 acres of grassland habitat or grassland-dominated habitat (< 20 percent shrub cover). The other 4 Core Areas may be smaller but will consist of at least 500 acres of contiguous grassland habitat or grassland-dominated habitat (< 20 percent shrub cover). Five of the 7 Core Areas must demonstrate the support of at least 20 grasshopper sparrow pairs with evidence of successful reproduction within the first five years after permit issuance. Successful

reproduction is defined as a nest that fledged at least one known young (MSHCP Section 9, Table 9-3).

The Plan Area includes 118,653 acres of modeled habitat for the grasshopper sparrow. If the species-specific conservation objectives above are met for the grasshopper sparrow, the incidental take permit for the MSHCP will authorize impacts associated with public and private development, roadway projects, agriculture and other proposed Covered Activities over the 75-year permit term within 81,733 acres (69 percent) of modeled habitat, which encompasses 33 of the 54 (61 percent) grasshopper sparrow observations in our dataset. It is anticipated that most of the breeding and foraging habitat for grasshopper sparrow in these areas will be lost as a result of development. Some birds may be able to disperse to adjacent habitats, particularly rural mountainous areas where development impacts are anticipated to occur at a slower rate and at lower densities. Approximately 10,603 acres (13 percent) of the non-conserved modeled habitat for the grasshopper sparrow are designated as rural/mountainous land. However, displaced birds that are unable to locate suitable habitat will experience increased rates of predation or otherwise die or be injured due to loss of their foraging, breeding, and sheltering habitat.

To offset the loss of grasshopper sparrow habitat within the Plan Area, implementation of the MSHCP will conserve and manage 17,370 acres (15 percent) of modeled habitat for the species within the Additional Reserve Lands. Another 19,549 acres (16 percent) of modeled habitat for the grasshopper sparrow will remain within PQP Lands. In total, approximately 36,919 acres (31 percent) of the modeled habitat for the grasshopper sparrow will be conserved or remain in the Plan Area. This modeled habitat includes 21 (39) percent of the grasshopper sparrow observations in our dataset.

The Permittees will implement management and monitoring practices within the MSHCP Conservation Area. Cooperative management and monitoring are anticipated on PQP Lands. Reserve Managers will conduct surveys for grasshopper sparrow on all conserved lands with suitable habitat within three years after they are added to the MSHCP Conservation Area. Results of these surveys will be used to determine the number of occupied Core Areas as discussed above. Reserve Managers will maintain occupancy within three large Core Areas (100 percent) and at least 3 of the 4 smaller Core Areas (75 percent) in at least 1 out of any 5 consecutive year period. Surveys confirming reproductive status for the grasshopper sparrow will be conducted within the first five years after permit issuance. Each Reserve Manager responsible for a Core Area will evaluate the condition of the grassland vegetation within the Core Area and maintain a program to enhance, restore, and/or create grassland, with an emphasis on native grasslands, within the Core Area to keep the percent cover of grassland within 10 percent of the baseline value in areas identified as important to meeting the species-specific objectives for the grasshopper sparrow (Section 5, Table 5.2). Over the long term, surveys documenting the distribution of the grasshopper sparrow will occur at least every five years (MSHCP Section 9, Table 9-2) to verify occupancy at three of the large (100 percent) and at least 3 of the 4 small (75 percent) Core Areas. If a decline in the distribution of the grasshopper sparrow is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP.

Management actions to benefit the grasshopper sparrow or other Covered Species (*e.g.*, exotic vegetation removal, mowing, prescribed burning, habitat manipulation) may result in impacts to a small number of individual grasshopper sparrows. It is anticipated that any impacts to grasshopper sparrows from management actions will be minimized by adherence to appropriate survey protocols and other guidelines described in Section 7.4 of the MSHCP.

Indirect Effects

The grasshopper sparrow could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These impacts include the indirect effects described in the “General Indirect Effects” section of this biological opinion. Implementation of the Urban/Wildlands Interface policy will help minimize the indirect effects of the Covered Activities on foraging and breeding habitat for the grasshopper sparrow.

Conclusion

We anticipate the proposed action will directly and indirectly affect the grasshopper sparrow as described in the analyses above, including the loss of 69 percent of its modeled habitat in the Plan Area. Implementation of the avoidance, minimization, and mitigation measures identified in the Plan will reduce the impacts to this species. We anticipate that this species will persist, and the species-specific objectives for this species will be met, in the remaining 31 percent of the modeled habitat within both the PQP Lands and the Additional Reserve Lands. Together, these lands form a system of large, contiguous habitat blocks that are interconnected within the Plan Area. We anticipate that these areas will be monitored and managed cooperatively to benefit this species.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service’s biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the grasshopper sparrow. We reached this conclusion based on the widespread distribution of the grasshopper sparrow in North America and because the impacts associated with loss of this species’ habitat, when viewed in conjunction with protection and management of the MSHCP Conservation Area, is not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Amount or Extent of Take

As mentioned above, proposed Covered Activities that we anticipate will impact occupied grasshopper sparrow habitat include, but are not limited to: roadway projects, agriculture, and public and private development. Many of these projects and actions are not yet well-described and will occur later in time throughout the 75-year permit term. Other factors that complicate the determination of the amount or extent of take include: 1) occupation of modeled habitat by grasshopper sparrows is expected to fluctuate and; 2) baseline survey data is incomplete. Estimating the actual number of grasshopper sparrows that will be lost, as a result of Plan implementation, is not feasible. Therefore, the Service is quantifying the take as the number of acres of modeled habitat that will be impacted in the Plan Area as a result of the proposed action.

We anticipate that up to 81,733 acres of modeled habitat within the Plan Area will become unsuitable for the grasshopper sparrow as a result of the proposed action. Additionally, a small, but undeterminable, number of grasshopper sparrows are anticipated to be taken as a result of management actions. Take will be in the form of harm, death, and injury. This level of take is not likely to result in jeopardy to the grasshopper sparrow.

Great blue heron (*Ardea herodias*)

Status of the species

Listing Status

The great blue heron is not listed under the Federal or State Endangered Species Acts.

Species Description

At 60 centimeters tall, the great blue heron is the largest heron in North America. It has a long neck and wings, gray upper parts, fore-neck streaked with white, black and rust-brown, brownish or greenish legs, long, tapered, a yellowish bill and a short tail. In flight, the neck folds in a S-shape, legs are extended along the body axis and wing-beats are deep and slow (Butler 1992).

Habitat Affinities

The great blue heron breeds most commonly in isolated areas, such as wooded swamps or predator-free islands. Upland hardwood forest, forest-bordered lakes and ponds, and riparian woodlands are also used. Breeding sites are always near water (Butler 1992). Nest sites are variable but are located high in trees, often from 20 to 60 feet high, but sometimes as high as 100 feet (Kaufman 1996). A variety of tree species may be used. Suitable nesting sites are "open" or have exposed limbs, allowing birds to enter and leave easily (Short and Cooper 1985). Occasionally nests are made in low shrubs (Behle 1958; Vermeer 1969) or on the ground on predator-free islands (Kaufman 1996; Taverner 1926; Gill and Mewaldt 1979). When trees are not available, great blue herons may also build nests in bulrushes, cacti (Rosenberg *et al.* 1991), sagebrush (Blus *et al.* 1980), duck blinds (Palmer 1962), channel markers (Henny and Kurtz 1978; Blus *et al.* 1980), or artificial nest platforms (Sandilands 1980).

Great blue herons forage in a variety of habitat types, including marshes, shores, swamps, tidal flats, lakes, rivers, lagoons, riparian forests, and coastal wetlands. Any slow-moving, shallow water will suffice for foraging (Kaufman 1996). In a study of herons in British Columbia (Butler 1991), juveniles foraged in grasslands, adult females in estuarine marshes or the intertidal zone, and adult males along riverbanks. Foraging habitat for yearlings was not well documented in this study, but included estuaries and beaches. Insular herons prefer to forage in areas located away from the main channel and containing submergent or emergent vegetation (Thompson 1979; Hoffman 1978), while herons in coastal areas will forage in more exposed areas, such as mud flats and sandbars (Longley 1960; Edison Electric Institute 1980; Bayer 1978).

Life History

Most great blue herons reproduce in their second season (greater than 22 months of age) (Butler 1992). They are monogamous within a particular breeding season but may choose a different mate between years (Butler 1992). In California, the courtship-to-egg-laying period is early January to mid-March (Brandman 1976). The bird breeds in colonies, often composed entirely of its own species and containing several hundred pairs of birds (Butler 1992). Occasionally great blue herons will breed alongside other species, including other herons, waterfowl, and even hawks, owls, and vultures (Custer *et al.* 1980; Mengel 1965; Ryser 1985). The heron rarely breeds in isolated pairs (Kaufman 1996).

Males arrive first at the nest site and court females from the nest (Kaufman 1996; Brandman 1976; Mock 1976). The male may choose a mate from as many as five females. Courtship behavior involves elaborate displays by males, including stretching the neck up with bill pointing skyward, flying in circles above the colony with the neck extended, stretching the neck forward with head and neck feathers erect and then snapping the bill shut (Kaufman 1996).

The nest is constructed by the female with materials presented by the male (Cottrille and Cottrille 1958; Palmer 1962; Mock 1976). It is a large platform of sticks, up to 1.25 meters wide and 0.5 meters deep (Gibbs *et al.* 1987), and it ranges from flimsy to sturdy (Butler 1992). Nests are often reused from year to year and may even be "borrowed" by species other than great blue herons, such as Canada geese, house sparrows, and great horned owls (Vermeer 1969). Time invested in building the nest ranges from three days to two weeks (Butler 1992).

One to seven (usually from 3 to 5) pale blue eggs are laid (Kaufman 1996). Clutch size varies geographically, with populations at higher latitudes generally producing larger clutches (Palmer 1962; Henny and Bethers 1971; McAloney 1973). Mean clutch size decreases as the season progresses (Pratt *et al.* 1985). Both males and females share in egg incubation duties (Pratt 1970; Brandman 1976; Mock 1979). In southern California, incubation lasts 25-29 days (Pratt 1970) and the first brood per season hatches in early March (Brandman 1976). Both parents feed the young (Kaufman 1996). At first, young eat food regurgitated by parents, but eventually the young eat whole fish dropped onto the floor of the nest. Young are able to fly at approximately 60 days of age. For an additional approximate three weeks period, fledglings return to the nest to be fed by their parents (Kaufman 1996). In northern populations, one brood is usually produced per year, while in southern populations, two broods may be produced annually (Kaufman 1996). Birds may also attempt more than one nest if eggs or chicks are lost early in the season (Pratt 1972).

Most young great blue herons disperse far from the natal colony, and few yearlings return to the natal colony (Henny 1972). Adults disperse from the colony after the breeding season (Gill and Mewaldt 1979; Pratt 1970; Butler 1991). Most populations of great blue herons move southward in the autumn (Butler 1992).

Unattended great blue heron eggs are preyed upon by crows and ravens (Butler 1989). Nestlings are preyed upon by eagles, raccoons, bears, turkey vultures, and red-tailed hawks (Butler 1992). However, chicks are more likely to be lost to starvation than predation (Pratt and Winkler 1985).

Colony sites are abandoned subsequent to predation on adults (Butler 1991) and nestlings (Kelsall and Simpson 1980; Simpson *et al.* 1987). Although estimates vary regionally, mortality of great blue herons within the first year of life is estimated at 69 percent. Of those surviving the first year, 36.3 percent will perish in the second year. The mortality rate for subsequent years is 21.9 percent (Henny 1972). Great blue herons may live for 15 years (Fish and Wildlife Service 2001). The oldest banded heron survived to an age of 23 years (Fish and Wildlife Service 2001).

Birds forage singly or with conspecifics (Butler 1992). The great blue heron may stand very still or walk very slowly in shallow water, waiting for prey to come near, then strike with a rapid thrust of the bill (Kaufman 1996). Birds may wade up to belly deep in water (Butler 1992) and have been observed to dive for food (Bent 1926; Dickinson 1947; Gordin 1977). Birds may also forage from floating objects (Kaufman 1996; Gordin 1977) and while floating (Jensen 1932). The great blue heron forages both at night and during the day (Kaufman 1996; Butler 1992). They feed mainly on fish but will also consume salamanders, frogs, turtles, insects, snakes, birds, and rodents (Kaufman 1996). The heron has been seen stalking voles and gophers in fields. Voles comprise 24-40 percent of the diet of nestlings and are thought to be critical to juvenile winter survival in British Columbia (Butler 1991). The variable diet of the heron has been implicated as a causal factor for the species's ability to survive further north than other species of heron (Kaufman 1996). Male herons usually defend feeding territories, while females and juveniles tend to forage in groups and do not defend territories (Butler 1991; Gibbs 1991).

Status and Distribution

Considered one of the most common, widespread, and hardy herons, the great blue heron is widely distributed in a variety of aquatic habitats (Garrett and Dunn 1981). It breeds from along the coast of southeast Alaska and British Columbia and the southern regions of the Canadian prairie provinces in the north, southward through the United States, Mexico, and Central America as far as Belize and Guatemala. The species also breeds on the Galapagos Islands and islands near Venezuela. The winter range of this heron extends along the Pacific coast south of 61° N, throughout the United States, Mexico, Central America, the Caribbean, the north and west coasts of South America as far south as Colombia and occasionally in Hawaii (Butler 1992).

The great blue heron is fairly common all year throughout most of California in shallow estuaries and wetlands (Garrett and Dunn 1981, Granholm 1990). In southern California breeding occurs in Morro Bay, Goleta, Lake Cachuma, Lake Casitas, Point Loma, the Salton Sea and the Colorado River (Garrett and Dunn 1981). Some historic rookery sites that are now abandoned include: several in Santa Barbara County, Santa Monica, Chatsworth, Santa Ana, Laguna Beach and San Onofre (Garrett and Dunn 1981).

Threats

The single largest threat to the heron is the elimination of wetland foraging and nesting habitat through urbanization and agricultural development. Agricultural development also often involves the application of pesticides, such as dioxin, dieldrin, endrin, and, in the past, DDT. Colonies highly contaminated with dioxins show decreased growth and development of young (Hart *et al.* 1991) and possible reproductive failure (Elliott *et al.* 1988, 1989). Dieldrin

(Ohlendorf *et al.* 1981), endrin (Ohlendorf *et al.* 1979), and heavy metals (Short and Cooper 1985) are suspected to be lethal to the great blue heron. When in use, DDT thinned the eggshells of herons but did not appear to lead to a decrease in reproductive success (Pratt 1974). Although great blue herons currently appear to tolerate low levels of pollutants, these chemicals can move through the food chain, accumulate in the tissues of prey and may eventually cause reproductive failure in great blue herons (U.S. Fish Wildlife Service 2001). As water quality worsens, numbers of large fish and insects that the heron feeds on also decrease (U.S. Fish Wildlife Service 2001).

Urbanization, in addition to the resulting loss of wetland habitats, also poses a threat to the great blue heron. Breeding colonies are very vulnerable to human-related disturbance, especially early in the nesting season (Butler 1992; Kaufman 1996). Heronries have been abandoned due to human disturbance in the form of housing and industrial development (Simpson and Kelsall 1979), water recreation, and highway construction (Ryder *et al.* 1980). Heronries in Minnesota were found to be located a minimum of 3.3 kilometers from human dwellings and an average of 1.3 kilometers from the nearest road (Mathisen and Richards 1978). Colonies will generally remain active until the site is disrupted by changes in land use (Short and Cooper 1985).

Other adverse management practices include channelization of water courses, "navigational improvements" such as locks and dams and dredging, strip mining, and removal of old trees (Illinois Natural History Survey 2001).

Conservation Needs

Due to the significant loss of wetlands in southern California, a primary conservation need of this species is maintaining wetland foraging and nesting habitats. The Service's Chesapeake Bay Field Office (2001) recommends protection of wetland foraging sites within 15-20 kilometers of heron colonies to ensure prey availability. In addition, habitat suitability models (Short and Cooper 1985) suggest that the recommended disturbance-free zone around a potential nest site is 250 meters on land or 150 meters on water. Houses, roads, and similar disturbances should not occur within this zone; activities, like dredging, timbering, and mechanized agriculture, should not occur in the exclusion zone from February through August. Lastly, additional surveys are also necessary to determine any other potential nesting locales.

Environmental Baseline

Great blue heron nesting and foraging habitats occur within all Bioregions of the Plan Area. Known foraging habitat and potential nesting habitat for the great blue heron occurs near large lakes, reservoirs, and drainages that support open water habitats within the Plan Area. Therefore, the habitat model for the great blue heron was created by capturing the following vegetation types that occur within 9843 feet (3000 meters) of open or standing water: meadows and marshes, cismontane alkali marsh, playas and vernal pools, and riparian scrub, woodland, and forest. Based on this analysis, the Plan Area supports approximately 18,541 acres of modeled habitat for the great blue heron. Approximately 8,985 acres (48 percent) of the modeled habitat occur within PQP Lands, including the Prado Basin/Santa Ana River. A large percentage of the habitats in the Prado Basin are riparian woodland and upland habitats that

encompass a variety of land uses that do not provide suitable habitat for great blue herons. In addition, breeding great blue herons do not use open water habitats for foraging unless secure nesting sites are located nearby. Thus, the modeled habitat likely overestimates the extent of suitable nesting and foraging habitat for this species.

Potential breeding areas include Lake Mathews, Lake Perris, Lake Skinner, Canyon Lake, Prado Basin/Santa Ana River, San Jacinto Wildlife Area/Mystic Lake area, Collier Marsh, and Lake Elsinore. Currently, there are no records in our dataset of great blue heron rookeries within the Plan Area. However, there are observations of great blue herons and/or great blue heron rookeries provided by the County, the resource agencies, and Orange County Water District personnel (Christine Moen, Southwestern Riverside County Multi-Species Reserve, pers. comm., 2003; Yvonne Moore, California Department of Fish and Game, pers. comm., 2003; Dharm Pellegrini, Orange County Water District, pers. comm., 2003).

As stated in the Plan, the locations of these observed rookeries are in the Prado Basin/Santa Ana River, Lake Skinner, and Rome Hill adjacent to Collier Marsh areas. In the spring of 2003, great blue heron nests were observed at the north end of the Prado Basin. The nests were located in the willows and 8-12 nesting pairs were seen with 1-2 young per nest (Dharm Pellegrini, Orange County Water District, pers. comm., 2003). There were also nesting great blue herons observed along the north side of Lake Skinner during 2003. These nests were located on PQP Lands (Christine Moen, Southwestern Riverside County Multi-Species Reserve, pers. comm., 2003). In 2002, great blue herons were observed near Lake Elsinore, along the back bay near Rome Hill adjacent to Collier Marsh. This observation occurred outside of the breeding season, so no nests were detected. This area is on private property (Yvonne Moore, California Department of Fish and Game, pers. comm., 2003).

A large percentage of the modeled habitat for the great blue heron is located on PQP Lands. Most PQP Lands are currently managed under a multiple use policy, and consequently, populations of great blue herons are subject to a variety of wildlife management activities that could reduce or remove localities from a reserve. For example, alterations in flooding cycles on the San Jacinto Wildlife Area could alter existing wetland habitat. In Prado Basin, maintenance of water polishing ponds and creation of open-water habitat for waterfowl could modify potential breeding habitats. Similarly, the Eastern Municipal Water District has proposed to develop 320 acres of permanent wetlands on the eastern edge of the Mystic Lake area using reclaimed and storm water (EMWD 1994). There is a concern that this development would alter the inundation cycle for wetland and alkali playa habitat already established around the margins of Mystic Lake (Bramlet 1996).

Effects of the Action

Direct effects

The Plan Area includes 18,541 acres of modeled nesting and foraging habitat for the great blue heron. Loss of 3,175 acres (17 percent) of this modeled habitat is anticipated over the 75-year permit term. A 17 percent loss of great blue heron habitat distributed over the Plan Area is not anticipated to result in direct mortality of adult birds. However, loss of foraging and nesting

habitats to development will cause great blue herons to disperse in search of other wetland habitats and experience increased competition for the remaining suitable habitat. Birds forced to disperse may also experience decreased fitness due to increased energy and time spent locating new habitats and may be subjected to increased rates of predation and injury. If clearing of habitat occurs near the initiation of the breeding season, the search for and establishment of a new breeding site may result in an overall reduction in reproductive output. Thus, loss of breeding and foraging habitat may impact overall population numbers of the great blue heron within the Plan Area over the long term by reducing the number of areas suitable for use as foraging and rookery sites.

Both of the known rookery sites noted above are located within PQP Lands (Yvonne Moore, California Department of Fish and Game, pers. comm., 2003); thus, no active great blue heron nests are anticipated to be harmed as a result of planned development. Because most of the modeled habitat for the great blue heron is in the MSHCP Conservation Area, it is likely that any new rookery sites established within the Plan Area during the permit term will be located within the Conservation Area. The MSHCP did not anticipate take of active great blue heron nests (Section 9, Table 9.2).

The MSHCP will conserve and manage 6,381 acres (34 percent) of modeled habitat for the great blue heron within the Additional Reserve Lands. Another 8,985 acres (48 percent) of modeled habitat will remain in PQP Lands. In total, 83 percent of the modeled habitat for the great blue heron will be conserved or remain in the Plan Area.

Six open water habitats and one drainage will support great blue herons within the Plan Area, including Lake Mathews, Diamond Valley Lake, Lake Skinner, Lake Elsinore, Vail Lake, Lake Perris, the Prado Basin/Santa Ana River, and the wetland habitats within Prado Basin/Santa Ana River.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands, including surveys for the great blue heron. Cooperative management and monitoring are anticipated on PQP Lands. Surveys for the great blue heron will be conducted at least every eight years to verify occupancy at a minimum of 75 percent of the known or future-identified locations. If a decline in the distribution of the great blue heron is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP.

Reserve Managers will manage known or historic breeding locations in Prado Basin/Santa Ana River, Collier Marsh, and Lake Skinner. Reserve Managers will also identify, protect, and buffer nest sites in the MSHCP Conservation Area. A 100-meter buffer will be established around the known or future-identified nest sites in the MSHCP Conservation Area. Reserve Managers will also ensure habitat support functions within the MSHCP Conservation Area by maintaining hydrological processes, specifically seasonal flows in the Santa Ana River (Section 5, Table 5.2).

The MSHCP will conserve great blue herons by conserving known and historic breeding locations, linking core areas with nearby suitable foraging habitat, and managing breeding

colonies within the Conservation Area. The Conservation Area will be managed to: (1) preserve the quality of wetland associated foraging areas; (2) improve the potential and suitable emergent wetland habitat within the Prado Basin, Santa Ana River, and other major wetland areas; (3) monitor the potential breeding locations; and (4) protect any existing and future documented nest sites by providing buffers around them.

Indirect Effects

The great blue heron could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These impacts include the indirect effects described in the “General Effects” section of this biological opinion. In particular, maintaining the hydrological processes and water quality standards (*e.g.*, controlling sedimentation and other pollutants) of open water and wetland habitats will be important in conserving great blue heron habitat within the MSHCP Conservation Area. Although this species is not listed under the Riparian/Riverine Area and Vernal Pools policy or the Urban/Wildlands Interface policy, implementation of these policies will help minimize the indirect effects of the Covered Activities on foraging and breeding habitat for the great blue heron.

Conclusion

We anticipate the proposed action will directly and indirectly affect the great blue heron as described in the analyses above, including the loss of 17 percent of its modeled habitat in the Plan Area. Implementation of the avoidance, minimization, and mitigation measures identified in the Plan will reduce the impacts to this species. We anticipate that this species will be able to persist in the remaining 83 percent of its modeled habitat within both the existing PQP Lands and the Additional Reserve Lands. Together these lands form a system of large, contiguous habitat blocks that are interconnected within the Plan Area. We anticipate that these lands will be monitored and managed cooperatively to benefit this species.

After reviewing the current status of this species, the environmental baseline for the Plan area, the effects of the proposed action, and the cumulative effects, it is the Service’s biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the great blue heron. We reached this conclusion because the impacts associated with loss of this species’ habitat, when viewed in conjunction with protection and management of the MSHCP Conservation Area, are not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Amount or Extent of Take

The loss of up to 3,175 acres of nesting and foraging habitat for the great blue heron in the Plan Area is not likely to result in direct mortality of adult birds; however, for some individuals, reproduction may be impaired or life expectancy shortened. Due to the difficulty in quantifying the number of great blue herons impacted over the 75-year permit term, the Service is quantifying the take as the number of acres of modeled habitat that will be impacted in the Plan Area as a result of the proposed action. We anticipate that up to 3,175 acres of nesting and foraging habitat within the Plan Area will become unsuitable for great blue herons as a result of

the proposed action. Take will be in the form of harm and injury. This level of take is not likely to result in jeopardy to the great blue heron.

Lincoln's Sparrow (*Melospiza lincolni*)

Status of the Species

Listing Status

The Lincoln's sparrow is not listed under the Federal or State-Endangered Species Acts.

Species Description

The Lincoln's sparrow is a small sparrow (13.5-15.3 centimeters) with grayish brown plumage streaked with black, rusty edges on wings and tail, uniform gray face and sides of neck, broad buffy chest band and white belly. Males and females have similar plumage. Juveniles have a heavily streaked breast and a crown that is nonuniform in color (Ammon 1995).

Habitat Affinities

Lincoln's sparrows are known to prefer dense, low underbrush often in disturbed edges with grasses and weeds mixed with shrubs (Bent 1968). The species occurs in a variety of habitats including willow-sedge swamp, scrub-meadow and flat land aspen (Salt 1957). They are most common in wet meadows with little damage by grazing. Singing males are concentrated in flooded or boggy areas near meadow edges where pines provide elevated perches for singing (Cicero 1997). At lower elevations, they prefer mesic willow shrubs and can be found in mixed deciduous groves such as aspen and cottonwoods, mixed shrub-willows, bogs, and a variety of other riparian habitats (Ammon 1995). Openings without shrub cover are generally avoided.

Breeding in southern California occurs in wet montane meadows of corn lily, sedges and low willows (Garrett and Dunn 1981). Nests are built on the ground, usually in a shallow depression at the base of a willow (Zeiner *et al.* 1990a) and are extremely difficult to find (Bent 1968). The nest has a distinct nest entrance tunnel through the ground vegetation, oriented toward the east-northeast. During the breeding season, foraging occurs on the ground in willow bogs, lower parts of willows, and coniferous trees, but mostly in dense underbrush or ground vegetation (Ammon 1995).

During the winter and spring and fall migration, the species requires thickets of shrubs or tall forbs interspersed with grassy areas, usually on damp ground or near water (Zeiner *et al.* 1990a). Lowlands that are avoided during the breeding season are used. Lincoln's sparrows may be found in the urban and suburban environment or in brushy forest edges, weedy fields, hedgerows, marshes, and blackberry thickets. Primary habitats for wintering in Mexico include tropical evergreen forest, arid and humid pine-oak forests, tropical deciduous forest, Pacific swamp forest, and arid subtropical scrub. Savannah, freshwater marsh, and coniferous forests are also inhabited (Ammon 1995). During winter and migration, foraging occurs on the ground, in cultivated fields, park like structures, riparian vegetation and along roadsides.

Life History

Lincoln's sparrows are solitary, monogamous nesters (Bent 1968). Males arrive on breeding grounds in mid- to late May (Ammon 1995) and establish a territory of about one acre (Zeiner *et al.* 1990a; Terres 1980). Territory boundaries are easily defined because territorial males generally use conspicuous trees and shrubs as singing perches. The clutch size is 3-6 eggs (Zeiner *et al.* 1990a). Incubation lasts from 10-13 days (Ammon 1995). Nestlings leave the nest 10 to 11 days after hatching and remain under dense shrub for the first 4 days after fledging. The number of young fledged per egg laid varies between years from 34 percent to 62 percent depending on predation rates, nestling starvation, and exposure (Ammon 1995). Territorial boundaries break down about 5 to 8 days after the young fledge as the family group begins to forage throughout the site (Ammon 1995).

The Lincoln's sparrow forages on seeds and insects (Zeiner *et al.* 1990a). Animal foods predominate in breeding season and seeds are the main foods at other times (Martin *et al.* 1961). The members of the Coleoptera ranked highest for preference and of the non-Coleoptera, selections tended to be for cryptic and uniformly distributed insects (Raley and Anderson 1990). Food is scratched out of soil and leaf litter and occasionally plucked out of the air (Zeiner *et al.* 1990a).

Dispersal from the breeding ground takes place in early September and migration takes place mainly at night (Ammon 1995). In the non-breeding season, the Lincoln's sparrow is usually solitary or in loose, small foraging flocks of a few individuals. It occasionally mixes with other sparrows, such as white-crowned, song, and swamp sparrows (Ammon 1995). Only 2 percent of the young are known to return to the natal site. Return rates to the established breeding grounds from year to year is 37 percent for males and 36 percent for females (Ammon 1995). The average adult survivorship is unknown, but it can reach at least seven years (Klimkiewicz and Futcher 1987).

Status and Distribution

The Lincoln's sparrow is found during the summer in Alaska, all of Canada, the northern U.S. and the mountains of the West (Terres 1980). More specifically, it has a boreal distribution from west-central Alaska, central Yukon, central northwest territories, northern Saskatchewan and northern Manitoba to north central Quebec, Labrador, and Newfoundland, south through the Cascade Mountains of Washington, Oregon, and California to southern Tulare County; also south through Wyoming, central and western Colorado to south central New Mexico and west to northeast Utah and north central Idaho (Ammon 1995). In Oregon, it breeds in the Blue Mountains and Wallowa Mountains. In California, the species breeds in the Warner Mountains, the northern inner coastal range south to Tehama County, and irregularly in other mountain ranges of the southwest (Ammon 1995). In southern California, it has been documented breeding in the San Gabriel Mountains, the San Bernardino Mountains, the San Jacinto Mountains, and on Mt. Pinos (Garrett and Dunn 1981).

Wintering for the species occurs along the Pacific coast of British Columbia, Washington, Oregon and California, in the central part of the United States, in Baja California, Mexico, and

along the Gulf Coast. It is a causal wintering bird in Central America (Ammon 1995; Terres 1980). The species is a common migrant and winter visitor throughout California with some breeding populations in the northern mountains (Zeiner *et al.* 1990a). Individuals arrive in southern California in late September and depart in late April (Unitt 1984).

No historical changes in distribution boundaries are known (Ammon 1995). Between 1966 and 1991, there have been significant increases in the breeding populations in Alberta, New Brunswick, northern spruce-hardwood forests, aspen parklands, and the central Rocky Mountains. When measured overall (the entire North American continent), the population increases were also significant for the period 1966 to 1991. Between 1982 and 1991, the breeding populations in Quebec and the northern spruce-hardwood forests decreased but increased in British Columbia. Several new populations have been documented in the Tulare County area of California, probably as a result of wetland establishment (Ammon 1995).

Threats

Breeding activity of the Lincoln's sparrow was shown to be significantly reduced when a glyphosate-based herbicide was applied to an area in Maine (Ammon 1995; Mackinnon and Freedman 1993). Other threats cited include degradation of breeding habitat via livestock grazing and human disturbance of nest sites (Ammon 1995). Lincoln's sparrows breeding in montane meadows are potentially vulnerable to local extirpation because of their insular distribution, low population density, and fluctuating habitat conditions (Cicero 1997). Heavy damage from livestock grazing drastically increases the probability of local extirpation (Cicero 1997). Based on geographic range, population size, reproductive potential, migratory status, and diet specialization, the Lincoln's sparrow was listed as moderately vulnerable to extirpation as a montane breeding bird in the Great Basin (Reed 1995). Lincoln's sparrow is rarely a host to brown-headed cowbirds, which is probably due to the lack of overlap of habitat (Ammon 1995).

Although threats to the species in western Riverside County have not been specifically studied, the list of range-wide threats likely apply to the Plan Area. Additionally, recreation in and around the wet meadows could have an adverse effect on habitat and the behavior of the bird.

Conservation Needs

Due to the insular nature of Lincoln's sparrow breeding habitat, it should be conserved with little or no fragmentation. Grazing and recreation should be eliminated or tightly controlled in breeding habitat. Restoration or enhancement of suitable breeding habitat may maximize the number of breeding birds. Because the Lincoln's sparrow is widespread as a wintering bird within the Plan Area, and population levels rangewide appear to be stable, it is anticipated that this species will respond well to a landscape level of management for its wintering occurrence within the Plan Area (MSHCP, Volume II-B, p. B-276).

Environmental Baseline

Although no Plan Area assessments of the status and distribution of the Lincoln's sparrow have been completed, the species apparently occurs within the western Riverside County area as a

fairly common migrant and winter visitor in appropriate habitat. Records in the UCR database that likely refer to migrant or wintering individuals include the following areas within the central portion of the Plan Area: the Prado Basin, Lake Mathews area, Wasson Canyon, Santa Ana River, Santa Rosa Plateau, Temecula/Murrieta area, Lake Skinner, Vail Lake, Lakeview Mountains, Wilson Valley, Lake Perris, and Mystic Lake/San Jacinto Wildlife Area (MSHCP, Volume II-B, pp. B-283 and B-284). The species has bred, and may continue to breed, within the San Bernardino Mountains and within the San Jacinto Mountains at Tahquitz and Round Valleys. Of the 67 Database records for the Lincoln's sparrow, 13 (19 percent) occur within PQP Lands.

We identified primary breeding and secondary foraging habitats for the Lincoln's sparrow in our habitat model for this species. Vegetation types included within the modeled habitat are chaparral, cismontane alkali marsh, Riversidean alluvial fan sage scrub coastal sage scrub, grassland, meadows, and marshes, peninsular juniper woodland and scrub, mule fat scrub, riparian scrub, riparian woodland, riparian forest, broadleafed upland forest, coast live oak woodland, dense Engelmann oak woodland, oak woodland, woodlands, woodlands, and forests. However, because Lincoln's sparrow uses only “. . . low-growing bushes and clumps of annuals interspersed with grass, especially on damp ground or near water” (Grinnell and Miller 1944) or “. . . overgrown weedy fields and wet, brushy thickets and channels” (Garrett and Dunn 1981) within the general vegetation communities stipulated, the modeled habitat likely overestimates the extent of suitable habitat for Lincoln's sparrow in the Plan Area. Approximately 742,621 total acres of modeled Lincoln's sparrow's habitat occur within the Plan Area. Of this total, approximately 292,064 acres (39 percent) occur on PQP Lands.

Effects of the Action

Direct Effects

The Lincoln's sparrow will not be considered a Covered Species Adequately Conserved by the MSHCP unless the conservation objectives in Tables 9-2 and 9-3 are met. The Plan Area includes 742,621 acres of modeled habitat for the Lincoln's sparrow, including 460 acres of breeding habitat. If the conservation objectives in Tables 9-2 and 9-3 are met, the incidental take permit for the MSHCP will authorize impacts associated with development and other proposed Covered Activities over the 75-year permit term within 313,519 acres (42 percent) of the modeled habitat for the Lincoln's sparrow, including 45 acres (43 percent) of breeding habitat.

It is anticipated that most of the breeding and foraging habitat for Lincoln's sparrow in these areas will be lost as a result of development or other Covered Activities. Some birds may be able to disperse to adjacent habitats, particularly rural mountainous areas where development impacts are anticipated to occur at a slower rate and at lower densities. Approximately 101,072 acres (32 percent) of the non-conserved habitat in the Plan Area is designated as rural/mountainous land. However, displaced birds that are unable to locate suitable habitat will experience increased rates of predation or otherwise die or be injured due to loss of their foraging, breeding, and sheltering habitat.

To offset the loss of Lincoln's sparrow habitat and to meet the requirements in Tables 9-2 and 9-3, the MSHCP will conserve and manage 137,039 acres (18 percent) of modeled habitat for the species within the Additional Reserve Lands, including 32 acres (30 percent) of breeding habitat. Another 292,064 acres (39 percent) of modeled habitat for the Lincoln's sparrow will remain within PQP Lands including 28 acres (27 percent) of breeding habitat. In total, approximately 429,102 acres (58 percent) of the modeled habitat, including 60 acres (57 percent) of breeding habitat, will be conserved in the MSHCP Conservation Area. Eighteen (27 percent) of the known occurrences for the Lincoln's sparrow in the Plan Area will be conserved or remain in MSHCP Conservation Area.

Many of the Lincoln's sparrow occurrences from our dataset overlap with species that are specifically identified in the Riparian/Riverine and Vernal Pools policy (pp. 6-20 and 6-21). Thus, we anticipate that this species will indirectly benefit from the avoidance and protection of some of its modeled wetland habitats through the Riparian/Riverine and Vernal Pools policy.

The Permittees will implement management and monitoring practices within the MSHCP Conservation Area. Cooperative management and monitoring are anticipated on PQP Lands. Reserve Managers will conduct surveys for Lincoln's sparrow every eight years. Reserve Managers will maintain breeding occupancy within three large Core Areas (100 percent) in at least one year out of five-year consecutive period. Core Areas (breeding) may include Tahquitz Valley, Round Valley, and Garner Valley. The three Core Areas will consist of a minimum of 50 acres of montane meadow, wet montane meadow, and edges of montane riparian or riparian scrub. The Core Areas will be demonstrated to support at least 20 Lincoln's sparrow pairs with evidence of successful reproduction within the first five years after permit issuance. Successful reproduction is defined as a nest which fledged at least one known young. Surveys confirming reproductive status for the grasshopper sparrow will be conducted within the first 5 years after permit issuance. If a decline in the distribution of the Lincoln's sparrow is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP. Additionally, General Management Measures 1 and 5 (Section 5) will be applied to modeled habitat areas including the proposed Core Areas (breeding).

Management actions to benefit the Lincoln's sparrow or other Covered Species (*e.g.*, hydrological maintenance, exotic vegetation removal, prescribed burning, habitat manipulation) may result in impacts to a small number of individual Lincoln's sparrows. It is anticipated that any impacts to Lincoln's sparrows from management actions will be minimized by adherence to appropriate survey protocols and other guidelines described in Section 7.4 of the MSHCP.

Indirect Effects

The Lincoln's sparrow could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These impacts include the indirect effects described in the "General Effects" section of this biological opinion. In particular, maintaining the integrity of wetland and wet shrubby habitats will be important to sustaining the Lincoln's sparrow in the MSHCP Conservation Area. Implementation of the Urban/Wildlands Interface

policy will also help minimize the indirect effects of the Covered Activities on foraging and breeding habitat for the Lincoln's sparrow.

Conclusion

We anticipate the proposed action will directly and indirectly affect the Lincoln's sparrow as described in the analyses above, including the loss of 42 percent of its modeled habitat in the Plan Area and loss of 43 percent of its modeled breeding habitat. Implementation of the avoidance, minimization, and mitigation measures identified in the Plan will reduce the impacts to this species. We anticipate that this species will persist in the remaining 58 percent of the modeled habitat within both the existing PQP Lands and lands conserved within the Additional Reserve Lands, including 57 percent of modeled breeding habitat. Together these lands form a system of large, contiguous habitat blocks that are interconnected within the Plan Area that we anticipate will be monitored and managed cooperatively to benefit this species.

After reviewing the current status of this species, the environmental baseline for the Plan area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the Lincoln's sparrow. We reached this conclusion based on the widespread distribution of the Lincoln's sparrow within the Plan Area and because the impacts associated with loss of this species' habitat, when viewed in conjunction with protection and management of the MSHCP Conservation Area, are not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Amount or Extent of Take

Because the small size of these birds, it will be difficult to quantify the number of Lincoln's sparrows impacted in the Plan Area over the 75-year permit term. Thus, we are quantifying the take as the number of acres of habitat that will be impacted in the Plan Area as a result of the proposed action. We anticipate that up to 313,519 acres of modeled habitat within the Plan Area will become unsuitable for the Lincoln's sparrow as a result of the proposed action. A small, but undeterminable, number of Lincoln's sparrows are anticipated to be taken as a result of management actions.

Take will be in the form of harm, death, and injury. This level of take is not likely to result in jeopardy to the Lincoln's sparrow.

Loggerhead shrike (*Lanius ludovicianus*)

Status of the species

Listing Status

The loggerhead shrike is a Fish and Wildlife Service Migratory Non-game Bird of Management Concern and is listed on the Federal Birds of Conservation Concern (2002). It is considered a

California Species of Special Concern by the California Department of Fish and Game. It is not listed under the Federal Endangered Species Act.

Species Description

The loggerhead shrike is a gray, black and white passerine, 21 centimeters in length. It has a black, hooked bill, grey back, black wings and facial mask, white underside and black legs and feet. Female tends to be smaller and have browner primaries than the male. It will often sit horizontally on exposed perches (Yosef 1996).

Habitat Affinities

Loggerhead shrikes occur in the highest density in open-canopied valley foothill hardwood/hardwood-conifer, valley foothill hardwood-conifer, valley foothill riparian, pinyon-juniper, juniper, desert riparian, and Joshua tree habitats. They rarely inhabit heavily urbanized areas but often are found in open crop land, especially during the winter (Zeiner *et al.* 1990a). In many regions, indices of loggerhead shrike abundance correlate with the percentage of pastureland available (Gawlik and Bildstein 1993). In the Mojave Desert, loggerhead shrikes were observed in urban settings more than other raptor species occurring there (Knight *et al.* 1999). In the midwest, the habitat use of the shrike is defined as savannah habitat at the landscape scale, but at the fine-scale, sites used by shrikes were characterized by tall, sparse, structurally heterogeneous, herbaceous vegetation with high-standing dead plant cover and low litter cover (Michaels and Cully 1998).

The loggerhead shrike is known to forage over open ground within areas of short vegetation, pastures with fence rows, old orchards, mowed roadsides, cemeteries, golf courses, riparian areas, open woodland, agricultural fields, desert washes, desert scrub, grassland, broken chaparral and beach with scattered shrubs (Unitt 1984; Yosef 1996). The habitat is characterized by well-spaced, often spiny shrubs and low trees, usually interspersed with short grasses, forbs, and bare ground (Yosef 1996). They appear to favor areas with fence lines and utility lines and poles for perching (Yosef 1996). In suboptimal foraging habitat areas, where grass is tall and dense, their foraging success is not affected; however, their foraging methods are altered and include more hovering, more flights, and frequent changes in perches, generally more energetically expensive behaviors, and thus larger prey items are taken (Yosef and Grubb 1993).

Breeding pairs appear to settle near isolated trees or large shrubs (Yosef 1994). Nesting occurs in branches up to 4.5 meters above the ground, frequently in a shrub with thorns or with tangled branching habits (Zeiner *et al.* 1990a; Yosef 1996). In an Idaho sagebrush rangeland community, most loggerhead shrike nests (65 percent) were constructed in sagebrush, although bitterbrush and greasewood were also used frequently (Woods and Cade 1996). Nests or nest materials are often reused in subsequent years (Yosef 1996).

Life History

In those geographic locations where the loggerhead shrike is a year-round resident, pairs establish permanent territories (Yosef 1996). For populations that are migratory, a territory is

defended through the non-breeding season (Miller 1931; Smith 1973). Some pairs spend the entire year on a single territory. Outside the breeding season, the mates may defend neighboring territories, which coalesce at the beginning of the nesting season (Yosef 1996). Miller and Stebbins (1964) observed large territories of 12-16 hectares, while Yosef (1996) determined a mean territory size to be 8.5 hectares. Territories in California are jointly defended by pairs during the breeding season, but during the fall, these pairs disband and defend separate, although often adjacent, winter territories (Yosef 1996).

Female loggerhead shrikes build nests between approximately mid-March to mid-June (Yosef 1996). The mean clutch size for the species is 5.4 eggs per nest with a range of 1 to 9 eggs (Yosef 1996). Loggerhead shrikes exhibit a latitudinal and longitudinal cline in clutch size with larger clutches at higher latitudes and farther west (Yosef 1996). In California, the incubation period for the loggerhead shrike is 16 days, and the nestling period is 20 days (Miller 1931). To avoid predation, parent shrikes may induce young to fledge from the nest earlier than normal (Woods 1993). This behavior may be due to the high predation rate on loggerhead shrike nestlings.

The average nesting success of the loggerhead shrike, measured as the percent of nests in which at least one young fledges, is 56 percent (Yosef 1996). The large clutch size and relatively high rate of hatching success, potentially enables the loggerhead shrike to produce large numbers of offspring, although many young are lost through brood reduction and predation (Yosef 1996). Porter *et al.* (1975) believed that 52 percent of all nest failures were due to predation and 33 percent of nest failures were due to adverse weather.

Loggerhead shrikes primarily subsist on large ground-dwelling insects and do not seem to require water (Miller and Stebbins 1964). Other prey items include small mammals, amphibians, reptiles, fish and invertebrates. Individuals perch to search for prey, and they use impaling as a means of handling prey (Zeiner *et al.* 1990a). Shrikes can consume toxic insects by impaling them and allowing them to "age," which apparently rids the then dead prey of the toxic chemical (Yosef and Whitman 1992).

Status and Distribution

The loggerhead shrike is a resident throughout most of the southern portion of its range (Yosef 1996). The northern populations are migratory (Yosef 1996). The species nests from southern Canada through the Great Basin and California, to Baja California, Mexico and the Gulf coast (Terres 1980). Specifically, in western North America, the species breeds from southeastern Alberta, western Montana, northwest Wyoming, southern Idaho, south-central Washington, eastern Oregon, and California south to southern Baja California.

In California, the species is found throughout the foothills and lowlands of California as a resident (Zeiner *et al.* 1990a). Winter migrants are found coastally, north of Mendocino County (Zeiner *et al.* 1990a). It seems that the loggerhead shrike has always been most abundant in the southern and western portions of its range (Cade and Woods 1997). Wintering grounds are found in the southern portion of the breeding range and further south into Mexico (Terres 1980). The northern populations winter from northern California, northern Nevada, northern Utah, central Colorado, southern and eastern Kansas, western Missouri, northern Kentucky, and

northern Virginia south through the southern United States and in Mexico south throughout the breeding range (Yosef 1996).

The loggerhead shrike was once widely distributed and common over most of North America, occupying an exclusive breeding range with no other shrikes (Cade and Woods 1997). Recently, Christmas bird count data and Breeding Bird Survey data have revealed an overall downward trend across the continent that appears to be related to alterations in habitat structure and loss of habitat as well as the loss of pasture lands and an increase in intensive row-crop agriculture (Cade and Woods 1997; Prescott and Collister 1993; Telfer 1992; Gawlik and Bildstein 1993; Smith and Kruse 1992). Most populations along the coastal plains of southern California have been displaced by urban development, although the subspecies occupying the region (*L. l. gambeli*) is not yet in danger of extirpation (Morrison 1981a).

Threats

Despite its wide distribution, the loggerhead shrike is one of the few North American passerines whose populations have declined continent-wide in recent decades (Yosef 1996). Loss and fragmentation of habitat due to urban development, the spraying of biocides, and competition with species that are more tolerant of human-induced changes may all be contributing to population declines (Yosef 1996). The loggerhead shrike is thought to be generally tolerant to human harassment, although it will abandon nesting attempts if disturbed (Yosef 1996). Studies by Terres (1980) revealed that shrikes are often killed by automobiles in the early morning. The pesticide DDE may have reduced an Illinois population through eggshell thinning (Anderson and Duzan 1978; Morrison 1979). A study of the effect of spraying the common fertilizer, sodium ammonium nitrate, on cattle pastures concluded that the foraging territories of shrikes increased on average to 138 percent of a control group; the survivorship of eggs, nestlings, fledglings, and adults was reduced; and one territory was abandoned (Yosef and Deyrup 1998).

The loggerhead shrike may also suffer population declines due to the presence of the fire ant. Studies have looked at changes in the shrike's winter habitat and found that, in addition to changes in land use, the shrike's decline in counties of the southern United States is directly correlated with an increase in fire ants in the area. The shrike and fire ant are direct competitors for food sources. Both feed on invertebrates, reptiles, and small mammals. The San Clemente loggerhead shrike appears to be threatened by the introduction of exotic species that have altered the ecosystem of San Clemente Island including loss of suitable habitat and increased predation of nests and adults (Scott and Morrison 1990).

Conservation Needs

Large areas of suitable foraging and nesting habitat, as well as habitat linkages and movement corridors between core population areas that allow for dispersal and movement of loggerhead shrikes throughout their range, should be conserved. Additionally, perches should be maintained near suitable foraging habitats; non-native species that compete with or predate on loggerhead shrikes should be controlled; and pesticide use should be limited within suitable habitat throughout their range. There is little conclusive information available regarding reasons for the species' decline, necessary ecological processes for habitat regeneration, and specific

conservation needs within the Plan Area; therefore, focused surveys need to be conducted and findings should be incorporated into an adaptive management strategy for the loggerhead shrike.

Environmental Baseline

Loggerhead shrikes will nest in a variety of vegetation types, including riparian areas with dense shrubs or trees a few meters from the ground. Their foraging habitats are also diverse and include agricultural fields, orchards, and open ground with short grasses. Loggerhead shrikes occur in the highest density in open-canopied valley foothill hardwood/hardwood-conifer, valley foothill riparian, pinyon-juniper, juniper, desert riparian, and Joshua tree habitats. Therefore, our habitat model for the loggerhead shrike captured the following vegetation types: agricultural land, cismontane alkali marsh, coastal sage scrub, desert scrubs, grassland, peninsular juniper woodland and scrub, playas and vernal pools, riparian scrub/woodland/forest, riversidean alluvial fan sage scrub, and woodlands/forests in the Riverside Lowlands, San Jacinto Foothills, and Santa Ana Mountains bioregions of the Plan Area. Based on this analysis, the Plan Area supports approximately 453,587 acres of modeled habitat for the loggerhead shrike.

Approximately 79,049 acres (17 percent) of modeled habitat occur within PQP Lands. Due to the habitat preferences of this species for dense nesting habitat, open-ground foraging habitat, and foraging perches, the modeled habitat likely overestimates the amount of suitable nesting and foraging habitat within the Plan Area.

According to the MSHCP, there are at least 12 general areas where loggerhead shrikes are known to breed and forage within western Riverside County. These areas include the Prado Basin/Santa Ana River, Lake Mathews/Estelle Mountain area, Wasson Canyon, Temecula Creek, Wilson Valley, Quail Valley, Lake Perris/Mystic Lake/San Jacinto Wildlife area, the Badlands, the Wildomar area, the area around San Jacinto, Moreno Valley, and the Homeland/Winchester/ Menifee area. At least four pairs of loggerhead shrikes were present in the Prado Basin during the 2003 breeding season (Pat Tennant and Dharm Pellegrini, Orange County Water District, pers. comm. to Loren Hays, Fish and Wildlife Service, July 29, 2003).

Effects of the Action

Direct Effects

The Plan Area includes 453,587 acres of modeled breeding and foraging habitat for the loggerhead shrike. The loss of 295,625 acres (65 percent) of this habitat is anticipated over the 75-year permit term, which encompasses 209 of the 299 (70 percent) loggerhead shrike observations in our dataset. A 65 percent loss of loggerhead shrike habitat distributed over the Plan Area is anticipated to result in direct mortality of adult birds due to vehicle strikes from the expected increase in the number of high speed roadways and from loss of foraging and nesting habitats to development. Some loggerhead shrikes in impacted areas may be able to disperse to adjacent habitats. However, birds forced to disperse may experience decreased fitness due to increased energy and time spent locating new habitats and competition for the remaining suitable habitat. Displaced birds that are unable to locate suitable habitat will experience increased rates of predation or otherwise die or be injured due to loss of their foraging, breeding, and sheltering habitat. Loss of habitat will result in mortality of loggerhead shrikes; however, we anticipate

that some birds will survive in rural/mountainous areas, where development impacts are expected to occur at lower densities. Approximately 48,470 acres (16 percent) of the non-conserved modeled habitat for the loggerhead shrike are designated as rural/mountainous land.

Loss of roost sites, nesting trees/shrubs, and foraging habitat may preclude the establishment of new loggerhead shrike nesting sites. Because agricultural land, used as foraging habitat by the loggerhead shrike, is rapidly being urbanized in areas surrounding the Prado Basin, it could also diminish the success of nesting sites there due to lack of food resources. Thus, loss of nesting and foraging habitat may impact population numbers of the loggerhead shrike within the Plan Area over the long term by reducing the number and distribution of areas suitable for use as foraging and nesting sites.

To offset the loss of loggerhead shrike habitat within the Plan Area, the MSHCP will conserve and manage 78,913 acres (17 percent) of modeled habitat for this species within the Additional Reserve Lands. Another 79,049 acres (17 percent) of modeled habitat for the loggerhead shrike will remain in PQP Lands. Several (65 locations or 22 percent) of the loggerhead shrike observations in our dataset were recorded from PQP Lands. In total, 35 percent of the modeled habitat for the loggerhead shrike will be conserved or remain in the Plan Area. This modeled habitat includes 30 percent of the loggerhead shrike observations in our dataset.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands, including surveys for the loggerhead shrike. Cooperative management and monitoring are anticipated on PQP Lands. Surveys for the loggerhead shrike will be conducted at least every eight years to verify occupancy and reproductive success at a minimum of 75 percent of the Core Areas. If a decline in the distribution or reproductive status of the loggerhead shrike is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP. Successful reproduction is defined as producing fledglings from a nesting attempt.

Reserve Managers will manage habitat linkages and movement corridors between Core population areas in order to allow for dispersal and movement of loggerhead shrikes throughout the Plan Area and to areas outside of the planning area. In particular, linking Core areas of breeding and foraging habitats will be important to sustaining loggerhead shrikes in the MSHCP Conservation Area. Reserve managers will also manage known and future occurrences of this species with regard to habitat conversion, fertilizer, and pesticide use. According to the MSHCP, the fire ant is identified as a threat to the loggerhead shrike, but it currently exists in only one known location. This area is under quarantine and efforts are being made to eradicate the ant. This known location is outside of the MSHCP Conservation Area (Section 5, Table 5.2).

Core areas designated for the loggerhead shrike in the MSHCP are as follows: Prado Basin/Santa Ana River, Lake Mathews-Estelle Mountain, Wasson Canyon, Wildomar, Temecula Creek, Wilson Valley, Quail Valley, San Jacinto, Lake Perris/Mystic Lake/San Jacinto Wildlife Area, Moreno Valley, Badlands, and scattered within the larger area of Homeland/Winchester/Menifee area. The MSHCP states that the loggerhead shrike is anticipated to respond to a landscape level of management with site specific requirements within the aforementioned Core areas.

The MSHCP will conserve loggerhead shrikes by conserving known and future-identified breeding and foraging locations, linking Core Areas with nearby suitable foraging habitat, and managing nesting areas within the Conservation Area. The Conservation Area will be managed to: 1) preserve the quality of nesting and foraging areas; 2) improve the potential and suitable habitat within the Prado Basin and Santa Ana River; 3) monitor the Core and potential breeding locations; and 4) protect any existing and future documented nest sites.

Management actions to benefit loggerhead shrikes or other Covered Species, such as prescribed burning, may result in impacts to a small number of individual loggerhead shrikes. It is anticipated that any impacts to loggerhead shrikes from management actions will be minimized by adherence to appropriate survey protocols and other guidelines described in Section 7.4 of the MSHCP.

Indirect Effects

The loggerhead shrike could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These impacts include the indirect effects described in the “General Effects” section of this biological opinion. Implementation of the Riparian/Riverine Areas and Vernal Pools policy and the Urban/Wildlands Interface policy will help minimize the indirect effects of the Covered Activities on foraging and breeding habitat for the loggerhead shrike.

Conclusion

We anticipate the proposed action will directly and indirectly affect the loggerhead shrike as described in the analyses above, including the loss of 65 percent of its modeled habitat in the Plan Area. Implementation of the avoidance, minimization, and mitigation measures identified in the Plan will reduce the impacts to this species.

Agricultural lands represent 30 percent (133,743 acres) and rural/mountainous areas represent 16 percent (48,470 acres) of the total modeled loggerhead shrike habitat that occurs outside the MSHCP Conservation Area. While much of the agricultural land is being converted by urban development, wholesale loss of these agricultural lands is not anticipated over the permit term. In addition, this species will utilize a diversity of habitat types for both nesting and foraging. We also anticipate that some birds will survive in rural/mountainous areas. Thus, despite the loss of significant areas of modeled foraging and breeding habitat, we anticipate that the loggerhead shrike will be able to persist within the Plan Area in the remaining 35 percent of the modeled habitat within both the existing PQP Lands and the Additional Reserve Lands. Together these lands form a system of large, contiguous habitat blocks that are interconnected within the Plan Area. We anticipate that these lands will be monitored and managed cooperatively to benefit this species.

After reviewing the current status of this species, the environmental baseline for the Plan Area, the effects of the proposed action, and the cumulative effects, it is the Service’s biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the loggerhead shrike. We reached this conclusion based on the widespread distribution of the

loggerhead shrike in the Plan Area, the species' overall distribution and plasticity in regard to foraging habitat and nest site selection, and because the impacts associated with loss of this species' habitat, when viewed in conjunction with protection and management of the MSHCP Conservation Area, are not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Amount or Extent of Take

Due to the difficulty in quantifying the number of loggerhead shrikes impacted over the 75-year permit term, including displaced individuals and loggerhead shrike adults killed by vehicle strikes, the Service is quantifying the take as the number of acres of modeled loggerhead shrike habitat that will be impacted in the Plan Area as a result of the proposed action. We anticipate that up to 295,625 acres of breeding and foraging habitat within the Plan Area will become unsuitable for the loggerhead shrike as a result of the proposed action. Additionally, a small, but undeterminable, number of loggerhead shrikes are anticipated to be taken as a result of management actions.

Take will be in the form of harm, death, and injury. This level of take is not likely to result in jeopardy to the loggerhead shrike.

MacGillivray's warbler (*Oporornis tolmiei*)

Status of the species

Listing Status

The MacGillivray's warbler is not listed under the Federal or State Endangered Species Acts.

Species Description

The MacGillivray's warbler is a small (10-15 centimeters) wood-warbler, green above and yellow below with white crescents above and below eyes and gray hood (Pitocchelli 1995). It is most similar to its eastern relative, the mourning warbler (*O. philadelphia*), but most adult mourning warblers lack eye crescents. Some individuals have characteristics intermediate between the two species (Pitocchelli 1995).

Habitat Affinities

Throughout California, MacGillivray's warblers inhabit valley foothill riparian, coastal Douglas-fir, redwood, montane riparian and desert riparian habitats (Zeiner *et al.* 1990a). They have been characterized as breeding commonly in riparian habitat and clearcuts of northern coniferous forests, secondary growth, and disturbed habitat. They occur in moist habitats, willow thickets and brushy areas, usually near water, from sea level along the Pacific Northwest coast to 3,000 meters in the Sierra Nevada range. Habitat includes dense undergrowth and moderate cover in coniferous and deciduous forests with the amount of cover being important for assessing breeding habitat. For example, breeding takes place in deciduous forests with 60

percent total cover, composed of 44 percent shrubs, 8 percent coniferous species and 7 percent deciduous species (Morrison 1981b).

MacGillivray's warblers typically nest in riparian habitat along stream and river banks within the undergrowth of deciduous and mixed forests, logging clear cuts, and areas recovering from avalanches. They may nest on clumps of grass on or above the ground among cedar, alder, hawthorn, willows, flowering shrubs of wild raspberry, stinging nettle, buckthorn, saskatoon, wild rosebush, gooseberry, currant, blackberry vines, huckleberry, wild lettuce, heliobore, salal bush, hazel bush, wild columbine, dry ferns and wildflowers. The nest is always by shrubs and dense undergrowth (Pitocchelli 1995).

In migration, MacGillivray's warblers are elusive, mostly seen passing through thick shrubbery but avoiding trees (Pitocchelli 1995; Miller and Stebbins 1964). They are common in dense shrubs or well-shaded habitats along mountains and desert of interior California. Foraging occurs from shrubs or the ground in dense thickets (Zeiner *et al.* 1990a).

Life History

Nesting occurs in shrubs in moist thickets from May through July with peak activity in June. The clutch size is 3-6 eggs, usually four eggs (Zeiner *et al.* 1990a; Pitocchelli 1995). Incubation is 11-13 days by the female only, and the altricial nestlings are tended by both parents until fledging occurs, 8 to 9 days after hatching (Bent 1953; Zeiner, *et al.* 1990a). Family groups appear to forage together during the post-fledging period, but it is not known how long they stay together (Pitocchelli 1995).

MacGillivray's warblers eat mostly insects, including true bugs, leaf hoppers, beetles, bees, wasps and ants (Zeiner *et al.* 1990a). They forage by gleaning along the inner parts of the vegetation at a height ranging from ground level to 3 meters (Pitocchelli 1995). They are preyed upon by accipiters, small mammals and snakes (Zeiner *et al.* 1990a).

Species density of the MacGillivray's warbler has been recorded at 10 and 2.5 pairs per 100 acres for two study groups in Idaho (Johnston 1949). A separate study found a density of 10 pairs per 100 acres in willow-sedge swamp, 30 pairs per 100 acres in a flat land aspen stand and 85 pairs per 100 acres in a scrub-meadow in Wyoming (Salt 1957).

Status and Distribution

The MacGillivray's warbler occurs within suitable habitat along the Rocky Mountains, west to the Pacific Ocean, from southeast Alaska, to British Columbia, the Yukon, south to northern New Mexico, central Arizona, and southern California within the San Bernardino Mountains (Pitocchelli 1995). Within California, breeding populations occur mostly in the coastal areas north of Monterey County and in the Sierras (Zeiner *et al.* 1990a). The populations tend to be more disjunct at the periphery of the breeding range, especially within the prairies and in the southwestern United States (Pitocchelli 1995). In addition, the MacGillivray's warbler is less common in the southern limits of its breeding range (Pitocchelli 1995). In southern California, this species is a common spring and fall transient through the interior, but it is considerably less

numerous on the coast where it is an uncommon spring and fairly common fall transient (Garrett and Dunn 1981).

The species winters from southern Baja California to Panama, but this is poorly defined (Terres 1980). It is a highly migratory species, but little is known about the nature of migration because of the species' preference for dense undergrowth and its elusive and shy behavior. The earliest spring migrants appear in March in California and pass through the lowland areas into late May (Pitocchelli 1995).

The current breeding range may be much smaller than the ancestral range. It has been speculated that the breeding range of the ancestor of the mourning and MacGillivray's warblers may have stretched across North America prior to the Pleistocene. Subsequent glaciation during the Pleistocene divided the range into the eastern and western populations. Overall, the MacGillivray's warbler populations have expanded since the late 1880s in the western United States. The MacGillivray's warbler shows an expanding range in parts of southern California especially in the San Gabriel and San Bernardino mountains (Pitocchelli 1995).

Threats

According to Pitocchelli (1995), the MacGillivray's warbler responds differently to different types of human-related activities. Ranching activities destroy the habitat of MacGillivray's warbler at migratory stopovers and on the wintering and breeding grounds; however, some human activities, such as logging, may actually benefit the species. This was the case only with selection-cut logging forests, which harvest certain species, but leave a variety of sizes, where the MacGillivray's warbler showed an upward pattern of numerical response in population size (Medin and Booth 1989). Logging may open up more potential breeding habitat for the MacGillivray's warbler in the short term. However, the selection of certain trees to replant in these areas is critical. Choosing an inappropriate tree species may affect the habitat quality and eventually prevent dense, lush undergrowth needed as breeding habitat (Pitocchelli 1995).

MacGillivray's warbler is also susceptible to pesticide contamination (acephate) resulting in depressed cholinesterase (ChE) activity (Pitocchelli 1995). Exposure to two other insecticides, however (carbaryl and trichlorfon), resulted in minor effects on the ChE activity. Thus the influence of pesticides on the populations is undetermined (Pitocchelli 1995).

Additional threats may include surface water diversion, groundwater extraction, heavy recreation use, facilities development, and overgrazing by livestock that can degrade montane riparian habitat (Stephenson and Calcarone 1999).

Conservation Needs

Basic conservation needs for the MacGillivray's warbler can be defined in terms of breeding and migratory habitat requirements. These habitat requirements are well known and discussed in detail above in the habitat affinities section. Conservation and proper management of existing and potential breeding habitats is needed for the conservation of the MacGillivray's warbler within the Plan Area. In addition, the hydrological and ecological processes necessary to sustain

suitable habitat needs to be protected. Additional conservation needs for MacGillivray's warbler include the need to gain more information on MacGillivray's warbler breeding distribution, migratory/dispersal stopovers or corridors and abundance.

Environmental Baseline

Breeding MacGillivray's warblers occur in willow thickets and other moist shrubby habitats within coniferous forests from 6,562 to 9,186 feet (2,000 to 2,800 meters) in elevation (Garret and Dunn 1981). No recent records for breeding MacGillivray's warblers have been documented within the Plan Area. Potential breeding sites within the Plan Area are restricted to the high elevation montane riparian scrub and forests, montane coniferous forests and montane meadows of the San Bernardino National Forest, including a small portion of the San Bernardino Mountains and throughout the San Jacinto Mountains. However, migratory and/or foraging MacGillivray's warblers may be found almost anywhere in the Plan Area within dense shrublands or thickets.

According to our dataset, there are 12 recent known locations for the MacGillivray's warbler within the Plan Area. The majority of these records are located within the Riverside Lowlands Bioregion and likely reflect migratory MacGillivray's warblers that use lowland areas (these lowland habitats are not used for breeding). Six of the 12 records are located in the Canyon Lake area, two records are adjacent to Sycamore Canyon Regional Park, and the remaining 4 single records located in Tenaja Canyon, Santa Ana River/Mt. Rubidoux area, Box Springs Mountain and in the vicinity of Murrieta Hot Springs. None of the known locations within our dataset are known breeding localities for the MacGillivray's warbler.

Chaparral, coastal sage scrub, desert scrubs, montane coniferous forest, riparian scrub woodland and forest, Riversidean alluvial fan sage scrub and oak woodlands and forest habitats throughout all bioregions were used to model habitat for the MacGillivray's warbler within the Plan Area. We found that the Plan Area supports approximately 644,150 acres of modeled habitat for the MacGillivray's warbler. Because the MacGillivray's warbler needs specific microhabitat features, such as dense undergrowth and moderate cover, modeled habitat likely overestimates the extent of suitable habitat for this species. Forty-five percent of MacGillivray's warbler modeled habitat occurs on existing PQP Lands.

Effects of the Action

Direct Effects

The Plan Area supports 644,150 acres of modeled habitat for the MacGillivray's warbler. The MacGillivray's warbler will be subject to impacts associated with development and other proposed Covered Activities over the 75-year permit term within 232,036 acres (36 percent) of this modeled habitat. It is anticipated that most of this modeled habitat for MacGillivray's warbler in these areas will be lost as a result of development although some habitat for this species may remain in areas avoided as a result of the Riparian/Riverine Areas and Vernal Pools policy and in rural mountainous areas where development impacts are anticipated to occur at a slower rate and at lower densities. Approximately 89,664 acres (39 percent) of the non-

conserved modeled habitat for the MacGillivray's warbler are designated as rural/mountainous land.

Although 84 percent of the MacGillivray's warbler observations in our dataset are outside the MSHCP Conservation Area, all of these observations are believed to be dispersing migratory birds; no breeding MacGillivray's warblers have been observed in the Plan Area. Loss of this habitat may decrease the use of the Plan Area by the MacGillivray's warbler over the long term by reducing the number of areas suitable for use as migratory stop-overs and foraging sites.

To offset the loss of MacGillivray's warbler habitat, the MSHCP will conserve and manage 120,963 acres (19 percent) of modeled habitat for the MacGillivray's warbler within the Additional Reserve Lands. Another 291,151 acres (45 percent) of modeled habitat for the MacGillivray's warbler will remain within PQP Lands. In total, 64 percent of the modeled habitat for the MacGillivray's warbler will be conserved or remain in the Plan Area. This modeled habitat includes 16 percent of the MacGillivray's warbler observations in our dataset.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands, including surveys for MacGillivray's warbler. Cooperative management and monitoring for MacGillivray's warbler is anticipated on PQP Lands. Surveys for MacGillivray's warbler will be conducted at least every eight years to verify occupancy at a minimum of 75 percent of the known locations. If a decline in distribution of the MacGillivray's warbler is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP. It is also anticipated that the MacGillivray's warbler will benefit from the General Management Measures described in Section 5 of the MSHCP, which include control of unauthorized public access, off-road vehicle use and vandalism in the MSHCP Conservation Area. In addition, wetland habitat will be maintained and managed to the extent feasible and baseline wetland habitat conditions will be measured and monitored at regular intervals within the MSHCP Conservation Area.

Indirect Effects

The MacGillivray's warbler could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These impacts include the indirect effects described in the "General Effects" section of this biological opinion. In particular, maintaining the hydrological processes and water quality standards (*e.g.*, controlling sedimentation and other pollutants) of wetland habitats will be important to sustaining MacGillivray's warblers in the MSHCP Conservation Area. Implementation of the Riparian/Riverine Area and Vernal Pools policy and the Urban/Wildlands Interface policy will help minimize the indirect effects of the Covered Activities on breeding habitat for the MacGillivray's warbler.

Conclusion

We anticipate the proposed action will directly and indirectly affect the MacGillivray's warbler as described in the analyses above, including the loss of 36 percent of its modeled habitat in the Plan Area. Implementation of the avoidance, minimization, and mitigation measures identified in the Plan will reduce the impacts to this species. We anticipate that this species will persist in

the remaining 64 percent of the modeled habitat within existing PQP Lands and the Additional Reserve Lands. Together these lands form a system of large, contiguous habitat blocks that are interconnected within the Plan Area, which we anticipate will be monitored and managed cooperatively to benefit this species.

After reviewing the current status of this species, the environmental baseline for the Plan area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the MacGillivray's warbler. We reached this conclusion based on the widespread distribution of the MacGillivray's warbler throughout its range and because the impacts associated with loss of this species' habitat, when viewed in conjunction with protection and management of the MSHCP Conservation Area, is not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Amount or Extent of Take

Because of the large area covered, it will be difficult to quantify the number of MacGillivray's warblers that will be impacted as a result of the proposed action over the 75-year permit term. Therefore, the Service is quantifying the take as the number of acres of modeled habitat that will be impacted in the Plan Area as a result of the proposed action. We anticipate that 232,036 acres of habitat within the Plan Area will become unsuitable for MacGillivray's warbler as a result of the proposed action. Take will be in the form of harm, death, and injury. This level of take is not likely to result in jeopardy to the MacGillivray's warbler.

Merlin (*Falco columbarius*)

Status of the species

Listing Status

The merlin is not listed under the Federal Endangered Species Act. It is considered a California Species of Special Concern by the California Department of Fish and Game.

Species Description

The merlin is a small (24 to 30 centimeters) falcon with dark brown iris, blue-gray beak and bright yellow legs. Males and females differ in size and plumage. Males are 24 to 30 percent smaller than females and have blackish gray to pale backs, leg feathers with a distinct rufous wash and black tail with white terminal band and 2 to 4 lighter gray bands. Females are brown on the back, have no rufous leg feathers and have brown tails with light bands. Juveniles are similar to female adult in coloration but are darker on back and lack grayish cast on rump and uppertail coverts (Sodhi *et al.* 1993).

Habitat Affinities

The merlin uses a wide variety of habitats. Range-wide, merlin breed in open country (*e.g.*, open coniferous woodland, prairie) and winter in open woodland, grasslands, cultivated fields, marshes, estuaries and sea coasts (AOU 1998). Within southern California, birds are often found in these same habitats and are rarely found in heavily wooded areas or over open deserts (Garrett and Dunn 1981). The merlin frequents coastlines, open grasslands, savannahs, woodlands, lakes, wetlands, edges, and early successional stages (Zeiner *et al.* 1990a). It ranges from annual grasslands to ponderosa pine and montane hardwood-conifer habitats. Dense tree stands, close to bodies of water are frequently used for cover (Sodhi *et al.* 1993).

Merlin nest in small groves of deciduous trees adjacent to open areas for foraging. An abandoned stick nest from a crow or magpie, usually in a conifer but also in a deciduous tree, may be used. Occasionally nests are built in cavities, cliffs, in a deserted building or on the ground (Craighead and Craighead 1956; Brown and Amadon 1968).

Life History

The merlin defends nest sites during the breeding season and intraspecific nest intruders are aggressively chased off (Sodhi 1991). The nearest neighbor distances range from 161 to 4,669 meters in some areas (Sodhi *et al.* 1992). The clutch of 4-5 eggs is laid from late May into June. Incubation is 28-32 days, and chicks fledge at about 24 days (Trimble 1972). Fledglings disperse from nest sites between July 10 and August 9 in Montana (Becker and Sieg 1985). Mean natal dispersal distance is 4.1 kilometers for females and 3.0 kilometers for males (Sodhi *et al.* 1993).

The distances moved between successive breeding seasons varies greatly (Wiklund 1996) Fidelity to the breeding site was higher in males than females and females dispersed nearly three times as far as for males. For both genders, low reproductive success was associated with long dispersal distances (Wiklund 1996). Most individuals have a short life span, with a maximum life span seldom exceeding eight years (Sodhi *et al.* 1993). First year mortality is approximately 70 percent (Fox 1964).

The merlin feeds primarily on small birds usually weighing less than 50 grams; it also feeds on small mammals, reptiles, and insects (Sodhi *et al.* 1993). Most studies report a specialization on one or two locally abundant species of small birds. In addition to being locally abundant, the principal prey species is often foraging away from cover making it more vulnerable to predation and in the 20 to 40 gram weight range (Sodhi and Oliphant 1993). In the winter merlin frequent shorelines and catch shorebirds. They search while flying at low levels then attack with a short dive, or dash from above. Prey may be captured on the ground or in the air, after direct pursuit. The young may rely upon insects while developing predatory skills (Zeiner *et al.* 1990a).

Status and Distribution

Merlin breed locally in North America from Alaska through most of Canada, eastward to Newfoundland, southward to Washington and Maine. The merlin does not breed in California.

The species winters in a large majority of the breeding range and southward to northern South America (AOU 1998, Sodhi *et al.* 1993). Trends are difficult to track, as merlin are uncommon throughout their range. Most populations are reproducing well (Sodhi *et al.* 1993).

Locally the merlin is an uncommon fall transient and rare winter visitor from late September to early March. It is a rare winter migrant in the Mojave Desert and casual transient on the Channel Islands (Garrett and Dunn 1981). While *F. c. columbarius* was formerly considered fairly common locally, in certain years (Grinnell and Miller 1944), according to Zeiner *et al.* (1990a) numbers of the species have declined markedly in California in recent decades.

Merlin have adapted well to many semi-urban and rural areas in response to increased availability of flocking species such as European starlings and house sparrows (Sodhi *et al.* 1992, 1993; White 1994; Kirk and Hyslop 1998, cited in Hoffman and Smith 2003). The species often winters in cities throughout its range, where it frequently perches on buildings, power poles, and tall trees (Oliphant 1974, Servheen 1985, cited in Sodhi *et al.* 1993). The expansion of populations into urban habitats helps to maintain numbers and is an optimistic reflection of the health of these urban environments and the adaptability of the species (Sodhi *et al.*, 1993).

Threats

Historically, population declines of many raptor species, including merlin, were attributed to environmental contaminants such as cyclodienes and DDT. Since the ban of these chemicals in North America in the early 1970's, most merlin populations are no longer affected by pesticide contamination. However, the continued presence of environmental contaminants in the merlin is a cause of concern as some pesticides are still used in parts of the merlin wintering range, south of the United States (Stephens and Anderson 2002).

Currently, the loss of suitable habitat may be the major factor affecting merlin numbers (Cade 1982). Nest site availability is decreased by the loss of nest stands to timber harvest (Stephens and Anderson 2002). Loss of foraging habitat and locally abundant prey species may be detrimental to transient and wintering populations. The winter range and winter diet of merlin is poorly documented (Sodhi *et al.* 1993); therefore, threats to this species in the Plan Area are largely unknown.

Conservation Needs

Adequate prey base is required to maintain transient and wintering merlin populations. Large blocks of habitat supporting known and potential foraging locations should be conserved in the Plan Area. Dense tree stands close to bodies of water are needed for cover (Zeiner *et al.* 1990a).

Environmental Baseline

Merlin are known to use a wide variety of habitats, except for dense coniferous woodland and open water, that occur throughout the Plan Area in all Bioregions. The primary vegetation types used to model habitat for this species were agricultural land, grassland, coastal and valley freshwater marsh, cismontane alkali marsh, playas and vernal pools, desert scrubs, Riversidean

alluvial fan sage scrub, coastal sage scrub, peninsular juniper woodland and scrub, riparian scrub, woodland, forest, and oak woodlands and forests. Based on this analysis, the Plan Area supports approximately 463,210 acres of modeled habitat for the merlin. Approximately 98,176 acres (21 percent) of this modeled habitat occurs within PQP Lands.

Merlin are expected to occur as rare winter visitors and uncommon fall and early spring transients throughout western Riverside County within suitable habitat (Garrett and Dunn 1981). Our dataset includes 24 records for merlin within the Plan Area between 1988 and 1999. Observations were recorded each year during that period, except for 1994 and 1995. Within PQP Lands our dataset includes observations in the San Jacinto Wildlife Area, Sycamore Canyon, Box Springs Reserve, Santa Ana River, Diamond Valley Lake, Rawson Canyon and San Bernardino National Forest. Additional records in our dataset include observations of merlin in French Valley, west of Hogbacks, Santa Ana Mountains, east of Lake Skinner, west of Red Mountain, along the aquaduct in San Jacinto Mias Canyon, Moreno Valley, Riverside Basin, San Jacinto River in Lakeview and along the San Diego Canal in Hemet.

Effects of the Action

Direct effects

The Plan Area includes 463,210 acres of modeled habitat for the merlin. It is anticipated that development and other proposed Covered Activities over the 75-year permit term will impact approximately 280,647 acres (61 percent) of this modeled habitat. Due to the wide ranging nature of the species, its sparse distribution, and lack of breeding in the Plan Area, it is unlikely that this loss of habitat will have an impact on population numbers of the merlin within the Plan Area over the long term.

Due to the widespread distribution of merlin, conservation of the species is based on maintaining large blocks of foraging habitat in the Plan Area. The MSHCP will conserve and manage 84,387 acres (18 percent) of modeled habitat for the merlin within Additional Reserve Lands. Another 98,176 acres (21 percent) of modeled habitat will remain in PQP Lands. In total, 39 percent of the modeled habitat for the merlin will be conserved or remain in the Plan Area. This modeled habitat includes 92 percent of the merlin observations in our dataset.

Although no core areas have been identified for the merlin, the Plan will conserve large blocks of habitat in known and potential foraging locations within the MSHCP Conservation Area. These include the Prado Basin, Santa Ana River, Lake Mathews-Estelle Mountain, Wilson Creek, Mystic Lake/San Jacinto Wildlife Area and Lake Skinner/Diamond Valley Lake.

The merlin will benefit from the General Management Measures described in Section 5.2.1 of the MSHCP, which provides for control of unauthorized public access and off-road vehicles within the MSHCP Conservation Area, maintenance and management of existing upland and wetland habitats in a similar or better condition as at their time of conveyance to the MSHCP Conservation Area, and conservation of any identified raptor nest within the MSHCP Conservation Area.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands, including surveys for the merlin. Cooperative management and monitoring are anticipated on PQP Lands. Surveys for the merlin will be conducted at least every eight years to verify occupancy at a minimum of 75 percent of the known locations. If a decline in the distribution of the merlin is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP.

Indirect Effects

The merlin could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These generally include the indirect effects mentioned in the “General Effects” section of this biological opinion. The management provisions listed above will help to reduce the indirect effects to this species.

Conclusion

We anticipate the proposed action will directly and indirectly affect the merlin as described in the analyses above, including the loss of 61 percent of its modeled habitat in the Plan Area. Implementation of the avoidance, minimization, and mitigation measures will reduce the impacts to this species. We anticipate that this species will persist in the remaining 39 percent of its modeled habitat within both the existing PQP Lands and the Additional Reserve Lands. We anticipate that these areas will be monitored and managed cooperatively to benefit this species.

After reviewing the current status of this species, the environmental baseline for the Plan area, the effects of the proposed action, and the cumulative effects, it is the Service’s biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the merlin. We reached this conclusion based on the limited presence of the merlin within the Plan Area and because the impacts associated with loss of this species’ habitat, when viewed in conjunction with protection and management of the MSHCP Conservation Area, are not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Amount or Extent of Take

We anticipate that up to 280,647 acres of habitat within the Plan Area will become unsuitable for the merlin as a result of the proposed action. Because merlin use a variety of habitats that will remain in large blocks within the MSHCP Conservation Area and only limited use of the action area by merlin is anticipated, the loss of modeled habitat for the merlin within the Plan Area is not likely to result in the death or injury of adult merlin.

We anticipate zero (0) take of merlin as a result of implementation of the Plan. This level of take is not likely to result in jeopardy to the merlin.

Mountain plover (*Charadrius montanus*)Status of the species*Listing Status*

The mountain plover was proposed for listing as a federally threatened species on February 16, 1999 (64 FR 7587). The proposal was open for public comment between December 5, 2002 (67 FR 72396), and March 21, 2003 (68 FR 8487). On September 9, 2003, the Service determined that the listing is not warranted and published a withdrawal of the proposed rule to list the species as threatened (68 FR 53083). The mountain plover is a Fish and Wildlife Service migratory non-game bird of management concern and is listed on the Federal Birds of Conservation Concern (2002h). In California it is a Species of Special Concern.

Species Description

The mountain plover is a fairly large plover (body 8-9.5 inches), similar in appearance to killdeer but with no breast rings (May 2001). It has a sandy brown back and white forehead, throat, breast and underwings (Knopf 1996). Distinguishing marks for the bird in flight include a thin white stripe on the wing and wide black tail band. Breeding birds have a black stripe that extends from the bill to the eye and a black forecrown (May 2001; Knopf 1996). Males and females are similar in size and appearance (May 2001).

Habitat Affinities

Range-wide, mountain plovers breed in dry, open, shortgrass prairies or grasslands and winter in shortgrass plains, plowed fields, open sagebrush areas, and sandy deserts (AOU 1998). In the breeding areas, the species appears to require relatively open areas with little vegetative cover where it forages for insects. The species has been recorded for breeding in dry open shortgrass prairies or grasslands (AOU 1998; Graul and Webster 1976). Nesting occurs mainly in flat areas with at least 30 percent bare ground (Knopf 1996). In areas of fragmented prairies, it also nests on fallow and recently plowed ground. At locations where courting or breeding birds have the opportunity to use plowed versus prairie surfaces, they use both equally (Knopf 1996). Overall, it avoids high and dense cover. It nests in high-elevation grassland, often in blue grama and buffalo grass patches (Graul 1975). Within the winter range, the birds spend about 75 percent of their time on plowed fields but prefer heavily grazed annual grasslands or burned fields as well as other open little vegetated areas (Knopf 1996).

The species appears to require relatively open areas with little vegetative cover where it forages for insects. Generally, the mountain plover forages in extensive areas of disturbed ground surface or areas of short vegetation (less than 2 centimeters) with interstitial spaces of bare ground. Disturbed surface sites include prairie dog towns, kangaroo rat precincts, sites of heavy sheep or cattle grazing or concentrations, dirt or gravel roadbeds, recently plowed ground, and fallow fields (Knopf 1996).

Within California, the mountain plover frequents open plains with low, herbaceous or scattered shrub vegetation; it may occur in areas with sparse shrub cover but avoids high and dense cover (Zeiner *et al.* 1990a). Within southern California, the largest numbers of birds occur in grasslands and agricultural areas in the interior (Garrett and Dunn 1981). The mountain plover does not nest in California; it occurs within the State only during the wintering season.

Life History

Mountain plovers arrive on breeding grounds and establish territories in March by performing “falling leaf” aerial displays, *wee-wee* calls and horizontal threat displays (Graul 1973). Breeding territories may overlap but were estimated to be 16 hectares for three males in Colorado (Graul 1973). During the breeding season, territories are defended against conspecifics, larkspurs, and horned larks.

The species is generally monogamous, and pair bonds form at least 18 days prior to copulations (Knopf 1996). The pair bonds are only maintained during the breeding season where 83 percent of the males return to the previous year’s territories, in contrast to only 40 percent of the females (Knopf 1996). However, both males and females return to the same breeding area (within 100-800 meters of the previous year’s nest) during subsequent breeding seasons (Knopf 1996). Only one brood is raised per adult per season, although some pairs have two clutches if the first clutch fails (Knopf 1996). The species breeds from late April through June (Knopf 1996). Nests are widely spaced within a nesting area. Graul (1975) found 21 nests/65 hectares (162 acres), with an average distance between nests of 140 meters (425 feet). The female lays an average clutch of three eggs (range = 1-4). In years of abundant food, males may incubate and brood the young while females lay another clutch, often tended by another male (Ehrlich *et al.* 1988). The home range of adults with broods averages at 56.6 hectares until the fledging of young (Knopf 1996).

Chicks leave the nest within three hours of hatching and can catch their own food by the evening after they are born (Knopf 1996). Fledged mountain plovers join loosely organized fall flocks that include both adults and young of the year. These flocks begin forming in mid-June in some areas. Migration behavior consists of short- to long-distance migrations, more east-west than north-south (Knopf 1996). Birds move in flocks of greater than 30 individuals (Knopf 1996). Mountain plovers are usually not territorial in non-breeding seasons but may defend a small, mobile feeding space. They search on the ground for large insects, especially grasshoppers (Graul 1976) and appear to be general opportunists of invertebrate taxa (Knopf 1996, 1998).

Predation on the mountain plover limits chick survival to 0.17 to 0.74 chicks per nesting attempt and is even more limiting during drought years (Knopf 1996). Main predators of mountain plover chicks include the swift fox, thirteen-lined ground squirrel, coyote, Swainson’s hawk, prairie falcon and loggerhead shrike (Knopf 1996).

Status and Distribution

Mountain plovers breed locally from extreme southern Alberta generally eastward to North Dakota southward to Wyoming and western Texas. Birds disperse widely across the western and southern Great Plains in the late summer and early fall (Knopf 1996). The species winters

generally from California south to Baja California and southeasterly to Texas and northern mainland Mexico (Cogswell 1977; AOU 1998). It resides in California from September through March and is found below 1,000 meters (3,200 feet) on short grasslands and plowed fields of the Central Valley from Sutter and Yuba counties southward (Zeiner *et al.* 1990a). It is also found in foothill valleys west of San Joaquin Valley and in Imperial Valley. Flocks may occur, at least irregularly, in the Lucerne Valley and along the Colorado River (Garrett and Dunn 1981).

Formerly considered abundant in California (Grinnell and Miller 1944), the species has declined in recent years (Small 1994). For instance, there were 1,156 birds recorded on an Orange County Christmas Count in 1957 (Hamilton and Willick 1996), but no mountain plovers were detected anywhere in the Orange County during the winter of 1997-1998 (California Department of Fish and Game 1998, unpublished data) despite formal and informal censuses of historically-occupied locales.

Threats

In the proposed rule to list the mountain plover as threatened, the Service (1999d) concluded that the conversion of grassland habitat, agricultural practices, management of domestic livestock, and decline of native herbivores likely primarily led to the documented decline of mountain plovers. Population decline in the coastal plains of the region has been attributed to the destruction of suitable open wintering habitats (Garrett and Dunn 1981). Impacts to breeding habitats and birds on the breeding grounds are also likely to contribute to observed local declines. The habitat of the mountain plover is, in particular, easily converted to other landscapes and human uses. Nests are often made in cultivated fields and can be destroyed by farm machinery if planting occurs in May (Knopf 1996). Most of the threats to the species appear to occur at the breeding grounds within the Great Plains region. A major shift in regional planting activity has created a reproductive sink for mountain plovers and may explain the annual rate of decline since 1966 (Knopf 1996). However, in the withdrawal of the listing proposal, the Service concluded that the conversion of grasslands was not the imminent threat to mountain plover breeding habitat nor was the rate of conversion of grasslands in wintering areas as significant an influence on the total abundance of mountain plovers as previously thought (Fish and Wildlife Service 2003e).

Conservation Needs

Maintenance of adequate breeding and wintering habitat is important to the persistence of the species. Alteration of native grasslands (*e.g.*, loss of primary grazers, farming conversion of prairie to taller grasses) has led to the decline of many grassland species (Knopf 1996). Burning grasslands and/or croplands may have a beneficial effect for the mountain plover at breeding locations in spring prior to nesting and at winter locations for foraging (Knopf 1996).

Environmental Baseline

The mountain plover is found in the Plan Area only during the non-breeding season and generally occupies areas with little vegetative cover, such as alkali flats, open grasslands and some agricultural areas. Our habitat model for mountain plover foraging habitat included playas

and vernal pools within the Riverside Lowlands Bioregion. We excluded agricultural lands from our model because we cannot be certain how many acres of agriculture would be available with appropriate conditions (*i.e.*, little or no vegetation) for the species during winter. Based on this analysis, approximately 7,043 acres of modeled habitat for mountain plover exists within the Plan Area. Approximately 2,682 acres (38 percent) of this modeled habitat occurs within PQP Lands.

The MSHCP mentions 17 records for mountain plover within the Plan Area with dates from 1887 to 1999. Ten of those records were within the past 10 years, and only one point has a high degree of precision. We have only two data points for mountain plover in our dataset; one falls within PQP Lands at the San Jacinto Wildlife Area (high precision point), and the other is to the southeast within the San Jacinto U.S. Geological Survey quad map.

Effects of the Action

Direct effects

The Plan Area includes 7,043 acres of modeled habitat for the mountain plover. Loss of 985 acres (14 percent) of this modeled habitat is anticipated over the 75-year permit term. Because we had no method to determine the amount, distribution and condition of agricultural fields during the time that mountain plovers are present in the Plan Area, the modeled habitat for mountain plover did not include any agricultural lands. We do recognize, however, that newly plowed fields or sparsely vegetated fallow fields in the Plan Area will likely be available for mountain plover over the permit term. Thus, the habitat model for mountain plover likely underestimates the extent of suitable foraging habitat for this species in the Plan Area. In anticipation of some agricultural lands being available to mountain plover over the permit term, loss of only 985 acres of modeled foraging habitat distributed over the Plan Area is not likely to significantly impact overall population numbers of this species within the Plan Area. Because the mountain plover does not nest in the Plan Area, we do not anticipate the loss of active nests as a result of Plan implementation.

To offset the loss of mountain plover foraging habitat within the Plan Area, implementation of the MSHCP will conserve and manage large areas of modeled habitat for the mountain plover and linkages among these areas. Conserved habitat within the Additional Reserve Lands will include 3,377 acres (48 percent) of modeled habitat for the mountain plover. An additional 2,682 acres (38 percent) of modeled habitat for mountain plover will remain within PQP Lands. In total, 6,059 acres (86 percent) of the modeled habitat for the mountain plover will be conserved or remain in the Plan Area.

Four core areas, two large and two smaller, and interconnecting linkages will be included within the MSHCP Conservation Area. The two large areas will contain at least 2,500 acres of suitable habitat (playa, grassland, and fallow agriculture), and the two smaller areas will contain at least 1,000 acres of suitable habitat. The San Jacinto River floodplain (large core area) and Mystic Lake/San Jacinto Wildlife Area and the playa west of Hemet (small core areas) will be included in the MSHCP Conservation Area. The following areas may be included: Lake Skinner/Diamond Valley Lake and grassland areas adjacent to Lake Elsinore and Lake Mathews.

The conservation strategy outlined in the Plan for mountain plover is preservation of existing occupied habitat to the extent possible and the identification and management of additional suitable habitat within the MSHCP Conservation Area using fire as a management tool to create habitat from agricultural lands. The Permittees will implement management and monitoring practices within the Additional Reserve Lands, including surveys for the mountain plover. Cooperative management and monitoring is anticipated on PQP Lands. While the mountain plover does not have a special survey status under the Plan, under general management and monitoring activities, surveys will be conducted at least every eight years to verify occupancy at a minimum of 75 percent of the known or future-identified locations.

The mountain plover will also benefit from the General Management Measures described in Section 5 of the MSHCP, which provide for control of unauthorized public access and maintenance of existing habitat, including control of invasive weeds. Specific management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP. Table 5.2 states that managers will manage for mountain plovers with regard to farming, grazing, conversion of grassland habitat, and decline of native herbivores; based on Table 9.2 and the species account in the Plan, we assume that this means that appropriate grassland or agricultural lands will be burned to provide the low vegetative cover that the species prefers for foraging.

Indirect Effects

The mountain plover could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These impacts include the indirect effects described in the “General Effects” section above. In particular, maintaining the hydrological processes associated with alkali habitats will be important in conserving mountain plover habitat within the MSHCP Conservation Area. Implementation of the Riparian/Riverine Area and Vernal Pools policy and the Urban/Wildlands Interface policy will help minimize the indirect effects of the Covered Activities on foraging habitat for the mountain plover.

Conclusion

We anticipate the proposed action will directly and indirectly affect the mountain plover as described in the analyses above, including the loss of 14 percent of its modeled habitat in the Plan Area. Implementation of the avoidance, minimization, and mitigation measures will reduce the impacts to this species. We anticipate that this species will persist in the remaining 86 percent of its modeled habitat within both the existing PQP Lands and the Additional Reserve Lands. Together these lands form a system of large, contiguous habitat blocks that are interconnected within the Plan Area. We anticipate that these areas will be monitored and managed cooperatively to benefit this species.

After reviewing the current status of this species, the environmental baseline for the Plan area, the effects of the proposed action, and the cumulative effects, it is the Service’s biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the mountain plover. We reached this conclusion based on the limited presence of mountain plover within the Plan Area and because the impacts associated with loss of this species’ habitat, when

viewed in conjunction with protection and management of the MSHCP Conservation Area, are not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Amount or Extent of Take

Due to the difficulty in quantifying the number of mountain plovers impacted over the 75-year permit term, the Service is quantifying the take as the number of acres of modeled mountain plover foraging habitat that will be impacted in the Plan Area as a result of the proposed action. We anticipate that up to 985 acres of modeled foraging habitat within the Plan Area will become unsuitable for mountain plovers as a result of the proposed action. We anticipate zero (0) take of mountain plover as a result of implementation of the Plan. This level of take is not likely to result in jeopardy to the merlin.

Mountain Quail (*Oreortyx pictus*)

Status of the species

Listing Status

The mountain quail is not listed under the Federal or State Endangered Species Acts.

Species Description

The mountain quail is the largest quail (26-30 centimeters) north of Mexico. Males are generally larger than females but with similar plumages: a long, straight, black head plume with gray erectile crest, head, upper neck and breast gray, belly whitish, sides chestnut with vertical white bars and horizontal white bar above. The juvenile mountain quail assumes adult plumage coloring after the first summer of life (Gutierrez and Delehanty 1999).

Habitat Affinities

The mountain quail is found in dense montane chaparral and brushy areas within coniferous forests, locally on lower slopes, in pinon-juniper-yucca associations, also sometimes locally in dense arborescent coastal chaparral dominated by *Ceanothus* spp., manzanita, and scrub oak (Garrett and Dunn 1981). In the Transverse, Peninsular and Southern Coastal Ranges of southern California it occurs as low as 2,297 feet (700 meters) (Unitt 1984). The species rarely travels as low as 2,000 feet in elevation. The mountain quail may use early-successional stage shrub vegetation following fire, logging, or other disturbance (Gutierrez and Delehanty 1999). In central, coastal California, 97 percent of mountain quail were observed in mixed evergreen forest and chaparral cover types (Gutierrez 1980).

The microhabitat of the species includes a configuration of tall, dense shrubs which are in close proximity to water and escape cover (Brennan *et al.* 1987). Nests are built on the ground in herbage at the base of a tree, in rocks, or near shrubs, logs, or stumps. Foraging occurs in the shrub and forest communities under the canopy and at the edge of these habitats. Scrubs, brush

stands, and trees, particularly on steep slopes, are used for cover. Escape cover may include rock formations, boulders, or dead limbs from trees when grazing has destroyed shrub community (Gutierrez 1980). In four northern California habitats, the average distance to cover was 0.83 meters and to water was 131 meters, maximum shrub height was 2.4 meters and percent shrub cover was 45.8 percent (Brennan *et al.* 1987).

Life History

During the breeding season, adult mountain quail may exhibit agonistic behavior toward adults and young of other species (Gutierrez and Delehanty 1999). Breeding occurs at higher elevations from late March to late August (Zeiner *et al.* 1990a). One clutch is produced per year with an average of 10 eggs and a range of 6-15 eggs. The female incubates about 25 days, while the male remains nearby. Both genders tend the precocial young.

The brood may remain together through the winter as they move downslope, following the snow line (Zeiner *et al.* 1990a). They may migrate downslope up to 20 miles. Coveys, formed during the nonbreeding season, are composed of family groups, nonbreeding adults, or aggregations of families. Mountain and California quail occasionally form mixed flocks, particularly during the nonbreeding season. Single individuals of each species are reported within coveys of the other species for relatively long periods (up to several weeks). One individual within a covey may stand guard over the rest of the covey by sitting on an elevated perch and emitting an alarm call if a predator is near. Miller and Stebbins (1964) suggested coyotes, rattlesnakes, Cooper's hawks, and bobcats are potential predators of the mountain quail, especially at water sources (Zeiner *et al.* 1990a).

Mountain quail population densities have been documented in northern California to range from 9 to 30 birds per 100 hectares (Brennan *et al.* 1987). In Idaho, the home range averaged about 2.6 km² in a sedentary population (Ormiston 1966). Few movements of the species exceeded 0.8 km in summer. In California, a breeding pair occupied 2-20 hectares (5-50 acres) (Johnsgard 1973).

The main foods taken by the mountain quail are predominately plant material for individuals of all ages throughout the year (Gutierrez and Delehanty 1999). The mountain quail eats green foliage, buds, acorns, flowers, fruits, seeds of forbs, shrubs, and trees and also some arthropods (Zeiner *et al.* 1990a). The mountain quail depends on the seeds, fruits, and flowers of perennial plants in its primary California range (Gutierrez and Delehanty 1999). It gleans, scratches, plucks, grazes, and browses on and around the foliage. It can meet its water needs from food and dew in cool weather but requires drinking water in dry weather.

Status and Distribution

Mountain quail range from southern Washington and southwestern Idaho, south to northern Baja California (Weathers 1983). They occur in the mountain ranges of California, eastern Nevada, and western Idaho and were unsuccessfully introduced into western Colorado (Terres 1980). In California they occupy mountain ranges west of the deserts and the mountains of the northern interior at elevations ranging from 700 to greater than 3,000 meters. Their primary range is the

Sierra Nevada, Cascade and Coast Ranges, but substantial disjunct populations occur in the inter-mountain West and Baja Peninsula (Gutierrez and Delehanty 1999).

The lack of data on the historical distribution and inadequate records of introductions make the interpretation of the original distribution difficult. The Columbia River may have been the historic northern range limit in the Coast and Cascade Ranges of Oregon. Analyses of both long-term and short-term Breeding Bird Survey data found stable populations in California, Oregon, and Washington, but due to the small sample size of the dataset, the analysis may not have been able to detect trends (Gutierrez and Delehanty 1999). The status of the mountain quail in Sierra Nevada and southern California is unknown. The mountain quail was once widespread and common in Idaho, but according to published and unpublished survey data, hunter returns, and anecdotes, near extirpation occurred in the second half of the twentieth century.

Threats

Known threats to mountain quail in the Plan Area include loss of habitat due to human development, livestock grazing, fire exclusion, and water developments. Urbanization can destroy habitat and disrupt migratory corridors. Heavy grazing prevents development of important annual foods and may reduce important perennial shrubs. Wildfire temporarily destroys habitat but also may increase habitat suitability by promoting growth of the native shrub community. Water developments remove important water sources and reduce the amount of arid habitat that can be occupied. Large water impoundments destroy riparian vegetation within winter range habitat and impede migration (Gutierrez and Delehanty 1999).

Conservation Needs

Conservation of the mountain quail will require maintenance of habitat linkages between suitable summer nesting and foraging habitat and suitable winter foraging habitat at lower elevations. The maintenance of suitable habitat should include control of heavy grazing and promotion of the native shrub community through prescribed burning practices. In addition, the maintenance of drinking water sources within suitable habitat is essential in arid regions.

Environmental Baseline

The true distribution of mountain quail within the Plan Area is unknown although it is thought to be a fairly common resident in all of the mountain ranges west of the deserts (Garrett and Dunn 1981). In the Plan Area this includes the San Jacinto Mountains, San Bernardino Mountains and Santa Ana Mountains. The primary vegetation types used to model habitat for this species were chaparral, woodland and forests, and montane coniferous forest above 2000' in elevation of which there is 292,414 acres in the Santa Ana Mountains, San Jacinto Mountains, San Bernardino Mountains and Desert Transition Bioregions of the Plan Area. Approximately 197,408 acres (68 percent) of the modeled habitat occurs within PQP Lands.

There have been no focused surveys for the mountain quail in Western Riverside County. Our dataset includes 21 records of mountain quail in the Plan Area between 1991 and 1999. The

limited number of occurrences may be attributable to the secretive nature of the bird within dense vegetation (Gutierrez and Delehanty 1999) rather than a sparse distribution in Plan Area. The species has been observed west of Canyon Lake in the vicinity of Wasson Canyon, Murrieta Creek/Temecula Valley, Tule Creek and on PQP Lands in Cleveland and San Bernardino National Forests. It is suspected that the 6 observations in Wasson Canyon may be California quail and not mountain quail due to the distance of this area from suitable high elevation breeding habitat. The remaining 15 records are assumed to be observations of mountain quail.

Effects of the Action

Direct effects

The Plan Area includes 292,414 acres of modeled nesting and foraging habitat for the mountain quail. Mountain quail will be subject to impacts associated with development and other proposed Covered Activities over the 75-year permit term within 78,315 acres (27 percent) of this modeled habitat. It is anticipated that most of the breeding and foraging habitat for mountain quail in these areas will be lost as a result of development. Some birds may be able to disperse to adjacent habitats, particularly rural mountainous areas where development impacts are anticipated to occur at a slower rate and at lower densities. Approximately 24,369 acres (31 percent) of the non-conserved modeled habitat for the mountain quail are designated as rural/mountainous land. However, displaced birds that are unable to locate suitable habitat will experience increased rates of predation or otherwise die or be injured due to loss of their foraging, breeding, and sheltering habitat.

For construction projects within the Criteria Area, habitat clearing, grubbing, grading, and associated construction actions will be timed to avoid the active breeding season, defined for purposes of the MSHCP as March 1 to June 30. This measure will reduce, to some extent, the impact of planned development on mountain quail reproduction within 11,620 acres of modeled habitat within the Criteria Area but outside of Additional Reserve Lands. Mountain quail are ground nesters, and breeding occurs through August with the incubation period lasting 25 days. Thus, clearing activities after June 30 within the Criteria Area will likely impact active nests. Outside the Criteria Area, no breeding season restrictions will be implemented. Approximately 66,695 acres of modeled habitat for the mountain quail are outside of the Criteria Area. Habitat clearing, grubbing, grading, and associated construction actions during the breeding season of mountain quail are anticipated to destroy active nests and to significantly disrupt breeding activities.

Due to the limited information on the distribution of mountain quail in the Plan Area, conservation of the species is based on maintaining large blocks of breeding habitat with adequate linkages to lower elevation wintering habitat. The MSHCP will conserve and manage 16,691 acres (6 percent) of modeled habitat for the mountain quail within Additional Reserve Lands. The majority of mountain quail habitat (197,408 acres) will remain within PQP Lands in Cleveland and San Bernardino National Forests. In total, 73 percent of the modeled habitat for the mountain quail will be conserved or remain in the Plan Area. This modeled habitat includes 80 percent of the mountain quail observations in our dataset.

Modeled habitat within the Santa Ana Mountains will be linked to lower elevation habitat on the Santa Rosa Plateau and in the Temecula Valley by Proposed Linkages 9 and 10 (Section 3.2.3, pp. 3-104 and 3-105) that will be mainly surrounded by Rural/Mountainous designations. Additional identified linkages include Horsethief Canyon, Indian Canyon, the San Jacinto River, and Wilson Creek.

The mountain quail will benefit from the General Management Measures described in Section 5 of the MSHCP, which provide for control of unauthorized public access, maintenance of existing habitat, including control of invasive weeds, and management of specific threats to the species.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands, including surveys for the mountain quail. Cooperative management and monitoring are anticipated on PQP Lands. Surveys for the mountain quail will be conducted at least every eight years to verify occupancy at a minimum of 75 percent of the known locations. If a decline in the distribution of the mountain quail is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP.

Management actions to benefit the mountain quail or other Covered Species (*e.g.*, prescribed burning, habitat manipulation) may result in impacts to a small number of individual mountain quails. It is anticipated that any impacts to the mountain quail from management actions will be minimized by adherence to appropriate survey protocols and other guidelines described in Section 7.4 of the MSHCP.

Indirect Effects

The mountain quail could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These include the indirect effects described in the “General Effects” section of this biological opinion. Implementation of the Riparian/Riverine Area and Vernal Pools policy will benefit the mountain quail by maintaining drinking water sources and the Urban/Wildlands Interface Guidelines will help reduce the effects of adjacent development on linkages connecting Mountain quail breeding habitats to lower elevation wintering habitat.

Conclusion

We anticipate the proposed action will directly and indirectly affect the mountain quail as described in the analyses above, including the loss of 27 percent of its modeled habitat in the Plan Area. Implementation of the avoidance, minimization, and mitigation measures will reduce the impacts to this species. We anticipate that this species will persist in the remaining 68 percent of its modeled habitat within both the existing PQP Lands and the Additional Reserve Lands. Together these lands form a system of large, contiguous habitat blocks that are interconnected within the Plan Area. We anticipate that these areas will be monitored and managed cooperatively to benefit this species.

After reviewing the current status of this species, the environmental baseline for the Plan Area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the mountain quail. We reached this conclusion based on the anticipated widespread distribution of the mountain quail within suitable habitat in the Plan Area and because the impacts to mountain quail reproduction and this species' habitat loss, when viewed in conjunction with protection and management of the MSHCP Conservation Area, are not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Amount or Extent of Take

Because mountain quail prefer densely vegetated habitats, it will be difficult to quantify the number of birds and active nests, including eggs and chicks, that will be taken as a result of the proposed action over the 75-year permit term. Therefore, the Service is quantifying incidental take as the number of acres of modeled mountain quail breeding and wintering habitat that will be impacted in the Plan Area as a result of the proposed action.

We anticipate that up to 78,315 acres of breeding and wintering habitat within the Plan Area will become unsuitable for the mountain quail as a result of the proposed action. We anticipate that all nests, including eggs and chicks, within up to 66,695 acres of breeding habitat outside the Criteria Area will be taken and a small, but undeterminable, number, of active nests, including eggs and chicks, within up to 11,620 acres of breeding habitat within the Criteria Area, but outside of the Additional Reserve Lands, will be taken as a result of the proposed action. Additionally, a small, but undeterminable, number of mountain quails are anticipated to be taken as a result of management actions.

Take will be in the form of harm, death, and injury. This level of take is not likely to result in jeopardy to the mountain quail.

Nashville warbler (*Vermivora ruficapilla*)

Status of the Species

Listing Status

The Nashville warbler is not listed under the Federal or State Endangered Species Acts.

Species Description

The Nashville warbler is a medium sized (12 centimeters) wood-warbler with a thin, sharply pointed bill. There are two geographically separated subspecies: *V. r. ruficapilla* occurs east of the Mississippi River and *V. r. ridgwayi* occurs along the west coast of the United States. Males have a gray head, white eye-ring and lower belly, olive-green back, and bright yellow underparts and throat. Females are duller in color than males but still have a white eye-ring. Juveniles are brownish with a whitish throat patch. The western subspecies has a slightly brighter coloration than *V. r. ruficapilla*, with more white feathers on the lower belly (Williams 1996).

Habitat Affinities

The Nashville warbler generally prefers secondary growth, open deciduous, or mixed species forests, with a high level of light penetration and shrubby undergrowth. It is never found in unbroken forest habitats (Williams 1996; Ziener *et al.* 1990a). In the summer, within the San Gabriel and San Bernardino Mountains, individuals are found on shaded slopes in mixed coniferous forests with California black oaks and yellow pines and brush communities with manzanita (Bent 1953; Garrett and Dunn 1981).

This species most commonly breeds in pine, hardwood and conifer forests in the Sierras and in montane chaparral habitats in southern California. They nest near the edges of the forest or along streams, in open rather than heavily wooded areas (Williams 1996). Airola and Barrett (1985) have shown that Nashville warblers prefer to nest under oaks (*Quercus spp.*), but they also use deerbrush (*Ceanothus integrimus*) in a portion of the Sierras. Within the forests these birds tend to place their nest on open ground at the base of a shrub in a generally dry and sandy plateau with nearby oaks, spruce, fir, aspens, white birch, white pines or redwood (Lawrence 1948). The nest, which is sunk in moss on or very near the ground, is built of mosses, stems of ferns, pine needles and rabbit fur, lined with rootlets, fine grasses, pine needles, and hairs of deer or moose (Terres 1980). Nests are often well hidden by leaves and mosses in thickets or among the roots of trees or shrubs (Williams 1996).

In the west, the Nashville warbler is found foraging predominately in forest trees, at low to mid-tree height or in low shrub foliage (Williams 1996). In the Sierra Nevada, it prefers feeding in black oak and later in the season forages in softer shrubs, especially deerbrush (Airola and Barrett 1985). Foraging occurs at the end of branches, at the tips of vegetation among twigs, in tassels of flowering trees, and on undersides of leaves, particularly in hardwoods (Williams 1996).

During migration, the western population of the Nashville warbler frequents mountain areas in both deciduous and coniferous trees, along forest edges, and in bands of conifers (Williams 1996). They have also been observed moving through desert habitats, lowland woodland and riparian areas (Ziener *et al.* 1990a). Although individuals do not appear to prefer a particular vegetation type, they have been frequently observed moving through tall trees (Miller and Stebbins 1964).

The wintering habitat is primarily low deciduous open forests and suburban gardens but may also include a wide variety of habitats such as cloud forest, tropical deciduous forest, disturbed deciduous forest, thorn forest and pine-oak-fir forest (Williams 1996).

Life History

The Nashville warbler breeds from May through August then migrates south to wintering grounds. The clutch size is 4 to 5 eggs, and incubation lasts for 11 to 12 days. The young first fly about 11 days after hatching (Terres 1980). As an adaptation to a short summer and breeding season, Nashville warblers mate on the wintering grounds or during migration (Quay 1986). The pairs breed solitarily; both parents tend to the young, and the young breed the following year

(Zeiner *et al.* 1990a). Total nest success of the Nashville warbler over a two-year period was calculated at 2.87 fledglings per total nests monitored (Williams 1996). One female was recovered at age 7 years 3 months (Klimkiewicz *et al.* 1983).

Fledglings have been observed foraging on their own and joining mixed-species flocks from July to the end of the summer resident period (Williams 1996). The Nashville warbler feeds almost entirely on insects, such as tent caterpillars, brown-tail moths, gypsy moths, leafhoppers, aphids, flies, and grasshoppers gleaned from all canopy levels and also hawked from the air (Zeiner *et al.* 1990a).

Status and Distribution

The breeding range of the Nashville warbler extends from southern Canada to central California and the northern midwest states of the United States (Terres 1980). The western population breeds from southern interior British Columbia and northwest Washington south through the Cascade Range into northwest and southwest Idaho and northwest Montana, also in central and southern Oregon along the Cascade Range, east to Hart Mountain into northern California south along the Coast Range and western slope of the Sierra Nevada, and in the extreme west-central Nevada (Williams 1996). The Nashville warbler has been recorded regularly in the summer in small numbers in the San Gabriel Mountains and San Bernardino Mountains and in the Mount Pinos area, although breeding has not been confirmed (Garrett and Dunn 1981).

Nashville warblers occur in coastal and desert lowlands of southern California during migratory movements. After arriving in April they quickly become common on breeding areas until September when they gradually leave the mountains. A few linger occasionally in coastal locations through early winter and there are a few records of overwintering along the coast (Zeiner *et al.* 1990a). The majority winter in Mexico, southern Texas, and southern Florida down through Guatamala (Williams 1996; Terres 1980).

Both long-term (1966-1994) and short-term (1980-1994) continent-wide Breeding Bird Survey trends of population size show no clear pattern of population increase or decrease. For the western population only, the Breeding Bird Survey long-term trend data showed a 1.6 percent increase continent-wide. This may be a result of newly available habitat in regenerating clear-cut areas (Williams 1996).

Threats

Nashville warblers, as ground nesters, are particularly vulnerable to predation from small mammals, accipiters and snakes (Zeiner *et al.* 1990a). Nests are subject to cowbird parasitism (Verner and Boss 1980). Declines in riparian habitat may affect the migrating population as they move from breeding to wintering grounds (Williams 1996). Because nests are constructed on the ground and are usually completely hidden by leaves, grasses or low bushes, they could be inadvertently destroyed by brush removal or other human disturbance.

In Yosemite National Park, prescribed burns during the breeding season caused the loss of an unknown number of Nashville warbler breeding pairs. Prescribed burns conducted during the breeding season in potential breeding habitat are also a threat to this species in the Plan Area.

Conservation Needs

More information is needed to determine if breeding occurs in potential habitat within the Plan Area. If nest sites are located, they should be protected from habitat loss and a cowbird management program should be implemented in those areas as necessary. Prescribed burns should be postponed until after the breeding season in areas found to support breeding birds.

Environmental Baseline

Nashville warblers occur as common spring transients and are less common but widespread fall transients throughout the Plan Area, within suitable habitat. Breeding, if it occurs, is likely restricted to the mountainous bioregions (Garrett and Dunn 1981). The primary vegetation types used to model habitat for this species were chaparral, coastal sage scrub, desert scrub, montane coniferous forest, riparian scrub woodland forest, Riversidean alluvial fan sage scrub and oak woodlands and forest. Based on this analysis, the Plan Area supports approximately 644,171 acres of modeled habitat for the Nashville warbler. Approximately 291,162 acres (45 percent) of the modeled habitat occurs within PQP Lands. Breeding habitat is available to the species along the edges of the forests and along streams, in open rather than heavily wooded areas of the San Bernardino, San Jacinto and Santa Ana Mountain bioregions; however, breeding has not been confirmed in the Plan Area.

According to our dataset, there are 15 recent records for the Nashville warbler within the Plan Area. The majority of these records are located within the Riverside Lowlands Bioregion and likely reflect migratory Nashville warblers. Three of the fifteen (20 percent) records are located on PQP Lands along the Santa Ana River. Additional locations include an inholding in San Bernardino National Forest (Lake Fulmor), Norco Hills, Antelope Valley, Avery Canyon, Box Springs Canyon, east of Temescal Wash (near Cajalco Road), Moreno Valley, Lake Mathews-Estelle Mountain, Wildomar (near Clinton Keith Road), Temecula Creek and Murrieta Creek. Given the wide diversity of habitats the Nashville warbler can occupy during migratory periods, it is likely that the data point locations are highly under-represented due to lack of reporting.

Additional locations identified in the MSHCP (Lake Elsinor, Wilson Creek, Sedco Hills, Motte-Rimrock Reserve and Banning) were not included in our dataset due to the age or the precision level of the records. The MSHCP also identifies two presumed breeding locations for Nashville warblers in the San Bernardino National Forest at Lake Fulmor and Pine Cove, but breeding has not been confirmed in these locations.

Effects of the Action

Direct Effects

The Plan Area includes 644,171 acres of modeled habitat for the Nashville warbler. The Nashville warbler will be subject to impacts associated with development and other proposed Covered Activities over the 75-year permit term within 232,043 acres (36 percent) of this modeled habitat. It is anticipated that most of the habitat for Nashville warbler in these areas will be lost as a result of development, although some habitat for this species may remain in areas avoided as a result of the Riparian/Riverine Areas and Vernal Pools policy and in rural mountainous areas where development impacts are anticipated to occur at a slower rate and at lower densities. Approximately 89,666 acres (39 percent) of the non-conserved modeled habitat for the Nashville warbler are designated as rural/mountainous land. Loss of this habitat may decrease the use of the Plan Area by the Nashville warbler over the long term by reducing the number of areas suitable for breeding, foraging, and migratory stop-overs. Currently, Nashville warblers have not been confirmed to breed within the Plan Area.

To offset the loss of Nashville warbler habitat within the Plan Area, the MSHCP will conserve and manage 120,966 acres (19 percent) of modeled habitat for the Nashville warbler within Additional Reserve Lands. Another 291,162 acres (45 percent) of modeled habitat will remain in PQP Lands. In total, 412,128 acres (64 percent) of modeled habitat for the Nashville warbler will be conserved or remain within the MSHCP Conservation Area. A total of 6 (40 percent) of the 15 known locations occur within the MSHCP Conservation Area.

Two Core Areas, at Lake Fulmor and Pine Cove, have been identified in the Plan as likely to support breeding Nashville warblers within the MSHCP Conservation Area. These areas and any future nesting locations identified within the MSHCP Conservation Area will be managed for loss of habitat due to modification by humans. Large blocks of habitat that will support migratory Nashville warblers include Prado Basin/Santa Ana River, Temescal Wash, Lake Mathews-Estelle Mountain, Sedco Hills, Santa Rosa Plateau Nature Reserve, Vail Lake/Wilson Valley, Temecula, Murrieta Creek, Tocalota Creek, Sycamore Canyon Regional Park, and Box Springs. Nashville warblers have not been observed to use all of these areas, but they all contain suitable foraging habitat.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands, including surveys for the Nashville warbler. Cooperative management and monitoring are anticipated on PQP Lands. Surveys for the Nashville warbler will be conducted at least every eight years to verify occupancy at a minimum of 75 percent of the known locations. Since there are currently no known breeding locations of Nashville warbler in the Plan Area, we assume the survey effort would focus on identified potential breeding sites and areas where migratory birds have been observed. If a decline in the distribution of the Nashville warbler is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP.

The Nashville warbler will benefit from the General Management Measures described in Section 5 of the MSHCP that provide for control of unauthorized public access, maintenance of wetland habitat (*i.e.*, control of sedimentation, erosion, and invasive weeds) and management of specific threats to the species.

Management actions to benefit Nashville warblers or other Covered Species (*e.g.*, prescribed burning, habitat manipulation) may result in impacts to a small number of individual Nashville warblers. It is anticipated that any impacts to Nashville warblers from management actions will be minimized by adherence to appropriate survey protocols and other guidelines described in Section 7.4 of the MSHCP.

Indirect Effects

The Nashville warbler could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These include the indirect effects described in the “General Effects” section of this biological opinion. The management provisions listed above will help to reduce the indirect effects to this species. In particular, implementation of the Riparian/Riverine Area and Vernal Pools policy and the Urban/Wildlands Interface policy will help minimize the indirect effects of the Covered Activities on migration and foraging habitat for the Nashville warbler.

Conclusion

We anticipate the proposed action will directly and indirectly affect the Nashville warbler as described in the analyses above, including the loss of 36 percent of its modeled habitat in the Plan Area. Implementation of the avoidance, minimization, and mitigation measures will reduce the impacts to this species. We anticipate that this species will persist in the remaining 64 percent of its modeled habitat within both the existing PQP Lands and the Additional Reserve Lands. Together these lands form a system of large, contiguous habitat blocks that are interconnected within the Plan Area. We anticipate that these areas will be monitored and managed cooperatively to benefit this species.

After reviewing the current status of this species, the environmental baseline for the Plan Area, the effects of the proposed action, and the cumulative effects, it is the Service’s biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the Nashville warbler. We reached this conclusion based on the widespread distribution of the Nashville warbler within suitable migration habitat in the Plan Area and because the impacts associated with loss of this species’ habitat, when viewed in conjunction with protection and management of the MSHCP Conservation Area, are not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Amount or Extent of Take

Because Nashville warbler breeding locations in the Plan Area are not known and because this species may be distributed throughout the Plan Area within suitable migration habitat, it will be difficult to quantify the number of individuals that will be taken as a result of the proposed

action over the 75-year permit term. Therefore, the Service is quantifying incidental take as the number of acres of modeled breeding and migratory habitat that will be impacted in the Plan Area as a result of the proposed action. We anticipate that 232,043 acres of breeding and migratory habitat within the Plan Area will become unsuitable for the Nashville warbler as a result of the proposed action. Additionally, a small, but undeterminable, number of Nashville warblers are anticipated to be taken as a result of management actions.

Take will be in the form of harm, death, and injury. This level of take is not likely to result in jeopardy to the Nashville warbler.

Northern Goshawk (*Accipiter gentilis*)

Status of the species

Listing Status

The northern goshawk is a Fish and Wildlife Service migratory non-game bird of management concern and is considered a California Species of Special Concern by the California Department of Fish and Game. It is not listed under the Federal Endangered Species Act.

Species Description

The northern goshawk is a large forest hawk with brown-gray upperparts, black cap on head, white superciliary line, light gray underparts with fine black streaks, broad wings, and long, rounded, dark gray tail with three to five inconspicuous dark bands. The female is larger than the male, has browner upperparts and more course markings below. The legs and feet are yellow and the eye is red. Juveniles have dark brown upperparts with buff white and cinnamon streaks, dark brown tail with a zig zag pattern and whitish borders, brown head and pale whitish superciliary stripe (Squires and Reynolds 1997).

Habitat Affinities

Similar to the other accipiter species, the goshawk is a bird of the woodland, either deciduous or coniferous and sometimes mixed with cultivation. Goshawks seem to prefer mature forests with large trees on moderate slopes with open understories (Squires and Reynolds 1997). The species is not averse to crossing clearings or entering them to hunt and will forage relatively large distances. Frequently, they migrate away from nesting or resident areas in response to food availability (Brown and Amadon 1968). Beier and Drennan (1997) found that degree of canopy cover and tree density were more important than prey density for foraging site selection. These results are consistent with the hypothesis that goshawk behavior and morphology are adapted for hunting in moderately dense mature forests where prey are most vulnerable (Squires and Reynolds 1997). In California, mature and old-growth habitat are used for foraging, whereas open habitats such as meadows and seedling and sapling stands are avoided (Austin 1993).

Northern goshawks usually nest on north slopes, near water, in the densest parts of stands, but close to openings (Jackman and Scott 1975). Productive old-growth forests are selected, with

greater than 60 percent of all adult relocations occurring in this cover type (Iverson *et al.* 1996). Nest trees are at least 11 inches in diameter at breast height (Reynolds *et al.* 1982) and, in the southwestern portion of the goshawks range, may include ponderosa pine, Douglas-fir, various other pines, and aspen. They also nest in cottonwoods and other deciduous trees in stream bottoms (Call 1978). The forest stands containing nests are often small, approximately 10 to 100 acres. Old nests are reused and up to five alternative nest sites are maintained (Squires and Reynolds 1997). In northern California, the maximum distance between alternative nest stands was 1.8 kilometers and approximately 85 percent of alternate nest stands were less than 0.7 kilometers apart (Squires and Reynolds 1997).

While the goshawk prefers middle and higher elevations and mature, dense conifer forests, nests have been found in most forest types throughout the geographic range, from sea level to alpine elevations (Squires and Reynolds 1997). The nest is a large, flat, untidy structure placed usually in a crotch, but sometimes out on a limb (Harrison 1978). It is usually at a height of 30 to 60 feet (Shuster 1980). In some areas, nests are lined with hard pieces of bark and green sprigs of conifers.

Life History

Northern goshawks are thought to be monogamous with a 1:1 sex ratio prior to fledging. Mate retention is high for both males and females, and it is thought that the pair remain together as long as both are alive, at least in areas where the species is non-migratory (Brown and Amadon 1968; Squires and Reynolds 1997). The northern goshawk is extremely defensive of the nest area. It is vociferous and will strike intruders, including humans.

Egg laying occurs between April and early June. The clutch size is between 1-5 eggs and usually 3 eggs are laid. The clutch size is affected by the abundance of favorable prey. In most cases, one clutch is produced per year (Squires and Reynolds 1997). Incubation is done by both male and female for approximately 41 days. The young become independent at approximately 70 days (Brown and Amadon 1968; Bond 1942). Fledglings remain within their respective nest stands for most of the post-fledging period and movements away from the nest tree are initially restricted by the size of the nest stand itself (Shipman and Bechard 1995). Dispersal typically occurs 65 to 95 days after hatching (Squires and Reynolds 1997). Nestlings from banding studies that are relocated as breeders have nested 16.1 to 24.2 kilometers from their natal site (Squires and Reynolds 1997). Estimated mortality rates based on banding recoveries are 66 percent for year 1, 33 percent for year 2, 19 percent for year 3, 19 percent for year 4, and 11 percent for the following years (Squires and Reynolds 1997).

The northern goshawk eats a wide diversity of prey items and is considered an opportunist. It feeds mostly on birds, from robin to grouse in size. Small mammals, of squirrel and rabbit size, are also taken. Carrion and insects are rarely eaten (Schnell 1958). Based on biomass, the snowshoe hare and grouse account for a very large proportion of the northern goshawk diet in the Cascade region of Washington. Prey are caught in the air, on the ground, or in vegetation, using a fast, searching flight, or rapid dash from a perch. The goshawk is fierce, aggressive, very persistent in pursuing prey, and is capable of tremendous short bursts of speed (Brown and Amadon 1968).

Status and Distribution

Northern goshawks breed in North America locally from Alaska eastward to Newfoundland and southward to southern California, New Mexico, mainland Mexico, Baja California, central Mexico, and the Gulf Coast (AOU 1998). Specifically, they breed from western and northern portions of central Alaska, north-central Yukon, northern Ontario, and Newfoundland, south along the Pacific Coast and Atlantic coast to southern Canada, excluding southeastern Alberta, southern Saskatchewan and southern Manitoba. Within the western United States, the goshawk breeds from the mountains of northern and western Washington south through the mountains of western Oregon and California. It also breeds from western and southern Montana and Idaho south through Wyoming, Utah, and the western half of Colorado to north central and southwestern New Mexico and into northwestern Arizona. In the eastern United States, it breeds from the Canadian border south to east-central Minnesota, northern Wisconsin the northern portion of Michigan, central Pennsylvania, northwestern New Jersey, southeastern New York to Massachusetts (Squires and Reynolds 1997).

Within California, the northern goshawk breeds in the north coast ranges through the Sierra Nevada, Klamath, Cascade, and Warner Mountains. The species remains year-long in breeding areas as a scarce to uncommon resident. Within southern California, the species breeds only in Ventura County (*e.g.*, Mount Pinos, Mount Abel), the San Bernardino Mountains, and the San Jacinto Mountains (Garrett and Dunn 1981). It is casual in occurrence in winter along the coast, throughout the foothills, and in the northern deserts, where it may be found in pinyon-juniper and low-elevation riparian habitats (Zeiner *et al.* 1990a).

The species winters primarily within the breeding range (AOU 1998). Studies suggest that northern goshawk migrations and wintering area selections are primarily dictated by prey availability (Squires and Reynolds 1997; Craighead and Craighead 1956). Cyclical southward irruptions of boreal birds appear to be driven by cycles of snowshoe hare and ruffed grouse. During irruption years, larger numbers may winter outside of the breeding range and travel greater distances and reach southern California, the Lower Colorado River, northern Texas, central Oklahoma, Arkansas, Tennessee, and central Virginia. Limited evidence suggest that some goshawks return to breeding range after such movements (Squires and Reynolds 1997).

Threats

General threats to the northern goshawk include forest management practices that reduce overstories or permit advanced development of understories, such as timber harvesting, fire suppression, and livestock grazing, as well as drought, disease, falconry, prey reduction, and toxic chemicals. Northern goshawks may also be relatively intolerant of human presence near their nests which has led to breeding failures in the Yosemite Park area (Gaines 1988).

Nests are destroyed by logging operations, but the impacts to the nesting populations are unknown. Harvest methods that create large areas of reduced forest canopy cover may be especially detrimental. In one study in California, nesting densities remained fairly high despite fragmentation of mature forests through timber harvest; however, territories associated with

large contiguous forest patches were more consistently occupied compared to highly fragmented stands (Squire and Reynolds 1997).

Hoffman and Smith (2003) concluded that logging or land-management activities that fragment or remove mature coniferous or aspen forest stands result in diminished goshawk productivity. Southern California national forests have not had a commercial green timber sale program for over a decade; however timber harvest for fuel management may have the potential to adversely affect the habitat by reducing canopy cover. Fire suppression practices may have also increased the density of understory vegetation, creating unsuitable foraging structure for the species. Loss of forest canopy due to drought and insect infestation may also be a significant current threat to local goshawk habitat.

Conservation Needs

More information is needed on where goshawks nest in the Plan Area (Stephenson and Calcarone 1999). Protected areas should be delineated around nest trees to reduce disturbances during the nesting period (Squires and Reynolds 1997).

The weight of evidence indicates that breeding goshawks in western North America do best in association with large tracts of mature coniferous or aspen forest (Hoffman and Smith 2003). Retention and restoration of mature forest habitats may encourage continued nesting in the Plan Area. Controlled fire and selective thinning may make habitats more suitable to goshawks by opening up dense understory vegetation, creating snags, downed logs, and woody debris, and creating other conditions conducive to goshawks and their prey (Fish and Wildlife Service 1998k).

Environmental Baseline

Transient and winter northern goshawks may be found in semi-wooded areas throughout the Plan Area, but residents occur principally above 2,000 meters in forested areas dominated by conifers (Garrett and Dunn 1981). According to the Plan, the San Bernardino Mountains and San Jacinto Mountains bioregions provide foraging and nesting areas above 2,000 meters and also provide winter foraging areas for the species if they move downslope for some period of time. The primary vegetation types used to model habitat for this species were woodland and forests and montane coniferous forest. Based on this analysis, the Plan Area supports approximately 43,171 acres of modeled habitat for the northern goshawk in the San Bernardino and San Jacinto Mountains bioregions. Approximately 33,539 acres (78 percent) of the modeled habitat occurs within PQP Lands.

The northern goshawk is a very rare resident in the San Jacinto Mountains and possibly the San Bernardino Mountains (Garrett and Dunn 1981). Historically, northern goshawks have been reported in the San Jacinto Mountains at Tahquitz Valley, Willow Creek, Skunk Cabbage, Humber Park and Lake Fulmor (Garrett and Dunn 1981). Based on information in the Plan, records from 1998 show two breeding pairs in San Bernardino National Forest: one pair in the Fulmor Lake/Lawlor Lodge area and one pair in the vicinity of the San Jacinto Wilderness area. If extant, these nest sites may represent the southern extent of the known breeding range in

California. Focused surveys of potential breeding locales in the San Jacinto Mountains have not been conducted.

Effects of the Action

Direct effects

The Plan Area includes 43,171 acres of modeled foraging, breeding and wintering habitat for the northern goshawk. Northern goshawks will be subject to impacts associated with development and other proposed Covered Activities over the 75-year permit term within 9,347 acres (22 percent) of this modeled habitat. Loss of foraging and nesting habitats to development will cause the northern goshawk to disperse in search of other habitats and experience increased competition for the remaining suitable habitat. Birds forced to disperse may also experience decreased fitness due to increased energy and time spent locating new habitats. Loss of additional perch and nesting trees may preclude the establishment of nesting sites. No recorded breeding sites for northern goshawk are currently known outside the MSHCP Conservation Area.

To offset the loss of northern goshawk habitat within the Plan Area, the MSHCP will conserve and manage 286 acres (less than 1 percent) of modeled habitat for the northern goshawk within Additional Reserve Lands. The majority of northern goshawk habitat (33,539 acres), including all the currently known nest sites, will remain within PQP Lands. In total, 78 percent of the modeled habitat (33,824 acres) for the northern goshawk will be conserved or remain in the Plan Area.

Large blocks of breeding and foraging habitat will support the northern goshawk in the San Bernardino National Forest and Mount San Jacinto State Park. Reserve managers will protect and buffer from disturbance the known northern goshawk nest sites and any additional nests sites found in the MSHCP Conservation Area. Buffering of the nest sites will include limiting human activities within a 250-meter radius around each of the nest site locations during the breeding season. A minimum of 1.6 square kilometers of suitable nesting habitat will also be protected around each known nest. Reserve managers will also manage this species with regard to falconry and logging.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands, including surveys for the northern goshawk. Cooperative management and monitoring are anticipated on PQP Lands. Surveys for the northern goshawk will be conducted at least every three years to verify the continued use and successful reproduction at a minimum of 75 percent of the known nesting localities (including any nesting locations identified in the MSHCP Conservation Area in the future). If a decline in the distribution or reproduction of the northern goshawk is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific-objectives identified in Section 9, Table 9.2 of the MSHCP. In addition, the northern goshawk will benefit from the General Management Measures described in Section 5 of the MSHCP, which provide for control of unauthorized public access, maintenance of existing habitat, including control of invasive weeds, and management of specific threats to the species.

Indirect Effects

The northern goshawk could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These impacts include the indirect effects described in the “General Effects” section of this biological opinion. The management provisions listed above will help to reduce the indirect effects to this species. In particular, implementation of the Urban/Wildlands Interface policy will help minimize the indirect effects of the Covered Activities on foraging and breeding habitat for the northern goshawk.

Conclusion

We anticipate the proposed action will directly and indirectly affect the northern goshawk as described in the analyses above, including the loss of 22 percent of its modeled habitat in the Plan Area. Implementation of the avoidance, minimization, and mitigation measures will reduce the impacts to this species. We anticipate that this species will persist in the remaining 78 percent of its modeled habitat primarily within PQP Lands. The PQP Lands include large, habitat blocks that we anticipate will be monitored and managed cooperatively to benefit this species. In addition, all currently known nesting areas are within PQP Lands.

After reviewing the current status of this species, the environmental baseline for the Plan area, the effects of the proposed action, and the cumulative effects, it is the Service’s biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the northern goshawk. We reached this conclusion based on the limited use of available habitats by the northern goshawk within the Plan Area, the distribution of the northern goshawk across North America, and because the impacts associated with loss of this species’ habitat, when viewed in conjunction with protection and management of the MSHCP Conservation Area, are not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Amount or Extent of Take

The loss of up to 9,347 acres nesting and foraging habitat for the northern goshawk in the Plan Area is not likely to result in direct mortality of adult birds; however, for some individuals, reproduction may be impaired or life expectancy shortened. Due to the difficulty in quantifying the number of northern goshawk impacted by the proposed action over the 75-year permit term, we are quantifying the take as the number of acres of habitat that will be impacted in the Plan Area as a result of the proposed action. We anticipate that 9,347 acres of modeled nesting and foraging habitat within the Plan Area will become unsuitable for the northern goshawk as a result of the proposed action. Take will be in the form of harm and injury. This level of take is not likely to result in jeopardy to the northern goshawk.

Northern harrier (*Circus cyaneus*)Status of the species*Listing Status*

The northern harrier is not listed under the Federal State Endangered Species Act. It is considered a California Species of Special Concern by the California Department of Fish and Game.

Species Description

The northern harrier is a sexually dimorphic hawk with a slim body, long wings and tail, and long, slender legs (MacWhirter and Bildstein 1996). Adult males tend to be gray above and generally lighter below with black wing tips. The females, which are about 50 percent heavier, are brown above with brown streaks below. Both sexes have a white rump patch and a facial ruff that gives an owl-like appearance.

Habitat Affinities

The northern harrier frequents open wetlands, wet and lightly grazed pastures, old fields, dry uplands, upland prairies, mesic grasslands, drained marshlands, croplands, shrub-steppe, meadows, grasslands, open rangelands, desert sinks, and fresh and saltwater emergent wetlands, and it is seldom found in wooded areas (Bent 1937; MacWhirter and Bildstein 1996). It uses tall grasses and forbs in wetlands or at wetland/field borders for cover and roosts on the ground (Bent 1937). No data were found on water requirements, but it frequents aquatic habitats. The home range usually includes fresh water. Northern harriers are mostly found in flat or hummocky open areas of tall, dense grasses, moist or dry shrubs containing edge areas for nesting, cover, and feeding (Bent 1937). In a shrub-steppe habitat, the northern harrier used riparian and cultivated habitats disproportionately (Martin 1987). In general, the species prefers saltwater marshes, wet meadows, sloughs, and bogs for its nesting and foraging habitat, and if these are absent, it hunts open fields and is frequently observed hunting over agricultural areas (Call 1978).

The northern harrier nests on the ground in shrubby vegetation or patches of dense vegetation, usually at the marsh edge (Brown and Amadon 1968; Toland 1987). The northern harrier mostly nests in emergent wetland or along rivers or lakes but may nest in grasslands, grain fields or on sagebrush flats several miles from water (Call 1978). The northern harrier is eclectic in its choice of vegetative cover even within a single area. In a continent-wide sample, 17 percent of nests were in wet marsh meadows dominated by willow, grasses, sedges, and herbaceous shrubs; 18 percent were in freshwater marshes dominated by tall grasses, reeds, bulrushes, and cattails; 26 percent were in dry grasslands including brome grass and wheatgrass; and 8 percent were in cultivated fields such as alfalfa and rangeland prairies (MacWhirter and Bildstein 1996). The nest is a relatively flimsy structure built of a large mound of sticks, straws, or grasses on wet areas, and a smaller cup of grasses on dry sites (Call 1978). Nests were placed an average of 3.5 meters from the outer edge of each patch of dense vegetation (Toland 1987).

Life History

The northern harrier is defensive of its territory and will attack more formidable birds of prey and humans during the breeding season (Zeiner *et al.* 1990a). The species breeds from April to September, with a peak of activity in June through July. A single brood is raised with a clutch size of 3-12 eggs (Harrison 1978). The female incubates while the male provides food. The nesting period lasts about 53 days (Craighead and Craighead 1956). Breeding pairs and juveniles may roost communally in late autumn and winter (Smith and Murphy 1973). There appears to be virtually no fidelity by the offspring to their natal area (MacWhirter and Bildstein 1996).

In Idaho, hatching success of the northern harrier was 69.6 percent, fledging success was 60 percent of the eggs that hatched and an average of 3.3 young fledged per successful nest (Toland 1987). The annual reproductive success of all nests averaged 1.8 offspring fledged per pair (MacWhirter and Bildstein 1996). Among 114 banded birds, the mean age at death was 16.6 months with the longest life span reported as 16 years 5 months (MacWhirter and Bildstein 1996; Bildstein 1988). The pre-1950s mortality rates have been estimated as 59 percent in the first year and 30 percent among adults (Bildstein 1988).

The northern harrier feeds mostly on small- and medium-sized mammals (primarily rodents), birds, frogs, small reptiles, crustaceans, insects, and, rarely on fish (Terres 1980). In the winter in the northern part of its range, it takes almost exclusively *Microtus* whereas in the southern part, mammals and birds are taken (MacWhirter and Bildstein 1996). It makes low, quartering flights 1-9 meters (3-30 ft) above open ground. It dives from a flight or a hover and rarely perches and pounces on prey (Zeiner *et al.* 1990a). Apparently the northern harrier is not territorial during the winter and may forage and roost communally (Bosakowski and Smith 1996).

Status and Distribution

Northern harriers breed from northern Alaska and Canada south to the northern Baja Peninsula and east to southern Nevada, southern Utah, northern New Mexico, northern Texas, southern Kansas, central Iowa, central Wisconsin, southern Michigan, northern Ohio, southern Pennsylvania, southeastern Virginia and probably in northeastern North Carolina (MacWhirter and Bildstein 1996). The species apparently does not breed in desert regions or the southeastern parts of the United States (Bildstein 1988). It appears to be most numerous in the northern great plains from the Dakotas and Montana into southern Canada (Bildstein 1988). During the winter, the northern harrier occurs throughout southern Canada and all of the United States (Bildstein 1988). The usual southern limit for wintering is Panama (MacWhirter and Bildstein 1996).

In California, the northern harrier occurs in low elevation annual grasslands and in high elevation lodgepole pine and alpine meadow habitats as high as 3,000 meters (10,000 feet) (Garrett and Dunn 1981). It breeds from sea level to 1,700 meters (5,700 feet) in the Central Valley and Sierra Nevada, and up to 800 meters (3,600 feet) in northeastern California. The California population can be locally abundant where suitable habitat remains free of disturbance, especially from intensive agriculture (MacWhirter and Bildstein 1996). The species is a

permanent resident of the northeastern plateau and coastal areas and is a less common resident of the Central Valley. The northern harrier is a widespread winter resident and migrant in suitable habitat. Some individuals migrate into California; others migrate through to Central America or northern South America (Garrett and Dunn 1981).

North American populations of northern harriers have remained stable or declined slowly since the 1960s according to Breeding Bird Survey data and Christmas Bird Count data (MacWhirter and Bildstein 1996).

Threats

Destruction of wetland habitat, native grassland and moist meadows, and the burning and plowing of nesting areas during early stages of the breeding cycle are major threats to the northern harrier (Remsen 1978). The continued widespread destruction of freshwater and estuarine wetlands in the United States also pose a threat to the populations by reducing prey availability and the amount of appropriate breeding and foraging habitat for the species.

The northern harrier is threatened by contaminants. During the late 1960s and early 1970s, levels of organochlorides in some eggs were high enough to cause eggshell thinning but after that time show no elevated levels and population declines may be attributed to a number of other factors, including loss of suitable habitat (Noble and Elliott 1990).

Conservation Needs

Conservation of the northern harrier is dependent upon the preservation of nesting areas from disturbance during the nesting season. Also, sufficient habitat to accommodate foraging birds during the breeding, migration, and winter seasons must be conserved to maintain the species in the Plan Area.

Environmental Baseline

Northern harrier breeding locations are not documented within the UCR database, but it has been documented as a scarce and local breeder in the literature (Garrett and Dunn 1981). The MSHCP indicates that there are breeding locations for the northern harrier at Mystic Lake/San Jacinto Wildlife Area, 1 to 3 nesting territories in the Lake Skinner area, and at Chino Hills, Lake Mathews-Estelle Mountain, Lake Elsinore grassland/Collier Marsh, and Vail Lake/Wilson Valley/east Temecula Creek. The northern harrier is widespread throughout the Plan Area as a winter resident, predominantly within the Riverside Lowlands and San Jacinto Foothills and Santa Ana and San Jacinto Mountains (Garrett and Dunn 1981).

The vegetation categories used to model primary (breeding) habitat for the northern harrier were cismontane alkali marsh, grassland, meadow and marshes, and playas and vernal pools. A total of 140,163 acres of these vegetation types occur within the Plan Area. Of this total, 24,765 acres (18 percent) occur on PQP Lands. The vegetation categories used to model secondary (foraging and wintering) habitat were field croplands, coastal sage scrub, and Riversidean alluvial fan sage

scrub. Approximately 268,703 acres of these vegetation types occur within the Plan Area. Of this total, 44,721 acres (17 percent) occur on PQP Lands.

Effects of the Action

Direct effects

The Plan Area includes 408,866 acres of modeled nesting and foraging habitat for the northern harrier. The species will be subject to impacts associated with development and other proposed Covered Activities over the 75-year permit term within 263,927 acres (65 percent), although some habitat for this species may also remain in areas avoided as a result of the Riparian/Riverine Areas and Vernal Pools policy and in rural mountainous areas where development impacts are anticipated to occur at a slower rate and at lower densities. Approximately 38,872 acres (15 percent) of the non-conserved modeled habitat for the northern harrier are designated as rural/mountainous land. It is anticipated that most of the modeled breeding (92,860 acres) and foraging (171,067 acres) habitat, which encompass 96 of the 143 observations (67 percent) in our dataset will be lost as a result of development. We do not anticipate direct mortality to adult birds from this loss. Adult birds will likely disperse to adjacent habitats; however, displaced birds that are unable to locate unoccupied suitable habitat will experience increased competition for the remaining suitable habitat. Thus, loss of these habitats may impact population numbers of the northern harrier within the Plan Area over the long term by reducing the number of areas suitable for their use.

The MSHCP will conserve and manage 75,453 acres (18 percent) of modeled breeding and foraging habitat for the northern harrier within the Additional Reserve Lands. Another 69,486 acres (17 percent) of modeled habitat will remain in PQP Lands. In total, 35 percent of the modeled habitat for the northern harrier will be conserved or remain in the Plan Area.

The MSHCP Conservation Area will include these known and historic breeding locations: Mystic Lake/San Jacinto Wildlife Area, Lake Skinner/Diamond Valley Lake, Chino Hills, Lake Mathews-Estelle Mountain, Lake Elsinore grasslands/Collier Marsh, Vail Lake/Wilson Valley/East Temecula Creek, and Garner Valley. Also, suitable breeding habitat will be available within the MSHCP Conservation Area at Potrero (in the Pass Area Plan) and at Prado Basin/Santa Ana River. While many of these areas are connected by linkages, some are more isolated. However, the northern harrier is able to fly long distances and is able to move between isolated habitat patches.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands, including surveys for the northern harrier. Cooperative management and monitoring are anticipated on PQP Lands. Surveys for the northern harrier will be conducted at least every five years to verify occupancy at a minimum of 75 percent of the known or future-identified nest sites in the MSHCP Conservation Area. If a decline in the distribution of the northern harrier is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP.

Reserve Managers will manage known or future-identified breeding locations in the MSHCP Conservation Area. A 250-meter buffer will be established around the known or future-identified nest sites in the MSHCP Conservation Area. Management will address impacts related to habitat loss and conversion, fire, and fire abatement measures during the early stages of the breeding cycle (Section 5, Table 5.2).

Management actions to benefit the northern harrier or other Covered Species (*e.g.*, prescribed burning, mowing, habitat manipulation) may result in impacts to a small number of individual northern harriers. It is anticipated that any impacts to the northern harrier from management actions will be minimized by adherence to appropriate survey protocols and other guidelines described in Section 7.4 of the MSHCP.

The MSHCP will conserve northern harriers by conserving known and historic breeding locations, linking core areas with nearby suitable foraging habitat, and managing breeding colonies within the Conservation Area. The Conservation Area will be managed to: 1) include within the MSHCP Conservation Area suitable primary breeding and foraging habitat; 2) include within the MSHCP Conservation Area the known and historic breeding locations listed in the Plan (above and Vol. II-B, pg. B-382); 3) include within the MSHCP Conservation Area suitable secondary foraging and wintering habitat; 4) protect within the Conservation Area known nest locations from disturbance with a 250-meter buffer; and 5) maintain (once every 5 years) the continued use of, and successful reproduction at, 75 percent of the known and future nesting areas.

Indirect Effects

The northern harrier could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These impacts include the indirect effects described in the “General Effects” section of this biological opinion. Implementation of the Riparian/Riverine Area and Vernal Pools policy and the Urban/Wildlands Interface policy will help minimize the indirect effects of the on foraging and breeding habitat for the northern harrier.

Conclusion

We anticipate the proposed action will directly and indirectly affect the northern harrier as described in the analyses above, including the loss of 65 percent of its modeled habitat in the Plan Area. Implementation of the avoidance, minimization, and mitigation measures identified in the Plan will reduce the impacts to this species. We anticipate that this species will be able to persist in the remaining 35 percent of the modeled habitat within both the existing PQP Lands and Additional Reserve Lands. Together these lands form a system of large, contiguous habitat blocks that are inter-connected within the Plan Area. We anticipate that these lands will be monitored and managed cooperatively to benefit this species.

After reviewing the current status of this species, the environmental baseline for the Plan Area, the effects of the proposed action, and the cumulative effects, it is the Service’s biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the

northern harrier. We reached this conclusion based on the widespread distribution of the species in North America and because the impacts associated with loss of this species' habitat, when viewed in conjunction with protection and management of the MSHCP Conservation Area, is not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Amount or Extent of Take

The loss of up to 263,927 acres of breeding and foraging habitat for the northern harrier in the Plan Area is not likely to result in direct mortality of adult birds; however, for some individuals, reproduction may be impaired or life expectancy shortened. Because of the large area covered, it will be difficult to quantify the number of birds impacted as a result of the proposed action over the 75-year permit term. Therefore, the Service is quantifying the take as the number of acres of modeled habitat that will be impacted in the Plan Area as a result of the proposed action. We anticipate that up to 263,927 acres of nesting and foraging habitat within the Plan Area will become unsuitable for the northern harrier as a result of the proposed action. Additionally, a small, but undeterminable, number of northern harriers are anticipated to be taken as a result of management actions.

Take will be in the form of harm and injury. This level of take is not likely to result in jeopardy to the northern harrier.

Osprey (*Pandion haliaetus*)

Status of the species

Listing Status

The osprey is not listed under the Federal Endangered Species Act. It is considered a California Species of Special Concern by the California Department of Fish and Game. It is also a California Department of Forestry and Fire Protection sensitive species.

Species Description

The osprey is a large, long-winged raptor with a dark brown back, mostly white breast, belly, crown and forehead and a dark line through the eye. The iris is yellow and legs are pale blue-grey. Males and females are difficult to distinguish in the field, but the female is 25 percent larger in body mass than the male and has a speckled brown necklace on the breast (sometimes appears in males also). Juveniles are similar to adults but have an orange-red iris and upper parts appear scaly due to light-buff feather edges on back and upper wing-coverts (Poole *et al.* 2002).

Habitat Affinities

The osprey is restricted to large water bodies supporting fish with surrounding or nearby forest habitats, often ponderosa pine or mixed conifers (Zeiner *et al.* 1990a). Rivers, lakes, and reservoirs are used for foraging. Ospreys spend much of their time near the water perched on a

dead snag of a tree or on rocks and occasionally they fly out 30-100 feet above the water surface to hunt.

Rocky pinnacles, large trees, and snags in open forest are used for cover and nesting (Zeiner *et al.* 1990a; Call 1978). Historically, nesting occurred throughout much of the continent in tall trees near productive shallow-water freshwater bodies. Nests are most often constructed in the tops of conifers, but deciduous trees may also be used (Call 1978). Nests are also built on artificial platforms, rocky or dirt pinnacles, and in the absence of predators on the ground (Poole *et al.* 2002). The osprey prefers to build the nest near accessory perches that can be used for sunning and protection from wind, provided it remains within sight of the nest (Call 1978). If nesting sites are in short supply, they may nest a mile or more from water if the food supply proves adequate (Call 1978). The same nest site is normally used year after year or as long as the tree remains standing (Call 1978). Nesting materials consist of large sticks, driftwood, and grasses or bark (Call 1978).

Life History

Ospreys may nest in colonies or singly and are fiercely defensive of the nest site (Terres 1980). The home range for osprey extends up to 5-6 miles from the nest (Zeiner *et al.* 1990a). Breeding occurs from March to September and pairs average 59 successful copulations per clutch, beginning 14 days before and peaking in the few days prior to the start of egg laying. The clutch size is one to four eggs, usually three eggs (Zeiner *et al.* 1990a). The mean clutch size has been estimated at 2.82 eggs and the mean size of successful broods are 2.06 chicks (Tishechkin and Ivanovsky 1992). Incubation may last for 38 to 43 days, although the incubation period has been reported to range from 28 to 43 days, depending on the location and investigator (Terres 1980). Early clutches produce more young in the successful nests (Tishechkin and Ivanovsky 1992).

Productivity surveys of osprey estimated an average of 1.21 fledglings per occupied territory, 1.33 fledglings per breeding attempt and 2.04 fledglings per successful breeding attempt (Witt 1996). Addled eggs and fallen nests were the main reason for reduced productivity (Tishechkin and Ivanovsky 1992). Young ospreys have been documented to return to the natal area when two years old or in the third year but do not breed until three years old (Terres 1980). Ospreys are relatively long-lived with banding records for survival ranging from 18 to 32 years of age (Terres 1980).

Ospreys prey mostly on fish but also take a few mammals, birds, reptiles and amphibians as well as invertebrates (Zeiner *et al.* 1990a). Mammals and birds may constitute important food sources at times and have been documented to make up 7.5 and 5.0 percent of the diet respectively (Chubbs and Trimper 1998). When they sight a fish, they hover with wings beating, legs trailing and sometimes plunge into the water from a straight flight. Upon capturing prey, they rise from the water with the fish gripped in both feet and fly to a habitual perch to eat the prey item (Terres 1980).

Status and Distribution

The osprey is found on every continent except Antarctica (Terres 1980). Within North America, it extends from northwestern Alaska to Baja California, Mexico and Florida (Terres 1980). Wintering habitat begins in the southern United States south to Peru and Brazil (Terres 1980). Within California, breeding populations reside in the Cascade and Sierra mountain ranges (Zeiner *et al.* 1990a). Although widely seen on the coast, these birds are rare transients in the interior portions of southern California (Garrett and Dunn 1981).

Osprey numbers declined starting in the early 1900s, probably due in large part to indiscriminate shooting (Kenyon 1947). They were eliminated from south and central California and northwest Baja before 1920. Widespread use of persistent organochlorine pesticides after 1945 caused dramatic declines of breeding ospreys. In addition, timber extraction and shoreline development have undoubtedly removed many preferred nest trees, likely causing population declines (Ewins 1997).

The Ban on DDT in the 1970's and the ability of the osprey to nest on artificial structures has helped increase the population and expand its range in North America in recent decades (Poole *et al.* 2002). Although the number of osprey pairs has increased at the southern end of their range, the breeding range has not extended any farther south (Henny and Anthony 1989).

Threats

Human disturbance of nest sites (or potential nest sites), environmental contaminants, and habitat fragmentation (such as shoreline development and timber extraction) are threats to the osprey. Shooting along seacoast habitats and estuaries is also a threat (Terres 1980). Human disturbance impacts seem to vary according to whether the birds are accustomed to human presence, the regularity of the disturbance, and if it commences during a sensitive stage of incubation or small chick stages (Ewins 1997). The lack of large, undisturbed, contiguous areas of habitat and pristine open waters continues to be a threat to the osprey. Due to their predatory habitats and largely piscivorous diet, ospreys are exposed to biomagnification hazards of environmental contaminants which may include the toxin mercury (Desgranes *et al.* 1998). Certain pesticides, as well as pollution within occupied waters, may result in reproductive failure (Zeiner *et al.* 1990a; Terres 1980).

Conservation Needs

Year-round application of buffer zones that restrict human access near potential nesting/breeding habitat for the osprey is essential in limiting human encroachment within these areas. Ewins (1997) developed management guidelines to provide buffers for nesting ospreys. Surveys need to be conducted to determine nest sites for osprey, and the following measures need to be implemented: *absolute buffer zone* within a 40-200 meter radius of an occupied nest tree where access is restricted year-round and activities are limited within the buffer zone, including nest site protection; *seasonal buffer zone* within a 100-800 meter radius of an occupied nest or up to 600 meters beyond the periphery of the absolute buffer zone and for the duration of the breeding season within which activities such as logging, road or pipeline construction, mining, and some

recreation are banned; *riparian/lacustrine buffer zone* for distances of 70-350 meters back from the water's edge where there may be no cutting and the retention of up to five snags and five clumps of tall trees (Ewins 1997). Ospreys typically build their nests above the canopy, so it is important to conserve areas that contain older trees and snags, preferably near open water (Ewins 1997). It is also pertinent to conserve and protect water resources from pesticide use, due to the sensitivity of this species to environmental pollutants (Terres 1980).

Environmental Baseline

Osprey foraging habitat occurs within all Bioregions of the Plan Area. Osprey forage in open water habitats and perch or nest on large trees and snags adjacent to open or standing water. Therefore, the habitat model for this species was created by capturing the following vegetation types that occur within 984 feet (300 meters) of open or standing water: open water, meadows and marshes, playas and vernal pools, chaparral, peninsular juniper woodland/scrub, montane coniferous forest, and riparian scrub, woodland, and forest. Based on this analysis, the Plan Area supports approximately 19,482 acres of modeled habitat for the osprey. Approximately 13,416 acres (69 percent) of the modeled habitat occur within PQP Lands, including the Prado Basin/Santa Ana River. Due to the absence of large trees or snags within certain habitat types, the modeled habitat likely overestimates the extent of suitable perching or nesting habitats for the osprey within the Plan Area.

Within Riverside County, the osprey occurs as fall and winter resident near water bodies west of the San Jacinto Mountains (Zeiner *et al.* 1990a; Garrett and Dunn 1981). While breeding attempts have been reported from Lake Elsinore (K. Cleary-Rose, Fish and Wildlife Service, pers. comm, 2003.), the osprey is not documented as a successful breeding bird within western Riverside County, and the population within the Plan area is currently unknown. In 2003, the osprey was not observed summering within the Prado Basin, despite the presence of migrants (Dharm Pellegrini, Orange County Water District, pers. comm., July 29, 2003).

As stated in the Plan, ospreys have been recorded as visitors near the following water bodies: Santa Ana River, Prado Basin, Lake Mathews, Lake Elsinore, Canyon Lake, Lake Skinner, Lake Perris, San Jacinto Reservoir, Vail Lake, Lake Hemet, and Mystic Lake/San Jacinto Wildlife Area. Other observations not associated with a water body may reflect observations of ospreys flying overhead. Although there is no documentation of osprey nests within the Plan area, there are suitable habitats for nesting that is important to conserve.

Effects of the Action

Direct effects

The Plan Area includes 19,482 acres of modeled nesting and foraging habitat for the osprey. The loss of 3,062 acres (16 percent) of this modeled habitat is anticipated over the 75-year permit term, which encompasses 11 of the 43 (26 percent) observations in our dataset. A 16 percent loss of osprey habitat distributed over the Plan Area is not anticipated to result in direct mortality of adult birds. However, loss of foraging and nesting habitats to development will cause osprey to disperse in search of other open water habitats and experience increased

competition for the remaining suitable habitat. Birds forced to disperse may also experience decreased fitness due to increased energy and time spent locating new habitats. Loss of additional perch and nesting trees may preclude the establishment of nesting sites. Thus, loss of nesting and foraging habitat may impact population numbers of the osprey within the Plan Area over the long term by reducing the number of areas suitable for use as foraging and nesting sites.

Because no recorded breeding site currently exists within the Plan Area, no osprey nests are anticipated to be harmed as a result of planned development. If osprey nests are established during the permit term in the Plan Area, it is likely that they will be located within the Conservation Area, which includes most of the modeled habitat for this species. The MSHCP did not anticipate take of active osprey nests (Section 9, Table 9.2).

The MSHCP will conserve and manage 3,005 acres (15 percent) of modeled habitat for the osprey within the Additional Reserve Lands. Another 13,416 acres (69 percent) of modeled habitat will remain in PQP Lands. In total, 84 percent of the modeled habitat for the osprey will be conserved or remain in the Plan Area. This modeled habitat includes 32 of the 43 (74 percent) observations of the osprey in our dataset.

Six open water habitats and one drainage will support ospreys within the Plan Area, including Lake Mathews, Diamond Valley Lake, Lake Skinner, Lake Elsinore, Vail Lake, Lake Perris, the Prado Basin/Santa Ana River, and the wetland habitats within Prado Basin/Santa Ana River.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands, including surveys for the osprey. Cooperative management and monitoring are anticipated on PQP Lands. Surveys for the osprey will be conducted at least every eight years to verify occupancy at a minimum of 75 percent of the known or future-identified locations. If a decline in the distribution of the osprey is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP.

Reserve Managers will manage known or future-identified breeding locations in the MSHCP Conservation Area, including Lake Perris. A 100-meter buffer will be established around the known or future-identified nest sites in the MSHCP Conservation Area. Management will address impacts related to logging, firewood harvesting, and pesticide use (Section 5, Table 5.2).

The MSHCP will conserve ospreys by conserving known and historic breeding locations, linking core areas with nearby suitable foraging habitat, and managing breeding colonies within the Conservation Area. The Conservation Area will be managed to: 1) preserve the quality of wetland associated foraging areas; 2) improve the potential and suitable emergent wetland habitat within the Prado Basin, Santa Ana River, and other major wetland areas; 3) monitor the potential breeding locations; and 4) protect any existing and future documented nest sites by providing buffers around them.

Indirect Effects

The osprey could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These impacts include the indirect effects described in the “General Effects” section of this biological opinion. In particular, maintaining the hydrological processes and water quality standards (*e.g.*, controlling sedimentation and other pollutants) of open water and wetland habitats will be important in conserving osprey habitat within the MSHCP Conservation Area. Implementation of the Riparian/Riverine Area and Vernal Pools policy and the Urban/Wildlands Interface policy will help minimize the indirect effects of the Covered Activities on foraging and breeding habitat for the osprey.

Conclusion

We anticipate the proposed action will directly and indirectly affect the osprey as described in the analyses above, including the loss of 16 percent of its modeled habitat in the Plan Area. Implementation of the avoidance, minimization, and mitigation measures identified in the Plan will reduce the impacts to this species. We anticipate that this species will be able to persist in the remaining 84 percent of the modeled habitat within both the existing PQP Lands and Additional Reserve Lands. Together these lands form a system of large, contiguous habitat blocks that are interconnected within the Plan Area. We anticipate that these lands will be monitored and managed cooperatively to benefit this species.

After reviewing the current status of this species, the environmental baseline for the Plan area, the effects of the proposed action, and the cumulative effects, it is the Service’s biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the osprey. We reached this conclusion based on the transient nature of the osprey in the Plan Area and because the impacts associated with loss of this species’ habitat, when viewed in conjunction with protection and management of the MSHCP Conservation Area, is not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Amount or Extent of Take

The loss of up to 3,062 acres of nesting and foraging habitat for the osprey in the Plan Area is not likely to result in direct mortality of adult birds; however, for some individuals, reproduction may be impaired or life expectancy shortened. Due to the difficulty in quantifying the number of osprey impacted by the proposed action over the 75-year permit term, we are quantifying the take as the number of acres of modeled osprey habitat that will be impacted in the Plan Area as a result of the proposed action. We anticipate that up to 3,062 acres of nesting and foraging habitat within the Plan Area will become unsuitable for osprey as a result of the proposed action. Take will be in the form of harm and injury. This level of take is not likely to result in jeopardy to the osprey.

Peregrine Falcon (*Falco peregrinus*)

Status of the species

Listing Status

The American peregrine falcon (peregrine falcon) was federally listed as endangered in 1970 (35 FR 16047); critical habitat was not designated for this species. It was also listed as State-endangered in 1971 and is a Fully Protected species. A Pacific Coast Recovery Plan for the peregrine falcon was adopted in 1982 (U.S. Fish and Wildlife Service 1982). This plan recommended that delisting be considered when 185 wild, self-sustaining pairs had been established, with at least 120 pairs in California, and fledgling success averaged 1.5 young per pair for a five-year period. The population of peregrine falcons along the Pacific coast from Washington to the Mexican border was 224 pairs in 1995, with more than 120 pairs occurring in California. The final rule to remove the peregrine falcon from the Federal list of endangered and threatened wildlife was published August 25, 1999 (64 FR 46542). The species is currently a Fish and Wildlife Service migratory non-game bird of management concern and is listed on the Federal Birds of Conservation Concern (2002).

Species Description

There are three subspecies of *Falco peregrinus* in North America: the American (*Falco peregrinus anatum*), Arctic (*Falco peregrinus tundrius*), and Peale's (*Falco peregrinus pealei*). *F. peregrinus* are approximately crow-sized, about 15-21 inches long, with a wingspan of about 40 inches. The females are larger than males but have similar plumage. Adult *F. peregrinus* have slate blue-gray wings, backs barred with black, pale undersides, white faces with a black stripe on each cheek, and large, dark eyes. Immature falcons are buff-colored in the front and have dark brown backs (Fish and Wildlife Service 1999e).

Habitat Affinities

Peregrine falcons are found in a large variety of open habitats, including tundra, marshes, seacoasts, savannahs and high mountains (American Ornithologists' Union 1983; Brown 1999). The species is most likely to be found where prey (primarily birds) concentrate. The species breeds mostly in woodland, forest, and coastal habitats (Brown 1999). Riparian areas and coastal and inland wetlands are important habitats year-round, especially in non-breeding seasons. During migration, the peregrine falcon prefers marshes, lakes, and ponds with high concentrations of water fowl, shorebirds, and other birds. Like many other migratory birds of prey they often travel along mountain ridges on both eastern and western coastlines when migrating (Brown 1999). Within southern California, peregrine falcons are primarily found at coastal estuaries and inland oases (Garrett and Dunn 1981). Nesting habitat usually consists of a cliff, or series of cliffs, generally 60 to 90 meters in height. Mountain valleys and river gorges with precipitous cliffs also are preferred nest sites. Nest sites are generally located below 2,900 meters. An adequate food source is normally found within 16 kilometers of the nest site. Peregrine falcons typically hunt within 16-32 kilometers of nesting sites. Important hunting areas are wetlands and riparian habitats; meadows and parklands; crop lands such as hayfields,

grainfields and orchards; and areas such as gorges, mountain valleys and lakes over which prey are vulnerable.

Life History

The peregrine falcon typically hunts its prey in air and prey is either struck to the ground or killed outright by a blow from the talons. They will also pursue prey in a low, fast flight, or attack passing birds from a perch. Some pairs hunt cooperatively with the larger female diving for the prey first and then if successful, eating first from the prey item (Brown 1999). Pigeon-size birds are the primary prey, but large numbers of lemmings and voles are also captured when present (Brown 1999). Due to their larger size, the females may take larger prey items.

Breeding occurs from early March to late August. The nest site, which is often referred to as an eyrie, usually consists of a rounded depression or scrape (Call 1978), with accumulated debris that is occasionally lined with grass. Clutch size varies from 3-7 eggs with incubation from 28-35 days performed by both parents (Brown 1999). The young typically fledge from the nest between 25-42 days (Brown 1999). The young are not independent of the parents for several months. If the first eggs are removed or destroyed early in the season, a second clutch is possible (Brown 1999). Peregrine falcons compete with ravens and prairie falcons for nesting sites (Zeiner *et al.* 1990a).

The hatching success of the species in the wild is about 75 percent. An average of one young reaches fledgling per laying pair. The juvenile birds continue to be particularly vulnerable during their first year of life as they learn to hunt and develop flying skills. Enderson (1969) estimated annual juvenile mortality at approximately 70 percent and adult mortality at approximately 25 percent. The mean life expectancy for those young that fledge is approximately four years. The maximum life span of the peregrine is in excess of 13 years. It is possible that a few individuals may reach 20 years of age.

In resident birds, pair-bonds remain established year-round (Brown 1999). Fidelity to the territory is strong, but territorial shifts do occur (Tordoff and Redig 1997). In the Rocky Mountains, the home range included the area encompassed by a radius up to 23 kilometers from cliff nests (Zeiner *et al.* 1990a). Cade (1960) found a minimum territory of about a 100-meter radius around peregrine nests in Alaska. White and Cade (1971) reported that the mean spacing between nests was 9.7 kilometers along Alaska rivers. In some parts of California, the home range averaged 325 square kilometers, and territories were spaced approximately 5-11 kilometers apart (Zeiner *et al.* 1990a). Little is known of post-breeding movements of adults or immatures (Fish and Wildlife Service 1984). Within the Midwest, dispersal from hack or natal sites had a large variation; however, the mean dispersal distance of females, at 320 kilometers, was about twice that of males at 176 kilometers.

Status and Distribution

The peregrine falcon has a worldwide distribution that is more extensive than any other bird. The species breeds in North America from Alaska, east to Labrador, southward to southern

California and Baja California, central Arizona and Mexico. The species winters from southern Alaska to Tierra del Fuego in southernmost South America (American Ornithologists' Union 1983). In California, the peregrine falcon is a very uncommon breeding resident and uncommon as a migrant or as winter resident. It breeds and winters throughout the State, with the exception of desert areas (Zeiner *et al.* 1990a). Active nesting sites of this species within California are known from the northern Channel Islands, along the coast from San Diego County to north of Santa Barbara, in the Sierra Nevada Mountains, and other mountains of northern California. However, not all nest sites are used every year. Some of the individuals that breed farther north migrate into California for the winter months. During this time, peregrines can be seen inland throughout the Central Valley. Spring and fall migrants occur along the coast and in the western Sierra Nevada Mountains (Brown 1999). As a transient species, peregrine falcons may occur almost anywhere within appropriate habitat (Garrett and Dunn 1981).

Populations of peregrine falcons declined precipitously in North America in the 1950s, continuing into the 1970s. Declines were attributed to eggshell thinning and nesting failure as a result of the use of organochlorine pesticides (*e.g.*, DDT, and its metabolite, DDE). These compounds accumulated in the birds as a result of feeding on contaminated prey, affecting their reproductive potential through interference with calcium metabolism. The eggs were laid with thin shells, rendering them easily broken and consequently, greatly affecting the species' reproductive success (Ambrose 2000). Many of the populations in the eastern and southern regions of the United States were extirpated. In the 1980s, there was a general increase in reproductive success generally attributed to the ban on the use of DDT in the United States in 1972 (Fish and Wildlife Service 1999e).

The peregrine falcon population in California began to decline seriously in the 1950s. From a conservative historical estimate of 100 pairs breeding in California before 1947, fewer than 10 nesting sites were believed active in 1969 (Herman *et al.* 1970). In California from 1977 to 1992, 702 peregrine falcons were released through the captive breeding program (California Department of Fish and Game 1999). In 1997, a California state-wide survey found 129 sites with at least one adult peregrine present and at least 111 territories with two courting adults present; at 78 of the sites productivity averaged about 1.5 young per pair (California Department of Fish and Game 2003).

Threats

Eggshell thinning from residual organochloride pesticides in the environment continues to be a problem in southern California populations of peregrine falcons (Fish and Wildlife Service 1999e). Removal of wetland and grassland habitat, among other types, by development is also a threat to this species.

Conservation Needs

General conservation for the peregrine falcon includes protection and improvement of habitat and monitoring of population trends and productivity. Nest sites require protection from destruction and human intrusion. Habitat improvements include modifications to nest sites on cliffs, buildings or towers to increase safety from predators and inclement weather and

construction of improved alternate nesting sites on towers or other structures. Monitoring for the peregrine falcon is being carried out under the monitoring plan for the American peregrine falcon (Fish and Wildlife Service 2003).

Environmental Baseline

Within the Plan Area, the peregrine falcon is a rare spring and more common fall transient and a casual visitor during other seasons (Garrett and Dunn 1981). It was formerly much more common in the region and probably concentrated wherever populations of waterfowl occurred. According to the Plan, although peregrines were observed on at least two occasions in the Prado Basin area in 1998, the species remains quite scarce elsewhere within the Plan. There is one known nesting pair located within the Plan Area on the County Building in downtown Riverside.

Other geographic locations recorded for the species include: Mystic Lake/San Jacinto Wildlife Area, Lake Perris, Lake Skinner, and Lake Elsinore, all of which may concentrate waterfowl or shorebirds and constitute foraging areas. All of these locations are likely to be visited by the species with some regularity during transient movements through the Plan Area and possibly for wintering. The Plan Area supports approximately 17,229 acres of modeled foraging habitat for the peregrine falcon including open water and riparian scrub, woodland, and forest. We did not model breeding habitat since our dataset is not able to adequately capture cliff faces that are a preferred nesting substrate. Approximately 13,988 acres (81 percent) of the modeled foraging habitat occur within PQP Lands, including the Prado Basin and Santa Ana River.

Effects of the Action

Direct effects

The Plan Area includes 17,229 acres of modeled foraging habitat for the peregrine falcon. Loss of 1,668 acres (10 percent) of this modeled habitat is anticipated over the 75-year permit term, which encompasses 10 of the 16 (62.5 percent) observations in our dataset. While this constitutes a large proportion of the total observations for the species in the Plan Area, the observations in our dataset are primarily of birds in flight since the species is mainly migratory in the Plan Area. Thus, the observations lack precision and provide limited information on peregrine falcon use of the Plan Area, and effects to the species are better explained in terms of overall habitat loss and conservation.

A 10 percent loss of peregrine falcon foraging habitat distributed over the Plan Area is not anticipated to reduce the overall prey base to a level that would result in mortality of adult birds. However, loss of habitat to development may reduce the prey base in certain areas causing peregrine falcons to disperse in search of other suitable habitats. Birds forced to disperse may experience decreased fitness due to increased energy and time spent locating new habitats. Since cliff face habitat could not be modeled, it is unclear how much of this type of nesting substrate in the Plan Area will be lost to development. However, given the limited records for nesting in the Plan Area and the ability of the peregrine falcon to nest on man-made structures, we anticipate that the impact of any nesting loss from implementation of the Plan will be minimal. While the recent nesting record on the County building in Riverside falls outside of the MSHCP

Conservation Area, we anticipate that peregrine falcons will continue to use that location, if disturbance to the nesting birds is avoided and minimized. If peregrine falcon nests are established during the permit term in the Plan Area, it is likely that they will be located within the MSHCP Conservation Area, in sites that make development unlikely due to slope, or perhaps in current or future urbanized areas, such as at the Riverside County building nest site. Because the peregrine falcon is a Fully Protected Species in the State of California, no direct take of peregrine falcons or active nests is anticipated during the breeding season either inside or outside of the Criteria Area. However, habitat clearing and associated construction actions outside the Criteria Area early during the breeding season of the peregrine falcon may result in disruption of normal breeding activities (nest site selection, pair formation, etc.).

The MSHCP will conserve and manage 1,572 acres (9 percent) of modeled foraging habitat for the peregrine falcon within the Additional Reserve Lands. Another 13,988 acres (81 percent) of modeled habitat will remain in PQP Lands. In total, 90 percent of the modeled habitat for the peregrine falcon will be conserved or remain in the Plan Area.

Six open water habitats and one drainage will support foraging peregrine falcons within the Plan Area, including Lake Mathews, Diamond Valley Lake, Lake Skinner, Lake Elsinore, Vail Lake, Lake Perris, Mystic Lake/San Jacinto Wildlife Area, Prado Basin and the Santa Ana River. The Plan includes an objective to identify, protect and buffer from disturbance a 100-meter buffer around open water bodies as these areas are incorporated into the MSHCP Conservation Area. This buffer will reduce disturbance effects at potential peregrine falcon foraging locations.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands, including surveys for the peregrine falcon. Cooperative management and monitoring are anticipated on PQP Lands. Surveys for the peregrine falcon will be conducted at least every eight years to verify occupancy at a minimum of 75 percent of the known locations. If a decline in the distribution of the peregrin falcon is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP.

The MSHCP will conserve peregrine falcons by conserving foraging habitat within the MSHCP Conservation Area. The MSHCP Conservation Area will be managed to (1) preserve and improve the quality of wetland associated foraging areas and (2) consider effects of pesticide use in managing the known and future occurrences of the species.

Indirect Effects

The peregrine falcon could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These impacts include the indirect effects described in the “General Effects” section of this biological opinion. Implementation of the Riparian/Riverine Area and Vernal Pools policy and the Urban/Wildlands Interface policy will help minimize the indirect effects of the Covered Activities on habitat for the peregrine falcon.

Conclusion

We anticipate the proposed action will directly and indirectly affect the peregrine falcon as described in the analyses above, including the loss of 10 percent of its modeled foraging habitat in the Plan Area. Implementation of the avoidance, minimization, and mitigation measures identified in the Plan will reduce the impacts to this species. We anticipate that this species will persist in the remaining 90 percent of the modeled habitat within both the existing PQP Lands and Additional Reserve Lands. We anticipate that these lands will be monitored and managed cooperatively to benefit this species.

After reviewing the current status of this species, the environmental baseline for the Plan area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the peregrine falcon. We reached this conclusion based on the nature of the peregrine falcon's use of the Plan Area and because the impacts associated with loss of this species' habitat, when viewed in conjunction with protection and management of the MSHCP Conservation Area, are not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Amount or Extent of Take

The loss of up to 1,668 acres of nesting and foraging habitat for the peregrine falcon in the Plan Area is not likely to result in direct mortality of adult birds; however, for some birds, reproduction may be impaired. Due to the difficulty in quantifying the number of peregrine falcons impacted by the proposed action over the 75-year permit term, we are quantifying the take as the number of acres of habitat that will be impacted in the Plan Area as a result of the proposed action. We anticipate that 1,668 acres of nesting and foraging habitat within the Plan Area will become unsuitable for peregrine falcon as a result of the proposed action. Take will be in the form of harm and injury. This level of take is not likely to result in jeopardy to the peregrine falcon.

Prairie Falcon (*Falco mexicanus*)

Status of the species

Listing Status

The prairie falcon (*Falco mexicanus*) is not listed under the Federal Endangered Species Act but is listed on the Federal Birds of Conservation Concern (2002). It is considered a California Species of Special Concern by the California Department of Fish and Game.

Species Description

The prairie falcon is a large (37 to 47 centimeters) pale brown falcon with large, dark eyes, squarish head with black malar streaks, dark ear patch, white area between eye and ear patch, and yellow legs and cere. Males and females have similar plumage, but the females are larger

and underwing coverts are more heavily marked. Juveniles have bluish-gray cere and legs and streaked underparts with a rosy tinge (Steenhof 1998).

Habitat Affinities

Habitat use of the prairie falcon includes annual grasslands to alpine meadows. They are associated primarily with dry environments of western North America where there are cliffs or bluffs for nest sites including: perennial grasslands, savannahs, rangeland, some agricultural fields during the winter season, and desert scrub areas (Brown and Amadon 1968). The species requires sheltered cliff ledges for cover and nesting which may range in height from low rock outcrops of 30 feet to vertical, 400 feet high (or more) cliffs and typically overlook some treeless country for hunting (Call 1978). Denton (1975) reported 76 percent of eyries had water within 0.4 kilometers (0.25 miles).

The prairie falcon usually nests in a scrape on a sheltered ledge of a cliff overlooking a large, open area, and may nest in a crevice or hole in a cliff, pothole or larger cave (Call 1978). Sometimes an old raven or eagle stick nest on a cliff, bluff, or rock outcrop is used, but they never build a stick nest themselves (Craighead and Craighead 1956). Prairie falcons have been documented to nest in stick nests on electrical power transmission towers (Bunnell *et al.* 1997). Usually the nests are on south-facing cliffs which may be advantageous when temperatures are low during incubation and brood-rearing in the northern parts of the breeding range (Enderson 1964). In the lower deserts, at the southern end of the range, prairie falcons may select nest sites to avoid high temperature, thus most nest sites have a microclimate that buffers the nestlings from temperature extremes. The cliff walls act as a heat sink during the day and a heat source at night and overhangs probably offer protection from storms and from hot sun in later parts of the season (Steenhof 1998).

Prairie falcons use open terrain for foraging. They capture prey most often in areas of low, sparse vegetation (Steenhof 1998). Foraging may occur in open habitat up to 3,350 meters in elevation (Steenhof 1998). They winter mostly in the Great Plains and Great Basin. Most individuals banded in Canada had winter recovery locations in grassland habitats, mainly in the Great Plains, but also in areas west of the Rocky Mountains with only 2 of 48 recoveries in forested habitat (Schmutz *et al.* 1991).

Life History

The prairie falcon breeds from mid-February through mid-September, with a peak in April to early August. It establishes the nesting territory in late February through March in most of the breeding range, and egg laying begins as early as March in some areas (Steenhof 1998). The mean laying date for 280 records from 1900-1977 was April 4-11 (Walton 1977). Prairie falcons usually have alternate nesting sites located on the same cliff or adjacent cliffs, and they exhibit a tendency to use alternate ledges in succeeding years (Call 1978). Aerial courtship display occurs near the nest site.

The prairie falcon intensively defends its territory. Breeding territory was estimated at 2.2 to 2.5 square miles in Utah (Smith and Murphy 1973), but active nests have been recorded within 636

feet of one another in sites where individuals did not confront or see each other regularly (Enderson 1964; Garrett and Mitchell 1973). Thus, relative orientation of potential nest site is probably more important than the actual distance from another potential site.

The clutch size is 3-6 eggs, with an average of 5. The incubation period is 29-31 days (Enderson 1964). Young leave the nest an average of 38 days after hatching but continue to receive food from parents for another 30-35 days (Steenhof 1998). The young begin to disperse in June and July. Prairie falcons appear to leave their natal territories immediately after the nesting season and apparently use widely separated nesting, post-nesting and wintering areas. They then show a tendency to return to breed in the general area where they were hatched (Steenhof *et al.* 1984).

The prairie falcon forages mostly in the early morning and late afternoon except when feeding nestlings, or prey is scarce (Zeiner *et al.* 1990a). Prey include small mammals, some small birds, and reptiles (Zeiner *et al.* 1990a). Ground squirrels are a key prey item during the breeding season in most areas, and horned larks and western meadowlarks are secondary prey species in most breeding areas (Steenhof 1998). Birds, however, are a principal prey of nesting prairie falcons in California (Fowler 1931). Prey are caught in the air and on the ground in open areas. The prairie falcon dives from a perch with rapid pursuit or dives from a searching flight 50-300 feet above ground. During pre-incubation, incubation, and brood-rearing, the male delivers the majority of the prey (Holthuijzen 1990). The prey is frequently cached and then retrieved at a later time, which presumably maximizes food intake and dampens fluctuations in prey availability (Holthuijzen 1990).

The survival of prairie falcon nestlings has been observed to be relatively consistent even when the prey abundance varies; mortality in two different years was determined to be 28 and 34 percent (McFadzen and Marzluff 1996). They may live as long as 13-20 years (Enderson 1969; Denton 1975). The lifetime reproductive output was estimated as 12.3 young for males and 9.8 young for females (Steenhof 1998). Estimates of adult survival rates range from 65 to 81 percent (Denton 1975).

Egg and nestling predation of the prairie falcon occurs at sites accessible to mammalian predators, great horned owls, and golden eagles (McFadzen and Marzluff 1996). They may compete with red-tailed hawks for food and nest sites and with great horned owls and ravens for nest sites. Although competition with other species for nest sites may occur, they are frequently found in close proximity to other raptor species and may actually benefit from nesting near ravens. They may benefit by being able to use abandoned raven stick nests, and the ravens may benefit from use of food cached by the prairie falcon, thus the relationship may be considered to be mutually beneficial (Steenhof 1998).

Status and Distribution

The breeding range of the prairie falcon includes southern central British Columbia, southern Alberta, and southernmost Saskatchewan, east to the badlands and plains of western North Dakota and extreme western Nebraska south to Chihuahua, Coahuila, central Durango, and San Luis Potosi, Mexico (Steenhof 1998). The species winters east to Minnesota, northwestern Iowa, east-central Missouri, central Oklahoma, and most of Texas, to Vancouver, British

Columbia, the coasts of Washington, Oregon, and California, all of Baja California and as far south as central Mexico (Steenhof 1998).

Data on population sizes are not available before 1950; however, the current data show significant increasing trends for the species continent-wide. Representatives from wildlife agencies in six western states characterized populations of the prairie falcon as “stable” in 1987, and the species is classified as “not at risk” in Canada because of stable or increasing numbers (Steenhof 1998).

At one time the prairie falcon was a common permanent resident throughout California except for in the humid northwest coast and higher mountains (Grinnell and Miller 1944). Migrants from northern areas winter in California. Some residents wander up slope in summer and down slope for winter (Zeiner *et al.* 1990a). While populations in the California deserts remain close to carrying capacity, surveys conducted in 1969-72 in the Central Valley showed low recruitment of young due to abnormally high numbers of non-reproductive pairs (Garrett and Mitchell 1973). Reproductive failures recorded in California between 1989 and 1991 may have been associated with high levels of hexachlorobenzene and DDE (Jarman *et al.* 1996). While recent surveys indicate population stability (Boyce *et al.* 1986), the total population within California is still very small and vulnerable (Remsen 1978).

Threats

The prairie falcon is harvested legally in 19 states for falconry, and although the harvests probably do not affect the population size, it may adversely affect some local population parameters such as territory fidelity (Steenhof 1998). The species is vulnerable to DDE poisoning and is more sensitive to DDE than the peregrine falcon and merlin (Remsen 1978). However, the prairie falcon eats more mammals and fewer birds than the peregrine falcon and merlin; therefore, it was less exposed to organochlorine pesticides and did not experience severe population declines as did the other two species (Steenhof 1998).

Populations levels of the prairie falcon are vulnerable to habitat change that could reduce their prey populations (Kirk and Hyslop 1998). Poisoning, use of farm machinery and loss of cover prevent ground squirrels from maintaining populations in agricultural areas (Steenhof 1998). Prairie falcons are susceptible to habitat loss on breeding areas because the nesting distribution is closely tied to cliffs. Because the number of nest sites is finite and nonrenewable, pairs cannot move to other undisturbed areas when nest sites or foraging habitats adjacent to cliffs are destroyed (Steenhof 1998).

The prairie falcon is more likely to flush when approached by a human on foot than when approached by an automobile (Holmes *et al.* 1993). This information may have important implications when addressing the potential impacts from hiking trails within breeding territories of the prairie falcon. Call (1978) indicated that they generally tolerate very little human disturbance at the nest site and abandon eyries where excessive human disturbance occurs.

Environmental Baseline

According to Zeiner *et al.* (1990a), the prairie falcon occurs within the Santa Ana Mountains during the wintering season and as a year-round resident throughout the rest of the western Riverside County area. Garrett and Dunn (1981) suggest that prairie falcons once bred in the early 1900s in Riverside County (*e.g.*, near Hemet), but more recent records are lacking. According to the Plan, there are no recent recorded observations of prairie falcon breeding within the Plan Area; however, one nest site could be present in the Vail Lake area, and one may have been historically present within the Lakeview Mountains area.

While migrating prairie falcons could be detected over all vegetation types, we used the following vegetation types to model foraging and roosting habitat: grassland, playas and vernal pools, desert scrub, Riversidean alluvial fan sage scrub, and coastal sage scrub. Approximately 303,355 acres of modeled habitat occurs within the Plan Area. Of this total, 61,043 acres (20 percent) occur within PQP Lands.

According to our dataset, there are 32 locations of prairie falcons documented in the Plan Area with most in the central portion, few records in the western or eastern mountains, and no records in the southeastern portion. The lack of records in the southeastern portion may reflect low survey effort rather than lack of use of the area. Location records occur in the Mystic Lake/San Jacinto Wildlife Area, Moreno Valley, Badlands, Beaumont/Banning, Lake Perris, Lake Skinner, French Valley, and Alberhill. These locations are likely winter observations given the lack of breeding records.

Effects of the Action

Direct Effects

The Plan Area includes 303,355 acres of modeled habitat for the prairie falcon. Loss of 168,966 acres (56 percent) of this modeled habitat is anticipated over the 75-year permit term, which encompasses 20 of the 32 (62.5 percent) observations in our dataset, which are likely observations of wintering birds or migrants moving through the Plan Area. A 56 percent loss of prairie falcon habitat distributed over the Plan Area is not anticipated to result in direct mortality of adult birds. However, loss of habitat to development will cause prairie falcon to disperse in search of other foraging and roosting habitats. Some may disperse to rural mountainous areas where development impacts are anticipated to occur at a slower rate and at lower densities. Approximately 38,030 acres (23 percent) of the non-conserved modeled habitat for the prairie falcon are designated as rural/mountainous land. Birds forced to disperse may experience increased energy and time spent locating new habitats; however, the species is capable of seasonal movements that reflect food availability so the likelihood of death or injury from such dispersal is minimal. Prairie falcons do not currently breed in the Plan Area; therefore, loss of modeled habitat will not impact breeding habitat or breeding individuals. However, a 56 percent loss of foraging habitat is likely to reduce the overall numbers of migrant or wintering prairie falcons that can be supported by remaining habitats in the Plan Area.

Because no breeding sites are currently known within the Plan Area, no prairie falcon nests are anticipated to be harmed as a result of planned development. The MSHCP did not anticipate take of active prairie falcon nests (Section 9, Table 9.2).

The MSHCP will conserve and manage 73,346 acres (24 percent) of modeled habitat for the prairie falcon within the Additional Reserve Lands. Another 61,043 acres (20 percent) of modeled habitat will remain in PQP Lands. In total, 134,389 acres (44 percent) of the modeled habitat for the prairie falcon will be conserved or remain in the Plan Area. This modeled habitat includes 12 of the 32 observations (37.5 percent) of the prairie falcon in our dataset. As stated in the Plan, the MSHCP Conservation Area will include areas with suitable foraging habitat, including grassland, playa and vernal pools, Riversidean alluvial fan sage scrub, and coastal sage scrub.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands for the prairie falcon. Cooperative management and monitoring is anticipated on PQP Lands. Surveys for the prairie falcon will be conducted at least every 8 years to verify occupancy at a minimum of 75 percent of the known locations. If a decline in the distribution of the prairie falcon is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP. Reserve Managers will manage cliff faces capable of supporting nesting of prairie falcons areas within the MSHCP Conservation Area.

Indirect Effects

The prairie falcon could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These impacts include the indirect effects described in the “General Effects” section of this biological opinion. Implementation of the Riparian/Riverine Area and Vernal Pools policy and the Urban/Wildlands Interface policy will help minimize the indirect effects of the Covered Activities on habitat for the prairie falcon.

Conclusion

We anticipate the proposed action will directly and indirectly affect the prairie falcon as described in the analyses above, including the loss of 56 percent of its modeled habitat in the Plan Area. Implementation of the avoidance, minimization, and mitigation measures identified in the Plan will reduce the impacts to this species. We anticipate that this species will persist in the remaining 44 percent of the modeled habitat within both the existing PQP Lands and Additional Reserve Lands. We anticipate that these lands will be monitored and managed cooperatively to benefit this species.

After reviewing the current status of this species, the environmental baseline for the Plan area, the effects of the proposed action, and the cumulative effects, it is the Service’s biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the prairie falcon. We reached this conclusion based on the transient nature of the prairie falcon in the Plan Area and because the impacts associated with loss of this species’ habitat, when viewed in conjunction with protection and management of the MSHCP Conservation Area, are not

anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Amount or Extent of Take

Due to the difficulty in quantifying the number of prairie falcons that will be impacted by the proposed action over the 75-year permit term, we are quantifying the take as the number of acres of modeled foraging and roosting habitat that will be impacted in the Plan Area as a result of the proposed action. We anticipate that up to 168,966 acres of modeled foraging and roosting habitat within the Plan Area will become unsuitable for the prairie falcon as a result of the proposed action. We anticipate that zero (0) prairie falcons will be taken as a result of the proposed action. This level of take is not likely to result in jeopardy to the prairie falcon.

Purple Martin (*Progne subis*)

Status of the species

Listing Status

The purple martin is not listed under the Federal Endangered Species Act. It is considered a California Species of Special Concern by the California Department of Fish and Game.

Species Description

The purple martin is the largest swallow, and the adult male is the only dark-bellied swallow in North America. The male plumage is glossy blue black, and the female resembles other female swallows in color except for a pronounced brownish or greyish collar around the nape. The yearling male resembles the female but with blue black feathers on head and underparts. The yearling female is lighter than the adult and more brownish above (Brown 1997).

Habitat Affinities

Purple martins may be found virtually anywhere in aerial habitat during migration, including grassland, wet meadow, and fresh emergent wetland, and are usually near water (AOU 1998). They forage aerially, at high altitudes (upwards of 50 meters), presumably over areas immediately surrounding the nest site (Brown 1997).

Purple martins typically breed in tall sycamores, pines, and other large trees, in or near oak woodlands or open coniferous forest (Garrett and Dunn 1981). The nests may be located in tall, old, isolated trees or snags (Zeiner *et al.* 1990a; Dawson 1923). The western populations of the purple martin nest solitarily in natural or woodpecker-made cavities in trees or cacti (Stutchbury 1991). Cavity-containing trees that have been used as nest sites include pines, aspens, cacti, palms, oaks, sycamores, spruce, firs, and cypress (Bent 1942; Grinnell and Miller 1944; Simpson 1993). The nesting trees are in relatively open and/or prominent positions to enhance predator detection and allow for efficient access to foraging areas (Williams 2002). Because the purple martin uses cavities excavated by several different bird species, the cavities that are chosen for

nesting differ widely in the size, depth, entrance hole diameter, height above ground, and position within the tree or cactus (Brown 1997). Nests are built out of twigs and stems of herbaceous plants, leaves and mud (Brown 1997).

Eastern populations historically nested in dead snags and woodpecker holes along forest edges and riparian area but are now found almost exclusively around cities and towns in human-made structures, in nesting boxes, under bridges, and in culverts. Birdhouses are constructed of wood, aluminum, or gourds and may have a single cavity or multiple compartments (Brown 1997). Western populations have not adapted well to artificial nest houses (Garrett and Dunn 1981); however, hollow-box bridges are used as nest sites by approximately 10 to 15 percent of the purple martin population in California (Williams 1998).

Life History

The purple martin arrives on the breeding grounds in late March and nests from April to August, with peak activity in June. The monogamous pair nests colonially or singly, depending on nest site availability. Nest building usually does not begin until several weeks after a pair bond has formed. Both male and female purple martins will defend a nest site averaging a 20-30 meter radius around the nest. Nest selection occurs by both sexes after a relatively long search. Individuals may reuse the same nest cavity in successive years. The clutch size ranges from 3 to 6 but is usually 4 or 5 per nest. Incubation lasts 15-18 days with the parents taking turns on the nest and some brief periods where the nest is left unattended. A second clutch may be laid, if the first nest fails (Brown 1997).

The altricial young are tended by both parents, and leave the nest at 24 to 31 days (Harrison 1978). Immediately following fledging, birds of all ages assemble in roosts before the fall departure (Brown 1997). Dispersal occurs by late September (Zeiner *et al.* 1990a). The young of the year wander widely and relatively few return to the natal colony site. Yearlings can breed but have a reduced success rate and are often found defending cavities with no nests (Brown 1997).

The maximum life span recorded for the purple martin is 13 years 9 months in Texas. Survival rates have been measured at 60.9 percent for adults and 32.2 percent for yearlings. Adverse weather kills more purple martins than all other sources of mortality combined. Owls and snakes are probably the most significant predators of both adults and nestlings of this species. European starlings and house sparrows compete with martins for nest cavities. Occasionally, native species will nest in martin houses (Brown 1997).

The diet of the purple martin is composed almost entirely of flying insects. Types of insects taken varies across the season and probably depend on availability. The purple martin hawks for insects on long, gliding flights (Airola 1980). Occasionally the purple martin forages on the ground for ants and other insects (Bent 1942). Individuals will forage for insects above water surfaces in ponds and lakes, if cold rainy weather limits the availability of normal food sources (Brown 1997). The purple martin drinks while in flight only, by skimming the water surface (Ehrlich *et al.* 1988; Brown 1997).

Status and Distribution

Purple martins breed locally from British Columbia disjunctly eastward to Nova Scotia southward to Baja California, central Mexico, and to the Gulf Coast. Although the species' winter range is not well known, the species winters primarily (presumably) in Amazonia and south-central Brazil. There are no documented winter records of purple martins anywhere in North or Central America (AOU 1998).

Historically, purple martins were fairly common in southwestern California in mountainous areas with abundant suitable nesting snags and in urban areas of lower foothills and valleys. Within Riverside County, historical nesting locations included Trabuco Canyon and the east side of the summit ridge in the Santa Ana Mountains, Fuller's Mill, Lake Hemet, Hemet Valley, Kenworthy Canyon and Hathaway Canyon in the San Jacinto Mountains, and the cities of Beaumont and Riverside (Williams 1998).

In southern California, the purple martin is a rare migrant in spring and fall and is absent in the winter. It is now a rare and local breeder on the coast and in interior mountain ranges, with few breeding localities (Garrett and Dunn 1981). In the north, it is uncommon to a rare local breeder on the coast and inland (McCaskie *et al.* 1979). It is absent from the higher slopes of the Sierra Nevada. The breeding range extends east to Modoc and Lassen counties (Airola 1980).

Weather related mortality periodically eliminates birds along the northern edge of the range, but these areas are usually reoccupied by at least a few individuals within several years. The overall northern limit of the breeding range in Canada has probably shifted southward in the recent century. Installation of birdhouses in the middle and western Great Plains may have permitted a range expansion in recent years. The birds' apparent absence from many potentially suitable areas in the northern Rockies, inter-mountain region, California, Pacific Northwest, and Mexican highlands may mean that the species has more specific habitat requirements in these areas that are unknown (Brown 1997).

Populations in northern North America have undergone long-term declines, especially since 1980, according to Breeding Bird Survey data (Peterjohn and Sauer 1997). Although birdhouses provide an abundance of nesting habitat in eastern North America, overall population declines in recent years suggest additional management may be necessary (Brown 1997). The population in California has been declining since the late 1950's (Garrett and Dunn 1981).

Threats

The purple martin was considered a fairly common summer resident in the early 1930s and had even spread by that time into cities (Willett 1933 in Garrett and Dunn 1981). Numbers of the purple martin have declined markedly in recent decades because of the loss of riparian habitat, removal of snags, and competition for nest cavities (Remsen 1978). Garrett and Dunn (1981) concluded that the great decline of this species as a breeder in southern California can be linked convincingly to the explosive increase in the regional population of European starlings, which compete with purple martins for nest cavities.

Conservation Needs

Conservation of the purple martin within the Plan Area requires protection of existing nesting sites and other suitable sites (*i.e.*, large trees and snags with nesting cavities). Williams (1998) concluded that physical access to a cluster of suitable cavities is the most important limiting factor within their California range. Locations of timber harvest may need to be revised and eliminated near nesting sites within Forest Service lands. Clusters of large snags should be maintained following fires (Williams 1998).

Purple martins have not adapted to artificial nest boxes within southern California (Garrett and Dunn 1981); however, efforts to entice the species to nest in such structures might increase the nesting population within the Plan Area. Williams (1998) found a potential for increasing purple martin colony size and reproductive success in several areas in California by using starling-proof nest boxes or even hollow gourds. Artificial nests must be carefully designed and maintained to prevent use by starlings and house sparrows.

Focused surveys for purple martin are needed to assess potential breeding locations and to determine the current status of historic breeding locations. Suggested survey protocols can be found in Williams (1998). Control of European starlings and house sparrows, if feasible, would likely enhance purple martin nesting habitat (Brown 1997) within the Plan Area.

Environmental Baseline

Our dataset includes observations of purple martins along the Santa Ana River, Norco Hills, Box Springs, Moreno Valley, Canyon Lake and south of Vail Lake near Kolb Creek. Because no breeding activity is documented from these areas, it is likely that these observations are of transient birds. The habitat types associated with these records include riparian, open water, woodlands, grasslands, and developed areas.

Based on information in the Plan, breeding colonies of purple martins persist in the Thomas Mountain and Dripping Springs areas of San Bernardino National Forest. The breeding colony above Lake Hemet, reported by Garrett and Dunn (1981), has not been recently verified; however, suitable breeding habitat for purple martin is still present in the area. Purple martins were observed in the late 1980's visiting probable nest sites in the Orange County portion of the Santa Ana Mountains close to the Riverside County line, suggesting a possible additional breeding locale in the western portion of the Plan Area (Gallagher 1997). On May 28, 2003, a pair of purple martins were reported nesting at the Santa Rosa Plateau Ecological Reserve, using a woodpecker hole in the first power pole west of the Hidden Valley Trailhead (SBVAS 2003).

Within the Plan Area, the purple martin is currently a rare migrant and breeder, predominantly within the woodlands of the foothills and within the montane areas (Garrett and Dunn 1981). It does not winter within the Plan Area. Purple martin nesting and foraging habitat occurs within all Bioregions of the Plan Area. The primary vegetation types used to model habitat for this species were riparian scrub/woodland/forest, montane coniferous forest, and woodlands/forests. Based on our analysis, the Plan Area supports 72,464 acres of modeled habitat for the purple martin. Approximately 47,966 acres (66 percent) of the modeled habitat occurs within PQP

Lands. Breeding populations of purple martin occupy only a small subset of this habitat, generally nesting only in large trees and snags with existing cavities, in areas with low numbers of European starlings and house sparrows. Thus, the modeled habitat likely overestimates the extent of suitable habitat available for the purple martin within the Plan Area.

Effects of the Action

Direct effects

The Plan Area includes 72,464 acres of modeled breeding and foraging habitat for the purple martin. Purple martins will be subject to impacts associated with development and other proposed Covered Activities, over the 75-year permit term, within 18,680 acres (26 percent) of this modeled habitat. It is anticipated that most of the breeding and foraging habitat for purple martin in these areas will be lost as a result of development, although some habitat for this species may remain in areas avoided as a result of the Riparian/Riverine Areas and Vernal Pools policy and in rural mountainous areas where development impacts are anticipated to occur at a slower rate and at lower densities. Approximately 5,173 acres (28 percent) of the non-conserved modeled habitat for the purple martin are designated as rural/mountainous land. One historic breeding location (above Lake Hemet) and four other locations where transient birds have been observed are outside of the MSHCP Conservation Area. Birds may be able to disperse to adjacent habitats; however, displaced birds that are unable to locate suitable habitat will experience increased rates of predation or otherwise die or be injured due to loss of their foraging, breeding, and sheltering habitat. Thus, loss of this breeding and foraging habitat may impact population numbers of the purple martin within the Plan Area over the long term by reducing the number of areas suitable for use as foraging and breeding sites.

To offset the loss of purple martin habitat within the Plan Area, the MSHCP will conserve and manage 5,818 acres (8 percent) of modeled habitat for the purple martin within Additional Reserve Lands. Approximately 47,966 acres (66 percent) of modeled habitat for the purple martin will remain within PQP Lands. In total, 74 percent of the modeled habitat for the purple martin will be conserved or remain in the Plan Area. The MSHCP Conservation Area will also include suitable microhabitat (*i.e.*, groups of large snags) within potential nesting habitat for the purple martin, as stated in the species-specific objectives of the Plan (Section 9, pp. 9-79).

Three known purple martin breeding areas will remain within PQP Lands in the San Bernardino National Forest and Santa Rosa Plateau Ecological Reserve. In addition, large blocks of foraging, migratory and potential breeding habitat will support the purple martin in the Prado Basin, Santa Ana River, Lake Mathews-Estelle Mountain, Cleveland National Forest, Lake Skinner-Diamond Valley, San Jacinto Wildlife Area/Lake Perris, Vail Lake/Wilson Valley, and Lake Elsinore.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands, including surveys for the purple martin. Cooperative management and monitoring are anticipated on PQP Lands. Surveys for the purple martin will be conducted at least every eight years to verify occupancy at a minimum of 75 percent of the known breeding areas. If a decline in the distribution of the purple martin is documented below this threshold,

management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP. Other management actions described in Section 5 of the MSHCP will help maintain purple martin, such as managing the known and future-identified purple martin nest sites for house sparrows or European starlings competing for the nest cavities. If competition is occurring, removal of house sparrows or European starlings may be required. Nesting sites will be augmented with potential artificial nest sites, using gourds, if possible. Additional management actions may include closing roads near a nest site, fencing hiking trails, or fencing potential access points during the breeding season of the purple martin (Section 5, Table 5.2). Implementation of these management actions will help to avoid and minimize adverse effects to the purple martin.

Indirect Effects

The purple martin could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These impacts include the indirect effects described in the “General Effects” section of this biological opinion. In particular, maintaining the hydrological processes and water quality standards (*e.g.*, controlling sedimentation and other pollutants) of open water and wetland habitats will be important to sustaining purple martin in the MSHCP Conservation Area. Implementation of the Riparian/Riverine Area and Vernal Pools policy and the Urban/Wildlands Interface policy will help minimize the indirect effects of the Covered Activities on foraging and breeding habitat for the purple martin.

Conclusion

We anticipate the proposed action will directly and indirectly affect the purple martin as described in the analyses above, including the loss of 26 percent of its modeled habitat in the Plan Area. Implementation of the avoidance, minimization, and mitigation measures will reduce the impacts to this species. We anticipate that this species will persist in the remaining 74 percent of its modeled habitat within both the existing PQP Lands and the Additional Reserve Lands. Together these lands form a system of large, contiguous habitat blocks that are interconnected within the Plan Area. We anticipate that these areas will be monitored and managed cooperatively to benefit this species.

After reviewing the current status of this species, the environmental baseline for the Plan area, the effects of the proposed action, and the cumulative effects, it is the Service’s biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the purple martin. We reached this conclusion because the impacts associated with loss of this species’ habitat, when viewed in conjunction with protection and management of the MSHCP Conservation Area, are not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Amount or Extent of Take

Because purple martins are cavity nesters and the number of suitable nesting snags within potential habitat is not known, it will be difficult to quantify the number of individuals that will be taken as a result of the proposed action over the 75-year permit term. Therefore, the Service

is quantifying the take as the number of acres of modeled breeding and foraging habitat that will be impacted in the Plan Area as a result of the proposed action. We anticipate that up to 18,680 acres of modeled habitat within the Plan Area will become unsuitable for the purple martin as a result of the proposed action. Take will be in the form of harm, death, and injury. This level of take is not likely to result in jeopardy to the purple martin.

Sharp-Shinned Hawk (*Accipiter striatus*)

Status of the Species

Listing Status

The sharp-shinned hawk is not listed under the Federal Endangered Species Act. It is considered a California Species of Special Concern by the California Department of Fish and Game.

Species Description

The sharp-shinned hawk is the smallest of North American hawks (males 24-27 centimeters, females 29-34 centimeters in total length). The adult male has bluish gray to slate upperparts, darker crown, whitish underparts with rufous or tawny bars on breast, belly, side and flanks and tail crossed with 3-5 slaty bands and narrow, white tips. The female is similar to the male but has more brownish olive upperparts and underparts are less heavily barred. The legs and toes are yellow, and the eyes are red. The juveniles have pale yellow eyes, heavily streaked grayish brown and white crown, and dark brown to brownish gray back (Bildstein and Meyer 2000).

Habitat Affinities

Sharp-shinned hawks breed in mid-elevation ponderosa pine, black oak, riparian deciduous, mixed conifer, and Jeffrey pine habitats (Polite and Pratt 1990). The species uses dense stands in close proximity to open areas. It roosts in intermediate to high-canopy forest and nests in dense, even-aged, single-layered forest canopy. The species usually nests in dense, pole and small-tree stands of conifers which are cool, moist, and well shaded, with little groundcover and near water (Call 1978). Conifers are the tree most frequently used for the nest site, although in some locations, deciduous trees are used predominantly (Bildstein and Meyer 2000). The nests may be reused in later years (Reynolds *et al.* 1982). The nest of the sharp-shinned hawk is a platform or cup in dense foliage against the trunk, or in the main crotch of a tree, usually 2-24 meters (6-80 feet) above ground. This species has the most inconspicuous nest of the accipiters (Call 1978).

Sharp-shinned hawks may occur in a large variety of woodland habitats during winter and migration periods and are most common in southern California in the coastal lowlands and desert areas (Garrett and Dunn 1981). The female sharp-shinned hawk uses continuous deciduous forest and small dense pine stands within deciduous areas for wintering. The males use mixed forest and transitional habitats near open areas where densities of potential prey species are higher for wintering periods (Meyer 1987). Foraging occurs in openings at edges of woodlands, hedgerows, brushy pastures, and shorelines (Zeiner *et al.* 1990a).

Life History

Sharp-shinned hawks breed from April through August in California, with the peak nesting period from late May to July (Zeiner *et al.* 1990a). The species demonstrates very active nest defense, and resident males will fly straight at and chase approaching intruders. Breeding home ranges may be as large as approximately 800 hectares (Johnsgard 1990). The clutch averages 4-5 eggs, with a range of 3-8. Incubation is 34-35 days and is done by both parents. The male brings food to the female, and the semi-altricial young fledge at about 60 days. Among 11 pairs in Oregon, Reynolds (1975) reported 2.7 young per pair, and a hatching success of 70 percent. Egg loss in the species was greater than nestling loss. Fledging is timed to coincide with the fledging of prey birds, providing a food supply for young, inexperienced hunters (Reynolds *et al.* 1982).

The sharp-shinned hawk feeds almost entirely on small birds, usually no larger than jays. This species also rarely takes small mammals, insects, reptiles, and amphibians (Brown and Amadon 1968). It perches and darts out in sudden flight to surprise its prey; it also cruises rapidly in search flights. Often the sharp-shinned hawk hunts as a harrier, in low, gliding flights. These hawks choose avian prey opportunistically (Joy *et al.* 1994). It may compete with the Cooper's hawk (Reynolds 1975, 1979).

Females generally breed at one year of age, and all breed by the second year (Bildstein and Meyer 2000). The longest lifespan of the sharp-shinned hawk is 13 years (Keran 1981). No rigorous analysis of survival is available. Based on 92 band recoveries, 19 percent were from one year of age, 24 percent were from two years of age, 25 percent were from three years of age, 15 percent were from four years of age, 10 percent were from five years of age, 5 percent were from six years of age, 2 percent were from seven years of age, and 2 percent were from eight years of age (Bildstein and Meyer 2000).

Status and Distribution

The sharp-shinned hawk breeds from Alaska southward throughout much of Canada, the northern portions of the lower 48 states, the Rocky Mountains and mountains of the far west, parts of the Gulf States, and the highlands of Mexico. The range of the sharp-shinned hawk for nesting is from northwestern Alaska, Yukon, northern Saskatchewan, central Manitoba, northern Ontario, central Quebec, Newfoundland, south to California, Mexico, Texas, Louisiana, Tennessee, South Carolina, and Alabama (Terres 1980).

A highly migratory species, the sharp-shinned hawk winters from the lower 48 states to Panama and various Caribbean islands (AOU 1998). Specifically, it winters from Vancouver Island, southern British Columbia, western Montana, Nebraska, southern Minnesota, Illinois, southern Michigan, southern Ontario, New York, and Nova Scotia south to Panama and the Bahamas (Terres 1980).

Throughout California, the sharp-shinned hawk is a fairly common migrant and winter resident except in areas with deep snow. The breeding distribution of the species is poorly documented. There are very few breeding records for the Cascades/Sierra Nevada. It probably breeds south in

the Coast Ranges to about 35 degrees latitude and at scattered locations in the Transverse and Peninsular Ranges. It may no longer breed in the southern Sierra Nevada. It is an uncommon winter migrant to the Channel Islands. Small (1994) describes the range of the sharp-shinned hawk in California as poorly known. Breeding or summering birds have occurred throughout California, including the southern mountains, but Small (1994) indicates that it most probably breeds only in the northern half of the State.

There is little data for historical range of the sharp-shinned hawk. It is likely that the dependence of this species on relatively large tracts of contiguous forest for nesting, at least until recently, has affected the distribution particularly in eastern North America where local and regional distributions shifted in responses to the widespread loss of the eastern deciduous forest. Currently there appears to be an expansion in the sharp-shinned hawk's breeding range southward continent-wide (Bildstein and Meyer 2000).

Current population information is lacking due to the difficulty in collecting census data on this species. Declines in numbers of sharp-shinned hawks from the 1940s to early 1970s were attributed to widespread use of DDT and its effects on reproduction. The population increased following the U.S. ban on DDT. Population declines in the 1980s and 1990s are attributed to environmental contaminants, migratory short-stopping, natural population cycles, depressed populations of prey species and the aging of eastern forests (Bildstein and Meyer 2000).

Threats

Although no longer considered vermin, sharp-shinned hawks are shot on Latin American wintering grounds (Johnsgard 1990). Sharp-shinned hawks are still showing negative effects from exposure to pesticides and still appear to have relatively high levels of organochlorine pesticides, which they may be picking up in neotropical areas (Henny 1987; Reynolds 1989).

Logging and timber harvest is another potential hazard for the sharp-shinned hawk (Remsen 1978; Reynolds 1989). However, the lack of accurate estimates of the abundance at any level precludes assessment of the population-level effects of forest management practices and habitat degradation due to agricultural and urban development in North America. The loss of neotropical forests may be important to the prey species which may have caused declines in the sharp-shinned hawk at the migration watch sites (Bildstein and Meyer 2000).

Environmental Baseline

Although sharp-shinned hawks have been repeatedly recorded in the San Jacinto Mountains during summer months, there are no confirmed records of breeding there or anywhere within the Plan Area (Grinnell and Miller 1944; Garrett and Dunn 1981). In general, the breeding range within California is poorly understood (Bildstein and Meyer 2000), but it is likely that this species occurs within southern California mountainous areas as a summering bird and not a breeder (Small 1994).

The sharp-shinned hawk species is a fairly common migrant and wintering species within much of the Plan Area. It has been recorded predominantly within the western and central portion of

the Plan Area within a variety of habitats. Our dataset includes a total of 67 observations for the following locations: Aguanga, Anza, Bachelor Mountain, Murietta, Temecula, Alberhill, Lake Elsinore, Romoland, Corona, Lake Mathews, Guasti, Riverside, Steele Peak, Sunnymead, Perris, El Casco, Beaumont, San Jacinto Mountains, Lakeview and San Jacinto Wildlife Area.

The vegetation categories used to model habitat for the sharp-shinned hawk were chaparral, coastal sage scrub, desert scrub, montane coniferous forest, riparian scrub, woodland and forest, Riversidean alluvial fan sage scrub, and woodlands and forests. A total of 644,171 acres of this modeled habitat occur within the Plan Area. Of this total, 291,162 acres (45 percent) occur on PQP Lands. A total of 11 of the 67 known observations of the sharp-shinned hawk occur on PQP Lands.

Effects of the Action

Direct Effects

The Plan Area includes 644,171 acres of habitat for the sharp-shinned hawk. Loss of 232,043 acres (36 percent) of this modeled habitat is anticipated over the 75-year permit term, which encompasses 53 of the 67 (79 percent) observations in our dataset. A 36 percent loss of sharp-shinned hawk modeled habitat distributed over the Plan Area is not anticipated to result in direct mortality of adult birds. However, loss of habitats to development will cause sharp-shinned hawks to disperse in search of other habitats. Some may disperse to rural mountainous areas where development impacts are anticipated to occur at a slower rate and at lower densities. Approximately 89,666 acres (39 percent) of the non-conserved modeled habitat for the sharp-shinned hawk are designated as rural/mountainous land. Birds forced to disperse may experience increased competition for the remaining suitable habitat and decreased fitness due to increased energy and time spent locating new habitats. Thus, loss of habitat may impact population numbers of the sharp-shinned hawk within the Plan Area over the long term by reducing the number of areas suitable for use.

Because no breeding sites are currently known within the Plan Area, no sharp-shinned hawk nests are anticipated to be harmed as a result of planned development. If sharp-shinned hawk nests are established during the permit term in the Plan Area, it is likely that they will be located within the MSHCP Conservation Area, in particular on the PQP Lands containing montane coniferous forest habitat. Those areas would likely be managed to avoid impacts to nesting sharp-shinned hawks should nesting be detected.

The MSHCP will conserve and manage 120,966 acres (19 percent) of modeled habitat for the sharp-shinned hawk within the Additional Reserve Lands. An additional 4 (6 percent) observations are captured with the Additional Reserve Lands. Another 291,162 acres (45 percent) of modeled habitat will remain in PQP Lands. In total, 412,128 acres (64 percent) of the modeled habitat for the sharp-shinned hawk will be conserved or remain in the MSHCP Conservation Area. A total of 14 (21 percent) of the 67 observations are within the MSHCP Conservation Area.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands, including surveys for the sharp-shinned hawk. Cooperative management and monitoring are anticipated on PQP Lands. Surveys for the sharp-shinned hawk will be conducted at least every eight years to verify occupancy at a minimum of 75 percent of the known locations. If a decline in the distribution of the sharp-shinned hawk is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP. Management measures for the sharp-shinned hawk involve control of unauthorized public access to the MSHCP Conservation Area via fencing, signage and gates, and trespass control to restrain illegal dumping, off-road vehicle use and vandalism (Section 5.2, pp.5-5).

Indirect Effects

The sharp-shinned hawk could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These impacts include the indirect effects described in the “General Effects” section of this biological opinion. Implementation of the Riparian/Riverine Area and Vernal Pools policy and the Urban/Wildlands Interface policy will help minimize the indirect effects of the Covered Activities on habitat for the sharp-shinned hawk.

Conclusion

We anticipate the proposed action will directly and indirectly affect the sharp-shinned hawk as described in the analyses above, including the loss of 36 percent of its modeled habitat in the Plan Area. Implementation of the avoidance, minimization, and mitigation measures identified in the Plan will reduce the impacts to this species. We anticipate that this species will persist in the remaining 64 percent of modeled habitat within both the existing PQP Lands and Additional Reserve Lands. We anticipate that these lands will be monitored and managed cooperatively to benefit this species.

After reviewing the current status of this species, the environmental baseline for the Plan area, the effects of the proposed action, and the cumulative effects, it is the Service’s biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the sharp-shinned hawk. We reached this conclusion based on the wide distribution of this species in North America and because the impacts associated with loss of this species’ habitat, when viewed in conjunction with protection and management of the MSHCP Conservation Area, are not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Amount or Extent of Take

The loss of up to 232,043 acres of habitat for the sharp-shinned hawk in the Plan Area is not likely to result in direct mortality of adult birds; however, for some individuals life expectancy may be shortened. Due to the difficulty in quantifying the number of sharp-shinned hawks impacted by the proposed action over the 75-year permit term, we are quantifying the take as the number of acres of habitat that will be impacted in the Plan Area as a result of the proposed action. We anticipate that 232,043 acres of modeled habitat within the Plan Area will become

unsuitable for the sharp-shinned hawk as a result of the proposed action. Take will be in the form of harm and injury. This level of take is not likely to result in jeopardy to the sharp-shinned hawk.

Southern California (Ashy) rufous-crowned sparrow (*Aimophila ruficeps canescens*)Status of the species*Listing Status*

The southern California rufous-crowned sparrow is considered a California Species of Special Concern by the California Department of Fish and Game. It is not listed under the Federal Endangered Species Act.

Species Description

The southern California rufous-crowned sparrow is a medium sized sparrow (13-15 centimeters) with a rusty crown, rufous-brown upperparts with grayish-buff streaking, dark ear-coverts, distinct black malar stripe, prominent eye-ring and brown underparts with a grayish wash. Males and females have similar plumage, but the males are slightly larger than females. Juvenile plumage is similar to adults except the crown is dull brown, the crown and upperparts are streaked with dark brown, the underparts are pale buff, and the malar stripe is indistinct (Collins 1999).

Habitat Affinities

Optimal habitat for the rufous-crowned species as a whole consists of sparse, low brush or grass, hilly slopes preferably interspersed with boulders and outcrops (Willet 1912, 1933; Grinnell 1915, 1926; Grinnell and Miller 1944; Bent 1968a; Palliam and Mills 1977; Phillips *et al.* 1983; Unitt 1984; Ehrlich *et al.* 1988; Root 1988). The species may occur on steep grassy slopes without shrubs if rock outcrops are present (Zeiner *et al.* 1990a). Some observers have noted a preference for south-facing or west-facing slopes (Barlow 1902; Grinnell 1915; Grinnell and Miller 1944; Bent 1968a; Root 1988). The elevation range in California has been recorded as 60 to 1,400 meters (Collins 1999).

Southern California rufous-crowned sparrows are found largely on moderate to steep, dry, grass-covered hillsides with a mixture of coastal sage scrub (*e.g.*, Grinnell and Miller 1944; Garrett and Dunn 1981). This species has a preference for tracts of California sagebrush (Grinnell and Miller 1944). Just to the south of the Plan Area in San Diego County, the species is thought to be “. . . a characteristic bird of the coastal sage scrub . . . The known range of the of Southern California Rufous-crowned Sparrow is virtually coincident with the extensive stands of coastal sage scrub in the coastal lowland” (Unitt 1984).

The rufous-crowned sparrow breeds and feeds on steep, dry, herbage-covered hillsides with scattered shrubs and rock outcrops. Rufous-crowned sparrows are relatively secretive, seeking cover in shrubs, rocks, grass and forb patches, concealing their nest on the ground at the base of

a grass tussock or shrub or about 1 to 3 feet above the ground (Terres 1980; Verner and Boss 1980). The nest is cuplike and made of twigs, bark strips, and grasses and is lined with hair of deer, horses, and grasses (Terres 1980).

Life History

Home range of the southern California rufous-crowned sparrow, estimated from nesting density, is about 1.5 hectares (3.7 acres) in chaparral (Cody 1974). In coastal sage scrub, the territory size averages 2.0 acres with a range from 1.2 to 3.2 acres (Bent 1968a). The species is not gregarious and is generally found in groups composed of no greater than five or six (Bent 1968a).

The rufous-crowned sparrow breeds from mid-March to mid-June with a peak in May. The species is known to be monogamous (Pemberton 1910), and pairs are maintained throughout the year (Collins 1999). The clutch size is 2-5 eggs and is usually 3 or 4 eggs. Incubation lasts about 11 to 13 days (Collins 1999) and is by the female only. However, altricial young are tended by both parents (Harrison 1978). The nesting period is estimated to last 8 to 9 days. Fledglings are incapable of flight upon nest departure and are usually found either moving through low vegetation or hopping or running on the ground under protective cover of the vegetation (Collins 1999). Seasonal fecundity estimates for a population in southern California were 3.98 and 4.86 young/pair/season in 1996 and 1997, respectively (Collins 1999). The oldest individual of the rufous-crowned sparrow that has been reported is 3 years, 2 months (Klimkiewicz and Futcher 1987).

The southern California rufous-crowned sparrow may occur in family groups post-breeding (Ehrlich *et al.* 1988). They are not migratory although there may be some movement up slope post-breeding to 1,220 meters (4,000 feet) in the western Sierra Nevada (Gaines 1977a). Generally, the preferred breeding habitat remains occupied throughout the fall and winter. There may be limited wandering of the young and adults following the breeding season into nearby habitats that are not used for breeding (Collins 1999).

Foraging is on the ground in herbage and in litter beneath shrubs. Insects are gleaned from the ground and foliage under shrubs or within dense grass or herbaceous ground cover during the breeding season, and seeds, grasses, and forb shoots are included in the diet at other times of the year (Verner and Boss 1980; Bent 1968a). Generally, the diet is poorly known, but it appears to vary with season, locality, and availability. The diet includes more insects during the spring and summer and more seeds during the winter (Collins 1999).

Status and Distribution

The rufous-crowned sparrow, including all subspecies, is largely a resident species and occurs in central California, north-central Arizona, southwestern New Mexico, southeastern Colorado, northwestern and central Oklahoma, south discontinuously to southern Baja California and Mexico. The species occurs throughout much of the southwestern United States and Mexico, but the range is often discontinuous with numerous small, isolated populations (Collins 1999). East

of the Rocky Mountains, it winters from central and southern Oklahoma to northern Texas and south into Mexico (Terres 1980).

The current range and distribution of the southern California rufous-crowned sparrow is extremely restricted to a narrow belt of semiarid coastal sage scrub and sparse chaparral from Santa Barbara south to the northwestern corner of Baja California (Todd 1922; Grinnell 1926; Grinnell and Miller 1944; Bent 1968a; Zeiner *et al.* 1990a; Unitt 1984). It is generally resident throughout its range although limited movements to lower elevations have been reported during especially severe winters (Collins 1999). It is uncommon on the lower slopes of the western Sierra Nevada and on Santa Cruz Island (Grinnell and Miller 1944). It is most numerous in the western portion of its range in California (Zeiner *et al.* 1990a).

According to Breeding Bird Surveys conducted between 1966 and 1991, populations in both southern California and the western U.S. as a whole are increasing at 5.0 percent and 3.6 percent, respectively (Collins 1999). The conversion of large areas of coastal sage scrub for urban and agricultural developments have made this species more locally restricted in various southern California counties, including Los Angeles, Orange, Riverside, San Diego, and San Bernardino counties (Collins 1999).

Threats

The loss of coastal sage scrub for agriculture and urban development has reduced the available habitat for the southern California rufous-crowned sparrow (Bent 1968a; Unitt 1984). Other stressors include a range of avian, mammalian and reptilian predators, both native and domestic, that find the ground-nesting habit of this bird an easy target (Bent 1968a). Long-term fire suppression since the turn of the twentieth century may also contribute to the reduction in numbers in California by allowing the chaparral and coastal sage scrub habitats to grow into dense, decadent stands. It is only a rare host to brood parasitism of the brown-headed cowbird (Friedmann 1971; Collins 1999).

Specific threats within the Plan Area include the degradation, fragmentation, and destruction of habitat as a result of suburban and agricultural development and the construction and operation of associated infrastructure. Bolger *et al.* (1997a) studied the 20-most common bird species within a 260-kilometer area of coastal San Diego County in relation to edge and fragmentation sensitivity. The southern California rufous-crowned sparrow was found to be one of four species whose abundance is most reduced by presence of edges and fragmentation.

Conservation Needs

Focused surveys during the spring (when birds are actively vocalizing) to assess population numbers would greatly improve our knowledge of the relative status and distribution of this species in the Plan Area. Core populations should be identified and conserved. The conservation of core populations will require securing large patches of suitable habitat in order to minimize edge effects and managing these core areas to maintain coastal sage scrub in sufficient density for the southern California rufous-crowned sparrow. These core populations will need to be interconnected through corridors of habitat that provide for the regular movement

of dispersing juveniles between populations. Occupied corridors allow for the continual interchange of dispersing juveniles at higher frequencies as the juveniles will have to travel shorter distances between unsuitable habitat and therefore be less prone to predation. An interconnected series of core populations spanning the current distribution of the species within the Plan Area would also allow for the movement of the southern California rufous-crowned sparrow into and out of the Plan Area from adjacent populations.

Environmental Baseline

According to the Plan, the southern California rufous-crowned sparrow is widely distributed throughout the MSHCP Plan Area within suitable habitat in the Riverside Lowlands, Santa Ana Mountains, and San Jacinto Foothills bioregions. The vegetation types used to model primary habitat for this species were coastal sage scrub, desert scrubs, and Riversidean alluvial fan sage scrub. Grasslands and chaparral vegetation communities were used to capture secondary habitat for the species. Based on this analysis the Plan Area supports approximately 482,086 acres of modeled primary and secondary habitat for the southern California rufous-crowned sparrow. Approximately 138,334 acres (29 percent) of this modeled habitat occurs within PQP Lands. Of the 404 point locations in our dataset for the southern California rufous-crowned sparrow, 62 (15 percent) are locations within PQP Lands.

Effects of the Action

Direct Effects

The Plan Area includes 482,086 acres of modeled primary and secondary nesting and foraging habitat for the southern California rufous-crowned sparrow. This species will be subject to impacts associated with development and other proposed Covered Activities over the 75-year permit term within 231,641 acres (48 percent) of this modeled habitat. It is anticipated that most of the breeding and foraging habitat for the southern California rufous-crowned sparrow in non-conserved areas will be lost as a result of development. Some birds may be able to disperse to adjacent habitats, particularly rural mountainous areas where development impacts are anticipated to occur at a slower rate and at lower densities. Approximately 82,950 acres (36 percent) of the non-conserved modeled habitat for the southern California rufous-crowned sparrow are designated as rural/mountainous land. However, displaced birds that are unable to locate suitable habitat will experience increased rates of predation or otherwise die or be injured due to loss of their foraging, breeding, and sheltering habitat.

To offset the loss of modeled habitat, the MSHCP will conserve and manage 112,110 acres (23 percent) of modeled primary and secondary habitat for the southern California rufous-crowned sparrow within Additional Reserve Lands. An additional 138,334 acres (29 percent) of modeled primary and secondary habitat will remain in PQP Lands. In all, 250,445 acres (52 percent) of the modeled habitat for the southern California rufous-crowned sparrow will be conserved or remain in the Plan Area, including 108 point locations (27 percent).

The Plan identifies at least nine Core Areas that could support the southern California rufous-crowned sparrow within the MSHCP Conservation Area, including: 1) Lake Mathews-Estelle

Mountain, 2), Box Springs Mountains, 3), Lake Perris, 4), the Badlands, 5) west of Lake Elsinore, 6) Wasson Canyon, 7) Lake Skinner, 8) Wilson Valley, and 9) the Hogbacks. However, an analysis of the available database records reveals that the species is almost entirely absent from the Badlands and conserved areas west of Lake Elsinore. Only additional surveys will reveal if these two proposed Core Areas will contain substantial numbers of this species.

These Core Areas will be connected through habitat linkages. Additional locations with modeled habitat and occurrences for the Southern California rufous-crowned sparrow that will be conserved or remain in open space include the Jurupa Mountains, Chino Hills, Sycamore Canyon Regional Park, Lakeview Mountains, North Peak Conservation Bank, Kabian Park, Sedco Hills, and Vail Lake. However, one of the largest known concentrations of point locations for the southern California rufous-crowned sparrow surrounds the Santa Rosa Plateau Reserve and is almost entirely outside of the MSHCP Conservation Area. Additionally, two Core Areas identified in the Plan that are not included in the MSHCP Conservation Area include Gavilan Plateau and De Portola Road east of Bachelor Mountain.

The southern California rufous-crowned sparrow will benefit from the General Management Measures described in Section 5 of the MSHCP. Each Reserve Manager responsible for a Core Area will conduct baseline surveys as necessary to determine the number of acres occupied by the southern California rufous-crowned sparrows within the Core Areas. Each Reserve Manager will also evaluate the condition of the sage scrub vegetation within the Core Area and maintain a program to enhance and/or create sage scrub within the Core Area to within 10 percent of the acreage (82,640 acres of primary habitat) defined in Objective 1 of the Species Account. Reserve Managers will also verify occupancy of at least 80 percent of the occupied southern California rufous-crowned sparrow habitat, as determined using existing information and baseline surveys, within each Core Area. Additional management measures will address predation and harassment by domestic cats and dogs and competition from non-native species.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands, including surveys for the southern California rufous-crowned. Cooperative management and monitoring are anticipated on PQP Lands. Surveys for the southern California rufous-crowned sparrow will be conducted at least every eight years. Eighty percent of the occupied Southern California rufous-crowned sparrow habitat, as determined using existing information and baseline surveys, will be maintained within each Core Area identified above. If a decline in the distribution of the southern California rufous-crowned sparrow is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP.

Management actions to benefit the southern California rufous-crowned sparrow or other Covered Species (*e.g.*, prescribed burning, habitat manipulation) may result in impacts to a small number of individual southern California rufous-crowned sparrows. It is anticipated that any impacts to southern California rufous-crowned sparrows from management actions will be minimized by adherence to appropriate survey protocols and other guidelines described in Section 7.4 of the MSHCP.

Indirect Effects

The southern California rufous-crowned sparrow could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These include the indirect effects described in the “General Effects” section of this biological opinion. Implementation of the Urban/Wildlands Interface Guidelines will help reduce the effects of adjacent development on linkages connecting southern California rufous-crowned sparrow Core Areas.

Throughout southern California, but especially in western Riverside and San Bernardino counties, coastal sage scrub is being type-converted to non-native grassland and other ruderal (weedy) habitats (Allen *et al.* 2000; Allen *et al.* 1996; Minnich and Dezzani 1998). Minnich and Dezzani (1998) resampled Vegetation Type Map plots surveyed 60 years earlier. They found that only 40.1 percent of the coastal sage scrub originally mapped was still extant, while 41.9 percent of this mapped plant community was now open coastal sage scrub mixed with a continuous layer of exotic annual grasses. The remaining 18 percent of plots were entirely converted to exotic annual grassland. This conversion from shrublands to grasslands was due to a combination of factors including invasion of European annual grasses, increased fire frequency, and possibly nitrogen deposition due to air pollution (Minnich and Dezzani 1998). Thus, even in reserve areas not threatened by habitat destruction due to development, a continuous loss of suitable habitat available to the southern California rufous-crowned sparrow is ongoing.

Conclusion

We anticipate the proposed action will directly and indirectly affect the southern California rufous-crowned sparrow as described in the analyses above, including the loss of 48 percent of its modeled habitat in the Plan Area. Implementation of the avoidance, minimization, and mitigation measures will reduce the impacts to this species. We anticipate that this species will persist in the remaining 52 percent of its modeled habitat within both the existing PQP Lands and the Additional Reserve Lands. Together these lands form a system of habitat blocks that are inter-connected within the Plan Area. We anticipate that these areas will be monitored and managed cooperatively to benefit this species.

After reviewing the current status of this species, the environmental baseline for the Plan Area, the effects of the proposed action, and the cumulative effects, it is the Service’s biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the southern California rufous-crowned sparrow. We reached this conclusion based on the presumed widespread distribution of the southern California rufous-crowned sparrow within suitable habitat in the Plan Area and because the impacts to southern California rufous-crowned sparrow reproduction and this species’ habitat loss, when viewed in conjunction with protection and management of the MSHCP Conservation Area, are not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Amount or Extent of Take

Because of the large area covered and the small size of the southern California rufous-crowned sparrow, it will be difficult to quantify the number of birds that will be taken as a result of the proposed action over the 75-year permit term. Therefore, the Service is quantifying incidental take as the number of acres of modeled habitat that will be impacted in the Plan Area as a result of the proposed action. We anticipate that up to 231,641 acres of breeding and foraging habitat within the Plan Area will become unsuitable for the southern California rufous-crowned sparrow as a result of the proposed action. Additionally, a small, but undeterminable, number of southern California rufous-crowned sparrows are anticipated to be taken as a result of management actions.

Take will be in the form of harm, death, and injury. This level of take is not likely to result in jeopardy to the southern California rufous-crowned sparrow.

Swainson's Hawk (*Buteo swainsoni*)

Status of the species

Listing Status

The Swainson's hawk is not listed under the Federal Endangered Species Act. It is on the Federal Birds of Conservation Concern list (2002) and was State-listed as threatened by the California Department of Fish and Game in 1983.

Species Description

The Swainson's hawk is fairly slim with narrower wings relative to other members of the genus *Buteo*. Males and females are similar in appearance, but males are slightly smaller in total length (48-51 centimeters) than females (51-56 centimeters). The tail is grayish to grayish brown with numerous narrow, dark bands. Flight feathers are dark and contrast with paler wing-linings in pale morphs whereas the darkest adults lack the contrast between flight feathers and wing-linings. Pale morphs also have a dark breast-band between the lighter belly and chin. The dorsal surface is evenly colored. Juveniles have a similar underwing pattern as the adult, underparts with globular spotting on breast, sides and belly, and mottled or streaked back (England *et al.* 1997).

Habitat Affinities

Typical habitat of the Swainson's hawk is open desert, sparse shrub lands, grassland, or cropland containing scattered, large trees or small groves. During migration, they rest and feed in grasslands and harvested fields, especially where grasshoppers are numerous, often perching on fence posts, telephone poles, and power poles. Large flocks may roost at night in trees (England *et al.* 1997), but they will roost on the ground if trees are not available.

The species cannot forage in most perennial crops or in annual crops that grow much higher than native grasses, which makes prey more difficult to find (England *et al.* 1997). They forage in open grassland, shrub steppe, and agricultural areas in the North American breeding range and often forage exclusively in row, grain, and hay crop areas (England *et al.* 1997). During the winter, they may forage in croplands or recently filled fields an average of 4.8 kilometers from roost trees (Herzog 1996).

Nests are in scattered trees within grassland, shrubland, or agricultural landscapes especially along stream courses or in open woodlands. In California's Central Valley, the nests are typically at the edge of a narrow band of riparian vegetation, in isolated oak woodland, and in lone trees, roadside trees, or farmyard trees, as well as in adjacent urban residential areas (England *et al.* 1997). Swainson's hawk nests were recorded closest to roads and human structures when compared to red-tailed hawks and ferruginous hawks (Bechard *et al.* 1990, Schmutz 1984). Additionally, nearly half of the nests were in areas where the surrounding habitat was dominated by wheat fields. A GIS analysis of habitat at nest sites resulted in cropland as the dominant land cover type at nest sites of the Swainson's hawk (Bosakowski *et al.* 1996). The nest is a relatively flimsy structure when compared to other hawk stick nests (Call 1978). It is a platform of sticks, bark, and fresh leaves in a tree, bush, or utility pole from 1.3 to 30 meters above ground.

Life History

Swainson's hawks tend to not defend a large territory but rather aggressively defend only the small area around the nest from conspecifics and other buteos (England *et al.* 1997). In Utah, breeding home ranges of three pairs ranged from 1.2 to 2.1 square miles (Smith and Murphy 1973), and nesting densities were 0.1 nests per square kilometer (Bosakowski *et al.* 1996). Another study in Utah found home ranges of 5 pairs ranged from 0.3 to 1.6 square miles (Craighead and Craighead 1956). In Wyoming, the distance separating 17 active nests ranged from 0.4 to 1.8 miles (Dunkle 1977; Bosakowski *et al.* 1996). Bloom (1980) reported three territories within a 0.7-mile length of riparian habitat in the Central Valley.

Swainson's hawks begin to arrive in California in March and breeding occurs from late March to late August, with peak activity in late May through July. The clutch size is 2-4 eggs and is usually 2-3 eggs. Incubation lasts 25-28 days (Beebe 1974). Nestlings first leave the nest at 27-33 days and fly between 38-46 days (England *et al.* 1997). Within the first 10 days after fledging the juveniles wander as much as 1 kilometer from the nest. After that time, they wander much farther, up to 240 kilometers from the nest (England *et al.* 1997). Migration begins in August and lasts through October. Dispersal distances from the natal site to the subsequent breeding site range from 0 to 18.1 kilometers (Woodbridge *et al.* 1995). There are a few groups of juveniles that do not migrate their first winter (Brown 1996). Individuals frequently use the same area as the previous nest or are located within 2 kilometers of the previous year's nest (England *et al.* 1997)

Craighead and Craighead (1956) reported fledging success of 0.6 young per pair with a higher success rate of 1.67 reported by Bednarz (1988). In urban areas, a lower fledging success was observed at 1.64 young per successful attempt (England *et al.* 1995). An average of 1.24 young

are produced per pair that attempt to nest (Dunkle 1977). Longevity data for 410 birds banded as nestlings was determined to be 86 birds surviving over 3 years, and of these, 20 percent were greater than 10 years old (Houston and Schmutz 1995).

The Swainson's hawk eats mice, gophers, ground squirrels, rabbits, large arthropods, amphibians, reptiles, birds, and, rarely, fish during the breeding season (Cameron 1913; Brown and Amadon 1968; Dunkle 1977). It soars at low and high levels in search of prey. It also may walk on the ground to catch invertebrates and other prey (Terres 1980). It catches insects and bats in flight. Typically, it feeds on grasshoppers and to a lesser amount on dragonflies outside of the breeding season (Schmutz *et al.* 1980).

Status and Distribution

The Swainson's hawk occurs within western North America, including east-central Alaska, predominantly in the plains region of the United States and southern Canada (Brown 1996). Specifically, its breeding range includes the area north to portions of Washington and Oregon east of the Cascades, southern Idaho, western Montana, southern half of east Alberta, west-central and southeastern Saskatchewan and southwestern Manitoba. Small numbers also breed in the interior valleys of British Columbia, then west to central Washington and Oregon, extreme northeastern California, western and southern Nevada, north and southeastern Arizona and disjunctly in California in the Sacramento and San Joaquin Valleys, within the valleys of the Sierra Nevada and occasionally elsewhere. It breeds south in northern Mexico to northeastern Sonora and through Chihuahua to northeastern Durango, southern Chihuahua, northern Nuevo Leon and extreme north Tamaulipas. The species breeds east to western Minnesota and northern Iowa, central Oklahoma, and central Texas (England *et al.* 1997).

Swainson's hawks winter in South America in the grasslands of Argentina within the pampas areas of Cordoba, Santa Fe, Buenos Aires, La Pampa, and south to northeast corner of Chubut and extending east into adjacent Uruguay (Brown 1996). Some individuals migrate as far south as southern South America, passing in large flocks over Central America (Brown and Amadon 1968). It very rarely winters within the United States but occasionally winters in the western portion from California to the Mississippi River and sometimes in the Sacramento-San Joaquin River delta (Brown 1996).

Bloom (1980) estimated 110 nesting pairs and a total population of 375 pairs in California. In southern California, these numbers are now mostly limited to spring and fall transients. The Swainson's hawk was formerly abundant in California with a wider breeding range (Grinnell and Miller 1944; Bloom 1980; Garrett and Dunn 1981). It is now an uncommon breeding resident and migrant in the Central Valley, Klamath Basin, Northeastern Plateau, Lassen County, and Mojave Desert. Very limited breeding is reported from Lanfair Valley, Owens Valley, Fish Lake Valley, Antelope Valley, and in eastern San Luis Obispo County (Bloom 1980; Garrett and Dunn 1981).

Threats

As with many raptors, the availability of prey and of nest sites are important factors. For example, the decline of the prey populations has coincided with the decline in reproductive success of the Swainson's hawk in Saskatchewan (England *et al.* 1997). Breeding populations have largely been extirpated from coastal southern California probably because of urban development and subsequent loss of nesting habitat (Garrett and Dunn 1981). They have also been extirpated from the central Coast Ranges, where suitable nesting and foraging habitat remains (England *et al.* 1997). It is possible that the land conversion, from small farms to large agribusiness operations where the nesting trees are removed, may contribute to the loss of nest sites on the breeding grounds. The conversion of native habitat to woody perennial crops and urban development contribute to the loss of Swainson's hawks from an area. A similar situation is occurring on the wintering grounds in South America as native habitats are converted to cropland and roosting trees are removed (England *et al.* 1997).

The Swainson's hawk was historically shot by many ranchers and farmers until at least the late 1930s; however, banding records show that this may no longer be a problem (England *et al.* 1997).

Organochlorine contamination in eggs from central and northern California is not at a level known to adversely affect reproduction in California (Risebrough *et al.* 1989) despite migration to South American wintering grounds where a wide variety of chemicals are still used. Acute toxicity from insecticides is currently a bigger problem. Nearly 6,000 Swainson's hawks were killed in Argentina by organophosphate insecticides in 1995 and 1996 (England *et al.* 1995). Although local population declines continue to occur in California and have also been reported in Oregon and Nevada, other North American populations remain viable.

Conservation Needs

Conservation of the Swainson's hawk within the Plan Area depends largely on the preservation of sufficient habitat to accommodate foraging birds during migration. In addition, because the Swainson's hawk is largely insectivorous, relief from the acute and chronic effects of pesticides would also benefit the species.

Environmental Baseline

Although Swainson's hawks formerly bred in Corona and Temecula (Garrett and Dunn 1981), there are no recent records of breeding within western Riverside County. A decline in the population in southern California was noted as early as 1933 (Garrett and Dunn 1981). Breeding populations of Swainson's hawks have been extirpated from much of southern and central California (England *et al.* 1997), including, apparently, the Plan Area.

Migrant Swainson's hawks may occur anywhere within lowland portions of the Plan Area, but spring concentrations were historically "...usually found over desert grassland and lush blooms of spring wildflowers, which provide the hawks with a source of caterpillars" (Garrett and Dunn 1981:132). The species has been recorded in very few locations within the central portion of the

western Riverside County area and is, at best, a very rare migrant within southern California as a whole (*e.g.*, Garrett and Dunn 1981). Presumed migrant Swainson's hawks have historically been detected along the Santa Ana River and at Prado Basin and in or near Temecula, the Badlands, Wildomar, Winchester, Sycamore Canyon Regional Park, Box Springs Mountain, and Vail Lake/Wilson Valley.

While migrating Swainson's hawks could be detected over all vegetation types, we used the following vegetation types used to model foraging and roosting habitat in the Riverside Lowlands and San Jacinto Foothills bioregions including field crops, grassland, cismontane alkali marsh, playas and vernal pools, desert scrub, Riversidean alluvial fan sage scrub, coastal sage scrub, peninsular juniper woodland scrub, and riparian scrub, woodland and forest. Approximately 372,408 acres of modeled habitat occurs within the Plan Area. Of this total, 69,409 acres (16 percent) occur within PQP Lands.

According to our dataset, there are 12 recent records (post 1998) for Swainson's hawk within the Plan Area. These locations are generally in the areas of Corona, Norco, Box Springs, Winchester and Murietta and are likely sightings of migrant birds.

Effects of the Action

Direct Effects

The Plan Area includes 372,408 acres of modeled habitat for the Swainson's hawk. The loss of 237,492 acres (64 percent) of this modeled habitat is anticipated over the 75-year permit term, encompassing 11 of the 12 (92 percent) observations in our dataset, which are likely observations of migrants moving through the Plan Area. Due to the wide ranging nature of the species and its sparse distribution and lack of breeding in the Plan Area, it is unlikely that this loss of habitat will have an impact on population numbers of the Swainson's hawk within the Plan Area over the long term.

The MSHCP will conserve and manage 74,507 acres (20 percent) of modeled habitat for the Swainson's hawk within the Additional Reserve Lands. Another 60,409 acres (16 percent) of modeled habitat will remain within PQP Lands. In total, 134,916 acres (36 percent) of the modeled habitat for the Swainson's hawk will be conserved or remain in the Plan Area. This modeled habitat includes 1 of the 12 (8 percent) observations of the Swainson's hawk in our dataset. As stated in the Plan, the MSHCP Conservation Area will include areas with suitable foraging habitat, including grassland, cismontane alkali marsh, playa and vernal pools, Riversidean alluvial fan sage scrub, coastal sage scrub, field croplands, and roosting habitat such as peninsular juniper woodland and scrub, and riparian scrub, woodland, and forest.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands for the Swainson's hawk. Cooperative management and monitoring is anticipated on PQP Lands. Surveys for the Swainson's hawk will be conducted at least every 8 years to verify occupancy at a minimum of 75 percent of the known locations. If a decline in the distribution of the Swainson's hawk is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9,

Table 9.2 of the MSHCP. Management measures include control of unauthorized public access using appropriate fencing, gates and signs, trash removal, and control of illegal dumping, off-road vehicle use and vandalism.

Indirect Effects

The Swainson's hawk could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These impacts include the indirect effects described in the "General Effects" section in this biological opinion. Implementation of the Urban/Wildlands Interface policy will help minimize the indirect effects of the Covered Activities on foraging and roosting habitat for the Swainson's hawk.

Conclusion

We anticipate the proposed action will directly and indirectly affect the Swainson's hawk as described in the analyses above, including the loss of 64 percent of its modeled habitat in the Plan Area. Implementation of the avoidance, minimization, and mitigation measures identified in the Plan will reduce the impacts to this species. We anticipate that this species will be able to persist in the remaining 36 percent of the modeled habitat within both the existing PQP Lands and Additional Reserve Lands. We anticipate that these lands will be monitored and managed cooperatively to benefit this species.

After reviewing the current status of this species, the environmental baseline for the Plan area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the Swainson's hawk. We reached this conclusion based on the nature of the species' use of the Plan Area and because the impacts associated with loss of this species' habitat, when viewed in conjunction with protection and management of the MSHCP Conservation Area, is not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Amount or Extent of Take

Due to the difficulty in quantifying the number of Swainson's hawks that will be impacted by the proposed action over the 75-year permit term, we are quantifying the take as the number of acres of modeled habitat that will be impacted in the Plan Area as a result of the proposed action. We anticipate that up to 237,492 acres of modeled habitat within the Plan Area will become unsuitable for the Swainson's hawk as a result of the proposed action. Because Swainson's hawks use a variety of habitats that will remain in large blocks within the MSHCP Conservation Area and only limited use of the action area by this species is anticipated, the loss of modeled habitat for the Swainson's hawk within the Plan Area is not likely to result in the death or injury of adult Swainson's hawks. We anticipate zero (0) Swainson's hawks will be taken as a result of the proposed action. This level of take is not likely to result in jeopardy to the Swainson's hawk.

Tree Swallow (*Tachycineta bicolor*)Status of the species*Listing Status*

The tree swallow (*Tachycineta bicolor*) is not a State or federally listed species. However, this species is a Partners in Flight Priority Bird Species and a San Bernardino National Forest Sensitive Species.

Species Description

The tree swallow is a medium sized swallow (total length 14 centimeters) with iridescent greenish blue upperparts and white underparts. One year old females may have more brownish upperparts. Juveniles are brown above and white below with a dusky wash across the chest (Robertson *et al.* 1992).

Habitat Affinities

Although tree swallows may be found virtually anywhere in aerial habitat during migration and winter (*e.g.*, AOU 1998), birds forage primarily over and around ponds, marshes, rivers, lakes, and estuaries (Garrett and Dunn 1981). In winter and migration, the species may be found in open habitats, grasslands, meadows, brushlands, and near water sources but is not restricted to habitat that contains cavities as is the case during the breeding season (Zeiner *et al.* 1990a).

Suitable habitat during the breeding season is provided by riparian forest and woodland up through the lodgepole pine belt. Valley foothill and montane riparian habitats below 2,700 meters (9,000 feet) are also used. Nesting of the tree swallow occurs almost exclusively in cavity-containing trees that are near, or preferably in, water (Grinnell and Miller 1944). Tree swallows chiefly nest in an old woodpecker hole but also on cliff or bank, in nest box, or other human-made structure. Nesting trees are often in beaver ponds and wetland margins providing open areas near water (Robertson *et al.* 1992). Natural cavities typically occur in standing dead trees from about 1-10 meters above the substrate. Entrance holes are typically 4-9 centimeters in diameter, with cavities 10-20 centimeters deep. The tree swallow may also nest in short, hollow stumps over water and sometimes nest in unusual locations such as eaves of buildings, wood duck nest boxes, steel drums and old cliff swallow nests. The nest is made mostly of twigs and other plant materials and lined with feathers.

Life History

Tree swallows first arrive on the breeding grounds in January (Garrett and Dunn 1981). Both sexes of the tree swallow are both inter- and intra-specifically territorial in defending their nests. The actual defended territory is restricted to the nest site (Kuerzi 1941). Competition for suitable tree swallow nesting habitat occurs with both primary and secondary cavity nesters and includes house wrens, house sparrows, northern flickers and others (Robertson *et al.* 1992). Nests are typically spaced 10-15 meters apart, and birds are solitary at this time (Robertson *et al.*

1992). Home range varies in different areas but probably extends 60 kilometers or more prior to incubation (Robertson *et al.* 1992). Tree swallows are monogamous but exhibit extra-pair copulations frequently (Robertson *et al.* 1992). One study found 50 percent of nests contained offspring not descendent of the occupied male (Robertson *et al.* 1992).

Breeding occurs from mid-April to mid-August with a peak in activity in May and June. The clutch size for this species ranges from 2 to 8 eggs and is most commonly 4 to 7 (Robertson *et al.* 1992; Moller 1991). The species is often double-brooded. Incubation lasts for 13-16 days. The altricial young are tended by both adults and fledged at 16-24 days (Harrison 1978). Nestlings typically are active within three days and leave the nest after 18 to 22 days (Robertson *et al.* 1992). Nesting success of the tree swallow has been measured at 78.8 percent; this measure has been observed to be drastically reduced under poor weather conditions (Robertson *et al.* 1992). Most tree swallows have left the breeding grounds by October. Tree swallows often form large flocks of several hundred thousand birds outside of the breeding season (Robertson *et al.* 1992). At one perch site, individuals were observed to be spaced approximately 10 centimeters apart (Robertson *et al.* 1992).

The proportion of the banded nestlings that return to an area the next year ranges from 0.8 to 12 percent (Butler 1988). The proportion of breeding adults that return to the same area to breed the next year ranges from 13 to 60 percent. Yearlings of the tree swallow are able to breed (Robertson *et al.* 1992). Variation in winter mortality affects the return rates as does the average breeding success of the population from the previous year (Butler 1988). The maximum life span recorded was between 8-11 years (Robertson *et al.* 1992). Mortality during the first year takes 79 percent of one-year birds with a 40 to 60 percent annual survival rate thereafter (Robertson *et al.* 1992).

The tree swallow forages from dawn to dusk except during the early part of the breeding season, when the species feeds most actively during the late morning and afternoon (Robertson *et al.* 1992). Flying insects in open areas above land or water are the primary prey (Robertson *et al.* 1992). Insects are hawked in long, cruising flights. Individuals can subsist on seeds and berries for extended periods of time during harsh winters, and these items may make up about 20 percent of the diet (Bent 1942; Robertson *et al.* 1992).

Status and Distribution

Tree swallows breed locally from western Alaska eastward to Newfoundland southward to California and Georgia. The northern limit coincides approximately with the tree line. The species winters from Baja California along the Pacific coastline into Mexico, across Central America, along the Gulf of Mexico coast, throughout Florida and north along the Atlantic Coast to the Carolinas; it also winters southward to northern South America (AOU 1998). Flocks of the tree swallow are encountered with regularity along the Caribbean coast of South America, east to northwestern Venezuela (Robertson *et al.* 1992).

The tree swallow is a common summer resident in central and northern California, uncommon south of San Francisco Bay and a common to occasional transient throughout the State in virtually all non-desert habitats (Zeiner *et al.* 1990a). In winter, it is common in southern

California at the Salton Sea and Colorado River but uncommon to rare in coastal California north to Sonoma County and in the Central Valley (Grinnell and Miller 1944; McCaskie *et al.* 1979, 1988).

Numbers increase through the spring but diminish in summer in southern California. In late summer and early fall, the numbers increase again as transients pass through from the north. Small numbers regularly winter on the coast north to central California and in the Central Valley (Garrett and Dunn 1981).

The tree swallow was formerly a common breeder in lowland and foothill riparian habitats within the coastal areas of southern California including the Plan Area. It is now a very local summer resident (Garrett and Dunn 1981). The tree swallow has shown local but regular nesting since 1980 in central and western North Carolina and in Georgia, Arkansas, Alabama, Oklahoma and most of Tennessee, Kentucky and Missouri. This suggests a genuine southward expansion of the breeding range in the past decade (Robertson *et al.* 1992).

Threats

Garrett and Dunn (1981) concluded that the decline of the tree swallow species as a breeder in southern California was likely a result of the destruction of riparian groves, removal of snags, and competition with the introduced European starling for nesting cavities. European starlings only rarely have been recorded within the Prado Basin, which is the only known tree swallow nesting area in the Plan Area. Habitat destruction and water pollution in the breeding and wintering areas may affect tree swallows. The loss of marshes and other wetlands can result in greater concentrations of birds into smaller areas for roosting and breeding and consequently may result in local depletion of food supplies or vulnerability to adverse local conditions (Robertson *et al.* 1992).

PCBs and high levels of DDE have been found in adults, eggs, and nestlings and may harm the species, although eggshell thinning has not been documented (Robertson *et al.* 1992). Acid rain has been shown to reduce reproductive success. In clear-cut regrowth forests, nest predation varied with patch age, being highest in the youngest patches (Blancher and McNicol 1991). Reproductive success was also lower in individuals breeding below electrical power lines (Doherty and Grubb 1998).

Conservation Needs

The tree swallow occurs predominantly within riparian scrub, woodland and forest, and oak woodland and forest within the vicinity of water. This species forages primarily over and around ponds, marshes, rivers, lakes, and estuaries (Garrett and Dunn 1981). Nesting of the tree swallow occurs almost exclusively in cavity-containing trees that are near, or preferably in, water (Grinnell and Miller 1944). Therefore, large blocks of riparian scrub, woodland and forest, and oak woodland and forest habitat supporting, or potentially supporting, the tree swallow need to be conserved, such as the Prado Basin, along the Santa Ana River. The conserved areas need to include groups of dead trees or snags with cavities for the tree swallow

to nest and open water nearby. In addition, hydrological and other ecological processes necessary to maintain suitable habitat should be preserved.

Environmental Baseline

Tree swallows were formerly common breeders in lowland and foothill riparian areas in southern California from San Luis Obispo County to San Diego County, but they are now rare and considered local breeders in the Plan Area and southern California as a whole (Garrett and Dunn 1981). Their occurrence within the Plan Area as winter visitors is rare and limited to areas around marshes and rivers (Garrett and Dunn 1981).

The only known breeding population within the Plan Area persists in the Prado Basin and adjacent Santa Ana River (L. Hayes, Fish and Wildlife Service, pers. obs., 2003). After monitoring surveys, the Prado Basin and Santa Ana River populations were estimated to be approximately 20 pairs during the 1998 breeding season (Pike 1998, unpublished data). In 2002, nests containing eggs were only documented twelve times, resulting in a minimum of 40 tree swallow fledglings (Pike 2003, unpublished data). A minimum of 50 breeding pairs (Pat Tennant, Orange County Water District, pers. comm. 2003) and 102 fledglings (Pike 2003, unpublished data) were observed during the 2003 breeding season within the Prado Basin.

According to our dataset, there are 25 observations of tree swallows within the Plan Area. Only 5 out of the 25 observations were recorded within the Prado Basin and Santa Ana River area. The observations outside the Prado Basin and Santa Ana River area include Wasson Canyon/Canyon Lake, San Jacinto Wildlife Area, and Dawson Canyon. The Plan identifies additional locations where the tree swallow has been observed including, Temecula Creek, Lake Skinner, Vail Lake, and Wilson Valley. However, based on the breeding population information above, these locations likely represent winter visitors and/or migratory stopover records for the tree swallow in the Plan Area.

Tree swallow modeled habitat occurs in all Bioregions of the Plan Area. Tree swallows nest in tree cavities, perch on snags, and forage in open water habitats. Therefore, the habitat model for this species includes riparian scrub/woodland/forests, open water, and oak woodland/forests in all Bioregions of the Plan Area. There are 57,038 acres of modeled breeding and foraging habitat for the tree swallow in the Plan Area. Approximately 36,661 acres (64 percent) of modeled habitat occur in PQP Lands. Due to the absence of tree cavities or snags within certain habitat types, the modeled habitat likely overestimates the extent of suitable perching or nesting habitats for the tree swallow within the Plan Area.

Effects of the Action

Direct Effects

The Plan Area includes 57,038 acres of modeled breeding and foraging habitat for the tree swallow. Loss of 13,443 acres (24 percent) of this habitat is anticipated over the 75-year permit term, which encompasses 17 of the 25 (68 percent) tree swallow observations in our dataset. It is anticipated that most of the breeding and foraging habitat for tree swallows in these areas will

be lost as a result of development, although some habitat for this species may remain in areas avoided as a result of the Riparian/Riverine Areas and Vernal Pools policy and in rural mountainous areas where development impacts are anticipated to occur at a slower rate and at lower densities. Approximately 5,153 acres (38 percent) of the non-conserved modeled habitat for the tree swallow are designated as rural/mountainous land. Some birds may be able to disperse to adjacent habitats; however, displaced birds that are unable to locate suitable habitat will experience increased rates of predation or otherwise die or be injured due to loss of their foraging, breeding, and sheltering habitat. The Prado Basin and Santa Ana River area, the only known breeding site in western Riverside County, will not be negatively impacted by implementation of the Plan. However, other potential tree swallow nesting sites could be affected over the 75-year permit term. Thus, loss of this breeding and foraging habitat may impact population numbers of the tree swallow within the Plan Area over the long term by reducing the number of areas suitable for use as foraging and breeding sites.

To offset the loss of tree swallow habitat, the MSHCP will conserve and manage 6,934 acres (12 percent) of modeled habitat for the tree swallow within the Additional Reserve Lands. Approximately 36,661 acres (64 percent) of modeled habitat for the tree swallow will remain within PQP Lands, encompassing 28 percent of the tree swallow observations in our dataset. In total, 76 percent of the modeled habitat for the tree swallow will be conserved or remain in the Plan Area. This modeled habitat includes 32 percent of the tree swallow observations in our dataset. The MSHCP Conservation Area will also include suitable microhabitat (groups of large snags or older trees with cavities) within potential nesting habitat for the tree swallow, as stated in the species-specific objectives of the Plan.

The Prado Basin and Santa Ana River Core Area is the only known breeding site within the Plan Area. The habitat function of this Core Area (and any other potential breeding areas) will be protected by the maintenance of the Santa Ana River and any other hydrologic system important to tree swallow nesting areas. These nesting areas will be managed to maintain the integrity of nesting microsites (groups of snags and older trees containing cavities near water) and the hydrological and other ecological processes that are important to the Area. As stated in the Plan (Section 9, pp. 9-83), six Core Areas including the Prado Basin/Santa Ana River Area, Lake Skinner, Vail Lake, Temecula Creek, Wasson Canyon and Wilson Valley will be included in the MSHCP Conservation Area. In addition, the following potential breeding areas will be included in the MSHCP Conservation Area: Lake Perris/San Jacinto Wildlife Area, Lake Matthews/Dawson Canyon, Lake Elsinore and wooded drainages within the Cleveland National Forest and San Bernardino National Forest. The MSHCP Conservation Area will also provide adequate habitat linkages between Core Areas for this species and will include smaller drainages that may support small numbers of the tree swallow.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands, including surveys for the tree swallow. Cooperative management and monitoring are anticipated on PQP Lands. Surveys for the tree swallow will be conducted at least every eight years to verify occupancy at a minimum of 75 percent of the known locations. If a decline in distribution of the tree swallow is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP. In addition, Reserve Managers will conduct

presence/absence surveys of nesting tree swallows at a minimum of 70 percent of the known breeding locations in the MSHCP Conservation Area at least once every seven years and enhance and/or create additional habitat and/or nesting areas in the above Core Areas and potential breeding areas for the tree swallow. Within these areas, Reserve Managers will manage nesting habitat by protecting and maintaining snags and older tree stands of oak and cottonwood (Section 5, Table 5-2).

Indirect Effects

The tree swallow could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These impacts include the indirect effects described in the “General Effects” section of this biological opinion. In particular, maintaining the hydrological processes and water quality standards (*e.g.*, controlling sedimentation and other pollutants) of open water and wetland habitats will be important to sustaining tree swallows in the MSHCP Conservation Area. Implementation of the Riparian/Riverine Area and Vernal Pools policy and the Urban/Wildlands Interface policy will help minimize the indirect effects of the Covered Activities on foraging and breeding habitat for the tree swallow.

Conclusion

We anticipate the proposed action will directly and indirectly affect the tree swallow as described in the analyses above, including the loss of 24 percent of its modeled habitat in the Plan Area. Implementation of the avoidance, minimization, and mitigation measures identified in the Plan will reduce the impacts to this species. We anticipate that this species will persist in the remaining 76 percent of the modeled habitat within both the existing PQP Lands and the Additional Reserve Lands. Together these lands form a system of large, contiguous habitat blocks that are inter-connected within the Plan Area, which we anticipate will be monitored and managed cooperatively to benefit this species.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service’s biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the tree swallow. We reached this conclusion because 76 percent of the modeled habitat for the tree swallow will be conserved or remain in the Plan Area. Thus, the impacts associated with loss of this species’ habitat, when viewed in conjunction with protection and management of the MSHCP Conservation Area, are not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Amount or Extent of Take

Because of their small size, it will be difficult to locate and quantify the number of individual tree swallows that will be taken as a result of the proposed action over the 75-year permit term. Therefore, the Service is quantifying the take as the number of acres of modeled habitat that will be impacted in the Plan Area as a result of the proposed action. We anticipate that up to 13,443 acres of nesting and foraging habitat within the Plan Area will become unsuitable for tree

swallows as a result of the proposed action. Take will be in the form of harm, death, and injury. This level of take is not likely to result in jeopardy to the tree swallow.

Tricolored blackbird (*Agelaius tricolor*) (colony)Status of the species*Listing Status*

The tricolored blackbird is a Fish and Wildlife Service migratory non-game bird of management concern and is listed on the Federal Birds of Conservation Concern (2002). The California Department of Fish and Game considers it a Species of Special Concern. It is also on the Audubon Society California Watch List and a Partners in Flight Priority Bird Species. This species is not listed under the Federal Endangered Species Act.

Species Description

The tricolored blackbird is a medium sized (18-24 centimeters in length), sexually dimorphic blackbird. The male is black with a bright red and white patch on the shoulder. The female is mostly black with grayish streaks, a whitish chin and throat, and a small reddish shoulder patch. The juveniles are similar to the adult female but much paler gray and buff in color (Beedy and Hamilton 1999).

Habitat Affinities

The tricolored blackbird forms the largest colonies of any North American passerine bird (Sibley 2003). Breeding colonies may attract thousands of birds to a single site. This behavior results in specific habitat requirements. Breeding occurs near fresh water, preferably in emergent wetlands with tall, dense cattails or tules (Ziener *et al.* 1990a). In the Sacramento Valley, almost 93 percent of the nesting locations were in freshwater marshes dominated by cattails or bulrushes (Neff 1937). In addition to the freshwater marsh habitat, nests may be located in a variety of wetland and upland vegetation including blackberries, grainfields, giant cane, safflower, stinging nettles, willow scrub, riparian forest, barley, and orchards (Beedy *et al.* 1991).

Contrary to preferred habitats, some small breeding colonies have been documented at private and public lakes, reservoirs, and parks located near shopping centers, subdivisions and other urban development (Beedy and Hamilton 1999). In general, the characteristics of the nesting locations include: accessible water; protected nesting sites (either flooded or surrounded by thorny or spiny vegetation); and suitable foraging areas with adequate insect prey within a few kilometers of the nesting colony (Beedy and Hamilton 1999).

The nest is usually located a few feet over, or near, fresh water or hidden on the ground among low vegetation. The tricolored blackbird builds its nest of mud and plant materials (Ziener *et al.* 1990a). It is a highly colonial species, and hence, the nesting area must be large enough to support a colony of at least 50 pairs (Grinnell and Miller 1944). Tricolored blackbirds often change their nesting locations from year to year. These changes may be an adaptation to exploit

rapidly changing environments in ephemeral habitats, provide secure nesting sites, or to provide plentiful insect food supplies (Beedy and Hamilton 1999).

Within the Central Valley of California, the tricolored blackbird colonies are generally found in the rice lands of the Sacramento Valley and pasture lands of the lower Sacramento Valley and San Joaquin Valley. The colonies outside the Central Valley occur in several different habitat types, including being surrounded by chaparral-covered hills that may extend for miles, surrounded by orchard, adjacent to salt marsh, or surrounded by sagebrush-grasslands (Dehaven *et al.* 1975).

In winter, tricolored blackbirds often form single-species and sometimes single-sex flocks, but they also flock with other blackbird species. Foraging occurs on the ground in crop lands, grassy fields, flooded land, irrigated pastures, lightly grazed rangelands, dry seasonal pools, mowed alfalfa fields, feedlots, dairies, and along edges of ponds (Zeiner *et al.* 1990a; Beedy and Hamilton 1999).

Life History

The usual breeding season for tricolored blackbirds is mid-April into late July (Payne 1969). Orians (1960) also reported active breeding in October and November in the Sacramento Valley, although nesting success was low. Individual pairs in breeding colonies may initiate nesting synchronously. Even in colonies of 50,000 to 100,000 nests, all first eggs may be laid within one week (Orians 1961). The species is polygynous; each male may have several mates nesting in his small territory (Orians 1961). In dense vegetation, the breeding territory, which includes only the vicinity of the nest, is usually about 3.3 meters or less in size but may be larger in habitats of less suitable cover (Orians 1961). Nests may be located up to 6.4 kilometers (4 miles) from foraging areas (Orians 1961).

Tricolored blackbirds probably begin breeding at one year of age (Harrison 1978). The clutch size is typically three to four eggs, with clutches of two and five eggs observed occasionally (Emlen 1941). The first egg is usually laid the day after the nest is completed, and one egg is laid per day for one to five days (Emlen 1941). Tricolored blackbirds can raise two broods per year (Terres 1980). Incubation lasts about 11 days; the altricial young are tended by the female or by both parents (Lack and Emlen 1939). The young leave the nest around 13 days of age (Zeiner *et al.* 1990a). The tricolored blackbird has frequent wholesale desertions of nesting colonies with no obvious destruction or predation of eggs (Lack and Emlen 1939). The abandonment leads to a departure of the entire colony, sometimes to an unknown area of unknown distance (Lack and Emlen 1939).

In California, the diet of the tricolored blackbird consists predominantly of animal matter (mostly insects and spiders) that comprises 86 to 91 percent of the nestling and fledgling diet and 28 to 96 percent of the adult diet in spring and summer (Skorupa *et al.* 1980). Seeds and cultivated grains, such as rice and oats, are other major foods that compose most of the fall and winter diet for tricolored blackbirds (Martin *et al.* 1961)

Status and Distribution

The tricolored blackbird has a relatively restricted range, breeding from southern Oregon and the Modoc Plateau of northeastern California, south through the lowlands of California west of the Sierra Nevada to northwestern Baja California (Grinnell and Miller 1944). The species is not migratory but is nomadic and highly colonial, although the pattern of nomadism is poorly known (Orians 1961). Large flocks appear suddenly in areas from which they have been absent for months; they breed, and then quickly withdraw. This is known as itinerant breeding (Orians 1961; Collier 1968).

The tricolored blackbird is primarily a resident in California (Zeiner *et al.* 1990a). It is common locally throughout the Central Valley and in coastal districts from Sonoma County south (Zeiner *et al.* 1990a). Since 1980, active breeding colonies have been observed in 26 California counties, and most of the largest colonies are in the Central Valley (Beedy and Hamilton 1999). It breeds locally west of the Cascade Range, Sierra Nevada, and southeastern deserts from Humboldt and Shasta counties south to extreme southwest San Bernardino County, western Riverside County and western and southern San Diego County. In Central California, its breeding range extends east into the foothills of the Sierra Nevada (Beedy and Hamilton 1999). It is a summer resident in northeastern California, occurring regularly only at Tule Lake, but has bred some years as far south as Honey Lake and in the marshes of the Klamath Basin in Siskiyou and Modoc counties (Zeiner *et al.* 1990a). In the southern deserts, it is found regularly only at Antelope Valley, Los Angeles County. In winter, it becomes more widespread along the central coast and San Francisco Bay area (Grinnell and Miller 1944; McCaskie *et al.* 1979; Garrett and Dunn 1981).

The tricolored blackbird is not migratory over most of its range, but it leaves Oregon, northeastern California, Santa Barbara County and eastern San Diego County in fall and winter, presumably migrating south (Zeiner *et al.* 1990a; Beedy and Hamilton 1999). Flocks of the species become nomadic in fall, seeking food (Zeiner *et al.* 1990a). In winter, flocks become more widespread from Marin to Santa Cruz counties and in the Sacramento River Delta (Zeiner *et al.* 1990a).

Surveys of the tricolored blackbird indicate that the overall range of the species has changed little since the mid-1930s; however, the population numbers showed a 37 percent decline from 1994 to 1997. Population decline is most apparent in the Central Valley of California. Although tricolored blackbirds were once abundant in southern California, they are now described as rare throughout this former range, except in some sections of San Diego County (Beedy and Hamilton 1999). The population size fell more than 72 percent between the 1970s and 1980s, largely due to the size of the colonies rather than due to the number of colonies within the range (DeHaven *et al.* 1975; Beedy *et al.* 1991). Surveys indicate that tricolored blackbird populations have been rapidly declining for decades, likely due to water diversion, land conversion, and predation by mammals, corvids and black-crowned night herons (Beedy and Hamilton 1997; Hamilton *et al.* 1999; Hamilton 2000).

Threats

The loss of suitable nesting habitat is the primary threat to the tricolored blackbird. The loss of wetlands is a principal factor in population declines and loss of individual colonies (Beedy *et al.* 1991). Higher rates of nesting failures and lower reproductive success can result from the decrease in colony size (Orians 1961; Payne 1969). The smaller colonies that result from habitat fragmentation are more vulnerable to disturbance by natural predators and less able to compete with other species for remaining wetland habitats. Tricolored blackbird observations at Kesterson Reservoir, Colusa National Wildlife Refuge, and the Butte Sink (California) suggest that this species is sensitive to a variety of environmental perturbations while breeding. Predation is also a source of mortality and may increase as the continued loss of wetlands and other nesting habitat forces colonies into confined areas. Within Riverside County and within the Plan Area (*e.g.*, Prado Basin), potential tricolored blackbird breeding habitats are routinely destroyed or modified on a yearly basis during the maintenance of water polishing ponds or the creation of open-water waterfowl habitats. Reclamation, drainage, and dredging/cleaning of reservoirs, marshes, and canals are also threats to the species (Neff 1937). Poisoning, human disturbance from agricultural operations, contamination by trace elements (selenium), and use of pesticides are also potential causes for population declines and/or nest failures (Beedy *et al.* 1991; Beedy and Hayworth 1987).

Conservation needs

Tricolored blackbirds have incurred breeding losses through agricultural operations, harvesting, burning and discing of marshes. Other activities that result in losses of tricolored blackbirds include mowing, plowing, or burning of marsh areas within duck clubs and reservoirs or wetland maintenance of reservoirs containing occupied habitat. These losses are temporal and could be avoided by delaying the activity until after the colony completes the breeding cycle (Beedy and Hamilton 1999).

Due to the significant loss of wetlands in southern California, a primary conservation need of this species is maintaining wetland foraging and nesting habitat. Focused surveys of potential breeding locales are essential in conserving this species due to the rarity and sensitivity of breeding areas. It is important to reduce or eliminate human disturbance factors and pesticide use, because these threats have been linked to population declines in the tricolored blackbird. It is also important to conserve large blocks of suitable nesting habitat due to the large colonies that this species forms when breeding. Hydrological considerations may also be essential to the successful maintenance, management, restoration, and regeneration of tricolored blackbird breeding habitats.

Environmental Baseline

The tricolored blackbirds within the Plan Area do not appear to be migratory (Garrett and Dunn 1981). No nesting colonies were located within Riverside County through the 1930s (Neff 1937). Beedy *et al.* (1991) report historic breeding populations from the following locations within the Plan Area: Lake Norconian, 1 mile south-southwest of Norco (500 individuals in 1950); Chino Creek Valley (200 individuals in 1950); Fairmount Park (50 individuals in 1951); 1

mile northwest of Alberhill (750 individuals and 750 nests in 1971); San Timoteo Canyon Road (20 pairs in 1983-1986); and San Jacinto Wildlife Area (3,000 pairs in 1989).

A large colony (more than 23,000 nests) recently existed near Lake Hemet in a man-made wetland (Beedy and Hamilton 1997); however, this population is subject to burning and bulrush removal, which results in extreme population reduction. Based on the information from the Tricolored Blackbird Survey Report 2001 (Humble and Churchwell 2002), the Lake Hemet colony was located on about 50 acres of land, and the associated foraging habitat occurred on alfalfas fields of private lands. Between 1997 and 1999, this area was burned and bulrush nesting substrate removed. The colony size was smaller during 1999 and 2000 and located in a smaller area unaffected by management actions. In 2000, the colony was unsuccessful due to predation by black-crowned night herons and great-tailed grackles (Hamilton 2000). The current status of the Lake Hemet population is unknown.

Flocks consisting of hundreds of tricolored blackbirds have been detected in the Prado Basin during the breeding season. Juveniles have been present in the Santa Ana River floodplain (J. Pike, Orange County Water District, pers. comm., 2001). The current status of the San Jacinto Wildlife Area population consists of approximately 3,000 pairs. A population of approximately 1,000 individuals was observed in the San Jacinto Wildlife Area during the spring of 2003. Tricolored blackbirds also bred recently in and around the city of Temecula and have bred in the vicinity of Bridge Road in the San Jacinto Valley and at the San Jacinto Wildlife Area (D. Cooper, Audubon Society, pers. comm., 2003). Thus, there are many potential breeding areas for the tricolored blackbird within the Plan Area, but currently there is only one confirmed nesting colony in/near the San Jacinto Wildlife Area. Although partial range-wide surveys of the species have been conducted in recent years, information on the current status and distribution of the tricolored blackbird within the Plan Area is limited.

Core areas identified in the Plan Area are as follows: the San Jacinto Valley (considered the floodplain of the San Jacinto River), Mystic Lake/San Jacinto Wildlife Area, Collier Marsh, Alberhill, and Vail Lake/Wilson Valley/eastern Temecula Creek. Other isolated locations of the tricolored blackbird within our dataset include: Lake Mathews, Lake Perris, north of the Santa Ana River, Canyon Lake, Murrieta Creek, Lake Riverside, Lake Hemet, San Jacinto, Lakeview Mountains area, Sycamore Canyon Regional Park, and San Timoteo Creek.

Tricolored blackbird nesting and foraging habitats occur within the Riverside Lowlands and San Jacinto Foothills bioregions of the Plan Area. We identified primary nesting and secondary foraging habitats in our habitat model for the tricolored blackbird. The primary nesting vegetation types captured in our habitat model were meadows and marshes and cismontane alkali marsh. The secondary foraging vegetation types captured in our habitat model were agricultural land, grassland, playas and vernal pools, and riparian scrub, woodland, and forest. Based on this analysis, the Plan Area supports approximately 389 acres of nesting habitat and 235,460 acres of foraging habitat for the tricolored blackbird. Approximately 33,108 acres (14 percent) of the modeled habitat occurs within PQP Lands, including the Prado Basin/Santa Ana River. Potential nesting habitat for the tricolored blackbird typically occurs near emergent vegetation of large freshwater marshes and vegetated borders of ponds and lakes (Zeiner *et al.* 1990a) that provide dense nesting cover and an ample supply of insects. Due to the habitat preferences of this

species, the modeled habitat likely overestimates the amount of suitable habitat for the tricolored blackbird within the Plan Area.

Because the confirmed nesting colony and other potential breeding areas exist on PQP Lands that are currently managed under a multiple use policy, populations of tricolored blackbirds are subject to a variety of wildlife management activities that could reduce or remove localities from a reserve. For example, alterations in flooding cycles on the San Jacinto Wildlife Area could alter existing wetland habitat. The Eastern Municipal Water District (EMWD) has proposed to develop 320 acres of permanent wetlands on the eastern edge of the Mystic Lake area using reclaimed and storm water (EMWD 1994). There is a concern that this development would alter the inundation cycle for wetland and alkali playa habitat already established around the margins of Mystic Lake (Bramlet 1996).

Effects of the Action

Direct effects

The Plan Area includes 235,849 acres of modeled nesting and foraging habitat for the tricolored blackbird. The loss of 46 acres (12 percent) of the modeled nesting habitat and 174,404 acres (74 percent) of the modeled foraging habitat is anticipated over the 75-year permit term, which encompasses 26 of the 35 (74 percent) tricolored blackbird observations in our dataset. Loss of nesting and foraging areas due to impacts from Covered Activities will cause tricolored blackbirds in the Plan Area to disperse from impacted areas in search of other nesting or foraging habitats. Birds forced to disperse from these areas may experience increased competition for the remaining suitable habitat and decreased fitness due to increased energy and time spent locating new habitats. Loss of suitable nesting sites and foraging habitat may preclude the establishment of new nesting colonies. Agricultural land used as foraging habitat by the tricolored blackbird is rapidly being urbanized in parts of western Riverside County; its conversion could diminish the success of nesting sites due to lack of food resources. Thus, the loss of nesting and foraging habitat may impact population numbers of the tricolored blackbird within the Plan Area over the long term by reducing the number and distribution of areas suitable for use as nesting and foraging sites.

Several large blocks of habitat supporting potential nesting colonies and potential foraging locations of the tricolored blackbird will be conserved as Additional Reserve Lands and PQP Lands, including the Prado Basin, Santa Ana River, Mystic Lake, San Jacinto Wildlife Area and adjacent San Jacinto River playa habitat, Vail Lake/eastern Temecula Creek/Wilson Valley, Lake Elsinore, and Alberhill. Areas of potential foraging habitat, including grassland and agricultural land, are included within or adjacent to these areas that have been identified as current or potential breeding colony locations. In addition, within the Plan Area, implementation of the Riparian/Riverine Area and Vernal Pools policy will provide additional assurances for the species by protecting nesting and foraging habitats associated with wetlands habitats.

To ensure that the tricolored blackbird persists in the Plan Area, species-specific management measures are outlined in the MSHCP. The Plan states that five Core Areas will be included in the MSHCP Conservation Area including the San Jacinto River floodplain, the Mystic Lake/San

Jacinto Wildlife Area, Collier Marsh/Lake Elsinore grasslands, Alberhill, and Vail Lake/Wilson Valley/eastern Temecula Creek (Section 9, pp. 9-4).

Based on our analysis, to offset the loss of tricolored blackbird nesting and foraging habitat in the Plan Area, the MSHCP will conserve and manage approximately 126 acres of modeled nesting habitat and 28,165 acres of modeled foraging habitat in Additional Reserve Lands. Approximately 217 acres of modeled nesting habitat and 32,891 acres of modeled foraging habitat will remain in PQP Lands, including the Prado Basin/Santa Ana River. In total, 61,399 acres (26 percent) of modeled habitat for the tricolored blackbird will be conserved or remain in the Plan Area.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands, including surveys for the tricolored blackbird. Cooperative management and monitoring are anticipated on PQP Lands. Surveys for the tricolored blackbird will be conducted at least every five years to verify occupancy at a minimum of 75 percent of the known or future-identified locations. If a decline in the distribution of the tricolored blackbird is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP. Reserve Managers will manage tricolored blackbirds in order to maintain (once every five years) the continued use of and successful reproduction within at least one of the identified Core Areas. Reserve Managers will ensure habitat support functions within the MSHCP Conservation Area by maintaining and preserving hydrological processes and habitat suitable for tricolored blackbird breeding within the San Jacinto River flood plain, Mystic Lake/San Jacinto Wildlife Area, Collier Marsh, Alberhill, and Vail Lake/Wilson Valley/eastern Temecula Creek. Reserve Managers will manage known and future occurrences of this species. Reserve Managers will conserve, protect, and provide a buffer with a 100-meter distance around any known nesting locations. Particular management emphasis will be given to habitat loss, predation, poisoning, human disturbance, and pesticide use (Section 5, Table 5.2).

Indirect Effects

The tricolored blackbird could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These impacts include the indirect effects described in the “General Effects” section of this biological opinion. Implementation of the Riparian/Riverine Area and Vernal Pools policy will benefit the tricolored blackbird by maintaining breeding and foraging habitat used both during the breeding and wintering seasons. The Urban/Wildlands Interface policy will help reduce the effects of adjacent development on linkages connecting both the breeding and migration habitats of the tricolored blackbird.

Conclusion

We anticipate the proposed action will directly and indirectly affect the tricolored blackbird, as described in the analyses above, including the loss of 12 percent of the modeled nesting habitat and 74 percent of the modeled foraging habitat within the Plan Area. Implementation of the avoidance, minimization, and mitigation measures identified in the Plan will reduce the impacts to this species. Within the Plan Area, 88 percent of the modeled nesting habitat and 26 percent

of the modeled foraging habitat will remain within both the existing PQP Lands and the Additional Reserve Lands. Together these lands form a system of large, contiguous habitat blocks that are interconnected within the Plan Area. We anticipate that these lands will be monitored and managed cooperatively to benefit this species.

We anticipate that tricolored blackbirds will persist in the remaining 61,399 acres (26 percent) of the modeled habitat within both the existing PQP Lands and lands conserved within the Additional Reserve Lands. Also, agricultural lands represent 40 percent (93,962 acres) of the total (174,450 acres) modeled tricolored blackbird foraging habitat that occurs outside the MSHCP Conservation Area. While much of this habitat is being converted by urban development, complete loss of these agricultural lands is not anticipated over the permit term. In addition, this species will commute up to four miles to forage in suitable habitats. Thus, we anticipate that the tricolored blackbird will be able to persist in the Plan Area despite the loss of significant areas of modeled habitat.

After reviewing the current status of this species, the environmental baseline for the Plan Area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the tricolored blackbird. We reached this conclusion based on species nomadic nature and ability to commute up to four miles to forage and because the impacts associated with the loss of this species' breeding and foraging habitat, when viewed in conjunction with protection and management of the MSHCP Conservation Area, are not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Amount or Extent of Take

Because of their colonial nature and nomadic foraging and breeding behavior, it will be difficult to quantify the number of tricolored blackbirds impacted in the Plan Area over the 75-year permit term. Thus, we are quantifying the take as the number of acres of modeled habitat that will be impacted in the Plan Area as a result of the proposed action. We anticipate that up to 46 acres of modeled nesting habitat and 174,450 acres of modeled foraging habitat within the Plan Area will become unsuitable for the tricolored blackbird as a result of the proposed action. This loss is not anticipated to result in direct mortality of adult birds; however, for some individuals, reproduction may be impaired or life expectancy shortened. Take will be in the form of harm and injury. This level of take is not likely to result in jeopardy to the tricolored blackbird.

Turkey Vulture (*Cathartes aura*) (Breeding)

Status of the Species

Listing Status

The turkey vulture is not listed under the Federal or State Endangered Species Acts.

Species Description

The turkey vulture has a large unfeathered body (64-81 centimeters long), with a red head, long wings with black to brown plumage, and an ivory-colored, hooked bill. The female is slightly larger than the male. The juvenile has a gray head and a black beak-tip (Kirk and Mossman 1998).

Habitat Affinities

Landscape features that meet turkey vulture breeding season habitat requirements vary geographically (Kirk and Mossman 1998). In the west, the turkey vulture occurs in areas of pastured rangeland, non-intensive agriculture, or wild areas with rock outcrops suitable for nesting, but generally not in the high mountains. This species occurs in open stages of most habitats that provide adequate cliffs or large trees for nesting, roosting, and resting (Garrett and Dunn 1981). The turkey vulture lays eggs in dark recesses within rock outcrops, including ledges, caves, and crevices, and among tumbled boulders (Coles 1944; Davis 1979, 1983; Jackson 1983; Coleman and Fraser 1989a; Mossman and Hartman 1992). It will also nest in thickets, brush piles, and abandoned structures isolated from human disturbance (Mossman and Hartman 1992; Buhnerkempe and Westemeier 1984). The size and shape of nest cavities are variable and difficult to categorize; however, the cavities are frequently too constricted or convoluted for human entry (Kirk and Mossman 1998). The turkey vulture uses large trees, rock outcrops, and riparian thickets for roosting, perching, and sunning (Hatch 1970). Communal roosting sites contain large conifers close to habitat features that contribute to air currents (Thompson *et al.* 1990). In eastern North America, habitat for the turkey vulture includes mixed farmland and forest, which provides the best opportunity for foraging on both wild and domestic carrion. For nesting in this region, forested or partly forested areas with nest sites such as rock outcrops, fallen trees, and abandoned buildings, isolated from human and perhaps other mammalian disturbances, are preferred (Kirk and Mossman 1998).

Life History

The turkey vulture is a partial migrant, and individuals that breed north of the wintering range are generally migratory. They may be nomadic along the northern border of the winter range (Kirk and Mossman 1998). The species appears to have a large home range, which is typically overlapped with that of other individuals. In a study using radio-tagged turkey vultures, their home range was reported to be 37,072 hectares (Coleman and Fraser 1989a). Those that winter outside of the breeding territory arrive on the breeding grounds as early as February but usually between mid-March and early April in the southern United States (Jackson 1983). In southern Wisconsin, young leave the nest site and join communal roosts during mid to late August. Presumed replacement clutches are laid in June and hatch in early July; young first fly in early to mid-September and join communal roosts in late September (Kirk and Mossman 1998). A ritualized display including several individuals may precede mating (Loftin and Tyson 1965; Brown and Amadon 1968). There is little evidence of territoriality; however, the nest locations are well spaced from each other (Zeiner *et al.* 1990a; Coleman and Fraser 1989a).

The turkey vulture lays one clutch per year of two eggs, and rarely one or three eggs (Work and Wool 1942). It incubates the eggs for 38-41 days (Brown and Amadon 1968). The semialtricial young hatch with eyes open; they are cared for by both parents for 80 days or more (Work and Wool 1942). Breeding birds have a strong fidelity to the breeding site. Marked birds are known to return to the same or nearby alternate nest for six or more years. No birds tagged as nesting adults have ever been reported during the nesting season of subsequent years at a location greater than 10 kilometers from the original nest (Kirk and Mossman 1998). Immature birds tend to wander during the second summer or return late in the season. Birds were equally or more likely to return to the natal area for the first time in the third year than in the second year; all birds that returned to the natal area in the second year did so after June (Kirk and Mossman 1998). Annual survival of the turkey vulture is at least 75 percent on the basis of nine radio-tagged vultures (Coleman and Fraser 1989b). The longevity record is more than 17 years (Clapp *et al.* 1982).

Mammals are the most common food items of the turkey vulture, ranging from mice and shrews to large ungulates; birds include mostly chickens; and the species is very adaptable to the local and regional variety of available carrion. The turkey vulture primarily eats wild and domestic carrion; it rarely eats rotting fruit, live birds, eggs, or live mammals (Zeiner *et al.* 1990a). The diversity and distribution of taxa constituting food items show turkey vultures to be opportunistic scavengers covering a variety of local habitats (Tomaides *et al.* 1989). The species searches for carrion from the air or from a perch, aided by its well-developed sense of smell (Smith and Paselk 1986). Food may be robbed from young herons and other species (Temple 1969). Individuals regularly forage 24-32 kilometers (15-20 miles) from the roost or nest site. The turkey vulture often feeds with ravens and condors and apparently is subordinate to both species (Bent 1937). Golden eagles and coyotes may keep turkey vultures from carcasses. Turkey vultures are generally regarded as a beneficial scavenger and protected as such in many states even prior to the enactment of the Federal Migratory Bird Treaty Act (Kirk and Mossman 1998).

Status and Distribution

The turkey vulture breeds in northern to southern British Columbia, northern Idaho, northwestern Montana, east-central Alberta, west-central Saskatchewan, southern Manitoba, western Ontario, southern Quebec, western Vermont, southern New Hampshire, and the southern half of Maine, south through the continental United States, Middle America, and South America to Tierra del Fuego and the Falkland Islands. Within the western United States and western Canada, the breeding range is discontinuous. Breeding is very local or absent in portions of the Great Plains, including most of Nebraska, eastern Colorado, and much of western Kansas (Kirk and Mossman 1998).

The turkey vulture winters primarily from northern California and north Central Valley south to the Mexican border, lower Colorado River Valley north to Parker, Arizona, New Mexico, eastern half of Texas, southeastern Oklahoma, through the southern portions of the Midwestern states, northern West Virginia, southeastern Pennsylvania, southern New York, and southern Connecticut (Kirk and Mossman 1998).

Beginning in the 1920s and continuing to the 1990s, the breeding range expanded northward in the upper Midwest. Turkey vulture populations have increased markedly in the northern parts of

the range where it formerly bred only sparingly (Kirk and Mossman 1998). The turkey vulture is common in the breeding season throughout most of California (Grinnell and Miller 1944). It is absent to uncommon in most of the State during winter, with the greatest concentrations in coastal regions, and is not found at the highest elevations of the Sierra Nevada Mountains. It migrates south or downslope for winter. In coastal regions, some individuals winter in California. The remainder of the population typically migrates to Central America for the winter (Grinnell and Miller 1944). Large flocks of turkey vultures concentrate along well-defined, traditional migration routes in the autumn (Garrett and Dunn 1981).

Threats

Human disturbance of nest or roost sites and canid predation may be significant causes of nest failure (Coleman and Fraser 1989a). Other threats include shooting, trapping, poisoning, use of pesticides and other contaminants or toxins including DDT and DDE, lead poisoning, and mercury contamination, and collisions with stationary or moving structures or objects (Kirk and Mossman 1998). The turkey vulture is sometimes persecuted as a predator of weak, newborn, or birthing livestock, even though the black vulture is almost always responsible for the act. The turkey vulture has been killed throughout its range as a pest at landfills, cattle ranches, airports, and in Disney World (Gallagher 1991).

A 50 percent decline in the roosting population of the turkey vulture in Oregon has been hypothesized to be partially or wholly attributed to the overall regional decline of the species, to the unlikely use of a new roost site, or to changing land use practices that have reduced the availability of carrion in the form of range cattle (Taylor 1985). This species may also abandon nests if researchers visit during incubation periods (Coleman 1985; Coleman and Fraser 1989a).

Conservation needs

The availability and quality of nest sites is one of the primary limiting factors of this species and has been shown to directly influence vulture numbers. The most important component of nest site selection appears to be isolation from human disturbance (Kirk and Mossman 1998). Therefore, it is important to protect turkey vulture nest sites and provide buffer zones around nests during the breeding season.

Environmental Baseline

Turkey vulture breeding and foraging habitats occur within the Riverside Lowlands, San Jacinto Foothills, Desert Transition, Santa Ana Mountains, San Jacinto Mountains, Agua-Tibia Mountains, and San Bernardino Mountains Bioregions of the Plan Area. The following vegetation types were captured in the habitat model for the turkey vulture: chaparral, coastal sage scrub, desert scrubs, grassland, montane coniferous forest, playas/vernal pools, Riversidean alluvial fan sage scrub, and woodlands/forests. Based on this analysis, the Plan Area supports approximately 769,892 acres of breeding and foraging habitat for the turkey vulture. Approximately 308,507 acres (40 percent) of the modeled habitat occurs within PQP Lands. Suitable habitat for this species consists of extensive open areas with protected nest and roost sites provided by large trees, snags, thickets, shrubs, and rock outcrops (Zeiner *et al.* 1990a).

Due to the absence of rock outcrops and cavities in certain habitat types, the modeled habitat likely overestimates the extent of suitable nesting habitat for the turkey vulture within the Plan Area.

The turkey vulture is widely distributed throughout the Plan Area, but there are fewer observations in the mountainous Bioregions. The concentration of the observations for this species is in the southwestern portion of the Plan Area from Lake Elsinore to the Santa Rosa Plateau, east to Wilson Valley and Lake Skinner. There are no breeding locations from the literature; however, turkey vultures have been documented anecdotally as nesting in cliff areas at Rawson Canyon and Lake Perris (Bernasconi Hills). The Bernasconi Hills is a historic (data from 1900-1908) nest site within PQP Lands that is probably still suitable for a nesting location. According to the plan a second location is for Rawson Canyon and is located near Lake Skinner. This nest site location is most likely within PQP Lands as well; however, the area surrounding Rawson Canyon is intermixed with PQP Lands and private lands, so it is difficult to discern the precise nest location relative to the MSHCP Conservation Area. The nest site contained one nesting pair and was found about 0.5 mile from the lake where Rawson Creek meets Lake Skinner (P. Bloom, pers. comm., 2003). There are probably many nest sites throughout the Plan Area where rocky areas meet steep hillsides or cliffs (P. Bloom, pers. comm., 2003). The lack of locations for turkey vulture nests is partially due to the topography and the difficulty in finding the nests on steep slopes.

Effects of the Action

Direct effects

The Plan Area includes 769,892 acres of modeled breeding and foraging habitat for the turkey vulture. The loss of 321,502 acres (42 percent) of this habitat is anticipated over the 75-year permit term, which encompasses 179 of the 254 (70 percent) turkey vulture observations in our dataset, some of which likely represent observations of transient birds.

Because turkey vultures are opportunistic scavengers covering a variety of local habitats, a 42 percent loss of turkey vulture habitat distributed over the Plan Area is not anticipated to result in direct mortality of adult birds. Loss of roost sites and nesting habitats to development may cause turkey vultures to disperse in search of other suitable habitats. Some may disperse to rural/mountainous areas where development impacts are anticipated to occur at a slower rate and at lower densities. Approximately 100,685 acres (31 percent) of the non-conserved modeled habitat for the turkey vulture are designated as rural/mountainous land. However, birds forced to disperse may experience increased competition for the remaining suitable habitat. Loss of roost sites and nesting trees/shrubs may preclude the establishment of new turkey vulture nesting sites. Thus, loss of nesting habitat may impact population numbers of the turkey vulture within the Plan Area over the long term by reducing the number and distribution of areas suitable for use as nesting sites.

To offset the loss of turkey vulture habitat within the Plan Area, the MSHCP will conserve and manage 139,883 (18 percent) of modeled habitat for this species within the Additional Reserve Lands. Another 308,507 acres (40 percent) of modeled habitat for the turkey vulture will remain

within PQP Lands. Several (40 locations or 16 percent) of the turkey vulture observations in our dataset were recorded from PQP Lands. In total, 58 percent of the modeled habitat for the turkey vulture will be conserved or remain in the Plan Area. This modeled habitat includes 30 percent of the turkey vulture observations in our dataset. Although the majority (70 percent) of the turkey vulture occurrences in our dataset are not within the MSHCP Conservation Area, this species will travel several miles to forage; therefore, these occurrences are not necessarily indicative of adjacent nesting sites.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands, including surveys for the turkey vulture. Cooperative management and monitoring are anticipated on PQP Lands. Surveys for the turkey vulture will be conducted at least every eight years to verify occupancy and every three years to verify reproductive success at a minimum of 75 percent of the known and future-identified nesting locations (Section 5, Table 5.3). If a decline in the distribution or reproductive status of the turkey vulture is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP.

Within the Plan Area, the management focus for this species is nesting habitat. Reserve Managers will ensure buffering of the nest sites, which will include restricting human activities within a 0.5 mile radius around each of the nesting locations during the breeding season (*e.g.*, fencing hiking trails or fencing potential access points). For Lake Perris, buffering will be consistent with the recreational activities at Lake Perris. Reserve Managers will ensure the conservation of cliff areas in the Criteria Area that are capable of supporting nesting turkey vultures. Particular management emphasis will be given to preventing human disturbance, canid predation, and pesticide use (Section 5, Table 5.2).

The MSHCP will conserve turkey vultures by conserving known and future-identified breeding locations, linking nest sites with suitable foraging habitat, and managing nesting areas within the Conservation Area. The Conservation Area will be managed to: 1) preserve the quality of nesting and foraging areas; 2) monitor the known and future-identified breeding locations; and 3) provide buffers around the known and future-identified nest locations.

Indirect effects

The turkey vulture could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These impacts include the indirect effects described in the “General Effects” section of this biological opinion. In particular, the conservation and buffering of nesting locations from human disturbance will be important to sustaining turkey vultures in the MSHCP Conservation Area. Implementation of the Riparian/Riverine Areas and Vernal Pools policy and the Urban/Wildlands Interface policy will help minimize the indirect effects of the Covered Activities on foraging and breeding habitat for the turkey vulture.

Conclusion

We anticipate the proposed action will directly and indirectly affect the turkey vulture, as described in the analyses above, including the loss of 42 percent of its modeled habitat in the

Plan Area. Implementation of the avoidance, minimization, and mitigation measures identified in the Plan will reduce the impacts to this species. We anticipate that this species will persist in the remaining 58 percent of the modeled habitat within both the existing PQP Lands and the Additional Reserve Lands. Together these lands form a system of large, contiguous habitat blocks that are interconnected within the Plan Area. We anticipate that these lands will be monitored and managed cooperatively to benefit this species.

After reviewing the current status of this species, the environmental baseline for the Plan Area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the turkey vulture. We reached this conclusion based on the widespread distribution of the turkey vulture in the Plan Area, the species' overall distribution, and because the impacts to turkey vulture reproduction and the loss of this species' habitat, when viewed in conjunction with protection and management of the MSHCP Conservation Area, are not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Amount or Extent of Take

The loss of up to 321,502 acres of nesting and foraging habitat for the turkey vulture in the Plan Area is not anticipated to result in mortality of adult birds; however, for some individuals, reproduction may be impaired. Due to the difficulty in quantifying the number of turkey vultures impacted over the 75-year permit term, the Service is quantifying the take as the number of acres of modeled habitat that will be impacted in the Plan Area as a result of the proposed action. We anticipate that up to 321,502 acres of breeding and foraging habitat within the Plan Area will become unsuitable for the turkey vulture as a result of the proposed action. Take will be in the form of harm and injury. This level of take is not likely to result in jeopardy to the turkey vulture.

White-faced ibis (*Plegadis chihi*)

Status of the species

Listing Status

The white-faced ibis is not listed under the Federal Endangered Species Act. It is considered a California Species of Special Concern by the California Department of Fish and Game. It is also a Fish and Wildlife Service migratory non-game bird of management concern.

Species Description

The white-faced ibis is a medium-sized (46-56 centimeters in length) wading bird with a long neck, long legs, and a long decurved bill. Plumage is dark maroon brown in winter, and during the breeding season it turns to chestnut-maroon with a metallic green and bronze sheen. The wings will also take on a purplish overtone, and white feathers appear on the head separating the forehead from the eye. The iris is reddish-brown (Ryder and Manry 1994).

Habitat Affinities

Within its breeding range in inland areas, the white-faced ibis typically occurs in shallow marshes with islands of emergent vegetation. They occasionally occur on spoil banks created by dredging. In the coastal areas of the southern portion of the range, the white-faced ibis nests mostly in wetlands of outer coastal plains, freshwater marshes of common reed, bulltongue, saltmeadow cordgrass and torpedo panic-grass (Ryder and Manry 1994). In southern California, extensive marshes are required for nesting (Garrett and Dunn 1981). The species prefers shallow, grassy marshes and nests in dense, fresh emergent wetland vegetation (Zeiner *et al.* 1990a). The nest, which is made of dead tules or cattails, is built within tall marsh plants, sometimes on mounds of vegetation. The nest components generally include the dominant vegetation in the nesting area and vary between populations (Ryder and Manry 1994). The average distance between nests of the white-faced ibis was 2 meters (7 feet) in nesting colonies studied by Burger and Miller (1977).

Migrant and wintering white-faced ibis may be found foraging in shallow lacustrine waters, muddy ground of wet meadows, marshes, ponds, lakes, rivers, flooded fields, and estuaries (Zeiner *et al.* 1990a). Habitat use by wintering ibis in California appears to vary by region: in the Sacramento Valley, ibis are concentrated in agricultural fields and managed wetlands; in the San Joaquin Valley, ibis appear to use grassland/wetlands; in the Coachella Valley/Salton Sea/Imperial Valley, the vast majority of ibis occur in irrigated agricultural lands, particularly alfalfa and wheat; on the coastal slope of central and southern California, wintering ibis use marshy pasture lands, managed or natural freshwater marsh, pond edges, lake shores, and margins of brackish lagoons and estuaries (Shuford *et al.* 1996).

The foraging habitat of the white-face ibis includes shallowly flooded pond margins, reservoirs, and marshes (Ryder and Manry 1994). A 1988 study in the Great Basin Valley showed white-faced ibis to have a preference for alfalfa fields and less preference for corn, wheat-barley, pastures and oat fields (Bray *et al.* 1988). Other preferences included fields which were located closer to the colony, larger fields, fields with clay and clay-loam soils and those which are irrigated.

Life History

White-faced ibises are not generally aggressive and do not exhibit territorial behavior until the nesting season. The species undertakes regular north-south migrations and arrives on the breeding grounds in April. Pair formation and nest-site selection occurs mid-April to mid-May (Ryder and Manry 1994). Nesting can be highly asynchronous within a large colony, with courting, nest-building, and incubating pairs, downy young, and volant fledglings present at the same time in a mid season (Ryder and Manry 1994). Thus, the breeding season can vary across the species range and within an individual colony. Egg laying and incubation can occur from the last week in April through early August (Ryder and Manry 1994). During the nesting period, territories for nesting pairs comprise approximately one square meter around the nest and the home range and have been measured at 40-48 square kilometers in Idaho. The earliest recorded breeding age by a white-faced ibis was at two years (Ryder and Manry 1994). The oldest bird

known in the wild is recorded at 14 years 6 months and the oldest bird in captivity was recorded at 14+ years (Ryder and Manry 1994).

The usual clutch size of the white-faced ibis is three to four eggs, but the clutch size may vary from two to five eggs (Ryder and Manry 1994). The eggs are incubated for 21 days, mostly by the female, and the young are fed in or near the nest for about five weeks (Cogswell 1977). The monogamous pairs will renest if the initial nesting attempt fails (Ryder and Manry 1994). Nest success rates (percentage of nests producing one or more seven-day-old chicks) were measured at 63 percent for populations in Utah (Ryder and Manry 1994). Adults and subadults leave the breeding grounds in late summer.

The diet of the white-faced ibis is mainly composed of aquatic and moist-soil insects, crustaceans and earthworms, amphibians, small fishes, and miscellaneous invertebrates (Ryder and Manry 1994). It probes deep in the mud with its long bill and also feeds in shallow water or on the water surface (Cogswell 1977). Ibises feed in large flocks of more than 1,000 individuals (Ryder and Manry 1994) and will commute several miles to forage (James Pike, Orange County Water District, 2003).

Status and Distribution

White-faced ibis breed locally in North America from Oregon eastward to North Dakota and southward to the Mexican plateau. The largest breeding colonies are usually in Utah, Nevada, Oregon, and coastal Texas and Louisiana (Ryder and Manry 1994). There are also breeding and wintering populations in South America and Mexico, as far south as central Chile and central Argentina; however, the details of the more southern distribution are less well known (AOU 1998). The species winters from California (locally) eastward to Texas and coastal Louisiana and southward to Guatemala (Ryder and Manry 1994).

The white-faced ibis is an uncommon summer resident in sections of southern California and a rare visitor in the Central Valley (Zeiner *et al.* 1990a). It winters mainly in the San Joaquin Valley and Imperial Valley but is recorded widely as a transient. At the Salton Sea area, it is fairly common April to September and uncommon through the winter. A few pairs bred in 1977 and 1978 at the Salton Sea and in 1979 at Buena Vista Lagoon, San Diego County (Garrett and Dunn 1981). The white-faced ibis has nested recently at Honey Lake, in the Klamath Basin and at a few isolated areas in Central Valley (Airola 1980; McCaskie *et al.* 1979; Ryder 1967). It is an uncommon transient elsewhere in southern California and a very local winter visitor along the coast (Garrett and Dunn 1981). It is rare in the San Joaquin Valley, occurring mainly near Los Banos, August to April (McCaskie *et al.* 1979).

Historically, white-faced ibis were more common during all seasons throughout California (Grinnell and Miller 1944) and southern California specifically (Garrett and Dunn 1981). In the 1960s and 1970s, nesting populations and numbers of colonies of the white-faced ibis decreased because of pesticide contamination and loss of habitats to drought and drainage. In the 1980s and 1990s, the species increased as habitat improved, reclaiming the historic breeding range and expanding north to the northern portions of the United States (Ryder and Manry 1994).

Threats

Throughout the range, pesticides have caused a decline in the numbers of the white-faced ibis (Terres 1980). The species is subject to eggshell thinning from DDT-DDE contaminants (Ryder and Manry 1994). Despite the ban on DDT in the 1970's, DDE levels in white-faced ibis populations remains high in the Great Basin, probably due to continued use of these pesticides on the wintering grounds in Mexico (Ryder and Manry 1994).

The decline of the species in California has been attributed to the destruction of appropriate habitats (Grinnell and Miller 1944). Destruction of marsh habitats, especially along the southern coast and in the San Joaquin Valley, is perhaps the main factor responsible for the decline of white-faced ibis populations (Remsen 1978). Garrett and Dunn (1981) subsequently noted that measures should be taken to preserve the nesting habitat of this species, which is declining throughout its range. In areas with appropriate habitat following a severe drought, emergent wetland vegetation may take several years to recover to a condition suitable for white-faced ibis nesting (Ryder and Manry 1994). Habitat fragmentation creates isolated pockets of populations that are more susceptible to stochastic events or disease. Botulism has been identified as a disease which kills white-faced ibises (Ryder and Manry 1994).

Humans entering active colonies of the white-faced ibis may cause partial or total desertion, particularly during the nest-site selection, nest-building, and incubation phases. Unattended eggs and nestlings are highly vulnerable to avian predators and to chilling or overheating (Ryder and Manry 1994). Increased predation associated with human development and water level fluctuation is also a threat to the species. Domestic cats, along with avian predators, can prey more easily upon chicks when human disturbance causes adult birds to abandon their nests. Predation of white-faced ibis' eggs and nestlings occurs by gulls, magpies, night-herons, gallinules, owls, and ravens as well as raccoons, skunks, coyotes and weasels.

Conservation Needs

Due to the significant loss of wetlands in southern California, a primary conservation need for this species is maintaining nesting, foraging, and stopover wetland habitats. The white-faced ibis requires extensive marshes for nesting (Garrett and Dunn 1981). Management of the historic breeding location in western Riverside, within the Prado Basin (Michael Patten, California Bird Records Committee, pers. comm., 2003), needs to include minimization measurements for human disturbance, especially in nesting habitats, where human presence can lead to partial or complete desertion of nest sites (Ryder and Manry 1994). Buffer zones need to be established around known or future-identified nesting locations. Earnst *et al.* (1988) suggest that the species will also benefit from a mosaic landscape consisting of well-distributed peripheral wetlands and persistent colony sites.

Environmental Baseline

Although the white-faced ibis has been repeatedly recorded in the Mystic Lake/San Jacinto Wildlife Area and previously bred there (Garrett and Dunn 1981), currently there is only one confirmed nesting colony in western Riverside County located near the Prado Basin (Michael

Patten, California Bird Records Committee, pers. comm., 2003). Approximately 50 pairs have bred in the Basin in recent years; however, nesting was not confirmed during the 2003 breeding season (P. Tennant and D. Pellegrini, Orange County Water District, pers. comm., 2003). Up to 2,000 birds reside in the Prado Basin year-round, and although no nests were detected in 2003 within the Prado Basin proper, the ibises likely nested at a location nearby (James Pike, Orange County Water District, pers. comm., 2003). In the recent past, there was also a large roost of white-faced ibis observed at the EMWD treatment wetland in the City of San Jacinto. This roost may have represented a nesting colony, but it was not a confirmed nesting location (Riverside County Transportation Commission 2002). White-faced ibises have been recorded wintering in Prado Basin, Corona duck clubs, and San Jacinto Valley (Shuford *et al.* 1996). Migrants or wintering birds are currently found sparsely throughout most of the Plan Area. Additional locations of the white-faced ibis have been documented for the Santa Ana River, Eastvale, Alberhill, Collier Marsh, Lake Riverside, San Jacinto Valley area, Moreno Valley, and Motte-Rimrock Reserve. As stated in the Plan, historic and current population size is unknown due to the nomadic and transient nature of the white-faced ibis. In fact, little information exists on abundance, recruitment, and dispersal requirements of the white-faced ibis in the Plan Area.

White-faced ibis' nesting and foraging habitats occur within the Riverside Lowlands Bioregion of the Plan Area. We identified primary nesting and secondary foraging habitats for the white-faced ibis in our habitat model for this species. The primary nesting vegetation type captured in our habitat model for the white-faced ibis was freshwater marshes. The secondary foraging vegetation types captured in our habitat model were agricultural field croplands, cismontane alkali marsh, playas/vernal pools, and riparian scrub/woodland/forests. Based on this analysis, the Plan Area supports approximately 302 acres of nesting habitat and 220,335 acres of foraging habitat, totaling 220,637 acres of modeled habitat for the white-faced ibis. Approximately 21,971 acres (10 percent) of this modeled habitat occurs within PQP Lands, including the Prado Basin/Santa Ana River. Much of the agricultural land in the Plan Area is maintained via dry land farming that does not always provide adequate conditions for foraging white-faced ibis; thus, modeled habitat likely overestimates the amount of suitable foraging habitat for the white-faced ibis within the Plan Area.

Because the one confirmed nesting colony and other potential breeding areas exist on PQP Lands that are currently managed under a multiple use policy, populations of white-faced ibises are subject to a variety of wildlife management activities that could reduce or remove localities from a reserve. For example, alterations in flooding cycles on the San Jacinto Wildlife Area could alter existing wetland habitats. In Prado Basin, maintenance of water polishing ponds and creation of open-water waterfowl habitats could modify potential breeding habitats. Similarly, the EMWD has proposed to develop 320 acres of permanent wetlands on the eastern edge of the Mystic Lake area using reclaimed and storm water (EMWD 1994). There is a concern that this development would alter the inundation cycle for wetland and alkali playa habitat already established around the margins of Mystic Lake (Bramlet 1996).

Effects of the Action

Direct effects

The Plan Area includes 220,637 acres of modeled nesting and foraging habitat for the white-faced ibis. The loss of 32 acres (11 percent) of the modeled nesting habitat and 167,332 acres (76 percent) of the modeled foraging habitat is anticipated over the 75-year permit term, which encompasses 21 of the 46 (46 percent) white-faced ibis observations in our dataset. Loss of nesting and foraging areas due to development impacts will cause white-faced ibises in the Plan Area to disperse from impacted areas in search of other wetland habitats. Birds forced to disperse from these areas may experience increased competition for the remaining suitable habitat and decreased fitness due to increased energy and time spent locating new habitats. Loss of suitable nesting sites and adjacent foraging habitat may preclude the establishment of new white-faced ibis nesting colonies. Because agricultural land, used as foraging habitat by the white-faced ibis, is rapidly being urbanized in areas surrounding the Prado Basin, development could also diminish the success of nesting sites at Prado Basin due to lack of food resources. Thus, loss of nesting and foraging habitat may impact population numbers of the white-faced ibis within the Plan Area over the long term by reducing the number and distribution of areas suitable for use as foraging and nesting sites.

The only confirmed white-faced ibis' nesting colony in western Riverside County will not be negatively impacted by implementation of the Plan. If new ibis' nesting colonies are established in the Plan Area, it is likely that they will be located within the MSHCP Conservation Area, which includes 89 percent of the modeled nesting habitat in the Plan Area for this species. Over the permit term, however, it is possible that a few white-faced ibis colonies could be established outside the Conservation Area.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands, including surveys for the white-faced ibis. Cooperative management and monitoring are anticipated on PQP Lands. Surveys for the white-faced ibis will be conducted at least every eight years to verify occupancy at a minimum of 75 percent of the known and future-identified locations. If a decline in the distribution of the white-faced ibis is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP. Reserve Managers will also address impacts to this species with regard to flood control, habitat fragmentation, human disturbance, and pesticide use (Section 5, Table 5.2).

The MSHCP will conserve known and historic nesting locations of the white-faced ibis, link core areas with nearby suitable foraging habitats, and manage nesting colonies within the Conservation Area. The Conservation Area will be managed to (1) conserve primary breeding habitat within the Prado Basin, Santa Ana River, and other major wetland areas; (2) preserve the quality of wetland associated foraging areas; (3) monitor the potential breeding locations; and (4) protect any existing nest sites.

Indirect effects

The white-faced ibis could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These impacts include the indirect effects described in the “General Effects” section of this biological opinion. In particular, maintaining the hydrological processes and water quality standards (*e.g.*, controlling sedimentation and other pollutants) of wetland habitats will be important to sustaining the white-faced ibis in the MSHCP Conservation Area. Implementation of the Riparian/Riverine Area and Vernal Pools policy and the Urban/Wildlands Interface policy will help minimize the indirect effects of the Covered Activities on foraging and nesting habitat for the white-faced ibis.

Conclusion

We anticipate the proposed action will directly and indirectly affect the white-faced ibis as described in the analyses above, including the loss of 11 percent of its modeled nesting habitat and 76 percent of its modeled foraging habitat in the Plan Area. Implementation of the avoidance, minimization, and mitigation measures identified in the Plan will reduce the impacts to this species.

Agricultural lands represent 55 percent (92,536 acres) of the total (167,332 acres) modeled white-faced ibis foraging habitat that occurs outside the MSHCP Conservation Area. While much of this habitat is being converted by urban development, wholesale loss of these agricultural lands is not anticipated over the permit term. In addition, this species will commute up to several miles to forage in suitable habitats. Thus, we anticipate that the white-faced ibis will be able to persist in the Plan Area despite the loss of significant areas of modeled foraging habitat.

Within the Plan Area, 89 percent of white-faced ibis modeled nesting habitat and 24 percent of modeled foraging habitat will remain within both the existing PQP Lands and the Additional Reserve Lands. Together these lands form a system of large, contiguous habitat blocks that are interconnected within the Plan Area. We anticipate that these lands will be monitored and managed cooperatively to benefit this species.

After reviewing the current status of this species, the environmental baseline for the Plan Area, the effects of the proposed action, and the cumulative effects, it is the Service’s biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the white-faced ibis. We reached this conclusion based on the transient nature of the white-faced ibis within the Plan Area, the species’ overall distribution, and because the impacts associated with the loss of this species’ nesting and foraging habitats, when viewed in conjunction with protection and management of the MSHCP Conservation Area, are not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of the white-faced ibis throughout its range.

Amount or Extent of Take

The loss of up to 32 acres of modeled nesting habitat and 92,536 acres of modeled foraging habitat for the white-faced ibis in the Plan Area will not result in direct mortality of adult birds; however, for some individuals, reproduction may be impaired or life expectancy shortened. Due to the difficulty in quantifying the number of white-faced ibises that will be taken over the 75-year permit term, the Service is quantifying the take as the number of acres of modeled habitat that will be impacted in the Plan Area as a result of the proposed action. We anticipate that up to 32 acres of modeled nesting habitat and 92,536 acres of modeled foraging habitat within the Plan Area will become unsuitable for the white-faced ibis as a result of the proposed action. Take will be in the form of harm and injury. This level of take is not likely to result in jeopardy to the white-faced ibis.

White-tailed kite (*Elanus leucurus*)

Status of the Species

Listing Status

The white-tailed kite is considered a Fully Protected Species by the California Department of Fish and Game. It is a Fish and Wildlife Service Migratory Non-game Bird of Management Concern but is not listed under the Federal Endangered Species Act.

Species Description

The white-tailed kite is a medium to small hawk with a long white tail. The adults are white underneath, gray on the back from the crown to upper tail coverts, and have conspicuous large, black scapulars. Two subspecies of *E. leucurus* are recognized: *E. l. majusculus* in North America and *E. l. leucurus* in South America (Dunk 1995).

Habitat Affinities

The white-tailed kite breeds in low elevation, open grasslands, savannah-like habitats, agricultural areas, wetlands, and oak woodlands. Riparian areas adjacent to open areas are also used (Dunk 1995). Specific plant associations seem to be unimportant while the vegetation structure and prey abundance is apparently more important (Dunk 1995). Nest trees range from single isolated trees to trees within relatively large stands (Dunk 1995).

The winter range of the white-tailed kite is similar to the breeding range, but the proximity to nest trees is not important. Ungrazed areas tend to be used more than grazed lands. Communal roosts in fall and winter are generally located in small stands of trees but have been observed in open fields on the ground and in orchards (Dunk 1995).

Life History

The white-tailed kite is diurnally active year-long (Zeiner *et al.* 1990a). It preys primarily on small mammals and occasionally on birds, insects, reptiles, and amphibians. It forages in undisturbed, open grasslands, meadows, farmlands, emergent wetlands, ungrazed grasslands, fence rows and irrigation ditches adjacent to grazed lands, shrub, scrub, and open woodlands (Dunk 1995). It hunts almost exclusively by hovering from 5-25 meters above the ground.

The white-tailed kite is monogamous and pairs can be found together year-round but more individuals are paired from December through August (Dunk 1995). Breeding occurs from February to October, with a peak from May to August. The nest consists of loosely piled sticks and twigs that are lined with grass, straw, or rootlets. The nest is placed near the top of a dense oak, willow, or other tree stand and is usually 6-20 meters above ground in trees that vary from 3-50 meters in height (Dixon *et al.* 1957). The nest tree is located near an open foraging area. The average clutch is 4-5 eggs, with a range of 3-6 eggs. The female only incubates for about 28 days. The young fledge in 35-40 days. During the incubation and nestling period, the male feeds the female, and supplies her with food to feed the young. White-tailed kites usually have a single brood but may occasionally have two broods. Dunk (1995) found that 1.6 young per active nest fledged and 2.9 per successful nest fledged in a study near San Francisco Bay.

There is no evidence of natal philopatry. Two white-tailed kites banded as nestlings were recovered 19 and 160 kilometers from the nests (Dixon *et al.* 1957). Adults may exhibit breeding site fidelity, and some adults stay on territories year round (Dunk 1995). The maximum life span recorded for the white-tailed kite is 5 years and 11 months (Clapp *et al.* 1982). Predators of adults and young include owls, hawks, and falcons. Probable egg predators include corvids and small and medium sized carnivores (Dunk 1995).

Generally, the white-tailed kite is not territorial, but the nest site may be defended against crows, other hawks, and eagles (Pickwell 1930; Dixon *et al.* 1957). Dunk and Cooper (1994) reported estimated prey and competitor abundances were inversely correlated with kite territory size and hypothesized that kite territory size is proximately regulated by competitor abundance and ultimately regulated by prey abundance. The white-tailed kite typically forages from a central perch over areas as large as three square kilometers (Warner and Rudd 1975). It seldom hunts more than 0.8 kilometers from the nest when breeding (Hawbecker 1942). Communal roosts are used in the non-breeding seasons (Waian and Stendell 1970).

The breeding density of the white-tailed kite varies greatly, ranging from 1 pair per 26 hectares to 1 pair per 472 hectares, and the vole density at the onset of breeding appears to influence the numbers. It is likely that breeding densities vary even more dramatically than this (Dunk 1995). The primary factor known to regulate the population is prey availability. The availability of nesting and roosting sites becomes important in areas where prey are not limiting (Dunk and Cooper 1994).

Status and Distribution

The present distribution of the white-tailed kite is the largest in the species' known history and may still be expanding. The breeding range stronghold in North America is California, with nearly all areas occupied up to the western Sierra Nevada foothills and southeast deserts (Small 1994; Dunk 1995). The species is common in the central valley of California and along the entire length of the coast. Breeding has been documented regularly in the far west counties of Oregon and documented recently in southwest Washington. It is a common breeder in southern Texas. A small breeding population has been established in southern Florida since at least 1986 with scattered reports elsewhere in the peninsula and in the eastern panhandle (Dunk 1995). Its breeding range continues south along the coast in Mexico, into Central America and in South America from Colombia south to Buenos Aires (Dunk 1995).

The species is a winter resident throughout most of its breeding range, although dispersal occurs during the non-breeding season, resulting in some range expansion during winter. In California, it occurs sporadically throughout most of the State in winter (Dunk 1995). By the early 1900s, the California population was reduced by habitat loss, shooting, and possibly egg collecting. By the 1930s, extinction was predicted for the white-tailed kite. From the 1940s to the early 1980s, the California population increased dramatically; however, Breeding Bird Survey data indicates that 11 of 14 regions in California showed significant declines between 1982 and 1991. The most significant declines occurred in the southern California grassland region, with an annual decline of 38.7 percent per year from 1982 to 1991 (Dunk 1995).

Threats

Declines in the status of the species reported by Dunk (1995) may have been the result of diminished prey availability resulting from droughts or other factors such as clean farming techniques that leave few residual vegetation areas for prey, increased competition for nest sites with other raptors and corvids, and increased disturbances at the nest. A significant threat to the species is the loss or degradation of habitat, especially the loss of nest trees and foraging habitat through the urbanization of natural lands or agricultural lands (Dunk 1995). Although there has been no specific assessment of threats to the species within the Plan Area, habitat destruction or degradation likely continues to impact the species within western Riverside County.

Conservation Needs

The white-tailed kite occurs predominantly within open grasslands, savannah-like habitats, agricultural areas, wetlands, and in oak woodlands and riparian areas adjacent to open lands. Conservation of the white-tailed kite depends on the protection of breeding sites, winter roost sites, and foraging habitat. Conserved lands containing appropriate landscapes should be managed to reduce disturbance at nest sites and to provide breeding, foraging, and roosting areas for the species.

Environmental Baseline

The white-tailed kite is distributed throughout the Plan Area. Although there are no recent status and distribution data derived from surveys in the large majority of the Plan Area, a minimum of 5 pairs were present within the Prado Basin during the 2003 breeding season (Pat Tennant and Dharm Pellegrini, Orange County Water District, pers. comms., July 29, 2003). The MSHCP identifies the following Core Areas: Prado Basin/Santa Ana River, Lake Mathews-Estelle Mountain, Temescal Wash, Wasson Canyon, Murrieta Creek, Santa Rosa Plateau, Temecula Creek, Vail Lake, Wilson Valley, Lake Skinner, and Lake Perris/Mystic Lake. Concentrations of winter roosting white-tailed kites occur along San Timoteo Creek and in the Murrieta Hot Springs area of French Valley (MSHCP Volume II, pp. B-598).

White-tailed kite breeding and foraging habitats occur within the Riverside Lowlands, San Jacinto Foothills, and Santa Ana Mountains bioregions of the Plan Area. We identified primary breeding and secondary foraging habitats for the white-tailed kite in our habitat model for this species. The primary nesting vegetation types captured in our habitat model for the white-tailed kite were peninsular juniper/woodland/scrub, riparian scrub/woodland/forests, and oak woodland/forests. The secondary foraging vegetation types captured in our habitat model were agricultural lands, grasslands, cismontane alkali marsh, playas/vernal pools, freshwater marsh, Riversidean alluvial fan sage scrub, coastal sage scrub, and chaparral. Based on this analysis, the Plan Area supports approximately 28,541 acres of breeding habitat and 637,842 acres of foraging habitat, totaling 666,382 acres of modeled habitat for the white-tailed kite. Due to the absence of open areas within certain habitat types, the modeled habitat likely overestimates the extent of suitable breeding and foraging habitats for the white-tailed kite within the Plan Area. Approximately 165,640 acres (25 percent) of the modeled habitat occurs within PQP Lands, including the Prado Basin/Santa Ana River. Forty (23 percent) of the 175 observations in our dataset were located within PQP Lands.

Effects of the Action

Direct Effects

The Plan Area includes 666,382 acres of modeled breeding and foraging habitat for the white-tailed kite. White-tailed kites will be subject to impacts associated with development and other proposed Covered Activities over the 75-year permit term within 375,583 acres (56 percent) of this modeled habitat. It is anticipated that most of the breeding and foraging habitat for the white-tailed kite in these areas will be lost as a result of development. We do not anticipate direct mortality to adult birds from this loss. Adult birds will likely disperse to adjacent habitats. Some may disperse to rural/mountainous areas where development impacts are anticipated to occur at a slower rate and at lower densities. Approximately 94,499 acres (25 percent) of the non-conserved modeled habitat for the white-tailed kite are designated as rural/mountainous land. However, birds forced to disperse may experience increased competition for the remaining suitable habitat. Thus, loss of these habitats may impact population numbers of the white-tailed kite within the Plan Area over the long term by reducing the number of areas suitable for their use.

To offset the loss of white-tailed kite modeled habitat within the Plan Area, the MSHCP will conserve and manage 125,158 acres (19 percent) of modeled breeding and foraging habitat for the white-tailed kite within the Additional Reserve Lands. Another 165,640 acres (25 percent) of modeled breeding and foraging habitat will remain in PQP Lands. In total, 290,798 acres (44 percent) of modeled habitat for the white-tailed kite will be conserved or remain in the MSHCP Conservation Area, including 37 percent of the white-tailed kite observations in our dataset.

The MSHCP will conserve white-tailed kites by conserving suitable breeding habitat and foraging habitat in the MSHCP Conservation Area, which will also include least 10 core breeding areas at Prado Basin/Santa Ana River, Lake Mathews-Estelle Mountain, Temescal Wash, Wasson Canyon, Murrieta Creek, Temecula Creek, Vail Lake, Wilson Valley, Lake Skinner/Diamond Valley Lake, and Lake Perris/Mystic Lake (Section 9, pp. 9-89). The MSHCP Conservation Area will be managed to (1) protect and buffer from disturbance the known winter roost area along San Timoteo Creek and any winter roost locations identified in the Conservation Area in the future, (2) ensure the continued use of and successful reproduction at 75 percent of the core breeding areas once every 3 years, and (3) protect habitat from degradation. Management will focus on conserving nest trees and foraging habitat, encouraging appropriate farming techniques that leave cover for prey species, and aiding in reducing competition for nest sites with other raptors and corvids.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands, including surveys for the white-tailed kite. Cooperative management and monitoring are anticipated on PQP Lands. Surveys for the white-tailed kite will be conducted at least every eight years to verify occupancy at a minimum of 75 percent of the known or future-identified locations. If a decline in the distribution of the white-tailed kite is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP. Reserve Managers will manage and protect the known winter roost location in San Timoteo Canyon and future-identified winter roosts in the MSHCP Conservation Area. The white-tailed kite will also benefit from the General Management Measures described in Section 5 of the MSHCP, including conservation of known or newly-observed active raptor nests and conservation of a 250-meter buffer of undeveloped habitat around active nests within the MSHCP Conservation Area. Reserve Managers will manage this species with regard to habitat loss and urbanization, habitat degradation (loss of nest trees and foraging habitat), clean farming techniques, and competition for nest sites with other raptors and corvids (Section 5, Table 5.2).

Indirect Effects

The white-tailed kite could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These impacts include the indirect effects described in the “General Effects” section of this biological opinion. Implementation of the Riparian/Riverine Area and Vernal Pools policy and the Urban/Wildlands Interface policy will help minimize the indirect effects of the Covered Activities on foraging and breeding habitat for the white-tailed kite.

Conclusion

We anticipate the proposed action will directly and indirectly affect the white-tailed kite as described in the analyses above, including the loss of 56 percent of its modeled habitat in the Plan Area. Implementation of the avoidance, minimization, and mitigation measures identified in the Plan will reduce the impacts to this species. We anticipate that this species will be able to persist in the remaining 44 percent of its modeled habitat within both the existing PQP Lands and Additional Reserve Lands. Together these lands form a system of large, contiguous habitat blocks that are interconnected within the Plan Area. We anticipate that these lands will be monitored and managed cooperatively to benefit this species.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the white-tailed kite. We reached this conclusion based on the distribution of the species in North America and because the impacts associated with loss of this species' habitat, when viewed in conjunction with protection and management of the MSHCP Conservation Area, are not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Amount or Extent of Take

The loss of up to 375,583 acres of breeding and foraging habitat for the white-tailed kite in the Plan Area is not likely to result in direct mortality of adult birds; however, for some individuals, reproduction may be impaired or life expectancy shortened. Due to the difficulty in quantifying the number of white-tailed kites impacted by the proposed action over the 75-year permit term, we are quantifying the take as the number of acres of modeled habitat that will be impacted as a result of the proposed action. We anticipate that up to 375,583 acres of modeled habitat within the Plan Area will become unsuitable for the white-tailed kite as a result of the proposed action. Take will be in the form of harm and injury. This level of take is not likely to result in jeopardy to the white-tailed kite.

Williamson's sapsucker (*Sphyrapicus thyroideus*)

Status of the Species

Listing Status

The Williamson's sapsucker is not listed under the Federal or California State Endangered Species Act.

Species Description

The Williamson's sapsucker is a medium-sized woodpecker. Plumage of males and females is distinctly different. Males are black with a bright red patch on the chin and upper throat, a

yellow belly, and white wing-coverts, rump, and facial stripes. Females are mostly cryptic brown with little contrast except for their yellow bellies (Dobbs *et al.* 1997).

Habitat Affinities

The Williamson's sapsucker typically inhabits forests with large trees and sparse to moderate canopy cover (Zeiner *et al.* 1990a). Throughout its range, it breeds at middle to high elevations in montane spruce-fir, Douglas fir, lodgepole pine and ponderosa pine forests and also may occur in mixed deciduous-coniferous forest with quaking aspen, an important nesting substrate (Dobbs *et al.* 1997). Availability of suitable nest sites, like snags, is a critical component of their breeding habitat (Conway and Martin 1993). Raphael and White (1984) observed 40 percent of nests in snags and 58 percent of nests in the dead portions of live trees. Within southern California, the Williamson's sapsucker typically breeds in higher elevations in coniferous forests dominated by lodgepole pines and firs down to the upper border of the yellow pine/Jeffrey pine belt (Garrett and Dunn 1981). In southern California, they are typically found on north-facing slopes (Stephenson and Calcarone 1999).

During migration, the Williamson's sapsucker is found in a wide variety of habitat and may move down-slope during migration and into oak scrub, pinon-juniper, deciduous riparian, and even exotic conifer plantings (Dobbs *et al.* 1997). In the southwestern United States, the winter habitat consists of low to mid-elevation forests of oak-juniper and pine-oak forests and, to a lesser extent, deciduous riparian and oak forests (Bock and Larson 1986).

Life History

The Williamson's sapsucker is diurnally active year-round (Zeiner *et al.* 1990a). It is omnivorous with a seasonally specialized diet. It feeds on sap, cambium and the soft tissues of several coniferous trees during the pre-nesting period, shifting to mainly ants after the hatching of young (Dobbs *et al.* 1997). It also eats other insects like beetles, flies, and aphids during the breeding season (Dobbs *et al.* 1997). It forages mainly in conifers and snags by sap-sucking and insect-gleaning from the bark surface of tree trunks. In California, lodgepole pine is preferred, but the species will forage on hemlock, white fir, Jeffrey pine and aspen (Dobbs *et al.* 1997).

The Williamson's sapsucker is monogamous, nests in cavities, and tends to select nest sites in areas close to conifer-dominated forest. Tree fungal infection can play a role in nest tree selection because infected trees may have a softer core, making it easier to excavate (Conner *et al.* 1975). The Williamson's sapsucker has one brood per year. It lays eggs from late May to mid July (Zeiner *et al.* 1990a). The clutch size is usually 4 to 6 eggs and averages 4.38 eggs per nest (Dobbs *et al.* 1997). Both parents incubate the eggs and brood the young. Incubation begins before the clutch is complete, lasting for 12 to 14 days. Departure from the nest occurs 31 to 32 days after hatching, and it usually requires 1 to 2 days for the entire brood to leave the nest. Adults quickly disperse after the young leave the nest and males often abandon the young 1 to 2 days before they fledge (Dobbs *et al.* 1997). Both sexes can breed in their first year. Birds often return to their same territory, or even same nest tree, year after year.

Nesting success of Williamson's sapsuckers was high in a mixed conifer forest in Arizona at 93.2 percent nest success (Conway and Martin 1993). Successful nests in Arizona fledged an average of 3.67 young; hatching failure and/or nestling mortality was calculated as 1.33 young per nest (Dobbs *et al.* 1997).

The male establishes and defends a territory based on the location of the nest. Territories have been estimated at from 4-7 hectares (Dobbs *et al.* 1997). In California, Bock and Lynch (1970) reported breeding density at one pair per 40 hectares. Competition may occur between Williamson's sapsucker and other sapsucker species over territory and nest sites (Raphael and White 1984). Accipiter hawks are predators of both adults and juveniles (Dobbs *et al.* 1997).

Status and Distribution

The Williamson's sapsucker occurs as a summer resident from southern British Columbia, south through the Cascades, Sierras and Rockies of the western U.S. (Terres 1980). Its distribution appears somewhat disjunct and is described as occurring at middle to high elevation generally between 1,500 and 3,200 meters in several regions including the Pacific Northwest, U.S. Rocky Mountains, the Great Basin, and in Mexico (Dobbs *et al.* 1997).

Within California, there are several disjunct breeding populations of Williamson's sapsucker in the mountains of southern California west of the Mojave Desert, including in the San Gabriel, San Bernardino, and San Jacinto mountains and at Mount Pinos. Large concentrations of breeding birds are thought to occur on the north-facing slopes of the San Bernardino Mountains, behind Big Bear Lake near Mount San Gorgonio (Garrett and Dunn 1981). There is a major breeding range within the Sierra Nevada-Cascade ranges from the Greenhorn Mountains north to Oregon, and isolated breeding populations in the extreme north in Siskiyou, Trinity, and Warner mountains, East Warner Mountains, Sweetwater Range, Carson Range, Ruby and Pequop mountains, Spruce Mountain, and the Snake Range (Dobbs *et al.* 1997).

The Williamson's sapsucker winters at lower elevations in the southern part of the breeding range (Terres 1980). In most of California, the breeding populations are generally resident, but there is some regular movement to mid-elevations and irregular or casual movement to lowlands surrounding the breeding areas from September to April (Dobbs *et al.* 1997).

Based on literature from the late 1800's to the present, DeSante and George (1994) reported the Williamson's sapsucker expanded its range westward, resulting in increased numbers in parts of British Columbia (cited in Dobbs *et al.* 1997). However, Breeding Bird Survey data indicate a decreasing population trend (DeSante and George 1994). Populations significantly declined throughout their range from 1982 to 1991, especially in the Pacific Northwest (Dobbs *et al.* 1997)

Threats

The primary threat to the Williamson's sapsucker is habitat loss. It has narrow habitat requirements because it requires large snags or softwood for excavating nesting cavities.

Breeding habitat in southern California is likely most threatened by stand-replacing wildfire (Stephenson and Calcarone 1999).

Conservation Needs

The preferred breeding habitat of Williamson's sapsucker, coniferous forests dominated by lodgepole pines or white firs (Stephenson and Calcarone 1999), needs to be protected, particularly in areas with high densities of snags. Additional known or future areas of occupation also need to be managed to prevent loss of nesting and foraging habitat. Without an adequate knowledge of the status and distribution of the species within the Plan Area, defining critical conservation areas is presently problematic. The Plan Area may be very important to the survival of the Williamson's sapsucker in southern California because the breeding population in southern California is small and disjunct (Stephenson and Calcarone 1999).

Environmental Baseline

No species-specific distribution surveys for the Williamson's sapsucker have been conducted in the Plan Area. Our dataset includes two recent records from the Santa Ana River basin, which are likely to be incidental or transitory occurrences. The MSHCP identifies three additional locations within the San Jacinto Mountains that were not included in our dataset due to the age or the precision level of the records. These records are not adequate to represent the distribution of Williamson's sapsucker in the Plan Area. The literature for the southern California area documents that the species is an uncommon to fairly common local resident in the higher mountains west of the deserts (Garrett and Dunn 1981). Within the Plan Area, this includes the San Bernardino and San Jacinto mountains between 1,700 and 2,900 meters (Zeiner *et al.* 1990a).

Wintering areas and migratory corridors in the Plan Area are also unknown.

The primary vegetation types used to model habitat for the Williamson's sapsucker were montane coniferous forest and oak woodlands forest in the San Bernardino and San Jacinto Mountains bioregions. Based on this analysis, the Plan Area supports approximately 43,171 acres of Williamson's sapsucker modeled habitat. Approximately 33,539 acres (78 percent) of this modeled habitat occurs on PQP Lands.

Effects of the Action

Direct Effects

The Williamson's sapsucker will not be considered a Covered Species Adequately Conserved by the MSHCP unless the Forest Service agrees through an MOU to manage their lands cooperatively with the Permittees for the benefit of the Williamson's sapsucker. The Plan Area includes 43,171 acres of modeled habitat for the Williamson's sapsucker. If the MOU with the Forest Service is executed, Williamson's sapsuckers will be subject to impacts associated with development and other proposed Covered Activities over the 75-year permit term within 9,347 acres (22 percent) of this modeled habitat, which does not include any of the Williamson's sapsucker observations in our dataset. It is anticipated that most of the breeding and foraging

habitat for the Williamson's sapsucker in these areas will be lost as a result of development. Displaced birds that are unable to locate suitable roosting cavities will experience increased rates of predation or otherwise die or be injured due to loss of their sheltering habitat. The loss of suitable nesting and roosting cavities may also impact population numbers of the Williamson's sapsucker within the Plan Area over the long term by increasing competition for the remaining suitable habitat.

To offset the loss of Williamson's sapsucker habitat within the Plan Area, implementation of the MSHCP will conserve and manage large areas containing modeled habitat for the sapsucker and linkages among these areas. Conserved habitat within the Additional Reserve Lands will include 286 acres (<1 percent) of modeled Williamson's sapsucker habitat. An additional 33,539 acres (78 percent) of modeled Williamson's sapsucker habitat will remain within PQP Lands. In total, about 78 percent of the modeled habitat for the Williamson's sapsucker will be conserved in the Plan Area.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands including surveys for the Williamson's sapsucker. If the MOU with the Forest Service is signed, additional monitoring and management would occur for Williamson's sapsucker habitat within Forest Service lands included in the MSHCP Conservation Area. Surveys for the Williamson's sapsucker will be conducted at least every eight years to verify occupancy at a minimum of 75 percent of the areas identified above. If a decline in the distribution of the Williamson's sapsucker is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP.

Reserve Managers will manage known and future occurrences of the Williamson's sapsuckers by preventing habitat degradation and loss of snags and timber. These measures and the other general management actions described in Section 5 of the MSHCP will help maintain habitat and reduce threats to the Williamson's sapsucker.

Management actions, such as fuel modification, could result in harm or injury to a small number of individual Williamson's sapsuckers. It is anticipated that any impacts to Williamson's sapsuckers from management actions will be minimized by adherence to appropriate survey protocols and other guidelines described in Section 7.4 of the MSHCP.

Indirect Effects

The Williamson's sapsucker could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These include the indirect effects described in the "General Effects" section of this biological opinion. Because of their susceptibility to habitat loss due to wildfire, the Williamson's sapsucker is likely to be vulnerable to indirect effects associated with roads and other developments that increase urban interface with habitat areas. Implementation of the Urban/Wildlands Interface policy will help minimize the indirect effects of the Covered Activities on foraging and nesting habitat for the Williamson's sapsucker.

Conclusion

We anticipate the proposed action will directly and indirectly affect the Williamson's sapsucker as described in the analyses above, including the loss of 22 percent of its modeled habitat in the Plan Area. Implementation of the avoidance, minimization, and mitigation measures identified in the Plan will reduce the impacts to this species. We anticipate that this species will persist in the remaining 78 percent of its modeled habitat within both the existing PQP Lands and the Additional Reserve Lands. Together these lands form a system of large, contiguous habitat blocks within the Plan Area. We anticipate that these areas will be monitored and managed cooperatively to benefit this species.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the Williamson's sapsucker. We reached this conclusion because most of this species modeled habitat occurs within PQP Lands and because the impacts associated with loss of this species' habitat, when viewed in conjunction with protection and management of the MSHCP Conservation Area, are not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Amount or Extent of Take

Because Williamson's sapsuckers are cavity nesters, and the number of suitable nesting snags within potential habitat is not known, it will be difficult to quantify the number of individuals that will be taken as a result of the proposed action over the 75-year permit term. Therefore, the Service is quantifying the take as the number of acres of modeled habitat that will be impacted in the Plan Area as a result of the proposed action. We anticipate that up to 9,347 acres of breeding and foraging habitat within the Plan Area will become unsuitable for Williamson's sapsucker as a result of the proposed action. Additionally, a small, but undeterminable, number of birds will be taken as a result of management actions.

Take will be in the form of harm, death, and injury. This level of take is not likely to result in jeopardy to the Williamson's sapsucker.

Wilson's warbler (*Wilsonia pusilla*)

Status of the Species

Listing Status

The Wilson's warbler is not a State or federally listed species.

Species Description

The Wilson's warbler is a small wood-warbler. In breeding plumage, the adult male has uniformly yellowish to olive green upper parts with lemon yellow underparts and a glossy black

patch on top of the head. The adult female is similar but duller in color overall. Three subspecies of the Wilson's warbler are recognized. These subspecies differ slightly in size and plumage coloration and pattern (Ammon and Gilbert 1999).

Habitat Affinities

Breeding habitats for the Wilson's warbler include montane meadows and low, dense willow thickets as well as other shrubs and scrub, often on steep slopes (Garrett and Dunn 1981). It nests in the Arctic up to the tree line and typically nests in habitats such as thickets, second-growth saplings or clearings, in spruce-tamarack, balsam fir, and sphagnum bogs, or in alders and birches near streams and ponds (Terres 1980). The western montane, northern, and northeastern populations are restricted to mesic shrub thickets of woodland habitats, the edges of beaver ponds, lakes, bogs, and overgrown clear-cuts of the montane and boreal zone (Ammon and Gilbert 1999). The Pacific coast populations use a variety of mesic shrub habitats in humid coastal forests, such as clear-cuts, shrub thickets, and stands of young conifers, alders, and maples. The Pacific coast birds also breed in the dryer scrub habitats consisting of coyote bush and blackberry mixed with Douglas fir, in shrub understory of the forests. Their abundance is positively correlated with the amount of deciduous tree and shrub cover (Ammon and Gilbert 1999).

During spring and fall migrations, the Wilson's warbler occurs in most deciduous shrub habitats as well as riparian understories (Ammon and Gilbert 1999). It is also found in other woodlands, suburban habitats, agricultural areas, desert scrub, and montane forests. In the winter, it occurs in tropical evergreen and deciduous forest, cloud forest, pine-oak forest, and forest edge habitat, as well as mangrove undergrowth, secondary growth, thorn-scrub, dry washes, riparian gallery forest, mixed forests, brushy fields, and plantations (Ammon and Gilbert 1999).

Life History

The Wilson's warbler is diurnally active year-long with nocturnal migratory activity (Zeiner *et al.* 1990a). It primarily consumes terrestrial invertebrates such as bees (Hymenoptera), flies (Diptera), mayflies (Ephemeroptera), spiders (Araneae), beetles (Coleoptera), and caterpillars (Lepidoptera), as well as some berries (Ammon and Gilbert 1999). It forages by gleaning for invertebrate prey, usually within 10 feet of the ground and may forage by flycatching for insects in the lower canopy (Terres 1980, Zeiner *et al.* 1990a).

The Wilson's warbler is monogamous and breeds from late April to early August (Harrison 1951). Pairs typically nest near water or meadows, within one meter of the ground or on the ground, under dense shrub cover (Zeiner *et al.* 1990a). The nest is a bulky structure, sunken in moss or sedges, sometimes at the base of alders, and is built of mosses, dead leaves, fine weed stalks, and grasses and is lined with finer grasses (Terres 1980). The species may nest in loose colonies (Terres 1980). Eggs are laid in April in California and in June or July in Alaska. The clutch size is 4-6 eggs, commonly five. Incubation lasts 10 to 11 days, and the young leave the nest when 10 to 11 days old (Bent 1953, Terres 1980). One brood is typically reared per year.

In Marin County, California, as few as 2.1 percent of young birds returned to their natal site, and annual adult survival of summer residents was estimated at 50.3 percent (Chase *et al.* 1997). Patterns of survival and productivity parameters suggest that abundance in the Marin County population is influenced primarily by circumstances on the breeding grounds (Chase *et al.* 1997). The average life span of individual birds is unknown, but Wilson's warblers can live more than five years. Predators of the Wilson's warbler include domestic cats, accipiters, small mammals, and snakes (Zeiner *et al.* 1990a, Ammon and Gilbert 1999).

Males establish breeding territories where foraging and breeding mostly occur in the defended area. Territories vary across years in size and shape and range from 0.18 to 1.17 hectares. The Wilson's warbler wanders during the post-breeding season. This nomadic wandering probably occurs after breeding or attempted breeding and during the time when territoriality is waning. This activity is correlated with an unrestricted search for food in preparation for molt and migration and to increase the chance of survival during the post breeding period (Stewart 1973).

Status and Distribution

The breeding range for the Wilson's warbler is relatively large, extending from northern Alaska, east to Newfoundland, south to southern California into northern New Mexico and northern New England (Terres 1980). The wintering range is from southern Baja California, Mexico and southern Texas south to Panama (Terres 1980).

In California, the majority of the range is occupied by summer migrants and extends along the coast and in the Sierras (Zeiner *et al.* 1990a). The winter range extends into San Diego, Orange, Los Angeles, Ventura and Santa Barbara counties along the coast (Garrett and Dunn 1981). Wilson's warblers are migratory. Along the Pacific coast, spring migration occurs from mid-March through early June, peaking in mid-April through mid-May in southern California (Garrett and Dunn 1981). Fall migration usually occurs in August, September, and October.

Historically extensive populations were extirpated due to riparian habitat loss, urbanization, and possibly cowbird parasitism in southern California. Before the extirpation, the Wilson's warbler was a common breeder along the coastal streams in Los Angeles area and south to San Diego (Ammon and Gilbert 1999).

Threats

Threats to the Wilson's warbler include habitat loss and degradation, herbicides, cowbird parasitism, human disturbance, cattle grazing, and predation by domestic cats (Ammon and Gilbert 1999). Brown-headed cowbirds regularly parasitize the Wilson's warbler and may be partially responsible for extirpation of the species from lowland areas in lower southern California (Garrett and Dunn 1981).

On the breeding grounds, the Wilson's warbler is less abundant in 0-10 year old forest clear cuts than in uncut forests; however it is more abundant in 11-20 year old clear cuts than in uncut forests. The decreased abundance of birds is also associated with heavy cattle grazing. Yong *et al.* (1998) suggest that immature Wilson's warblers are particularly vulnerable to habitat

disturbances at stopover sites during fall migration, probably because of their lower social status and inexperience with long-distance migration.

Cowbird parasitism may be partly responsible for the disappearance of the species from former lowland breeding areas within the Plan Area (*e.g.*, see Grinnell and Miller 1944, Garrett and Dunn 1981); the species apparently remains a frequent cowbird host in the northern lowlands of southern California (Dunn and Garrett 1997).

An additional threat to the species within the Plan Area is increasing habitat fragmentation and the related degradation of ecosystem function in areas where potentially suitable habitats may occur. For instance, the proliferation of exotic plants (*e.g.*, giant reed) within migration stopovers (and potential breeding habitats) poses serious threats to the function and survival of riparian and wetland habitats in the Plan Area and the southwestern U.S. and the species that are dependent on them (including the Wilson's warbler). Recent droughts, fires, bark-beetle infestations and the subsequent removal of affected trees may have also significantly altered and impacted potential Wilson's warbler montane breeding habitats within the Plan Area and southern California.

Conservation Needs

The conservation needs of the Wilson's warbler include the preservation and expansion of large unfragmented habitat tracts, the elimination of invasive exotic plants, and the suppression of cowbird parasitism within the large areas of suitable habitat. Published information suggests that Wilson's warblers may be deleteriously affected by habitat disturbances during migration and that the protection of even small, disjunct riparian habitats is important to the conservation of the species (*e.g.*, Skagen *et al.* 1998). Conservation will also depend on the preservation and restoration of potential breeding habitat.

Environmental Baseline

The Wilson's warbler formerly bred within the lowlands of southern California, including the Plan Area (see Grinnell and Miller 1944). However, because there have been no focused surveys for breeding Wilson's warblers within most of the Plan Area, the recent breeding status of the species is unknown. The exception is Prado Basin where, despite an abundance of intensively-surveyed, suitable habitat, Wilson's warblers have not been detected breeding there since 1986 (L. R. Hays, U.S. Fish and Wildlife Office, pers. obs.). In California, the Wilson's warbler is a common migrant in spring and fall and sometimes remains through the winter in lowland willow thickets and other wet, brushy areas (Garrett and Dunn 1981).

We modeled primary breeding habitat and secondary wintering/migration (transient) habitat for the Wilson's warbler in all bioregions of the Plan Area. Modeled breeding habitat for the Wilson's warbler occurs in the Riverside Lowlands, San Bernardino Mountains, San Jacinto Mountains, and Santa Ana Mountains bioregions of the Plan Area. The vegetation types used to model breeding habitat for this species were montane meadows; woodland and forests; riparian scrub, woodland and forests; and Riversidean alluvial fan sage scrub. There are 46,318 acres of modeled breeding habitat for the Wilson's warbler in the Plan Area; of that, approximately

28,284 acres of modeled breeding habitat occurs on PQP Lands. Wintering/migration modeled habitat for the Wilson's warbler occurs in the Riverside Lowlands and San Jacinto Foothills bioregions of the Plan Area. The vegetation types used to model wintering habitat were chaparral; coastal sage scrub; desert scrub; peninsular juniper woodland and scrub; riparian scrub, woodland and forests; Riversidean alluvial fan sage scrub; grasslands; and woodland and forests. There are 390,709 acres of modeled wintering habitat for the Wilson's warbler in the Plan Area; of that approximately 73,071 acres of modeled wintering habitat occurs on PQP Lands.

Effects of the Action

Direct effects

The Plan Area includes a total of approximately 421,683 acres of modeled breeding (46,318 acres) and wintering habitat (390,709 acres) for the Wilson's warbler. Loss of 213,323 acres (51 percent) of this modeled breeding and wintering habitat is anticipated over the 75-year permit term, which encompasses 48 of the 74 (65 percent) Wilson's warbler observations in our dataset. We anticipate that most of this modeled breeding and wintering habitat will be lost as a result of Covered Activities, although some habitat may remain in areas avoided as a result of the Riparian/Riverine Areas and Vernal Pools policy and in rural mountainous areas where development impacts are anticipated to occur at a slower rate and at lower densities. Approximately 61,704 acres (29 percent) of the non-conserved modeled habitat for the Wilson's warbler are designated as rural/mountainous land. Loss of this habitat may decrease the use of the Plan Area by the Wilson's warbler over the long term by reducing the number of areas suitable for breeding, foraging, and migratory stop-overs.

To offset the loss of Wilson's warbler habitat within the Plan Area, the MSHCP will conserve and manage 5,619 acres (12 percent) of the modeled breeding habitat and 111,775 acres (29 percent) of the modeled wintering habitat for the Wilson's warbler within Additional Reserve Lands. Approximately 94,796 acres (22 percent) of modeled breeding and wintering habitat for the Wilson's warbler will remain within PQP Lands. In total, 49 percent of the modeled breeding and wintering habitat for the Wilson's warbler will be conserved or remain in the Plan Area, including 26 (35 percent) of the Wilson's warbler observations in our dataset.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands, including surveys for the Wilson's warbler. Cooperative management and monitoring are anticipated on PQP Lands. Surveys will be conducted at least every eight years to verify occupancy at a minimum of 75 percent of the known locations. If a decline in the distribution of the Wilson's warbler is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP. The Wilson's warbler will also benefit from the General Management Measures described in Section 5 of the MSHCP, which provide for control of unauthorized public access, maintenance of existing habitat, including control of invasive weeds, and management of specific threats to the species. Implementation of these management measures will help to avoid and minimize impacts to the Wilson's warbler.

Indirect Effects

The Wilson's warbler could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These include the indirect effects described in the "General Effects" section of this biological opinion. Implementation of the Riparian/Riverine Area and Vernal Pools policy will benefit the Wilson's warbler by maintaining breeding and wintering/migration habitat. The Urban/Wildlands Interface policy will help reduce the effects of adjacent development on linkages connecting both the breeding and migration habitats of the Wilson's warbler.

Conclusion

We anticipate the proposed action will directly and indirectly affect the Wilson's warbler as described in the analyses above, including the loss of 27 percent of its modeled breeding habitat and 51 percent of its combined breeding and wintering/migration modeled habitat within the Plan Area. Implementation of the avoidance, minimization, and mitigation measures identified in the Plan will reduce the impacts to this species. We anticipate that this species will persist in the remaining 208,360 acres (49 percent) of the total modeled habitat within both the existing PQP Lands and the Additional Reserve Lands. Together these lands form a system of large, contiguous habitat blocks that are interconnected within the Plan Area, which we anticipate will be monitored and managed cooperatively to benefit this species.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the Wilson's warbler. We reached this conclusion based on the wide-spread distribution of this species in North America and because the impacts associated with loss of this species' habitat, when viewed in conjunction with protection and management of the MSHCP Conservation Area, are not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Amount or Extent of Take

Because Wilson's warbler breeding locations in the Plan Area are not known and because this species may be distributed throughout the Plan Area within suitable migration habitat, it will be difficult to quantify the number of individuals that will be taken as a result of the proposed action over the 75-year permit term. Therefore, the Service is quantifying the take as the number of acres of modeled breeding and migration/wintering habitat that will be impacted in the Plan Area as a result of the proposed action. We anticipate that up to 213,323 acres of modeled habitat within the Plan Area will become unsuitable for the Wilson's warbler as a result of the proposed action. Take will be in the form of harm, death, and injury. This level of take is not likely to result in jeopardy to the Wilson's warbler.

Yellow warbler (*Dendroica petechia brewsteri*)Status of the Species*Listing Status*

The yellow warbler is not federally listed but is considered a Species of Special Concern by the California Department of Fish and Game.

Species Description

The yellow warbler is a medium-sized, foliage-gleaning wood-warbler. Its plumage is more extensively yellow than most other wood-warblers and has unique yellow color on the inner webs of the tail feathers. There are 43 subspecies divided into three groups (*petechia*, *erithachorides*, *aestiva*); at times, each group has been regarded as a distinct species. *D. p. brewsteri* is in the *aestiva* group (Lowther *et al.* 1999).

Habitat Affinities

The yellow warbler breeds most commonly in wet, deciduous thickets, especially those dominated by willows and in disturbed and early successional habitats (Lowther *et al.* 1999). The yellow warbler is found at elevations from 100 to 2,700 meters within riparian habitat and at higher elevations along watercourses with riparian growth (Lowther *et al.* 1999). In California, the yellow warbler also breeds in montane chaparral and open ponderosa pine/mixed conifer habitats with substantial amounts of brush (Zeiner *et al.* 1990a). Breeding in montane shrubs and conifers is perhaps a recent phenomenon (Gaines 1977a). In southern California, yellow warblers breed in lowland and foothill riparian woodlands dominated by cottonwoods, alders, willows, and other small trees and shrubs typical of low, open-canopy riparian woodland (Garrett and Dunn 1981). It usually arrives in California in April and generally has migrated out of the area by October. During the post-breeding season, there is an upslope movement primarily to middle elevations (Beedy 1975), though it is scarce at elevations above 2,500 meters (8,000 feet) (Gaines 1977a). Small numbers regularly overwinter in southern California lowlands (Garrett and Dunn 1981).

During spring and fall migrations, the yellow warbler occurs in scrub/shrub and semi-open habitats and second growth forests and is often associated with wetlands. A study of stopover sites in southeastern Arizona led researchers to conclude that riparian patches are important stopover sites for migrants, regardless of size and degree of isolation or connectivity (Skagen *et al.* 1998). Other researchers in Oregon specifically identified “mesic shrub vegetation” as a vegetation structure within riparian areas that provides high species richness and abundance, including high numbers of yellow warblers (Sanders and Edge 1998). In the winter, it occurs in a variety of wooded and scrubby habitats, including gardens, town plazas, second growth, brushy pastures and hedgerows, forest edge, streamside woodlands, wooded marshes, agricultural lands, and other semi-open areas.

Life History

The yellow warbler is diurnally active year-long, but it migrates nocturnally (Zeiner *et al.* 1990a).

The yellow warbler forages on insects and other arthropods and sometimes on wild fruits. It gleans and hovers in the upper canopy of deciduous trees and shrubs and occasionally hawks insects from the air (Bent 1953; Ehrlich *et al.* 1988). Foraging is typically observed between 1 and 55 feet (0.3 to 16.8 meters), at the top of the vegetation, never on the ground, and mostly between 20 and 26 feet (6 to 8 meters).

The yellow warbler builds its nest in an upright fork of a bush, sapling, or tree. The nest is an open cup placed 2 to 16 feet (0.6 to 5 meters) above ground. The preferred nest trees are willows, alders, and cottonwoods. The best predictor of nest site selection is based on the pattern of horizontal vegetation structure. The yellow warbler seems to select nest sites based upon patch characteristics surrounding the nest site; for example, it may prefer nest sites in a larger stand of vegetation with intermingling branches rather than isolated shrubs (Knopf and Sedgwick 1992). This selectivity may help reduce predation or nest parasitism.

The yellow warbler is primarily monogamous, but occasionally polygynous. It breeds from mid-April to early August with peak activity in June. Pairs breed solitarily. The female lays 3-6 eggs (usually 4 or 5); eggs are incubated by the female for 11 days. The altricial young are tended by both parents until fledging at 9-12 days (Harrison 1978). The young breed the following year. Site fidelity to breeding areas has been documented in adult birds (Lowther *et al.* 1999).

Nest predation was the major cause of nest failure in a group of species in Alaskan wetlands, including yellow warblers (Rodgers 1995). The annual adult survival rate, based on returns of banded birds to the same breeding location, is 52 percent. The maximum reported longevity is 8 years 11 months by a male yellow warbler (Klimkiewicz *et al.* 1983).

On the breeding grounds, the yellow warbler defends multipurpose territories. The territory interactions are dynamic and continue throughout the breeding season. Territories are established as soon as the males arrive on the breeding grounds (Lowther *et al.* 1999). The species tends to have relatively small territories and home ranges, varying from 0.08 to 0.5 acres in size (Ficken and Ficken 1966; Beer *et al.* 1956). Peak densities measured in southeast Arizona reached 48 birds per hectare (Skagen *et al.* 1998). Yellow warbler territories often include tall trees for singing and foraging and a heavy brush understory for nesting (Ficken and Ficken 1966).

The yellow warbler is subject to predation by a variety of small mammals, accipiters, corvids, snakes, and domestic cats. Brood parasitism by brown-headed cowbirds is heavy and apparently has been a major cause of the drastic decline in numbers in lowland localities of recent decades (Bent 1953; Remsen 1978; Garrett and Dunn 1981). Parasitism occurred in 9 of 25 nests or family groups in the Sierra Nevada where cowbirds were common (Rothstein *et al.* 1980; Verner and Ritter 1983; Airola 1986). The yellow warbler frequently responds to cowbird parasitism by building over the parasitized clutch, making multi-tiered nests. The yellow warbler is more

likely to desert or bury the cowbird egg if the cowbird egg appears before any warbler egg or appears early in the laying sequence (Lowther *et al.* 1999).

Status and Distribution

Yellow warblers breed from northern Alaska eastward to Newfoundland and southward to northern Baja California and Georgia. The species migrates throughout much of North America and winters from southern California, Arizona, and the Gulf Coast southward to central South America (AOU 1998). The breeding range of *D. p. brewsteri* occurs along coastal Washington, Oregon, and California. In California, Zeiner *et al.* (1990a) describe the yellow warbler as an uncommon to common summer resident in the north and locally common in the south. It breeds in riparian woodlands southward from the northern border of California west of the Sierra Nevada to the coastal slopes of southern California and from coastal and desert lowlands up to 2,500 meters (8,000 feet) in the Sierra Nevada and other montane chaparral and forest habitats (Grinnell and Miller 1944).

The yellow warbler occurs as a migrant throughout California, and there is at least one winter record for the species (Grinnell and Miller 1944). It is a common migrant on the Channel and Farallon islands in spring and fall (DeSante and Ainley 1980, Garrett and Dunn 1981). The *aestiva* group of yellow warblers winters primarily from northern Mexico south to Bolivia and Brazil.

The patterns of population density have probably fluctuated since the European settlement of North America altered the original vegetation. There are no large-scale range-wide changes documented for the yellow warbler. Populations in many lowland areas of the southwestern United States have declined dramatically in recent decades (southern coast, Colorado River, San Joaquin and Sacramento valleys) (Lowther *et al.* 1999). The yellow warbler is now rare to uncommon in many lowland areas where it was formerly common (McCaskie *et al.* 1979, Garrett and Dunn 1981).

Threats

The primary continuing threats to the yellow warbler in southern California include habitat destruction, degradation, fragmentation, and brood parasitism by cowbirds (Garrett and Dunn 1981). Although threats to the species in western Riverside County have not been specifically identified or quantified, the range-wide threats also apply to the Plan Area. Habitat destruction and degradation by the proliferation of exotic plants (*e.g.*, giant reed and perennial pepperweed) and impacts attributable to the brood-parasitic cowbird deserve further attention.

Due to limited and partial exotic plant abatement measures and uncertain future prospects for large-scale, long-term eradication efforts within the Plan Area, the invasive spread of giant reed and other nonnative plants poses a serious threat to the function and survival of southwestern riparian habitats and the species that are dependent upon them including the yellow warbler. In recent years, giant reed, in particular, has overtaken and displaced native riparian habitat elements and caused several large fires that completely destroyed yellow warbler habitat within the Santa Ana River Watershed.

Brood parasitism by brown-headed cowbirds has been a major cause of the decline in yellow warbler numbers in lowland localities (Bent 1953; Garrett and Dunn 1981) and is not an uncommon phenomenon in montane locales (Rothstein *et al.* 1980; Verner and Ritter 1983; Airola 1986). For example, one subspecies (*D. p. sonora*) of the yellow warbler that formerly bred along the length of the Colorado River, may have been completely extirpated from California (Garrett and Dunn 1981). Long-term Prado Basin surveys suggest that brood parasitism by the brown-headed cowbird, which thrives in altered landscapes such as parks, agricultural lands, and other open areas (*e.g.*, Garrett and Dunn 1981), likely poses a significant threat to the yellow warbler in unmanaged areas of the Plan Area. Despite 17 years of intensive cowbird abatement efforts in the Prado Basin, cowbird parasitism has not been entirely eliminated in the region (*e.g.*, Pike *et al.* 2002).

Conservation Needs

The conservation needs of the yellow warbler include the preservation and expansion of large unfragmented riparian habitat tracts, the elimination of invasive exotic plants, and the suppression of cowbird parasitism within the large areas of suitable habitat, particularly major watersheds. Conservation will also depend on the active management of any current or future-identified breeding populations. Area-wide cowbird abatement efforts and monitoring of yellow warbler populations within the Plan Area to detect population trends, dispersal, and demographics are important components of an effective management program.

Environmental Baseline

The yellow warbler was nearly absent as a breeding species from the Prado Basin (and possibly western Riverside County) as recently as 1986. However, by the 2003 breeding season, an estimated 650+ pairs were present within the Prado Basin area (P. Tennant and D. Pellegrini, Orange County Water District, pers. comm., July 29, 2003). The increase in the Prado Basin/Santa Ana River population is attributed to recent cowbird management programs and local habitat restoration and rehabilitation efforts. The near absence of breeding yellow warblers in the Prado Basin prior to the initiation of intensive management efforts in 1986 suggests that the species is not likely to breed in abundance anywhere other than suitable habitats that are managed to prevent cowbird brood-parasitism and continuing habitat destruction or degradation (L.R. Hays, Fish and Wildlife Service, pers. obs.). Currently, comprehensive cowbird control and lowland habitat restoration programs within the Plan Area are conducted only within the Prado Basin, adjacent reaches of the Santa Ana River upstream and downstream from the basin, and along portions of Temescal Wash and San Timoteo Creek. Non-breeding migrants are present in breeding habitats during most of the breeding season (*e.g.*, Garrett and Dunn 1981), which confuses efforts to understand the species' breeding status and distribution. Given that and the general lack of survey data for breeding yellow warblers, the breeding distribution and status of the yellow warbler in the Plan Area outside of Prado Basin is unclear.

Generally, yellow warbler breeding habitat occurs in lowland and foothill riparian woodlands dominated by cottonwoods, alders, willows, and other small trees and shrubs typical of low, open-canopy riparian woodland (Garrett and Dunn 1981). Therefore, the habitat model for this species includes riparian scrub, woodland and forests and oak woodland and forests in all

bioregions of the Plan Area. There are 45,463 acres of modeled breeding habitat for the yellow warbler in the Plan Area. Approximately 27,603 acres (61 percent) of modeled habitat occur in PQP Lands, including the confirmed breeding area in the Prado Basin.

Effects of the Action

Direct effects

The Plan Area includes approximately 45,463 acres of modeled breeding habitat for the yellow warbler. Loss of 12,059 acres (27 percent) of this habitat is anticipated over the 75-year permit term, which encompasses 72 of the 112 (64 percent) yellow warbler observations in our dataset. It is anticipated that most of the breeding and foraging habitat for yellow warblers in these areas will be lost as a result of development, although some habitat for this species may remain in areas avoided as a result of the Riparian/Riverine Areas and Vernal Pools policy and in rural mountainous areas where development impacts are anticipated to occur at a slower rate and at lower densities. Approximately 5,131 acres (43 percent) of the non-conserved modeled habitat for the yellow warbler are designated as rural/mountainous land. Birds forced to disperse from these areas may experience increased competition for the remaining suitable habitat and decreased fitness due to increased energy and time spent locating new habitats. Thus, loss of this breeding and foraging habitat may impact population numbers of the yellow warbler within the Plan Area over the long term by reducing the number of areas suitable for use as foraging and breeding sites.

The Plan states that at least nine Core Areas will be included in the MSHCP Conservation Area including Prado Basin/Santa Ana River, Temescal Canyon including tributaries such as Alberhill Creek, Wasson Canyon, Temecula Creek, Murrieta Creek, Vail Lake, Wilson Creek, San Timoteo Creek, and drainages and woodland areas within the San Bernardino National Forest. The Core Areas will be connected by habitat linkages.

Based on our analysis, to offset the loss of yellow warbler habitat within the Plan Area, the MSHCP will conserve and manage 5,800 acres (13 percent) of modeled habitat for the yellow warbler within Additional Reserve Lands. Approximately 27,603 acres (61 percent) of modeled habitat for the yellow warbler will remain within PQP Lands. In total, 33,403 acres (73 percent) of the modeled habitat for the yellow warbler will be conserved or remain in the Plan Area, including 40 of 112 (36 percent) of the yellow warbler observations in our dataset. This species is also anticipated to benefit from implementation of the Riparian/Riverine and Vernal Pools policy.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands, including surveys for the yellow warbler. Cooperative management and monitoring are anticipated on PQP Lands. Surveys for the yellow warbler will be conducted at least every five years to verify occupancy and successful reproduction at a minimum of 75 percent of the Core Areas (including future-identified Cored Areas). Successful reproduction is defined as a nest which fledged at least one known young. If a decline in distribution of the yellow warbler is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the

MSHCP. Other management measures listed in Section 5 will help to maintain habitats within the core population areas. Habitat will be maintained via preservation of hydrological processes within the drainages that support the habitat and by selectively rehabilitating or revegetating fragmented or degraded areas, such as areas infested by exotic plants and animals (*e.g.*, brown-headed cowbirds). Reserve Managers will be evaluate the condition of riparian vegetation in Core Areas and maintain a program to enhance and/or create riparian habitat within the Core Areas (Section 5, Table 5.2). Implementation of these management measures will help to avoid and minimize impacts to the yellow warbler.

Management actions to benefit the yellow warbler or other Covered Species (*e.g.*, exotic vegetation removal) may result in impacts to a small number of individual yellow warblers. It is anticipated that any impacts to the yellow warbler from management actions will be minimized by adherence to appropriate survey protocols and other guidelines described in Section 7.4 of the MSHCP.

Indirect Effects

The yellow warbler could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These impacts include the indirect effects described in the “General Effects” section of this biological opinion. Implementation of the Riparian/Riverine Area and Vernal Pools policy will benefit the yellow warbler by maintaining breeding and foraging habitat used both during the breeding season and spring and fall migrations. The Urban/Wildlands Interface policy will help reduce the effects of adjacent development on linkages connecting both the breeding and migration habitats of the yellow warbler.

Conclusion

We anticipate the proposed action will directly and indirectly affect the yellow warbler as described in the analyses above, including the loss of 27 percent of its modeled breeding habitat in the Plan Area. Implementation of the avoidance, minimization, and mitigation measures identified in the Plan will reduce the impacts to this species. We anticipate that this species will persist in the remaining 73 percent of the modeled habitat within both the existing PQP Lands and the Additional Reserve Lands. Together these lands form a system of large, contiguous habitat blocks that are interconnected within the Plan Area, which we anticipate will be monitored and managed cooperatively to benefit this species.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service’s biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the yellow warbler. We reached this conclusion because 73 percent of the modeled habitat for the yellow warbler will be conserved or remain in the Plan Area. Thus, the impacts associated with loss of this species’ habitat, when viewed in conjunction with protection and management of the MSHCP Conservation Area, are not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Amount or Extent of Take

Because of the large area covered, it will be difficult to quantify the number of birds that will be impacted as a result of the proposed action over the 75-year permit term. Therefore, the Service is quantifying the take as the number of acres of modeled habitat that will be impacted in the Plan Area as a result of the proposed action. We anticipate that up to 12,059 acres of modeled breeding habitat within the Plan Area will become unsuitable for the yellow warbler as a result of the proposed action. Additionally, a small, but undeterminable, number of yellow warblers are anticipated to be taken as a result of management actions.

Take will be in the form of harm, death, and injury. This level of take is not likely to result in jeopardy to the yellow warbler.

Yellow-breasted chat (*Icteria virens*)

Status of the Species

Listing Status

The yellow-breasted chat is considered a California Species of Special Concern by the California Department of Fish and Game. This species is not listed under the Federal Endangered Species Act.

Species Description

The yellow-breasted chat is a very large, aberrant warbler. Large size, aberrant structure, and distinctive plumage distinguish this species from all other wood-warblers and similarly colored songbirds (Eckerle and Thompson 2001). The upperparts are olive green to grayish olive, and the chin, throat, and breast are lemon-yellow, with a mainly white belly and under tail coverts. Two subspecies of *I. virens* are recognized, and the recognized western subspecies of the yellow-breasted chat is *I. v. auricollis* (AOU 1957).

Habitat Affinities

In the arid west, it breeds in riparian and shrubby habitats. It is a habitat generalist relative to other species (Eckerle and Thompson 2001). In southern California, the yellow-breasted chat is primarily found in dense, relatively wide riparian woodlands and thickets of willows, vine tangles, and dense brush with well-developed understories. Nesting areas are associated with streams, swampy ground, and the borders of small ponds. Grinnell and Miller (1944) suggested that plant cover in breeding habitat must be dense to provide shade and concealment.

During the spring and fall migrations, the yellow-breasted chat uses the same low, dense vegetation utilized on the breeding and wintering grounds, although spring migrants are occasionally found in suburban habitats. Rappole *et al.* (1995) classified winter habitat as shrub-steppe, with dense, low cover of woody vegetation.

Life History

The yellow-breasted chat is diurnally active year-long and migrates nocturnally (Zeiner *et al.* 1990a). Throughout the summer, adults feed on small invertebrates, mainly insects and spiders, and take fruits and berries when available (Eckerle and Thompson 2001). The yellow-breasted chat forages by gleaning from foliage of shrubs and low trees (Zeiner *et al.* 1990a). Nestlings are fed primarily larval and adult insects.

The yellow-breasted chat nests in low, dense vegetation in both riparian and upland habitats. In Missouri, chats preferred to nest in large habitat patches and, although this increased their risk of brood-parasitism, it decreased the risk of nest predation and resulted in a higher nesting success (Burhans and Thompson 1999). The yellow-breasted chat breeds from early May into early August with a peak of nesting activity in June. The yellow-breasted chat is monogamous and pairs may nest near one another (Ehrlich *et al.* 1988). The nest of the species is usually 0.6 to 2.4 meters (2 to 8 feet) above the ground in dense shrubs along a stream or river. Although the yellow-breasted chat lays from 3 to 6 eggs, 3 to 4 egg clutches are typical. Incubation is 11 to 15 days, and chicks fledged in 8 to 11 days. The altricial young are brooded exclusively by the female, but both sexes feed the young directly (Eckerle and Thompson 2001). Yellow-breasted chats do not appear to exhibit site fidelity to breeding areas but may exhibit fidelity to wintering areas.

During the breeding season, the male maintains and defends an individual territory. The effectiveness of territorial defense declines with increasing population densities (Eckerle and Thompson 2001). In a low density population in southern Indiana, territory size ranged from 1.1-1.6 hectares and fights between neighboring males were rare (Thompson and Nolan 1973). In a high density population, territory size ranged from 0.5-1.0 hectare; however, male-male interactions were common (Dennis 1958).

The yellow-breasted chat is susceptible to brood-parasitism by the brown-headed cowbird. The species is subject to predation by accipiters, small mammals, and snakes (Zeiner *et al.* 1990a).

Status and Distribution

Yellow-breasted chats summer and nest from British Columbia eastward to New Hampshire and southward to Baja California and northern mainland Mexico. The species presumably migrates throughout much of North America and winters primarily from northern Mexico to Panama (AOU 1998).

Zeiner *et al.* (1990a) describe the yellow-breasted chat as an uncommon summer resident and migrant in coastal California and in the foothills of the Sierra Nevada. The chat is found up to elevations of 1,450 meters (4,800 feet) in valley foothill riparian and up to 2,050 meters (6,500 feet) east of the Sierra Nevada in desert riparian habitats (Gaines 1977a, DeSante and Ainley 1980, Garrett and Dunn 1981). The yellow-breasted chat is uncommon along the coast of northern California and occurs only locally south of Mendocino County (McCaskie *et al.* 1979). In southern California, the species breeds locally on the coast and very locally inland at lower elevations throughout the region (Garrett and Dunn 1981).

In California, the yellow-breasted chat may be found during migration at lower montane elevations in riparian habitat (McCaskie *et al.* 1979). It usually arrives in April and departs by late September for the wintering grounds. The majority of the population winters from Mexico to western Panama, but some individuals overwinter in the southern United States (Eckerle and Thompson 2001). The yellow-breasted chat is occasionally recorded during winter in western California from Humboldt County south to Los Angeles County south to the Mexican border (Garrett and Dunn 1981; Small 1994).

I. v. auricollis has declined in much of its range (Dunn and Garrett 1997), including southern California (Garrett and Dunn 1981), the northern California coast (*e.g.*, Shuford 1993), and in western Washington (*e.g.*, Hunn 1982).

Threats

The primary threats range-wide, as well as in the Plan Area, to the yellow-breasted chat are habitat loss, parasitism by brown-headed cowbirds, and the proliferation of exotic plants (*e.g.*, giant reed). The loss and fragmentation of riparian woodlands in the coastal lowlands, as a result of development, agriculture, and channeling of rivers, are factors that have led to the decline of the yellow-breasted chat in southern California. Garrett and Dunn (1981) concluded that the clearing of dense riparian thickets and brushy tangles in southern California caused a noticeable decline in the number of breeding birds and that cowbird parasitism may have played an additional role in their decline (*e.g.*, Gaines 1974b; Remsen 1978). The invasive spread of giant reed and other nonnative plants may also pose serious threats to the southwestern riparian habitats and the species that reside in them such as the yellow-breasted chat.

Conservation Needs

There are little data regarding distribution and dispersal of the yellow-breasted chat throughout the Plan Area (*e.g.*, Dawson 1921; Griscom and Sprunt 1979; Morse 1989; Curson *et al.* 1994; Dunn and Garrett 1997). Despite the lack of information and relevant data, the conservation of the species likely depends on the management and expansion of existing population centers and the maintenance and enhancement of suitable habitats and all existing or potentially-restorable habitat corridors.

Environmental Baseline

The yellow-breasted chat, once considered common in California (Grinnell and Miller 1944), is now considered uncommon in southern California (Garrett and Dunn 1981). Given the lack of survey information within much of the Plan Area and the secretive nature of the species, the distribution (and status) of the yellow-breasted chat in the Plan Area is unknown. Potential areas to support populations of the species include the Santa Ana River, Temescal Wash, Alberhill Creek, Temecula Creek, San Timoteo Creek, and Murrietta Creek. Additional possible important locales include Bautista Creek, Wilson Creek, and Potrero Creek.

Western Riverside County is important to the conservation of the yellow-breasted chat in southern California. For instance, the number of yellow-breasted chats in the Prado Basin

greatly exceeds the numbers in all of Orange County (*e.g.*, Gallagher 1997). During the 2003 breeding season, the yellow-breasted chat population within the Prado Basin was estimated to be 400 pairs (Pat Tennant, Orange County Water District, pers. comm., July 24, 2003). This population has remained stable or increased slightly over the past 18 years (L. R. Hays, Carlsbad Fish and Wildlife Office, pers. obs.).

The primary vegetation types used to model habitat for this species were riparian scrub/ woodland/forests within the Riverside Lowlands and San Jacinto Foothills bioregions. There are 11,463 acres of modeled habitat for the yellow-breasted chat in the Plan Area. Approximately 5,770 acres (50 percent) of the modeled habitat occur within PQP Lands. A total of 20 (36 percent) of the 55 known observations of the yellow-breasted chat occur within PQP Lands.

Effects of the Action

Direct Effects

The Plan Area includes 11,463 acres of modeled nesting and foraging habitat for the yellow-breasted chat. The loss of 2,581 acres (23 percent) of the modeled habitat is anticipated over the 75-year permit term, which encompasses 15 of the 55 (27 percent) yellow-breasted chat observations in our dataset. Loss of nesting and foraging areas due to development impacts will cause yellow-breasted chats in the Plan Area to disperse from impacted areas in search of other nesting or foraging habitats. Birds forced to disperse from these areas may experience increased competition for the remaining suitable habitat and decreased fitness due to increased energy and time spent locating new habitats. Therefore, the loss of nesting and foraging habitat may impact population numbers of the yellow-breasted chat within the Plan Area over the long term by reducing the number and distribution of areas suitable for use as nesting and foraging sites.

Based on our analysis, to offset the loss of yellow-breasted chat habitat within the Plan Area, the MSHCP will conserve and manage 3,111 acres (27 percent) of modeled habitat for the yellow-breasted chat within Additional Reserve Lands. Approximately 5,770 acres (50 percent) of the modeled habitat will remain within PQP Lands, including 36 percent of the yellow-breasted chat observations in our dataset. In total, 8,882 acres (77 percent) of the modeled habitat will be conserved or remain in the MSHCP Conservation Area, including 20 (44 percent) of the 55 known of the yellow-breasted chat observations in our dataset. Implementation of the Riparian/Riverine Areas and Vernal Pools policy will also help to reduce impacts to this species.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands, including surveys for the yellow-breasted chat. Cooperative management and monitoring are anticipated on PQP Lands. Surveys for the yellow-breasted chat will be conducted at least every five years to verify occupancy and successful reproduction at a minimum of 75 percent of the Core Areas (including future-identified Core Areas). Successful reproduction is defined as a nest which fledged at least one known young. If a decline in distribution of the yellow-breasted chat is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP. Other management measure listed in Section 5 will help to maintain habitats within the core population areas, such as maintenance of ecological processes

within occupied habitat and appropriate new areas within the MSHCP Conservation Area. Reserve Managers will be responsible for Core Areas and will evaluate the condition of riparian vegetation and maintain a program to enhance/create riparian habitat and implement exotic species control programs. This species will also be managed for possible brown-headed cowbird parasitism (Section 5, Table 5.2).

Management actions to benefit the yellow-breasted chat or other Covered Species (*e.g.*, exotic vegetation removal) may result in impacts, including death, to a small number of individual yellow-breasted chats. It is anticipated that any impacts to yellow-breasted chats from management actions will be minimized by adherence to appropriate survey protocols and other guidelines described in Section 7.4 of the MSHCP.

Indirect Effects

The yellow-breasted chat could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These include the indirect effects described in the “General Effects” section of this biological opinion. Implementation of the Riparian/Riverine Area and Vernal Pools policy will benefit the yellow-breasted chat by maintaining breeding and foraging habitat used both during the breeding season and spring and fall migration windows. The Urban/Wildlands Interface policy will help reduce the effects of adjacent development on linkages connecting both the breeding and migration habitats of the yellow-breasted chat.

Conclusion

We anticipate the proposed action will directly and indirectly affect the yellow-breasted chat as described in the analyses above, including the loss of 23 percent of the species’ modeled breeding and migration habitat within the Plan Area. Implementation of the avoidance, minimization, and mitigation measures identified in the Plan will reduce the impacts to this species. We anticipate that this species will persist in the remaining 77 percent of the modeled habitat within both the existing PQP Lands and the Additional Reserve Lands. Together these lands form a system of large, contiguous habitat blocks that are interconnected within the Plan Area, which we anticipate will be monitored and managed cooperatively to benefit this species.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service’s biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the yellow-breasted chat. We reached this conclusion because 77 percent of the modeled habitat for the yellow-breasted chat will be conserved or remain in the Plan Area. Thus, the impacts associated with loss of this species’ habitat, when viewed in conjunction with protection and management of the MSHCP Conservation Area, are not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Amount or Extent of Take

Because of the large area covered, it will be difficult to quantify the number of birds that will be impacted as a result of the proposed action over the 75-year permit term. Therefore, the Service is quantifying the take as the number of acres of modeled habitat that will be impacted in the Plan Area as a result of the proposed action. We anticipate that up to 2,581 acres of modeled breeding and migration habitat within the Plan Area could become unsuitable for the yellow-breasted chat as a result of the proposed action. Additionally, a small, but undeterminable, number of yellow-breasted chats are anticipated to be taken as a result of management actions.

Take will be in the form of harm, death, and injury. This level of take is not likely to result in jeopardy to the yellow-breasted chat.

CRUSTACEANS

Santa Rosa Plateau fairy shrimp (*Lindleriella santarosae*)

Status of the Species

Listing Status

The Santa Rosa Plateau fairy shrimp is not a State or federally listed species.

Species Description

The Santa Rosa Plateau fairy shrimp is a small freshwater crustacean in the Family *Lindleriellidae* and Order *Anostraca*. Fairy shrimp have delicate elongate bodies, large stalked compound eyes, no carapaces, and 11 pairs of swimming legs. The Santa Rosa Plateau fairy shrimp, like other fairy shrimp, swim on their backs throughout their adult life cycle.

Habitat Associations

Fairy shrimp are restricted to vernal pools and vernal pool-like ephemeral basins. Vernal pools are a type of ephemeral wetland that occur within a range that extends from southern Oregon through California into northern Baja California, Mexico (U.S. Fish and Wildlife Service 1998b). They require a unique combination of climatic, topographic, geologic, and evolutionary factors for their formation and continued existence. Vernal pools form in regions with Mediterranean climates where shallow depressions fill with water during fall and winter rains and then dry up when the water evaporates in the spring (Collie and Lathrop 1976; Holland 1976; Holland and Jain 1977, 1988; Thorne 1984).

The Santa Rosa Plateau fairy shrimp is restricted to seasonal southern basalt flow vernal pools with cool clear to milky waters that are moderately predictable and remain filled for extended periods of time (Thiery and Fugate 1994; Eriksen and Belk 1999).

Life History

Little is known about the Santa Rosa Plateau fairy shrimp specifically. Anostracans are non-selective particle-feeding filter-feeders. They filter and ingest detritus, bacteria, algal cells, and other items between 0.3 to 100 microns from the water column in vernal pools. Fairy shrimp forage on micronutrient packages, converting the micro-nutrients into usable food for larger invertebrates and vertebrates. Fairy shrimp may be eaten by a wide variety of species, including beetles, dragonfly larvae, other arthropods, frogs, salamanders, toad tadpoles, shorebirds, ducks, and other fairy shrimp. The Santa Rosa Plateau fairy shrimp may be found swimming and competing for food resources with the vernal pool fairy shrimp.

Nothing is known about the Santa Rosa Plateau fairy shrimp's reproductive biology, except that it has large cysts (Eriksen and Belk 1999).

Status and Distribution

The Santa Rosa Plateau fairy shrimp is endemic to western Riverside County (Thiery and Fugate 1994; Eriksen and Belk 1999) at an elevation of 625 meters. The Santa Rosa Plateau fairy shrimp is known only from vernal pools on the Santa Rosa Plateau (Thiery and Fugate 1994; Eriksen and Belk 1999). A review of 7.5 minute U.S. Geological Survey topographic maps reveals other possible mesas with the potential to support Santa Rosa Plateau fairy shrimp habitat outside the protection of Santa Rosa Plateau Ecological Reserve.

Threats

Within the known range of the Santa Rosa Plateau fairy shrimp on the Santa Rosa Plateau Ecological Reserve, the species has been affected by alterations in hydrology, grazing, invasions of non-native species, and deleterious effects resulting from habitat fragmentation and adjoining urban land uses.

The Santa Rosa Plateau vernal pools are threatened by adjacent urban development and by the invasion of non-native grasses. Houses have been constructed across the road from Mesa de Colorado. Culverts have been constructed that connect this developed property to the property with vernal pools on Mesa de Colorado, allowing runoff from the developed land to flow down into the vernal pools (C. Bell and Z. Principe, Santa Rosa Plateau Ecological Reserve, pers. comm. to S. Brown, U.S. Fish and Wildlife Service 2003).

Nearby mesas, where surveys have not been conducted for the species, may support vernal pool habitat and Santa Rosa Plateau fairy shrimp. These mesas may be subject to the same threats documented for other vernal pool species, including agricultural conversion, grazing, competition with invasive species, and urban development.

Conservation Needs

The Santa Rosa Plateau fairy shrimp's known distribution is limited to eight pools on the Santa Rosa Plateau Ecological Reserve. Vernal pools in and around the Santa Rosa Plateau have not

been surveyed extensively for vernal pool species. Within the Plan Area, potential habitat for the species is very narrowly distributed and consists of about 2,415 acres of basalt flow soils on and around five mesas in the vicinity of the Santa Rosa Plateau Ecological Reserve. Suitable habitat for the Santa Rosa Plateau fairy shrimp in the Santa Rosa Plateau region should be managed and protected to benefit the species. Existing vernal pools, in the vicinity of the Santa Rosa Plateau Ecological Reserve and their associated watersheds, should be secured from further loss and degradation in a configuration that maintains habitat function and species viability.

Environmental Baseline

The Santa Rosa Plateau fairy shrimp is known only from vernal pools on the Santa Rosa Plateau Ecological Reserve (Thiery and Fugate 1994; Eriksen and Belk 1999). There are 13 vernal pools, totaling 53.18 acres, on three mesas at the Reserve (Lathrop and Thorne 1983). Limited fairy shrimp surveys were conducted in four pools on Mesa de Colorado and nine pools on Mesa de Burro in 1995 (Serpa 1995a, 1995b). Lathrop and Thorne (1983) described four pools on Mesa de Colorado and only eight pools on Mesa de Burro; however, the pool labeled B8 is shown as two basins in Figure 2 of their report. In 1995, Santa Rosa Plateau fairy shrimp were observed in five of the nine pools on Mesa de Burro and in three of the four pools on Mesa de Colorado (Serpa 1995a, 1995b). In 1998, Santa Rosa Plateau fairy shrimp were found in three pools on Mesa de Colorado (Angelos 1998).

The Santa Rosa Plateau Ecological Reserve, comprising approximately 9,000 acres, was assembled between 1983 and 1991 and is managed by The Nature Conservancy, the U.S. Fish and Wildlife Service, the California Department of Fish and Game, Riverside County Parks and Open Space District, and the Metropolitan Water District of Southern California (Dangermond & Associates, Inc. 1991; Metropolitan Water District of Southern California *et al.* 1991). There are five mesas with basalt flow soils suitable for vernal pools in and around the Santa Rosa Plateau Ecological Reserve. Mesa de Burro and Mesa de la Punta both fall within the Santa Rosa Plateau Ecological Reserve. Mesa de Colorado is located on the southwest edge of the Reserve, partially within the Reserve. Redonda Mesa and Avenaloca Mesa are both outside of the Reserve. It is unlikely that vernal pools currently exist on Avenaloca Mesa (Z. Principe, pers. comm. to S. Brown, U.S. Fish and Wildlife Service, 2003), but vernal pools suitable for the Santa Rosa Plateau fairy shrimp may occur in other mesa areas outside of the Santa Rosa Plateau Ecological Reserve.

There are two pools located south of Avocado Mesa Road on Mesa de Colorado. These pools are not included in the 13 vernal pools reported by Lathrop and Thorne (1983). One pool is on private property and the other falls within the boundary of the Santa Rosa Plateau Ecological Reserve. No surveys for vernal pool species have been conducted at these two pools (C. Bell, pers. comm. to S. Brown, U.S. Fish and Wildlife Service, 2003). Additional vernal pools and borrow pits, which have not been surveyed and may contain suitable habitat for vernal pool species, exist in private property west of the Reserve boundary across Via Volcano (Z. Principe, pers. comm. to S. Brown, U.S. Fish and Wildlife Service, 2003). Protocol fairy shrimp surveys have not been conducted in any of the pools on the Santa Rosa Plateau.

We used the following parameters to model habitat for Santa Rosa Plateau fairy shrimp within the Plan Area: vernal pools and playas and any other habitat that occurs on clay soils (Claypit, Porterville, Altamont, Auld, Bosanko) and Santa Rosa Plateau basalt flow soils within the Santa Ana Mountains Bioregion. The Plan Area supports 2,573 acres of modeled habitat for the Santa Rosa Plateau fairy shrimp. Approximately 1,330 acres (52 percent) of the modeled habitat occurs within PQP Lands. We were unable to include additional soil types that harbor vernal pools (such as Murrieta stony clay loam) in our model because we do not have access to digital overlays mapping the extent of these soil types in the Plan Area. This habitat model captures areas that may harbor undocumented vernal pools or other appropriate areas that may provide suitable habitat for the species. Although Santa Rosa Plateau fairy shrimp is a vernal pool-associated species, we did not use the vernal pool model in our analysis of this species. Since Santa Rosa Plateau fairy shrimp is only known to occur on the Santa Rosa Plateau within the Santa Ana Mountains Bioregion, using the vernal pool model would represent a gross overestimate of this species' potential habitat in the Plan Area.

Effects of the Action

Direct Effects

The Plan Area includes 2,573 acres of modeled habitat for the Santa Rosa Plateau fairy shrimp. Based on our analysis, approximately 901 acres (35 percent) of the modeled habitat are within the Additional Reserve Lands and approximately 1,330 acres (52 percent) are within existing PQP Lands. Thus, the MSHCP Conservation Area will include 2,231 acres (87 percent) of modeled habitat for the Santa Rosa Plateau fairy shrimp, including all the known occupied locations for this species. In addition, all currently known occupied sites outside of our modeled habitat will remain in PQP Lands.

We anticipate the loss of 342 acres (13 percent) of modeled habitat within the Plan Area over the 75-year permit term. No vernal pools currently known to be occupied by the Santa Rosa Plateau fairy shrimp will be impacted through implementation of the MSHCP.

The species-specific objectives for the Santa Rosa Plateau fairy shrimp indicate that the MSHCP Conservation Area will include at least 32 acres of basalt-flow vernal pools at the Santa Rosa Plateau Ecological Reserve and at least 2,134 acres of basalt flow that may contain unmapped vernal pool habitat which might support the species. Additional areas within the Plan Area important for the long-term conservation of the Santa Rosa Plateau fairy shrimp, identified through implementation of the Riparian/Riverine Areas and Vernal Pools policy, may be included within the MSHCP Conservation Area.

Several vernal pools west of Via Volcano have not been surveyed, and although these pools are proposed for inclusion in the Additional Reserve Lands, they may be affected by construction that has been initiated in this area (Z. Principe, pers. comm. to S. Brown, U.S. Fish and Wildlife Service, 2003). As projects are proposed within the Plan Area, surveys for the Santa Rosa Plateau fairy shrimp will be conducted in stock ponds, ephemeral pools, and other features that may impact suitable habitat for the species. If occupied by Santa Rosa Plateau fairy shrimp or

other vernal pool Covered Species, we anticipate that impacts to vernal pools will be avoided and minimized through implementation of the Riparian/Riverine Areas and Vernal Pools policy.

General management commitments important to vernal pool species are addressed in the “Generalized Effects Analysis for Vernal Pools.” The Permittees will implement management and monitoring practices within the Additional Reserve Lands including surveys for the Santa Rosa Plateau shrimp. Cooperative management and monitoring are anticipated on PQP Lands. Surveys for the Santa Rosa Plateau fairy shrimp will be conducted at least every eight years to verify occupancy at a minimum of 75 percent of the Core Areas for the species. If a decline in the distribution of the Santa Rosa Plateau fairy shrimp is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP.

Other management measures listed in Section 5, Table 5.2 will ensure habitat support functions within the MSHCP Conservation Area by maintaining and/or preserving watersheds of conserved known and future basalt vernal pools. Particular emphasis will be given to hydrological maintenance. Implementation of these management measures will help to avoid and minimize direct effects to the Santa Rosa Plateau fairy shrimp.

Management actions to benefit the Santa Rosa Plateau fairy shrimp (*e.g.*, salvage efforts, habitat creation/manipulation/restoration/enhancement) or other Covered vernal pool species may result in impacts, including death, to a small number of Santa Rosa Plateau fairy shrimp including cysts. It is anticipated that any impacts to the Santa Rosa Plateau fairy shrimp from management actions will be minimized by adherence to appropriate survey and monitoring protocols and other guidelines described in Section 7.4 of the MSHCP.

Indirect Effects

The Santa Rosa Plateau fairy shrimp could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These include the indirect effects described in the “General Effects” section of this biological opinion. Specific planned activities are known from the watershed of Mesa de Colorado, which extends beyond the boundary of the Santa Rosa Plateau Ecological Reserve, and these activities may indirectly impact vernal pools on this mesa. There are eight parcels along Via Volcano, and single family home construction may be proposed for these parcels. They cover the majority of the watershed outside of the Reserve for two vernal pools, and four culverts carry water directly from these parcels to the pools on the Reserve property (Z. Principe, pers. comm. to S. Brown, U.S. Fish and Wildlife Service, 2003). One of the two vernal pools is known to be occupied by the Santa Rosa Plateau fairy shrimp (Serpa 1995b, Angelos 1998). Alteration of hydrology and discharge of materials into these culverts, via construction activities and subsequent residential uses on these parcels, may result in adverse impacts to the pools and the Santa Rosa Plateau fairy shrimp.

Indirect effects with the potential to affect vernal pools and the species that occupy them within the Plan Area, including the Santa Rosa Plateau fairy shrimp, are addressed in the “Generalized Effects Analysis for Vernal Pools.” We anticipate that Section 6.1.4, Guidelines Pertaining to

the Urban/Wildlands Interface and Section 5.0, Management and Monitoring, will help to reduce indirect effects to the species.

Conclusion

We anticipate the proposed action will directly and indirectly affect the Santa Rosa Plateau fairy shrimp as described in the analyses above, including the loss of up to 13 percent of its modeled habitat in the Plan Area. We anticipate these impacts from Covered Activities to be greatly minimized with implementation of the Riparian/Riverine Areas and Vernal Pools policy (*i.e.*, we anticipate only a 10 percent loss of Santa Rosa Plateau fairy shrimp habitats determined to have long-term conservation value for the species). We anticipate that this species will persist in the remaining 87 percent of the modeled habitat within both the existing PQP Lands and the Additional Reserve Lands.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the Santa Rosa Plateau fairy shrimp. We reached this conclusion because no known Santa Rosa Plateau fairy shrimp will be affected by implementation of the MSHCP and because suitable basalt flow vernal pools will be conserved or remain in the Plan area. In addition, surveys and implementation of the Riparian/Riverine Area and Vernal Pools policy may result in newly discovered occurrences being avoided and/or included in the MSHCP Conservation Area. Thus, the impacts to this species and its modeled habitat, when viewed in conjunction with the protection and management of the MSHCP Conservation Area, are not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of the Santa Rosa Plateau fairy shrimp throughout its range.

Amount or extent of take

It is not possible to quantify the number of Santa Rosa Plateau fairy shrimp adults, cysts, or populations that will be impacted throughout the Plan Area over the 75-year permit term. Thus, the Service is quantifying the take as the number of acres of vernal pool habitat that will be impacted in the Plan Area as a result of the proposed action

We anticipate that up to 342 acres of vernal pool habitat within the Plan Area will become unsuitable for the Santa Rosa Plateau fairy shrimp as a result of the proposed action. Santa Rosa Plateau fairy shrimp and their cysts may also be taken through project-related salvage efforts and Reserve management activities, including regular monitoring efforts and creation, restoration and enhancement efforts. Take will be in the form of harm, death, and injury. This level of take is not likely to result in jeopardy to the Santa Rosa Plateau fairy shrimp.

Terms and Conditions for Fairy Shrimp Management Activities Involving Salvage, Creation, Restoration, and Enhancement efforts:

1. Fairy shrimp pond soil (inoculum) will be collected when it is dry to avoid damaging or destroying fairy shrimp cysts which are fragile when wet. A hand trowel or similar

instrument will be used to collect the soil. Whenever possible, soil will be collected in chunks. The trowel will be used to pry up intact chunks of soil, rather than loosening the soil by raking and shoveling which can damage cysts. Soil will not be collected from any ponds until approved by the Service.

2. The soil from each pond will be stored individually in labeled bags or boxes that are adequately ventilated and kept out of direct sunlight in order to prevent the occurrence of fungus or excessively heating the soil.
3. Inoculum will not be introduced into the created ponds until after the created ponds have been demonstrated to retain water for a minimum 60 days and will be placed in a manner that preserves, to the maximum extent possible, the orientation of the fairy shrimp cysts within the surface layer of soil (*e.g.*, collected inoculum will be shallowly distributed within the pond so that cysts have the potential to be brought into solution upon inundation).

FISH

Arroyo chub (*Gila orcutti*)

Status of the Species

Listing Status

The arroyo chub is not listed under the Federal Endangered Species Act. It is considered a California Species of Special Concern by the California Department of Fish and Game.

Species Description

The arroyo chub is a small (up to 120 millimeters standard length), chunky fish with fairly large eyes and a small, subterminal mouth. The species is silver or grey to olive-green dorsally, white ventrally, and there usually is a dull grey lateral band (Moyle 1976b). Males can be distinguished from females by their larger fins and, when breeding, by the prominent patch of tubercles on the upper surface of the pectoral fins (Tres 1992).

Habitat Affinities

The arroyo chub prefers slow moving or backwater sections of cool to warm (10° to 24° Celsius) streams with substrates of sand or mud, but they are also found in fast-moving sections of stream with coarser bottoms (Bell 1978). The depth of the stream is typically greater than 40 centimeters. Spawning takes place in quiet edgewater at temperatures between 14° and 22° Celsius (Tres 1992).

Castleberry and Cech (1986) demonstrated in laboratory studies that this species can tolerate hypoxic (low oxygen) conditions and wide fluctuations in temperature. They are adapted for

surviving the warm fluctuating streams of the Los Angeles Basin that naturally shifted between muddy torrents in the winter and clear intermittent brooks in the summer (Moyle 1976b).

Life History

The arroyo chub is omnivorous, feeding primarily on algae (Greenfield and Deckert 1973) and on roots of a floating water fern (*Azolla*) infested with nematodes (Moyle 1976b), but also ingesting other plants, aquatic insects and their larvae, and small crustaceans.

Arroyo chubs are fractional spawners that breed more or less continuously from February through August, although most spawning takes place in June and July (Tres 1992). Egg release is initiated by the male rubbing his snout against the area below the female's pelvic fins. Once released, eggs may be fertilized by more than one male. In captivity, arroyo chubs attach their eggs to vegetation in flowing water (Tres 1992). Embryos hatch after about 4 days, and larvae are about 4-6 millimeters in length (Swift 2001). After hatching, the fry spend the first three to four months in quiet water, usually among vegetation or other flooded cover. They begin to reproduce at the age of one year and may live three to four years (Tres 1992).

Status and Distribution

The native range of the arroyo chub includes the Los Angeles, San Gabriel, San Luis Rey, Santa Ana, and Santa Margarita rivers and also Malibu and San Juan creeks (Wells and Diana 1975). It is largely coincident with the Los Angeles metropolitan area where most streams are degraded and populations are reduced and fragmented (Moyle *et al.* 1995). This species is still relatively common in the upper Santa Margarita River and some of its tributaries, the Santa Ana River in Riverside County, Trabuco Creek below O'Neill Regional Park and San Juan Creek drainage, and Malibu Creek. It is present, but scarce, in Big Tujunga Canyon (Pacoima Creek above Pacoima Reservoir) and the Sepulveda Flood Control Basin; and present in the upper San Gabriel River drainage (Swift *et al.* 1993). Fish fossils at Rancho La Brea, including arroyo chub (Swift 1989), indicate local, permanent stream conditions were present in the past. The arroyo chub is reduced within its native range because the low-gradient streams in which they do best have largely been altered.

Introduced populations occur at Santa Maria-St. Inez, Mojave, Santa Clara, and Cuyama river drainages, and a portion of San Felipe Creek (Miller 1968; Moyle 1976c; Bell 1978; Sigler and Sigler 1987; Page and Burr 1991). Within the literature, there is some disagreement regarding the extent of this species' native distribution. Miller (1968) and Bell (1978) conclude that the Santa Clara population is probably introduced while Moyle (1976c) and Page and Burr (1991) indicate that this population is native.

Mass hybridization between the arroyo chub and the Mojave tui chub have completely eliminated the pure stock of Mojave tui chub in the Mojave River drainage (Hubbs and Miller 1943; Castleberry and Cech 1986). Within the Cuyama River, California roach-arroyo chub hybrids are abundant (Moyle 1976b). High stream flows segregate the two species, with chubs preferring large pools and reservoirs while the roach uses riffles and smaller pools. Low flow events force the species together, resulting in hybridization.

Threats

Although the arroyo chub is, in places, locally common in what remains of its native range, the total size of any one of these remaining populations is still relatively small. In general, all remaining populations of the arroyo chub are at risk due to their small size. The following conditions continue to threaten the status of the arroyo chub: 1) destruction, degradation, and fragmentation of habitat through urbanization, channelization and other flood control structures; 2) dewatering of habitat from water diversion and withdrawal; 3) reductions in water quality; 4) fire (*i.e.*, reduced habitat quality from increased sedimentation and loss of riparian shading); 5) recreational activities including off-road vehicle use and bathing; and 6) competition and predation from non-native species.

Conservation Needs

Barriers to fish movement should be modified or eliminated, a dependable water supply should be secured, and water quality standards should be examined. In addition, the practice of stocking non-native fishes in lakes, ponds, and other drainages within the Santa Ana and Santa Margarita river watersheds should be evaluated for its effect upon the arroyo chub and other native fish species. A non-native plant and animal species eradication program could reduce the adverse effects by removing these organisms from the watershed or reducing their numbers and/or distribution. Research on the actual effects of tertiary-treated wastewater and pesticide and herbicide contamination on the arroyo chub should be conducted so that appropriate efforts can be made to minimize potential detrimental effects. Acute and chronic toxicity studies targeting the arroyo chub should be conducted so that protective water quality standards for regulated discharges can be developed and implemented. Efforts to effectively curb urban runoff should be developed and implemented to prevent arroyo chub from being adversely affected by non-point source pollution. In addition, impaired portions of the Santa Ana and Santa Margarita rivers and their tributaries should be priorities for addressing the total maximum daily load of dissolved solids and contaminants.

Environmental Baseline

In the Plan Area, the arroyo chub exists within the Santa Ana and Santa Margarita river watersheds. Within the Santa Ana River watershed, the arroyo chub occurs between the San Bernardino County line and Prado Dam in the river and the following tributaries: Temescal Creek, Evans Lake Drain, Arroyo Tesquesquite, Sunnyslope Creek, and Mt. Rubidoux Creek (Swift 2001, CNDDDB 2003). Within the Santa Margarita River watershed, the river and the following six tributaries currently support arroyo chub: upstream portions of De Luz Creek and Sandia Creek, Murrieta Creek, Cole Creek, and Temecula Creek upstream of Vail Lake, and Long Canyon Creek (Fisher and Swift 1998, Warburton *et al.* 2000, R. Fisher, U.S. Geological Survey, pers. comm., 2003).

We have 10 occurrences of the arroyo chub in our dataset for the Plan Area. Seven occurrences are within the Santa Ana River watershed, and three occurrences are within the Santa Margarita River watershed. Based on this information and current information from Swift 2001, we

believe that a majority of the arroyo chub population in Western Riverside County is located within PQP Lands.

The Santa Ana River, which drains 1,792,000 acres of land, flows southwesterly into northern Riverside County from the southern border of San Bernardino County. As the Santa Ana River passes into Riverside County, riparian vegetation, gravel, cobble, and sand substrate and meandering streams provide diverse habitats suitable for arroyo chub spawning, foraging, and refugia for up to 15 miles within the Plan Area. Since the Santa Ana River in Orange County contains relatively unsuitable habitat, and the Santa Ana River in San Bernardino County contains less than four miles of suitable habitat, Riverside County contains the largest amount of suitable habitat for the arroyo chub within the Santa Ana River watershed.

The Santa Margarita River watershed drains 474,937 acres of land (Warburton *et al.* 2000). Although Murrieta, Temecula and Pechanga creeks, the three main creeks that are the source of the Santa Margarita River, had formed a large, flat, alluvial valley with an extensive riparian forest, this valley has now been developed into a mix of suburban development and agriculture with its associated runoff issues. Many of the smaller tributaries feeding the main creeks in this valley have steep gradients and waterfalls that limit upstream movement of native fishes.

Modeled habitat for the arroyo chub was based upon vegetation types associated with the two major river watersheds in the Plan Area. To model habitat for the arroyo chub, the boundaries of the Santa Ana River were expanded with a buffer area to capture all of the available riparian habitat in the floodplain between the levees in the northeastern portion of the river and in any tributaries that could provide habitat (*e.g.*, Sunnyslope Creek) in order to capture the meandering nature of the river, its tributaries, and dynamic hydrologic processes that provide essential habitat for native fish. Modeled habitat for the arroyo chub included vegetation types associated with rivers in the Plan Area including mule fat scrub, riparian/arundo forest, riparian forest, riparian scrub, southern cottonwood/willow riparian, southern sycamore/alder riparian woodland, southern willow scrub, tamarisk scrub, Riversidean alluvial fan sage scrub, disturbed alluvial habitat, marsh, coastal and valley freshwater marsh as well as open water, ponds, and reservoirs. By using such a buffer, the modeled habitat also included some grasslands, coastal scrub, Diegan coastal sage scrub, and Riversidean sage scrub within the flood plain. Modeled habitat also includes all of the habitat within the Prado Basin that may be inundated from flood control or water conservation activities but that frequently provides stream habitat during drier times. Although much of the modeled habitat within Prado Basin has not been documented to support the arroyo chub in recent years, it is connected with the Santa Ana River and has not been exhaustively surveyed for the species. We also included approximately 1,000 acres that are riparian areas but had been classified inappropriately in our dataset as urban/exotic, non-native grassland, or dairy/livestock. To provide connectivity within the stream courses of the Santa Margarita River watershed, we included chaparral, coastal sage scrub, grasslands, riparian scrub, woodland and forest, Riversidean alluvial fan sage scrub, woodlands and forest, meadows and marshes, open water, field crops and orchards, and developed or disturbed habitats.

The Plan Area contains 9,026 acres of modeled habitat for the arroyo chub. Due to limitations of our dataset, reservoirs and ponds were included in the number of acres of modeled habitat, although reservoirs and ponds do not generally support arroyo chub. Also, smaller tributaries to

the watersheds are not captured in our model that are or may be occupied by the arroyo chub (*i.e.*, Long Canyon Creek, Warburton *et al.* 2000). Of modeled habitat, 7,157 acres (79 percent) currently exists within PQP Lands.

Effects of the Action

Direct effects

The Plan Area includes 9,026 acres of modeled habitat for the arroyo chub. The loss of 638 acres (7 percent) of this modeled habitat is anticipated over the 75-year permit term due to development impacts. These 638 acres of modeled habitat are scattered in smaller disjunct patches along the margin of the Santa Ana River and some areas of the Santa Margarita River tributaries. We believe that the current distribution of arroyo chub within the mainstem of the Santa Ana River and its tributaries are within lands largely defined as PQP Lands and Additional Reserve Lands. On the Santa Margarita River, the current population distribution appears to be mainly within PQP Lands. About 7,157 acres (79 percent) of modeled arroyo chub habitat is within existing PQP Lands, and approximately 1,2310 acres (14 percent) of this habitat will be included within the Additional Reserve Lands. Therefore, we anticipate that approximately 93 percent of the modeled habitat for the arroyo chub will be conserved or remain within the Plan Area.

Covered Activities considered in the Plan that may adversely affect the arroyo chub include the construction of new roads, road widening and road maintenance; flood control activities; the construction and operation of Future Facilities such as water and wastewater treatment plants, electrical utility facilities, and natural gas facilities; and the development of land for residential, commercial, and industrial use (*i.e.*, urbanization).

Construction as a result of new or widened roads and bridges, road maintenance, new flood control, and/or flood control maintenance activities that take place within or upstream of occupied habitat could directly affect the arroyo chub by crushing fish and their eggs and/or larvae during construction, smothering fish and their eggs and/or larvae due to sediment movement during construction, degrading streambed habitat (*i.e.*, flattening or removing pool-riffle complexes, removing riparian vegetation), and altering hydrological processes such as the direction and velocity of stream flow that can undercut banks. Undercut banks can lead to a reduction in channel stability resulting in further erosion and increased sedimentation, smothering or desiccation of arroyo chub eggs and/or larvae, and a loss of vegetative cover. However, we anticipate that implementation of the Riparian/Riverine Areas and Vernal Pools policy will help ensure that effects to the arroyo chub and its habitat are avoided where possible. We also anticipate that implementation of the Guidelines for Facilities Within the Criteria Area, including the Construction Guidelines and Best Management Practices, will avoid and/or minimize potential impacts to the arroyo chub.

We have no project-specific information regarding the future energy and water delivery systems or the development of residential, commercial, or industrial facilities that may occur within the Plan Area over the life of the permit. However, where these facilities will occur within habitat for the arroyo chub, we anticipate that the direct effects of facility construction, operation and

maintenance such as ground disturbance and changes to water quality or quantity within the Santa Ana and Santa Margarita rivers, as described in the “Generalized Effects” section of this biological opinion, will be minimized and/or avoided by compliance with the Riparian/Riverine Areas and Vernal Pools policy, the Urban/Wildlands Interface Guidelines, Facilities Siting Criteria, and Construction Guidelines and Best Management Practices, where applicable.

To offset the loss of arroyo chub habitat within the Plan Area, implementation of the MSHCP will conserve and manage areas containing modeled habitat for the species. The Plan outlines five species-specific conservation objectives for the arroyo chub:

1. Include within the MSHCP Conservation Area 4,580 acres of habitat for the arroyo chub that provides potential spawning and foraging opportunities in the Santa Ana and Santa Margarita watersheds;
2. Include within the MSHCP Conservation Area the suitable Core Areas in the Santa Ana River watershed. Conserve the natural river bottom and banks including adjacent upland habitat where available to provide shade and suitable microclimate conditions on the Santa Ana River from the Orange/Riverside County line to the upstream boundary of the Plan Area;
3. Include within the MSHCP Conservation Area the suitable Core Areas and available adjacent habitat for the arroyo chub in the Santa Margarita River watershed. Conserve the natural river and creek bottom and banks up to an elevation of 400 meters in the reach of the Santa Margarita River in the Plan area, and in Deluz Creek and its tributary downstream to the County line, in upper Sandia Creek downstream to the County line, in Murrieta Creek from Winchester Road to near its confluence with the Santa Margarita, in Cole Creek between its confluence with Murrieta Creek and the boundary of the Nature Conservancy property and in Temecula Creek from Long (Smith) Canyon just below the falls downstream to the concrete drop structure at Highway 79;
4. Reserve Managers responsible for the areas outlined in conservation objectives 2 and 3 in the MSHCP Conservation Area will assess barriers to arroyo chub movement and the need for connectivity, and will identify measures to restore connectivity to be implemented as feasible;
5. Reserve Managers responsible for the areas outlined in conservation objectives 2 and 3 will assess threats to the arroyo chub from degraded habitat (*e.g.*, water quality, non-native invasive plants and animals); identify areas necessary for successful spawning; identify areas for creation of stream meander, pool/riffle complexes, and reestablishment of native riparian vegetation as appropriate and feasible; and identify and implement management measures to address threats and protect critical areas.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands including surveys for the arroyo chub. Cooperative management and monitoring are anticipated on PQP Lands. Surveys for the arroyo chub will be conducted at least every eight years to verify occupancy at a minimum of 75 percent of the Core Areas identified above. If a

decline in the distribution of the arroyo chub is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific conservation objectives identified above and in Section 9, Table 9.2 of the Plan.

According to Section 5, Table 5-2 of the Plan, Reserve Managers will prepare an Adaptive Management Plan for the arroyo chub to address threats from degraded habitat, including reduced water quality, loss of habitat, and introduction of non-native species. Reserve managers will identify areas of the watersheds that are necessary to successful spawning and will identify and implement habitat conservation measures to protect these areas from degradation due to flood control and water conservation operations. The Adaptive Management Plan will include monitoring to assess the current range of arroyo chub movement within the Santa Margarita River watershed and assess the need for connectivity within the portion of the watershed in the Plan Area and implement measures to restore connectivity if needed. Reserve Managers will enhance and/or create habitat for the arroyo chub to condition for spawning, foraging and refugia in both the Santa Ana River and Santa Margarita River watersheds. Reserve Managers will identify and protect spawning sites and monitor annually each of the Core Areas in order to obtain estimates of recruitment success. Enhancement measures will include removal of exotic species, the creation of stream meanders and riffle/pool complexes and reestablishment of native riparian vegetation. Existing flood control structures will be evaluated for need and modified as possible and as the opportunity arises to improve fish habitat. Within the Santa Ana River, enhancement measures will be concentrated between Mission Boulevard and the Orange/Riverside County line. Reserve Managers will conduct or cooperate with Federal, State, and local agencies in a bullfrog and non-native fish eradication program within the Santa Ana River and Santa Margarita River watersheds. The program will include development of fish barriers at sources of non-native species (*e.g.*, Prado ponds or Evans Lake) and active removal of non-native fish through mechanical means.

Implementation of management and monitoring activities for the arroyo chub may harm individuals of the species. For example, mechanical methods (*e.g.*, gillnets, trapping) for non-native species eradication may also net or trap arroyo chub, which may be killed or injured by this activity. Depending on the type of program implemented, monitoring of fish passage within a watershed may impact arroyo chub. It is anticipated that any impacts to arroyo chub from management and monitoring actions will be minimized by adherence to appropriate trapping protocols and other guidelines described in Section 7.4 of the MSHCP.

Indirect Effects

The arroyo chub could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. Potential indirect effects to the arroyo chub and its habitat include changes to water quality and quantity from road and/or bridge construction or widening, flood control, urbanization and future facilities that could result in increased runoff as described in the “Generalized Effects” section of this biological opinion. We anticipate that indirect effects to the arroyo chub from changes to water quality and quantity, introduction of new discharge points, and changes to hydrology, streambed dynamics and stream length will be avoided and minimized by compliance with the Riparian/Riverine Areas and Vernal Pools policy, Facilities Siting Guidelines, Construction Guidelines and Best Management Practices,

and implementation of the conservation objectives to maintain or improve existing water quality and flow levels.

Conclusion

We anticipate the proposed action will directly and indirectly affect the arroyo chub as described in the analyses above, including the loss of 7 percent of its modeled habitat in the Plan Area. Implementation of the policies, guidelines, and conservation objectives identified in the Plan will significantly reduce impacts to this species, and we anticipate that this species will persist in the remaining 93 percent of the modeled habitat within both the existing PQP Lands and the Additional Reserve Lands. We anticipate that these areas will be monitored and managed cooperatively to the benefit of this species.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the arroyo chub. We reached this conclusion because 93 percent of the modeled habitat for the arroyo chub and almost the entire distribution of the chub within the Plan Area will be included in the MSHCP Conservation Area. Thus, the impacts to this species and its associated habitat, when viewed in conjunction with the protection and management of the MSHCP Conservation Area, are not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Amount or Extent of Take

Occupation of modeled habitat by the arroyo chub is expected to fluctuate over time and baseline survey data is incomplete. Because estimating the actual number of arroyo chub anticipated to be taken is not feasible, the Service is quantifying the take as the number of acres of arroyo chub modeled habitat that will be impacted in the Plan Area as a result of the proposed action.

We anticipate that up to 638 acres of modeled habitat within the Plan Area will become unsuitable for the for the arroyo chub as a result of the proposed action. A small, but undeterminable, number of arroyo chub are also anticipated to be taken as a result of management and monitoring actions. Take will be in the form of harm, death, and injury. This level of anticipated take is not likely to result in jeopardy to the arroyo chub.

MAMMALS

Aguanga kangaroo rat (*Dipodomys merriami collinus*)

Status of the Species

Listing Status

The Aguanga kangaroo rat is not a State or federally listed species.

Species Description

The Aguanga kangaroo rat, a rodent of the family Heteromyidae, is one of 19 recognized subspecies of Merriam's kangaroo rat (*Dipodomys merriami*), a widespread species distributed throughout the arid regions of the western United States and northwestern Mexico (Hall 1981; Williams *et al.* 1993b).

Life History

Because there are few specific studies of the subspecies Aguanga kangaroo rat, the following information is largely for the full species *D. merriami*, with specific reference to the Aguanga kangaroo rat where appropriate.

D. merriami are primarily nocturnal, but they also exhibit crepuscular behavior. They typically emerge from their day burrows around dusk to forage and return to their day burrows before dawn (Behrends *et al.* 1986a). Many studies have reported on the diet of *D. merriami* (see Reichman and Price 1993 for a comprehensive review), but no specific studies have been conducted on the Aguanga kangaroo rat. *D. merriami* are primarily granivores (seed eaters), but they ingest herbaceous material and insects when available (Bradley and Mauer 1971; Reichman and Price 1993). They collect seeds from the substrate and store them in scattered surface caches in the vicinity of their burrows for later retrieval and consumption (Daly *et al.* 1992).

D. merriami have relatively low reproductive output for rodents (Wilson *et al.* 1985). In the wild they typically breed one or two times per year, with the peak breeding in mid-winter through spring, although they may breed more frequently in good years (Duke 1944; Fitch 1948; Quay 1953; Pfiesser 1956; Holdenreid 1957; Reynolds 1960; Beatley 1969; Bradley and Mauer 1971, 1973; Kenagy 1973; Reichman and Van De Graaf 1973, 1975; Van De Graaff and Balda 1973; Flake 1974). Breeding activities appear to vary in relation to ecological conditions. Daly *et al.* (1984) reported captive *D. merriami* had a mean litter size of 2.4. Females are capable of reproducing at approximately three months of age in captivity and in the wild (Daly *et al.* 1984). *D. merriami* have life spans of at least five years in the wild and seven years in captivity (Daly *et al.* 1990). Little, however, is known about average life span and annual survivorship of *D. merriami*, particularly the subspecies *D. m. collinus*.

D. merriami are generally solitary and asocial. Their home ranges may overlap though they may defend core areas around their day burrows. Jones (1989) reported *D. merriami* tend to establish home ranges in proximity to their natal range. Average home ranges of males and females are similar in size and range from 0.16 hectare (0.4 acre) in Arizona to 2.6 hectare (6.4 acres) in Texas, though individual home ranges may vary substantially (Behrends *et al.* 1986b). Dispersal in *D. merriami* is slightly male-biased, but more than 85 percent of individuals disperse less than 125 meters over their lifetimes (Jones 1989). Population densities are variable and range from 1 individual/ha in Texas to about 18 individuals/hectare in Arizona (Behrends 1986; Brown and Harney 1993). Population densities probably vary in association with resource availability.

Specific information on the types and abundances of predators of the Aguanga kangaroo rat is lacking. Daly *et al.* (1990), however, reported coyotes, snakes, owls, and shrikes were important

predators of *D. merriami* in Palm Desert, California. Natural predators of the Aguanga kangaroo rat likely include the common barn owl, great horned owl, long-eared owl, San Diego gopher snake, California king snake, red diamond rattlesnake, southern Pacific rattlesnake, gray fox, coyote, badger, long-tailed weasel, and bobcat.

Information regarding parasites and pathogens associated with the Aguanga kangaroo rat is lacking. A number of parasites and pathogens, however, are associated with the genus *Dipodomys* and therefore may be important in regards to Aguanga kangaroo rat conservation (Whitaker *et al.* 1993). Some parasites and pathogens may have deleterious effects on populations, particularly in small, isolated populations (Whitaker *et al.* 1993).

Habitat Affinities

The Aguanga kangaroo rat appears to be associated with sandy washes and drainages and Riversidean sage scrub, chaparral, redshank chaparral and non-native grassland vegetation communities. For example, the Aguanga kangaroo rat population along Wilson Creek was found in Riversidean sage scrub immediately adjacent to the creek. Dominant vegetation in the area was brittlebush, California buckwheat, coastal sagebrush, and cholla.

Soil texture is probably an important factor in Aguanga kangaroo rat habitat preferences. For example, sandy loam substrates allow for the digging of simple, shallow burrows that Aguanga kangaroo rats utilize. *D. merriami*, and other kangaroo rat species, actively avoid rocky substrates (Brown and Harney 1993). As with most kangaroo rat species, the Aguanga kangaroo rat is probably limited to habitats with sparse vegetation, as density of vegetation affects their burrowing, locomotion and foraging ability.

Status and Distribution

The Aguanga kangaroo rat occurs in Riverside and San Diego counties; however, little is known of their distribution within these areas. The Aguanga kangaroo rat has been documented in eastern San Diego County in the San Felipe, Earthquake, and Mason valleys (Williams *et al.* 1993b) and in Riverside County in the Aguanga Valley and Wilson Creek north of Rader and is probably scattered throughout sandy wash areas in the region west of the Anza Valley, particularly in Temecula Creek and tributaries east of Vail Lake. The Aguanga kangaroo rat in Riverside County overlaps with two other kangaroo rats, *D. stephensi* and *D. simulans*.

Threats

Threats to the Aguanga kangaroo rat in Riverside County are thought to include loss of habitat and habitat fragmentation through development, sand mining, agricultural activities, off-road vehicle activities, and grazing.

Conservation Needs

The conservation needs of Aguanga kangaroo rat include conservation and management of populations in Riverside and San Diego counties in a manner that provides for long-term

viability of the populations. Any newly discovered populations with long term conservation value should be conserved in the same manner. Actions that would increase the likelihood of deleterious effects to any population with long term conservation value from any identified threat should be avoided.

Environmental Baseline

Within the action area the Aguanga kangaroo rat is known to occur near Temecula and Tule creeks in the Aguanga Valley and along Wilson Creek south of Wilson Valley Road and north of Billy Goat Mountain in the Gonzalez Conservation Bank area (DUDEK 1995). According to the MSHCP, the Aguanga kangaroo rat is thought to occur in a scattered distribution throughout sandy wash areas in the region west of the Anza Valley, particularly in Temecula Creek and tributaries east of Vail Lake; however, no range-wide focused surveys have been conducted for this species within western Riverside County.

The vegetation communities used to model Aguanga kangaroo rat habitat include agricultural land, chaparral, coastal sage scrub, desert scrub, grassland, and Riversidian alluvial fan sage scrub. Given the lack of a definitive understanding of habitat associations, expert opinion was used in the MSHCP to outline areas with high potential to support Aguanga kangaroo rat populations within the Plan Area, and areas containing appropriate vegetation communities within these outlines were included in the modeled habitat. We expanded these potential habitat outlines to include all potential habitat within the same geographic area based on aerial photography. Based on this analysis, the Plan Area supports 9,839 acres of modeled habitat for the Aguanga kangaroo rat along Temecula Creek, Tule Creek, Wilson Creek, Kolb Creek, and Arroyo Seco. Approximately 747 acres of this modeled habitat are within PQP Lands. Because the lack of survey data limits our ability to produce a precise model, there may be other areas of suitable habitat for the Aguanga kangaroo rat within the Plan Area.

Effects of the Action

Direct Effects

The Plan Area includes approximately 9,839 acres of modeled habitat for the Aguanga kangaroo rat. There are 2,890 acres (29 percent) outside of the MSHCP Conservation Area; of that 2,460 acres (25 percent of total modeled habitat) occur within the Mammal Species Survey Area for the Aguanga kangaroo rat (Figure 6-5, pp. 6-68). The Aguanga kangaroo rat is considered an Additional Survey Needs and Procedures species. Surveys will be conducted in the Aguanga kangaroo rat survey area as part of the project review process for public and private projects where suitable habitat is present. Until such time that the Additional Reserve Lands can be assembled and conservation objectives for Aguanga kangaroo rat are met, surveys will be conducted for public and private projects within the Aguanga kangaroo rat survey area. Populations detected as a result of survey effort shall be avoided according to the procedures outlined in the Additional Survey Needs and Procedures (Section 6.3.2 of the Plan; *i.e.*, 90 percent of portions of property with long-term conservation value shall be avoided until the species conservation goals are met).

Within the 2,460 acres of modeled habitat outside the MSHCP Conservation Area but within the Aguanga kangaroo rat survey area (25 percent of modeled habitat), we anticipate that up to 10 percent of the area with long-term conservation value for this species (as discussed above) will be lost to individual projects, including up to all individuals within project footprints. For those locations found to contain large numbers of individuals or otherwise determined to be important to the overall conservation of the Aguanga kangaroo rat, the Plan allows flexibility to acquire these locations for inclusion into the Additional Reserve Lands (Section 6, pp. 6-70).

Aguanga kangaroo rats will be subject to impacts associated with development and other proposed Covered Activities within 430 acres of modeled habitat outside both the MSHCP Conservation Area and the Aguanga kangaroo rat survey area (4 percent of total modeled habitat). Thus, all individual Aguanga kangaroo rats outside of the MSHCP Conservation Area and outside of the Aguanga kangaroo rat survey area are anticipated to be impacted over the 75-year permit term as a result of the proposed Covered Activities.

Proposed expansion of the following roadways and trail systems may result in temporary and permanent direct impacts to the Aguanga kangaroo rat within the MSHCP Conservation Area. SR-79, Wilson Valley Road, and Sage Road may be expanded into Mountain Arterials, which would be 110 feet wide, and SR-371 may be expanded into a Major Artery, which would be 118 feet wide (MSHCP Figure 7-1). Each of these projects would impact modeled habitat for the Aguanga kangaroo rat. An Adopted Planned Regional Trail is proposed to run parallel to Temecula Creek in the Aguanga Valley and surroundings, and Adapted Proposed Regional Trails would cross Wilson Creek and run parallel to Cahuilla Creek within modeled habitat (MSHCP Figure 7-4). Trail construction and subsequent use will be compatible with biological resource protection as described in MSHCP Section 7.4.2. Construction of new flood control facilities is also considered a Covered Activity in the Plan. Flood control may limit the natural fluvial processes that maintain appropriate habitat conditions for the Aguanga kangaroo rat. We anticipate that incidental take of Aguanga kangaroo rats from these projects will be minimized by implementation of the *Guidelines for Facilities within the Criteria Area and Public/Quasi Public Lands* (Section 7.5, pp. 7-80) and through adherence to the Standard Best Management Practices (MSHCP Appendix C).

To offset the loss of Aguanga kangaroo rat habitat within the Plan Area, implementation of the MSHCP will conserve and manage large areas containing modeled habitat for the Aguanga kangaroo rat. Additional Reserve Lands will include 6,202 acres (63 percent) of modeled Aguanga kangaroo rat habitat in the Plan Area. An additional 747 acres (8 percent) of modeled Aguanga kangaroo rat habitat will remain within PQP Lands. In total, 71 percent of the modeled habitat for the Aguanga kangaroo rat will be conserved or remain in the Plan Area.

Because the Aguanga kangaroo rat is not widely distributed within the Plan Area, specific conservation objectives are provided in the MSHCP to ensure that suitable habitat and extant populations of the Aguanga kangaroo rat will persist (MSHCP Table 5-2). Within the occupied and suitable Aguanga kangaroo habitat in the MSHCP Conservation Area, the Permittees will ensure that at least 75 percent of the area is occupied and that at least 20 percent of the occupied habitat supports medium to high Aguanga kangaroo rat densities. Medium to high density is defined as ≥ 5 individuals per hectare as measured across any 8-year period (McKernan 1997). If

a decline in the distribution or density of the Aguanga kangaroo rat is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in MSHCP Table 9-2.

Management actions to benefit Aguanga kangaroo rats (*e.g.*, trapping, habitat manipulations) or other Covered Species and surveys for the species may result in impacts, including death, to a small number of individual Aguanga kangaroo rats. We anticipate that any impacts to Aguanga kangaroo rats from management actions or surveys will be minimized by adherence to appropriate trapping protocols and other guidelines described in Section 7.4 of the MSHCP.

The Aguanga kangaroo rat will also benefit from implementation of Species Conservation Objective 4, which ensures the maintenance or restoration of ecological processes within the historic floodplains of Temecula and Wilson Creeks, their tributaries and other currently unspecified localities. Maintenance and/or restoration of ecological processes within the MSHCP Conservation Area may include: 1) allowing for natural dynamic fluvial processes of flooding, scouring and habitat regeneration, and possibly fire, to maintain healthy alluvial fan sage scrub habitat; 2) careful planning and design of existing and future authorized uses that may affect natural processes such as flood control, water conservation, and sand and gravel mining; 3) control of other uses and disturbances such as farming and discing for weed abatement, heavy grazing, off-road vehicles, and vandalism, and 4) control of invasive exotic species.

Indirect Effects

Aguanga kangaroo rats could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These include the indirect effects described in the “General Effects” section of this biological opinion. Existing and proposed roads and road widening projects may increase fragmentation among Aguanga kangaroo rat populations. The detrimental effects of fragmentation are described in the “General Effects” section of this biological opinion. The guidelines and recommendations described in Section 7 and summarized in the Conservation Measures of this biological opinion will help minimize the impact of road construction on habitat connectivity.

Conclusion

We anticipate the proposed action will directly and indirectly affect the Aguanga kangaroo rat as described in the analyses above, including the loss of up to 4 percent of its modeled habitat in the Plan Area. An additional 25 percent of Aguanga kangaroo rat modeled habitat outside the MSHCP Conservation Area will be subject to surveys. Once the conservation objectives for the Aguanga kangaroo rat have been met, avoided areas, which have not been otherwise conserved, may be impacted. We anticipate that occurrences determined to be important to the overall conservation of the species will be considered for inclusion in the Additional Reserve Lands and that at least some of the avoided areas may be maintained as open space habitat.

Implementation of the avoidance, minimization, and/or mitigation measures included in the Plan will reduce the impacts to the Aguanga kangaroo rat. We anticipate that this species will persist in the remaining 71 percent of the modeled habitat within both the existing PQP Lands and the

Additional Reserve Lands. Together these lands form a system of large, contiguous habitat blocks that are interconnected within the Plan Area. We anticipate that these areas will be monitored and managed cooperatively to benefit this species.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of this species. We base this conclusion on the fact that no known populations of the Aguanga kangaroo rat would be affected by the proposed action, and individuals in nearly all modeled habitat will be protected within the MSHCP Conservation Area or avoided until species-specific conservation objectives are met. In addition, the impacts associated with loss of this species' modeled habitat, when viewed in conjunction with the protection and management of this MSHCP Conservation Area, is not anticipated to result in an appreciable reduction in the numbers, reproduction or distribution of this species throughout its range.

Amount or Extent of Take

We anticipate the take of all Aguanga kangaroo rats within up to 2,890 acres of modeled habitat outside of the MSHCP Conservation Area. A small, but undeterminable, number of Aguanga kangaroo rats are anticipated to be taken as a result of surveys or management actions. Take will be in the form of harm, death, and injury. This level of take is not likely to result in jeopardy to the Aguanga kangaroo rat.

Bobcat (*Lynx rufus*)

Status of the Species

Listing Status

The bobcat is not a State or federally listed species.

Species Description

The bobcat, a medium-sized carnivore of the family Felidae, is 1 of 4 species of the genus *Lynx*. There are 12 recognized subspecies of *L. rufus*.

Habitat Affinities

The bobcat inhabits a variety of environments. Habitat preferences throughout the year strongly reflect prey abundance, and males and females may prefer different habitats seasonally. For example, in Idaho, bobcats prefer higher elevations and are not as selective in their use of habitats during summer (Larivière and Walton 1997). In winter, habitat selection is influenced by snow conditions, and bobcats prefer low elevations, south-southwest facing slopes, rocky terrain, and open areas. Zeiner *et al.* (1990b) report bobcat use nearly all habitats and successional stages in California, though optimal habitats are bushy stages of low and mid-elevation conifer, oak, riparian, and pinyon-juniper forest, and all stages of chaparral. They use

cavities in rock areas, hollow logs, snags, stumps, and dense brush for cover and for denning (Zeiner *et al.* 1990b). Availability of water may limit bobcat distribution in xeric regions (Zeiner *et al.* 1990b). Natal dens are typically located in dry, well hidden, and relatively inaccessible sites, such as rocky areas and caves (Larivière and Walton 1997). Daily resting sites most often occur on steep-sloped rocky areas with dense vertical cover and sparse herbaceous ground cover and may include rockpiles, brushpiles, windfalls, hollow snags and trees, overhanging roots, and rocky cliffs (Larivière and Walton 1997).

Life History

Population and life history traits of bobcats can vary geographically (*e.g.*, Rucker *et al.* 1989; Larivière and Walton 1997); therefore, data reported from studies of one population may only approximate those of bobcat populations in other regions. Bobcats are mostly nocturnal but may be active any time of the day. Their activity generally peaks from 1800 to 2400 hrs and 0400 to 1000 (Larivière and Walton 1997). They are least active during midday.

Bobcats are carnivores, and in most regions, their main prey are lagomorphs (rabbits and hares) (Larivière and Walton 1997). Bobcats are generalists, however, and consume a wide variety of prey. In some areas, an important part of their diet is comprised of rodents, including sciurids (squirrels), microtine rodents, woodrats, heteromyids (kangaroo rats), muskrats, woodchucks, porcupines, beavers, and mountain beavers. Bobcats may occasionally kill domestic animals and larger prey, including mule deer, white-tailed deer, American pronghorn antelope, bighorn sheep, and javelina. Bobcats also prey on a variety of birds, reptiles, fish, and insects.

Bobcats are solitary hunters. They typically hunt in areas with cover using a stealth approach and then pouncing and striking. However, they may also sit and wait for prey along game trails. Kills may be cached.

Bobcats are polygamous (both sexes may have several partners), and females are polyestrous (multiple estrous periods during a breeding season) (Larivière and Walton 1997). Females that fail to become pregnant in the early spring may come into estrus again in late spring or summer and pregnancy rates appear to be affected by environmental factors (Rolley 1985). Females are induced ovulators, meaning that copulation stimulates ovulation. The peak of the breeding season is typically December to July, but timing varies with latitude, longitude, altitude and climate (Crowe 1975). Kittens may be born any month of the year, but births peak from April to June (Crowe 1975). The typical gestation period is about 63 days, and litter sizes range from 1-6 and vary geographically. For example, the mean litter size in a Kansas population is 2.0, while in Utah the mean litter size is 3.5 (Larivière and Walton 1997). Females may come into estrus in their natal year, but most first pregnancies occur in the second year (Crowe 1975; Rolley 1985). In a study of bobcats in Oklahoma, pregnancy rates in yearlings was 46 percent compared to 92 percent for adults (Rolley 1985). Litters born to adults tend to be larger than those of yearlings. Male reproduction is variable and more related to body weight than to age. Adults are reproductively active until death (Crowe 1975).

Young bobcats start traveling alone by six months of age but stay close to their natal den. Yearlings permanently disperse before the next litter is born and are capable of moving very

long distances. For example, young males have been documented to disperse more than 150 km from their natal area (Larivière and Walton 1997).

Bobcats may live up to 32 years in captivity and up to 15 years in the wild. Mortality in the wild is strongly related to harvesting of bobcats through hunting, trapping, and poaching (Larivière and Walton 1997). In the past, the bobcat has been considered a “varmint” species and was often trapped or hunted by ranchers and farmers (Nowak 1991). In Massachusetts, annual survival of adults was 0.62 and declined to 0.49 and 0.19 under conditions of heavy harvest and poaching, respectively. In an unharvested population in California, predation, disease, and starvation accounted for 35 percent, 15 percent, and 10 percent of deaths respectively (Larivière and Walton 1997).

Home ranges of bobcats vary geographically and in relation to sex and resource availability. They can range in size from 1 to 150 km² (Larivière and Walton 1997). In an urbanized area of southern California, bobcat home ranges were relatively small (an average of 1.3 to 4.0 km² depending on sex and age)(Riley *et al.* 2003). Home range sizes generally increase as prey abundance decreases; however, they also vary in relation to breeding activities. For example, male ranges increase during the breeding season, when prey availability presumably is higher, to seek out and consort with females, while female ranges are smallest during the breeding and rearing season. Male home ranges are typically about three times larger than those of females and often overlap the ranges of both other males and females. Female home ranges generally are exclusive of other females. Bobcats show high site fidelity between seasons and range boundaries are maintained by visual and olfactory cues, including scent marking with feces, urine, anal glands, and scrapes. Changes in home ranges usually only occur after the death of a resident animal. Daily movements range from approximately 1 kilometer (0.6 mile) to 10 kilometers (6.2 miles) per day (Larivière and Walton 1997).

Population density also varies geographically and in relation to resource availability. For example, bobcat density was estimated as 1 bobcat per 0.7 to 0.9 km² in California and 1 per 23.3 km² in Idaho (Larivière and Walton 1997).

Bobcats overlap with and may compete with coyotes and mountain lions. Great horned owls may occasionally kill young bobcat, and mountain lions may occasionally kill adults. Bobcats may occasionally be infected with rabies and cat-scratch fever and may contract pneumonia, gastric enteritis, and respiratory infections. They also carry many endo- and ecto-parasites.

Status and Distribution

The bobcat is present throughout Canada and the United States except in Alaska, Hawaii, Vancouver Island, Prince Edward Island, and Newfoundland. Its distribution southward extends to Rio Mescale, Mexico (Larivière and Walton 1997). The subspecies *L. r. californicus* occurs throughout California, with the exception of the extreme northwestern portion of the State and the Great Basin, Mojave, and Colorado deserts. Zeiner *et al.* (1990b) describe the bobcat as a common to uncommon, permanent resident of California.

Threats

Threats to the bobcat include loss, degradation, and fragmentation of habitat due to urban growth, road development, and industrial agriculture, as well as vehicle collisions and human disturbance (Rolley 1987; Kamradt 1995). Loss of large, relatively undisturbed tracts of habitat and adequate linkages between habitat tracts, as well as lack of functional wildlife crossings over or under major roadways and subsequent mortality due to vehicle collision are serious threats to the persistence of bobcats in urban and urbanizing environments.

Crooks (1999) reported that within coastal southern California bobcats appear to be sensitive to habitat fragmentation and isolation. The probability of occurrence of bobcats declined as habitat fragments became smaller and more isolated and was zero in most fragments less than 1 km². Further, it is expected that the probability of residency (as opposed to occurrence, or use) or long-term viability of bobcat populations is even lower in small, isolated fragments. The relative abundance of bobcats per unit area decreased with distance to the nearest linkage or natural area. Bobcats only visited 2 of 29 urban fragments, both of which were near linkages to larger natural areas, and did not persist in any highly isolated habitat fragment, even if the fragment was large (Crooks 1999). Crooks concluded that bobcat populations can persist in fragmented habitats, but only those with adequate movement corridors.

In general, mammalian carnivores are particularly vulnerable to environmental disturbances (*e.g.*, habitat fragmentation) and play important structuring roles in ecological communities (Crooks 1999). For example, apex predators such as mountain lions, bobcats, and coyotes may not be able to persist in habitat fragments, especially small isolated remnants not connected by movement corridors (Soule *et al.* 1988 as cited by Crooks 1999; Beier 1993). The decline or disappearance of these top predators from fragmented areas may lead to an increase in smaller predators that are often considered the principle predation threats on birds and other small vertebrates (Crooks 1999). Such “mesopredator release” (Soule *et al.* 1988 as cited by Crooks 1999) has been implicated in the decline and extinction of prey species worldwide (Crooks 1999). Conservation of large tracts of intact habitat and movement corridors and linkages is essential to the maintenance of apex predators, such as bobcats, in urbanizing landscapes. In turn, the continued presence of top predators in these landscapes will contribute to the maintenance of other native fauna, such as birds.

Conservation Needs

The conservation needs of the bobcat include the persistence of large tracts of suitable habitat and functional habitat linkages and movement corridors. Maintenance of bobcat in urbanizing areas, such as Riverside County, will also require functional wildlife crossings at major roadways to be designed, installed, monitored, and maintained.

Specific linkages have been identified within western Riverside County that are important to the movement of bobcats throughout the County. The South Coast Wildlands Project identifies five connectivity “choke points” for the bobcat within western Riverside County, including the connections between the Santa Margarita Ecological Reserve area and the Agua Tibia Mountains, between the Lake Skinner and Wilson Valley areas, between the northern San

Jacinto Mountains and the San Bernardino Mountains, between the Santa Ana Mountains and Lake Mathews/Estelle Mountain area, and between the Badlands and San Bernardino Mountains (Hunter 1999). They defined connectivity choke points as narrow and threatened habitat patches that are essential in linking larger areas of core bobcat habitat. Other critical linkages for bobcat in Riverside County, such as the link between the southern Santa Ana Mountains and the Santa Margarita Ecological Reserve, as well threats to these linkages were identified by Penrod (2000) in a report generated from the Missing Linkages conference.

Environmental Baseline

Though the current bobcat population size and distribution in the Plan Area is unknown, it is expected to occur throughout all of western Riverside County in suitable habitat. Our data set includes 29 records of bobcat scattered throughout the MSHCP's Riverside Lowland, San Jacinto Foothill, and Santa Ana Mountains bioregions. The vegetation communities used to model habitat for this species were chaparral, coastal sage scrub, desert scrub, grassland, meadow, montane coniferous forest, peninsular juniper woodland and scrub, playa and vernal pool, riparian scrub woodland and forest, Riversidean alluvial fan sage scrub, woodland and forest habitats within all bioregions. Based on these vegetation communities, the Plan Area contains approximately 784,944 acres of habitat for the bobcat. Approximately 316,123 acres of modeled habitat occur within PQP Lands. Because bobcat are sensitive to habitat fragmentation and isolation and are not likely to occur in small, disturbed, and/or isolated habitat fragments within the Plan Area (Crooks 1999), modeled habitat likely overestimates the extent of suitable habitat for this species within the Plan Area.

Effects of the Action

Direct Effects

The Plan Area includes 784,944 acres of modeled habitat for the bobcat. Given the widespread distribution of this species, proposed residential, commercial and urban development outside of the MSHCP Conservation Area will result in direct impacts to bobcat, including mortality, from loss of suitable breeding, feeding, and sheltering habitat. In particular, mortality of immobile young is anticipated from the crushing or removal of dens during clearing, grading, and associated construction activities that occur during the rearing season. Without detailed information on bobcat density within the Plan Area, we cannot determine how many individuals will be affected by planned development. However, we anticipate the loss of 325,261 acres (41 percent) of modeled bobcat habitat within the Plan Area over the 75-year permit term. Though bobcat will not survive in most modeled habitat outside the Conservation Area, some will survive in rural/mountainous areas in suitable habitat. Approximately 101,105 acres (31 percent) of the non-conserved modeled habitat for the bobcat are designated as rural/mountainous land where development impacts are expected to occur at a slower rate and at lower densities.

To offset the loss of bobcat habitat within the Plan Area, 143,661 (18 percent) of the modeled habitat will be conserved within the Additional Reserve Lands. An additional 316,023 acres (40 percent) of modeled habitat will remain within PQP Lands. In total, 459,684 (59 percent) of the modeled habitat for bobcat will be conserved or remain in the Plan Area.

As stated in the MSHCP, large contiguous habitat blocks and linkages for movement of bobcats between habitat blocks will be included within the MSHCP Conservation Area.

The seven primary habitat blocks identified include Santa Rosa Plateau-Santa Ana Mountains, Agua Tibia Wilderness-Palomar Mountains, Vail Lake-Wilson Valley-Aguanga, Anza-Cahuilla valleys, Badlands-San Jacinto Wildlife Area-Lake Perris, San Jacinto Mountains, Lake Mathews-Estelle Mountain, Lake Skinner-Diamond Valley Lake, and Santa Ana River-Prado Basin.

The upland and riparian linkages identified in the Plan include Santa Ana Mountains to Chino Hills via Fresno Canyon-Green River, Santa Ana Mountains to Lake Mathews-Estelle Mountain via Indian Canyon and Horsethief Canyon, Santa Ana Mountains to Agua Tibia Wilderness-Palomar Mountains via Pechanga Creek or future wildlife overpass over Interstate 15 north of Rainbow (possibly in San Diego County), along the length of the Santa Ana River between Rubidoux-North Riverside and Prado Basin, Lake Skinner-Diamond Valley Lake to Sage-San Jacinto Mountains via Tualota Creek and adjacent uplands in reserve or rural mountainous designation areas, along Badlands to San Jacinto Wildlife Area-Lake Perris and San Jacinto Mountains, Badlands to San Bernardino Mountains through Cherry Valley, and San Jacinto Mountains to San Bernardino Mountains via Banning Canyon and San Geronio Wash.

The Plan additionally states that functionality of dispersal routes will be maintained or improved within the MSHCP Conservation Area. Existing undercrossings in key areas will be evaluated for their adequacy and improved as necessary to convey bobcats. Key crossings that will be evaluated include, but are not limited to, the following: the crossing of SR-91 that connects the Santa Ana Mountains with the Chino Hills via Fresno Canyon-Green River, the crossings of I-15 that connect the Santa Ana Mountains with Lake Mathews-Estelle Mountain via Indian Canyon and Horsethief Canyon, the crossing(s) of I-15 that connect the Santa Ana Mountains with the Agua Tibia Wilderness-Palomar Mountains via Pechanga Creek or the possible "Rainbow" overpass, the undercrossings of SR-60 in the Badlands, and the possible undercrossing at I-10 in the Banning area.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands including surveys for the bobcat. Cooperative management and monitoring are anticipated on PQP Lands. Surveys for the bobcat will be conducted at least every eight years to verify occupancy of 75 percent of known locations. If a decline in the distribution of the bobcat is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP.

Other management actions described in Section 5, Table 5.2 of the MSHCP, such as maintaining and improving the functionality of dispersal routes and road crossings, will help convey bobcats throughout the Plan Area. Management actions (*e.g.*, habitat manipulations) to benefit the bobcat or other Covered Species may result in impacts, including death, to a small number of individual bobcats. It is anticipated that any impacts to bobcats from management actions will be minimized by adherence to appropriate protocols and other guidelines described in Section 7.4 of the MSHCP. The presence of the bobcat will contribute to the function of the Conservation Area by controlling mesopredators, thereby reducing predation pressures on other Covered Species.

Indirect Effects

The bobcat could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These include the indirect effects described in the “General Effects” section of this biological opinion. Existing and proposed roads and road widening projects will likely result in increased mortality due to collisions with vehicles and increased fragmentation and isolation of bobcat populations. The guidelines and recommendations described in Section 7 and summarized in the Conservation Measures of this biological opinion will help minimize the impact of roads on habitat connectivity.

Conclusion

We anticipate the proposed action will directly and indirectly affect the bobcat as described in the analyses above, including the loss of 41 percent of the modeled habitat for this species in the Plan Area. Implementation of the avoidance, minimization, and mitigation measures identified in the Plan will reduce the impacts to this species. We anticipate that this species will persist in the remaining 59 percent of the modeled habitat within both the existing PQP Lands and the Additional Reserve Lands. Together these lands form a system of large, contiguous habitat blocks that are inter-connected within the Plan Area. We anticipate that these areas will be monitored and managed cooperatively to benefit this species.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service’s biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the bobcat. We reached this conclusion based on the widespread distribution of the bobcat in North America and the Plan Area and because the impacts associated with loss of this species’ modeled habitat, when viewed in conjunction with the protection and management of the MSHCP Conservation Area, is not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Amount or Extent of Take

Because it will be difficult to quantify the number of individual bobcats that will be taken as a result of the proposed action over the 75-year permit term, the Service is quantifying incidental take as the number of acres of modeled habitat that will be impacted in the Plan Area as a result of the proposed action. We anticipate that up to 325,261 acres of modeled habitat within the Plan Area will become unsuitable for bobcat. A small, but undeterminable, number of bobcats are anticipated to be taken as a result of management actions. Take will be in the form of harm, death, and injury. This level of take is not likely to result in jeopardy to the bobcat.

Brush rabbit (*Sylvilagus bachmani*)Status of the Species*Listing Status*

The brush rabbit is not federally or State listed.

Species Description

The brush rabbit is a medium sized lagomorph of the family Leporidae. There are 14 recognized species in the genus *Sylvilagus* and 13 recognized subspecies of *S. bachmani* (Chapman 1974).

Habitat Affinities

Brush rabbits inhabit dense, brushy cover (Chapman 1974) most commonly in chaparral vegetation. They also occur in early successional stages of oak and conifer habitats (Zeiner *et al.* 1990b). In the San Francisco Bay area, Connell (1954) reported that brush rabbits concentrate their activities at the edge of brush and use grass and interior brush areas less frequently. At a study site near Corvallis, Oregon, Chapman (1971) documented that brush rabbits rarely left brushy cover.

Life History

Brush rabbits are herbivorous and graze on a wide variety of grasses, forbs, and shrubs (Chapman 1974). Their diet and foraging behavior vary in relation to season; they forage on annual, herbaceous vegetation during the wetter season and perennial brush species during the drier season. Brush rabbits mostly are crepuscular, with their greatest activity level occurring around dusk and dawn. They are less active at night and occasionally active during the day (Zeiner *et al.* 1990b). Brush rabbits do not dig their own dens, but use the burrows of other species, brush piles, or other formations.

The peak breeding season for brush rabbits in California is from December to May or June (Chapman 1974). Gestation is 27 ± 3 days. Three, or possibly 4, litters of 2-5 offspring are produced annually (Mossman 1955; Chapman and Harman 1972). Brush rabbits are generally not as fecund as other *Sylvilagus* species (Chapman and Harman 1972). They prepare a nest cavity lined with fur and grass (Chapman 1974). The young are only fed at night and spend about two weeks in the nest. They mature in about four to five months, but females, at least, probably do not breed in their natal season (Mossman 1955; Chapman and Harman 1972).

Annual survival rates in brush rabbits are relatively low but appear to be age-related. Based on live-trapping, Connell (1954) estimated an annual survival rate, of males and females combined, of only 15 percent over 12 months. He concluded that mortality or emigration (these two causes of disappearance could not be separated in the field study) of the young-of-the-year accounted for much of the "mortality" in the population, with males disappearing at a higher rate in the first 6 months after first capture (86 percent) compared to females (67 percent). In contrast, only 2 of 7 (29 percent) of adults trapped in April and May were not re-trapped in September. In

Connell's (1954) study, the longest-lived brush rabbits in the wild were more than two years old. Individuals may survive in captivity for more than three years.

Based on radiotelemetry data for brush rabbits near Corvallis, Oregon, Chapman (1971) reported that dispersal movements of brush rabbits were relatively small. Young brush rabbits were repeatedly trapped at the same trap sites and radio data indicated that they never left the bramble clump in which they were first trapped. Radio-tracking of adult rabbits also indicated that they rarely left the clumps in which they were trapped.

A study in Oregon showed that brush rabbits carefully avoid open areas when moving between habitat patches (Chapman 1971). The study also showed that brush rabbits tend to stay in a confined home area with little natural dispersal.

In the Berkeley Hills of northern California, Connell (1954) reported male brush rabbits had larger home ranges than females at all times of the year, and especially in May when females were moving the least (Connell 1954). Based on the maximum diameter of movement, Connell estimated circular average home ranges of 0.95 acres for males and 0.34 acres for females. In Oregon, Chapman (1971) reported circular average home ranges 0.27 acre for adult males, 0.41 acre for juvenile males, 0.21 acre for adult females, and 0.17 acre for juvenile females. The size and shape of home ranges of brush rabbits in Oregon reflected the size and shape of bramble clumps. The minimum size of permanently occupied clumps was about 460 sq meters (0.1 acre) (Chapman 1974). Smaller clumps may be occupied, but only if in proximity to larger clumps. Although the home range estimates above are based on circular ranges calculated from range diameters, range use probably is not circular in shape or uniform but rather consists of a series of runways that directly connect high use areas within brush habitat. Chapman observed that rabbits largely restricted their homing routes to brushy cover regardless of the direction or distance. When crossing between clumps, rabbits invariably chose the shortest distance between clumps. Rabbits' homing movements were impeded by human activity and vehicles, and they were reluctant to cross roads.

Connell (1954) reported that the home ranges of females tended not to overlap while the home ranges of males showed relatively extensive overlap. Connell characterized females as "semiterritorial" but did not observe whether they defended territories. Connell (1954) estimated population sizes of 0.9 to 2.3 rabbits per acre, but population densities can be expected to vary widely depending on local resource conditions, habitat patchiness, natural fluctuations in population cycles, etc.

Predators of brush rabbits include bobcat, coyote, gray fox, long-tailed weasel, raptors, and some snakes, such as rattlesnakes and gopher snake. They avoid predation by remaining close to brush and remain motionless for a period of time when in the open (Chapman 1974). Known ecto- and endoparasites of brush rabbits are *Hoplopyllus powersii* and *Hoplopyllus minutus*, tapeworms (*Moscovyia pectinata-america*, *Taenia pisiformis*), and pinworms (Nematoda: *Passalurus ambiguus*) (Chapman 1974). Brush rabbits can also carry bot fly larvae (Connell 1954).

Status and Distribution

The brush rabbit is a Pacific coastal species that occurs west of the Cascades and Sierra Nevadas from the Columbia River south to the southern tip of Baja California, Mexico. The local subspecies (*S. b. cinerascens*) is found from Santa Barbara County south to Ensenada, Baja California (Chapman 1974). It is generally absent from the dry Central Valley, except for a small population of *S. b. riparius* known only from the west side of the San Joaquin River in Stanislaus County. They occur from sea level to at least 2,070 meters (6,800 feet) (Chapman 1974).

Threats

The brush rabbit is vulnerable to urbanization, hunting, and loss of large, contiguous habitat patches (stands of brush).

Conservation Needs

Given the brush rabbit's tendency to avoid low quality habitat, the conservation needs of this species include the conservation of large tracts of unfragmented habitat and maintenance of habitat connections with dense shrub cover in order to facilitate dispersal.

Environmental Baseline

The brush rabbit is thought to occur in appropriate habitat throughout western Riverside County (Zeiner *et al.* 1990b); however, there have been no population studies within the Plan Area to confirm this generality. Populations appear to be centered around Sage, Anza Valley, Santa Rosa Plateau, and the foothills of the San Jacinto Mountains. Additional localities include Santa Ana River, Alberhill, Vail Lake, Lakeview Mountains, the Badlands, Sycamore Canyon, Banning-Beaumont, Calimesa, and Garner Valley. Most of these records are from incidental sightings associated with habitat assessments or surveys for other species done for planning purposes. The vegetation communities used to model brush rabbit habitat include chaparral, coastal sage scrub, Riversidean alluvial fan sage scrub, woodland and forest habitats. Each of these habitat types are thought to support brush rabbits at times. Woodland and forest habitats may only support brush rabbits in early successional stages given this species' preference for dense shrub cover. Similarly, Riversidean alluvial fan sage scrub often supports only sparse shrub cover and may not support healthy brush rabbit populations. Based on this analysis, the Plan Area supports 594,400 acres of modeled habitat for this species. Approximately, 206,506 acres of this modeled habitat are within PQP Lands. Four of the 61 (7 percent) known occurrences of brush rabbits in our dataset were located within PQP Lands.

Effects of the Action

Direct Effects

Given the presumed widespread distribution of this species, proposed residential, commercial and urban development outside of the MSHCP Conservation Area will result in direct mortality

of brush rabbits from construction activities. Forty-seven of the 61 (77 percent) occurrences of brush rabbit in our dataset are outside of the MSHCP Conservation. Without detailed information on brush rabbit distribution and density within the Plan Area, we cannot determine how many individuals or populations will be affected by planned development. However, we anticipate the loss of 217,740 acres (37 percent) of modeled brush rabbit habitat within the Plan Area over the 75-year permit term. This habitat loss will result in death and injury to individual brush rabbits in the Plan Area; however, some brush rabbits in the impacted areas may be able to escape to adjacent habitats, and some will survive in rural/mountainous areas with suitable habitat. Approximately 89,221 acres (41 percent) of the non-conserved modeled habitat for the brush rabbit are designated as rural/mountainous land where development impacts are expected to occur at a slower rate and at lower densities.

To offset the loss of brush rabbit habitat within the Plan Area, implementation of the MSHCP will conserve and manage large areas containing modeled habitat for the brush rabbit and linkages among these areas. Additional Reserve Lands will include 114,115 acres (19 percent) of modeled brush rabbit habitat (chaparral, coastal sage scrub, Riversidean alluvial fan sage scrub, woodland and forest) in the Plan Area. An additional 206,506 acres (44 percent) of modeled habitat will remain within PQP Lands. In total, 63 percent of the modeled habitat for brush rabbit will be conserved or remain in the Plan Area. An additional 44,000 acres of habitat for dispersal or movement corridors will be retained or conserved within several existing and proposed Cores and Linkages as PQP or Additional Reserve Lands (MSHCP Section 3.2.3).

The Permittees will implement management and monitoring practices within the Additional Reserve Lands including surveys for the brush rabbit. Cooperative management and monitoring are anticipated on PQP Lands. Surveys for the brush rabbit will be conducted at least every eight years to verify occupancy at a minimum of 75 percent of the known locations. If a decline in the distribution of the brush rabbit is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP.

Management actions to benefit brush rabbits (*e.g.*, trapping, habitat manipulations) or other Covered Species (*e.g.*, prescribed burning) may result in impacts, including death, to a small number of individual brush rabbits. It is anticipated that any impacts to brush rabbits from management actions will be minimized by adherence to appropriate trapping protocols and other guidelines described in Section 7.4 of the MSHCP.

Indirect Effects

Brush rabbits could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These include the indirect effects described in the “General Effects” section of this biological opinion. New road construction or road widening, as described in Section 7.3.5 in the MSHCP, is proposed for several of the habitat blocks proposed for brush rabbit conservation. Existing and proposed roads and road widening projects may increase fragmentation among brush rabbit populations. The detrimental effects of fragmentation are described in the “General Effects” section of this biological opinion. The guidelines and recommendations described in Section 7 and summarized in the Conservation

Measures of this biological opinion will help minimize the impacts of road construction on habitat connectivity.

Conclusion

We anticipate the proposed action will directly and indirectly affect the brush rabbit as described in the analyses above, including the loss of 37 percent of the modeled habitat for this species in the Plan Area. Implementation of the avoidance, minimization, and mitigation measures identified in the Plan will reduce the impacts to this species. We anticipate that this species will persist in the remaining 63 percent of the modeled habitat within both the existing PQP Lands and the Additional Reserve Lands. Together these lands form a system of large, contiguous habitat blocks that are inter-connected within the Plan Area. We anticipate that these areas will be monitored and managed cooperatively to benefit this species.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the brush rabbit. We reached this conclusion based on the widespread distribution of the brush rabbit in the Plan Area and because the impacts associated with loss of this species' modeled habitat, when viewed in conjunction with the protection and management of the MSHCP Conservation Area, is not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Amount or Extent of Take

Because it will be difficult to quantify the number of individual brush rabbits that will be taken as a result of the proposed action over the 75-year permit term, the Service is quantifying the take as the number of acres of modeled habitat that will be impacted in the Plan Area as a result of the proposed action. We anticipate that up to 217,740 acres of habitat within the Plan Area will become unsuitable for brush rabbit. A small, but undeterminable, number of brush rabbits are anticipated to be taken as a result of management actions. Take will be in the form of harm, death, and injury. This level of anticipated take is not likely to result in jeopardy to the brush rabbit.

Coyote (*Canis latrans*)

Status of the Species

Listing Status

The coyote is not a State or federally listed species.

Species Description

The coyote, a carnivore of the family Canidae, is 1 of 8 recognized species of the genus *Canis*. There are 19 recognized subspecies of *C. latrans*.

Habitat Affinities

Coyotes utilize all habitats types and often are found in urban areas adjacent to open land. Primary habitats include grasslands, short-grass prairies, semiarid sagebrush, and broken forests (Gier 1975). Within their geographic range, coyotes are limited by the absence of open areas (Gier 1975). Natal dens are associated with brush-covered slopes, thickets, hollow logs, rocky ledges, and burrows. For example, in eastern Maine, dens varied from shallow depressions to multi-chambered burrows extending 1-2 meters in depth (Harrison and Gilbert 1985).

The coyote has been recorded within virtually all upland and riparian habitat and land cover types in the Plan Area, including chaparral, scrub habitats (coastal scrub, Diegan coastal sage scrub, Riversidean alluvial fan scrub, Riversidean sage scrub, big sagebrush scrub and desert scrub), annual and native grassland, field crops and grove/orchard, oak woodlands (coast live oak woodland, dense Engelmann oak woodland, oak woodland), riparian (riparian scrub, southern cottonwood-willow riparian), lower montane coniferous forest, desert scrub and alkali playa. Coyotes have also been reported from residential and urban areas.

Life History

The coyote is an opportunistic predator and includes a wide variety of food in its diet including, but not limited to, deer, elk, rabbits, rodents, birds, lizards, snakes, crustaceans, insects, and fruit (Gier 1975). Its diet strongly reflects availability of prey and other food items (Gier 1975, Andelt *et al.* 1987). Coyotes prefer fresh meat but will scavenge carrion. Coyotes also can be a major predator on domestic animals and pets such as cattle, sheep, chickens, turkeys, ducks, cats and dogs. In central and southern California, lagomorphs (rabbits and hares) and rodents are primary prey items (Weintraub 1986, Cypher *et al.* 1996; Pierce *et al.* 2000). Coyotes use different hunting tactics such as pursuing prey in open areas or sitting and waiting for smaller prey. They may hunt in packs for larger or difficult prey (Gier 1975). Coyotes have few natural predators, though humans have attempted to control their populations through intensive shooting, trapping, and poisoning programs.

Coyotes may be active anytime of the day but they are primarily nocturnal and crepuscular (Nowak 1991). A coyote typically travels about 4 kilometers (2.5 miles) during a night of hunting (Nowak 1991). Daily movements, however, also depend on reproductive activities. While pups are nursing, males and females spend more time near the den; however daily movements increase during weaning and are much larger when the pups are weaned (Harrison and Gilbert 1985). Human disturbances may modify the temporal and spatial pattern of coyote activities. For example, Gese *et al.* (1989) studied the effects of military training activity on coyote movements in Colorado. They found that coyotes with high cover and little military activity in their ranges contracted their ranges, while coyotes with little cover and moderate levels of military activity in their ranges expanded their ranges. Also, coyotes generally increased their level of diurnal activity in relation to training activities, presumably to maintain space between themselves and the activities.

Female coyotes come into estrus once per year (Gier 1975) and lost litters are not compensated for in the same breeding season. Estrus typically occurs in mid to late-winter (January to March) and may last up to a month. Gestation is about 58 to 65 days. Litter sizes range from 2 to 12

pups. Some dens may contain more than one litter. Males and females establish a pairbond, whereupon they select a territory, prepare a den, hunt and sleep together during the pregnancy, and both provide care for the pups (Gier 1975). The male is the primary hunter during the nursing and weaning period, and food is brought back to the den and regurgitated for the pups. The territory around the den is defended from predators and other coyotes. Pups are weaned by 8-10 weeks, at which time the den is abandoned (Harrison and Gilbert 1985).

Coyotes live about ten years (Gier 1975), but mortality in the first year is high. About 10-15 percent of the pups die within a few days of birth from several causes, including parasitic infections (hookworm, roundworm), accidents, predation (hawks, owls, eagle), neighboring coyotes, the loss of the parents, and general physical weaknesses. By late summer, about 50 percent of the pups may have perished. Coyotes are highly mobile and capable of moving long distances, particularly when dispersing. Gier (1975) reported young dispersed as far as 80-160 kilometers (50-100 miles) from the parental range (Gier 1975).

Coyotes typically establish consistent home ranges and exhibit fairly extensive intraspecific home range overlap (Gier 1975). Home ranges may be quite variable, depending on geographic location and habitat, with a range of 1 to >100 km² (Lyren 2001). Lyren (2001) reported coyote home ranges sizes ranged from 1.23 to 54.19 km², with a mean of 13.72 km², in her Chino Hills/Prado Basin study area in Orange, Riverside and San Bernardino counties. Coyotes apparently are only strongly territorial during the denning season when their pups are at risk of being killed by other coyotes (Gier 1975). Coyotes may come together to hunt in packs comprised of a family unit or a temporary non-family pack of 2 to 6 individuals comprised of bachelor males, non-reproductive females, and near-mature young. Their spatial structure is related to the adequacy, type, and distribution of the food supply (*e.g.*, a pack is required to take larger prey such as deer), denning territory, and intraspecific and interspecific competition for resources.

Though the coyote is capable of persisting in urban areas, the coyote appears to be sensitive to some level of habitat fragmentation and isolation. Crooks (1999) reported coyote density was generally low, or zero, in highly fragmented sites (generally less than 2.47 acres {1 hectare}) in coastal southern California. The probability of occurrence of coyotes declined as habitat fragments became smaller and more isolated and they generally did not occur in fragments below some threshold size and isolation. Further it is expected that the probability of residency (as opposed to occurrence, or use) or long-term viability of coyote populations is even lower in particularly small and more isolated fragments. Additionally, though coyotes traveled through developed areas to reach many habitat fragments, their ability to move through the urban areas was limited (Crooks 1999).

Coyotes have a profound effect on prey populations and, consequently, on the faunal and floral composition of the communities supporting the prey populations. Crooks and Soulé (1999) documented that the coyote is an important component of the southern California ecosystem because they appear to control the abundance of native and non-native mesopredators such as striped skunk, gray fox, raccoon, Virginia opossum, and domestic cat that prey on smaller native wildlife such as birds and rodents. They found that where coyotes are absent or rare, mesopredator abundance is high, and high mesopredator abundance in a habitat fragment is

associated with low numbers of native scrub specialist bird species. They therefore concluded that coyotes appear to be important in maintaining native fauna in fragmented landscapes.

Status and Distribution

The coyote, in general, is a very resilient species and its geographic range has expanded dramatically in the last 150 years and includes the contiguous United States, western Canada and eastern Alaska, north to Hudson Bay and south throughout Central America (Hall 1981). Marginal records for the subspecies *C. l. clepticus* are San Marcos, Julian, and Jacumba in San Diego County, and into Baja California, Mexico (Hall 1981). The range of the subspecies appears to include western Riverside County, but the boundary with the range of the subspecies to the north, *C. l. ochropus*, is not clearly defined (Hall 1981).

Threats

Threats to some populations may include excessive loss, fragmentation, and isolation of habitat due to urban development. Urbanization results in increased habitat fragmentation and isolation, which may preclude coyotes from previously occupied areas. Additional threats include vehicle collisions, as well as shooting, trapping, and poisoning by humans. Lyren (2001) studied movement patterns of coyotes relative to roads and underpasses in the Chino Hills and Prado Basin Area. She reported 10 of 15 confirmed coyote deaths during the 2-year study were due to vehicle collisions.

Conservation Need

The conservation needs of coyote include maintenance of large habitat patches and linkages throughout its range. In fragmented and urbanizing areas, this includes providing for coyote movement across (under) roads. Predator control programs should emphasize education to minimize conflicts between people and coyotes to reduce the need for lethal control.

Environmental Baseline

Though the current population size of the coyote is unknown in the Plan Area, it is expected throughout all of western Riverside County in suitable habitat. Our dataset includes 168 records of coyote located throughout the Plan Area, though primarily in the Riverside lowland, San Jacinto Foothill, and Santa Ana Mountains bioregions. The vegetation communities used to model habitat for the coyote species were agriculture, chaparral, coastal sage scrub, desert scrub, grassland, meadow and marsh, montane coniferous forest, peninsular juniper woodland and scrub, playa and vernal pool, riparian scrub woodland and forest, Riversidean alluvial fan sage scrub, and woodland and forest habitats within all bioregions. Based on these habitats, the Plan Area supports approximately 941,334 acres of modeled habitat for the coyote. Approximately 327,012 acres of modeled habitat occur within PQP Lands. However, actual habitat suitable for coyotes is likely a smaller subset of the total modeled habitat because coyotes are sensitive to high levels of habitat fragmentation and are not likely to occur in very small, disturbed, and/or isolated habitat fragments within the Plan Area (Crooks 1999).

Effects of the Action

Direct Effects

The Plan Area includes 941,334 acres of modeled habitat for the coyote. Given the presumed widespread distribution of this species, proposed residential, commercial and urban development outside of the MSHCP Conservation Area may result in direct mortality of coyote, particularly of immobile young, from the crushing or removal of dens during clearing, grading, and associated construction activities that occur during the rearing season. Without detailed information on coyote density within the Plan Area, we cannot determine how many individuals will be affected by planned development. However, we anticipate the loss of 464,271 acres (49 percent) of modeled coyote habitat within the Plan Area over the 75-year permit term. Though coyote will not survive in most modeled habitat outside the Conservation Area, some will survive in rural/mountainous areas in suitable habitat. Approximately 108,426 acres (23 percent) of the non-conserved modeled habitat for the coyote are designated as rural/mountainous land where development impacts are expected to occur at a slower rate and at lower densities.

To offset the loss of coyote habitat within the Plan Area, 150,052 (16 percent) of the modeled habitat will be conserved within the Additional Reserve Lands. An additional 327,012 acres (35 percent) of modeled habitat will remain within PQP Lands. In total, 477,064 acres (51 percent) of the modeled habitat for coyote will be conserved or remain in the Plan Area.

Linkages for movement of coyotes between habitat blocks will be included within the MSHCP Conservation Area. Identified upland and riparian linkages include Santa Ana River, Badlands/San Timoteo Creek, Indian Canyon and Horsethief Canyon crossings of I-15, Cole Canyon-Murrieta Creek, Warm Springs Creek, French Valley tributary to Warm Springs Creek, generally continuous upland habitat from Lake Mathews to Wildomar, Gavilan Hills, San Jacinto River, Temecula Creek-Santa Margarita River, Kolb Creek/Arroyo Seco, Tocalota Creek, Wilson Creek, Tule Creek, and San Geronio Wash.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands including surveys for the coyote. Cooperative management and monitoring are anticipated on PQP Lands. Surveys for the coyote will be conducted at least every eight years to verify occupancy of 75 percent of known locations. If a decline in the distribution of the coyote is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP.

Other management actions described in Section 5 of the MSHCP, such as controlling public access, off-road vehicle usage, illegal dumping, and vandalism in the Conservation Area, will help convey bobcats throughout the Plan Area. Management actions (*e.g.*, habitat manipulations) to benefit coyote or other Covered Species may result in impacts, including death, to a small number of individual coyotes. It is anticipated that any impacts to coyotes from management actions will be minimized by adherence to the protocols and other guidelines described in Section 7.4 of the MSHCP. The presence of the coyote will contribute to the function of the Conservation Area by controlling mesopredators thereby reducing predation pressures on other Covered Species.

Indirect Effects

The coyote could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These include the indirect effects described in the “General Effects” section of this biological opinion. Existing and proposed roads and road widening projects will likely result in increased mortality due to collisions with vehicles and increased fragmentation and isolation of coyote populations. The guidelines and recommendations described in Section 7 and summarized in the Conservation Measures of this biological opinion will help minimize the impact of roads on habitat connectivity.

Conclusion

We anticipate the proposed action will directly and indirectly affect the coyote as described in the analyses above, including the loss of 49 percent of the modeled habitat for this species in the Plan Area. Implementation of the avoidance, minimization, and mitigation measures identified in the Plan will reduce the impacts to this species. We anticipate that this species will persist in the remaining 51 percent of the modeled habitat within both the existing PQP Lands and the Additional Reserve Lands. Together these lands form a system of large, contiguous habitat blocks that are inter-connected within the Plan Area. We anticipate that these areas will be monitored and managed cooperatively to benefit this species.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service’s biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the coyote. We reached this conclusion based on the widespread distribution of the coyote in North America and the Plan Area and because the impacts associated with loss of this species’ modeled habitat, when viewed in conjunction with the protection and management of the MSHCP Conservation Area, is not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Amount or Extent of Take

Because it will be difficult to quantify the number of individual coyotes that will be taken as a result of the proposed action over the 75-year permit term, the Service is quantifying the take as the number of acres of modeled coyote habitat that will be impacted in the Plan Area as a result of the proposed action. We anticipate that up to 464,271 acres of habitat within the Plan Area will become unsuitable for coyote. A small, but undeterminable, number of coyotes are anticipated to be taken as a result of management actions within the Additional Reserve Lands. Take will be in the form of harm, death, and injury. This level of anticipated take is not likely to result in jeopardy to the coyote.

Dulzura kangaroo rat (*Dipodomys simulans*)Status of the Species*Listing Status*

The Dulzura kangaroo rat is not a State or federally listed species.

Species Description

The Dulzura kangaroo rat, a rodent of the family Heteromyidae, is 1 of 21 species of kangaroo rats (genus *Dipodomys*) (Williams *et al.* 1993b). The genus *Dipodomys* generally occurs in the more arid portions of the North American continent (Schmidly *et al.* 1993).

Most of the literature cited in this species account considered the Dulzura kangaroo rat to be the Pacific (agile) kangaroo rat (*D. agilis*) at the time the studies were conducted. Since about 1997, the Dulzura kangaroo rat has been accepted as a distinct species based on chromosomal and morphometric data (Sullivan and Best 1997). In this account, the species is assumed to be the Dulzura kangaroo rat in studies where it is clear, based on geographic and elevational range, that the kangaroo rat species studied was the Dulzura kangaroo rat. For example, it is assumed that the Pacific kangaroo rat referred to in Price's (*e.g.*, Price *et al.* 1991; Price and Goldingay 1992; Goldingay and Price 1997) research in western Riverside County is currently named Dulzura kangaroo rat.

Habitat Affinities

The Dulzura kangaroo rat generally occurs in open microhabitats in chaparral, coastal sage scrub (including Riversidean and Diegan coastal sage scrub), Riversidean alluvial fan sage scrub and peninsular juniper woodland and scrub (Goldingay and Price 1997). Williams *et al.* (1993b) describe the habitat of the Dulzura kangaroo rat as coastal chaparral and grassland communities. The Dulzura kangaroo rat in Riverside County overlaps with three other kangaroo rats species or subspecies, (*D. stephensi*, *D. merriami collinus*, and *D. merriami parvus*). Similar species that coexist generally occupy and exploit different microhabitats or differ in their seasonality of resource exploitation (Brown and Harney 1993). Price and others (Price *et al.* 1991; Price and Goldingay 1992; Goldingay and Price 1997) reported where the Stephens' kangaroo rat and Dulzura kangaroo rat overlap, the Dulzura kangaroo rat was captured in areas with significantly greater bare ground, shrub and rock cover than the Stephens' kangaroo rat. Additionally, Dulzura kangaroo rat forage under shrub canopies and avoid lighted open areas more than Stephens' kangaroo rat (Price *et al.* 1991).

Periodic fires or temporary clearing of habitats appears to facilitate colonization by Dulzura kangaroo rat (Price and Waser 1984; Price *et al.* 1995). For example, Price and Waser (1984) reported Dulzura kangaroo rats increase in abundance following wildfires that create openings in chaparral and sage scrub habitats.

Life History

Dulzura kangaroo rats are primarily nocturnal, but they also exhibit crepuscular behavior. They emerge from their day burrows around dusk to forage. Little scientific literature is available on the specific diet of the Dulzura kangaroo rats in the wild, but they are primarily granivorous and probably are opportunistic in the collection of seeds. In a laboratory study of native seed selection Dulzura kangaroo rats were found to select first the seeds of *Avena* and *Erodium* (large seeds) over those of *Encelia* and *Phacelia* (small seeds) (Price *et al.* 1991). Behavioral and physiological adaptations enable kangaroo rats to live in arid environments (French 1993). Generally, they are adept at water conservation and can survive for extended periods with little free-water (French 1993). The Dulzura kangaroo rat, however, inhabits relatively mesic environments compared with many other heteromyid species. In laboratory conditions, Dulzura kangaroo rats needed free water or succulent vegetation to survive (Forman and Phillips 1993; French 1993).

There are no reproduction data for the Dulzura kangaroo rat. *Dipodomys*, in general however, have relatively low reproductive output for rodents (Randall 1993). They are opportunistic breeders and can reproduce several times a season and at any time of the year (Smith and Jorgensen 1975). Breeding activities appear to vary in relation to ecological conditions. Reproduction typically occurs following rainfall and production of herbaceous annuals. Individuals may not breed in years when conditions are poor. Average litter size for *Dipodomys* ranges from 2.5 (for *D. spectabilis*) to 3.5 (for *D. panamintinus*) pups, with seven other *Dipodomys* falling within this range (Daly *et al.* 1984; Eisenberg 1993). There are no published data on the life expectancy of the Dulzura kangaroo rat in the wild, but typical life expectancy of kangaroo rats is less than one year. Individuals, in captivity, however, may live up to 6-7 years.

There are little data on the dispersion patterns of the Dulzura kangaroo rat. MacMillen (1964) reported that male and female home ranges were equivalent in size (average of 0.8 acre, range of 0.4 to 1.5 acres) and that male home ranges overlapped females and other males more than female ranges overlapped ranges of other females. This is similar to the dispersion patterns of other kangaroo rat species, including *D. merriami*, *D. ordi*, *D. panamintinus*, and *D. ingens* (Jones 1993). There are no specific data on dispersal by the Dulzura kangaroo rat.

Specific information on the types and abundances of predators of the Dulzura kangaroo rat is lacking. Natural predators in Riverside County likely include owls, snakes, gray foxes, coyotes, long-tailed weasels, and bobcats. A number of parasites and pathogens are associated with the genus *Dipodomys* (Whitaker *et al.* 1993). Their effects on the health of *D. simulans* are generally unknown; however, some parasites and pathogens may have deleterious effects on populations (Whitaker *et al.* 1993), particularly on small, isolated populations.

Status and Distribution

According to Sullivan and Best (1997), the Dulzura kangaroo rat ranges from approximately the foothills east of Ventura and north of the Santa Clara River Valley south to approximately Magdalena Plain, Baja California, Mexico. The species is generally common and occurs at elevations below approximately 2,600 feet in the Transverse and Peninsular mountain ranges,

with recorded populations from Soliment Canyon in Ventura County, Cajon Pass in San Bernardino County, Lake Mathews and Cabazon in Riverside County, San Luis Rey Valley, Warner Springs, San Diego and Jacumba in San Diego County, and Ensenada, Sierra Juarez, Valle de Trinidad, San Quintin Plain, San Pedro de Martir, El Rosario, San Agustin, Santa Catarina, Laguna Chapala, San Andres, Mesquital, San Ignacio and Magdalena Plain in Baja California, Mexico (Sullivan and Best 1997).

Threats

The greatest potential threats to the Dulzura kangaroo rat are habitat loss, degradation, and fragmentation.

Conservation Needs

In general, Dulzura kangaroo rats likely require large tracts of interconnected blocks of suitable habitat.

Environmental Baseline

The Dulzura kangaroo rat is considered relatively common throughout the Plan Area in scrub and grassland communities at elevations up to 2,600 feet (Goldingay and Price 1997; Sullivan and Best 1997). While no known surveys have been conducted to specifically determine the distribution of this species, it has been trapped in several locations throughout the Plan Area in association with surveys for other rodent species according to our records. The vegetation communities used to model this species habitat were chaparral, coastal sage scrub, desert scrub, Riversidean alluvial fan sage scrub, and peninsular juniper woodlands and scrub. Based on this analysis, the Plan Area supports 336,832 acres of modeled habitat for this species. Approximately, 101,790 acres of this modeled habitat is within PQP Lands. Because Dulzura kangaroo rats prefer open microhabitats within these general habitat types (Goldingay and Price 1997), modeled habitat likely overestimates the extent of suitable habitat for this species.

Effects of the Action

Direct Effects

Given the presumed widespread distribution of this species, proposed residential, commercial and urban development outside of the MSHCP Conservation Area will result in direct mortality of Dulzura kangaroo rats from crushing of their burrows during clearing, grading, and associated construction activities. Without detailed information on Dulzura kangaroo rat distribution and density within the Plan Area, we cannot determine how many individuals or populations will be affected by planned development. We anticipate the loss of 143,411 acres (43 percent) of modeled Dulzura kangaroo rat habitat within the Plan Area over the 75-year permit term. This habitat loss will result in death and injury to individual Dulzura kangaroo rats in the Plan Area; however, some individuals may be able to escape to adjacent habitats, and some will survive in rural/mountainous areas with suitable habitat. Approximately 66,504 acres (46 percent) of the

non-conserved modeled habitat for the Dulzura kangaroo rat are designated as rural/mountainous land where development impacts are expected to occur at a slower rate and at lower densities.

To offset the loss of Dulzura kangaroo habitat within the Plan Area, implementation of the MSHCP will conserve and manage large areas containing modeled habitat for the Dulzura kangaroo rat and linkages among these areas. Additional Reserve Lands will include 91,631 acres (27 percent) of modeled Dulzura kangaroo rat habitat (chaparral, coastal sage scrub, desert scrub, and peninsular juniper woodland and scrub) in the Plan Area. An additional 101,790 acres (30 percent) of modeled habitat will remain within PQP Lands. In total, 57 percent of the modeled habitat for Dulzura kangaroo rat will be conserved or remain in the Plan Area. An additional 21,000 acres of habitat for dispersal or movement corridors will be retained or conserved within several existing and proposed Cores and Linkages as PQP or Additional Reserve Lands (MSHCP Section 3.2.3).

Four main habitat complexes will support the Dulzura kangaroo rat within the MSHCP Conservation Area: the Santa Ana Mountain foothills-Santa Rosa Plateau complex, the Lake Mathews/Estelle Mountain-Steele Peak-Kabian Park-Sedco Hill complex, the Badlands-San Jacinto Mountain foothills-Agua Tibia Wilderness complex, and the Banning Bench complex. Smaller habitats assumed to be isolated from these large habitat complexes will be in the Jurupa Hills, Box Springs Mountains, Lakeview Mountains, Sycamore Canyon Regional Park, Norco Hills, Double Butte, Motte-Rimrock Reserve, and Warm Springs Mountain.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands including surveys for the Dulzura kangaroo rat. Cooperative management and monitoring is anticipated on PQP Lands. Surveys for the Dulzura kangaroo rat will be conducted at least every 8 years to verify occupancy at a minimum of 75 percent of the known locations. If a decline in the distribution of the Dulzura kangaroo rat is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP.

Management actions to benefit Dulzura kangaroo rats (*e.g.*, trapping, habitat manipulations) or other Covered Species may result in impacts, including death, to a small number of individual Dulzura kangaroo rats. It is anticipated that any impacts to Dulzura kangaroo rats from management actions will be minimized by adherence to appropriate trapping protocols and other guidelines described in Section 7.4 of the MSHCP.

Indirect Effects

Dulzura kangaroo rats could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These include the indirect effects described in the “General Effects” section of this biological opinion. Each of the major habitat complexes identified above is bisected by at least one major road artery. Road widening is proposed for several of these roads as described in Section 7.3.5 in the MSHCP. Existing and proposed roads and road widening projects may increase fragmentation among Dulzura kangaroo rat populations. The detrimental effects of fragmentation are described in the “General Effects” section of this biological opinion. The guidelines and recommendations described in Section 7

of the MSHCP and the and summarized in the Conservation Measures of this biological opinion will help minimize the impacts of road construction on habitat connectivity.

Conclusion

We anticipate the proposed action will directly and indirectly affect the *Dulzura kangaroo rat* as described in the analyses above, including the loss of 43 percent of the modeled habitat for this species in the Plan Area. Implementation of the avoidance, minimization, and mitigation measures identified in the Plan will reduce the impacts to this species. We anticipate that this species will persist in the remaining 57 percent of the modeled habitat within both the existing PQP Lands and the Additional Reserve Lands. Together these lands form a system of large, contiguous habitat blocks that are inter-connected within the Plan Area. We anticipate that these areas will be monitored and managed cooperatively to benefit this species.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the *Dulzura kangaroo rat*. We reached this conclusion based on the widespread distribution of the *Dulzura kangaroo rat* in the Plan Area and because the impacts associated with loss of this species' modeled habitat, when viewed in conjunction with the protection and management of the MSHCP Conservation Area, is not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Amount or Extent of Take

We anticipate the take of all *Dulzura kangaroo rats* within up to 143,411 acres of modeled habitat outside of the MSHCP Conservation Area. A small, but undeterminable, number of *Dulzura kangaroo rats* are anticipated to be taken as a result of management actions. Take will be in the form of harm, death, and injury. This level of take is not likely to result in jeopardy to the *Dulzura kangaroo rat*.

Long-tailed weasel (*Mustela frenata*)

Status of the Species

Listing Status

The long-tailed weasel (*Mustela frenata*) is not federally or State-listed.

Species Description

The long-tailed weasel, a carnivore of the family Mustelidae, is 1 of 16 recognized species of the genus *Mustela* (Wozencraft 1993). There are 42 recognized subspecies of *M. frenata* (Hall 1951).

Life History

The long-tailed weasel is highly active and may be active out of the den anytime of the day or night (Criddle and Criddle 1925; Soper 1946). It is also highly mobile and has been observed to hunt in burrows for rodents, tunnel under snow in the winter, and climb trees for prey (climbing may also be an anti-predator strategy). Trees also may be used for caching food during the winter months (Weeks 1993). The long-tailed weasel is a generalist predator, feeding on a wide variety of prey, and is able to switch to alternative prey when normal prey numbers are low (Gamble 1981; King 1989). It primarily feeds on rodents, such as voles and deer mice, and rabbits.

The breeding season of the long-tailed weasel is variable. Females may enter estrus from early spring to summer. Implantation of the fertilized eggs is delayed from about 68 to 250 days. Gestation, including the implantation period, ranges from 205-337 days, with an average of 279 days. Females produce one litter per year of 3-9 offspring (average of 4-5) born between mid-April and early May. Lactation lasts approximately five weeks.

Long-tailed weasels are solitary most of the year, but home ranges of males and females overlap, and males may remain with females during the non-breeding season. Home ranges of males do not overlap. Home ranges may vary by season, and home ranges of males are larger than home ranges of females. In Kentucky, for example, summer home ranges ranged from 16 to 24 hectare and winter ranges ranged from 10 to 18 hectare. Where prey are scarce, home ranges as large as 160 ha have been recorded. Reported densities of the long-tailed weasel range from 0.004 to 0.008 weasels per ha in western Colorado (Quick 1951), 0.19 to 0.38 per hectare in chestnut oak forest, 0.07 to 0.09 per hectare in scrub oak-pitch pine forest in Pennsylvania (Glover 1943), and 0.2 to 0.3 per hectare in cattail marsh in Ontario, Canada (Wobeser 1966).

Although populations of the long-tailed weasel appear to be more stable than other weasel species (*M. erminea* and *M. nivalis*), they also fluctuate, and local populations may be extirpated in response to changes in the abundance of prey (King 1989).

Svendsen (1982) listed five sources of natural mortality in weasels: disease, parasites, nutrition, population stress, and predation. Predators of long-tailed weasels include red fox and gray fox, raptors (owls and hawks), coyotes, martens, bobcats, rattlesnakes and domestic cats and dogs. Other sources of mortality include trapping, shooting, automobiles, and the Powassan virus.

Because they feed on poultry, weasels are considered an agricultural pest species in some areas. Ectoparasites on long-tailed weasel include several species of fleas, sucking louse, biting lice, ticks, chiggers, and mites. Endoparasites include trematodes (a fluke or flatworm) and nematodes (roundworms). Weasels have also tested positive for plague.

Habitat Affinities

The long-tailed weasel prefers habitats with abundant prey (*i.e.*, areas supporting large populations of small mammals and birds), such as areas where dens of burrowing rodents are numerous and close to cover (Polderboer *et al.* 1941). Prey species diversity probably is an

important factor in determining suitable habitat for this species. The long-tailed weasel also appears to be partially restricted to habitats in close proximity to standing water (Gamble 1981). Waterways provide access to suitable habitat and are natural avenues for dispersal, particularly in areas that otherwise are unsuitable (Fagerstone 1987). Preferred habitat types include brushland and open timber, brushy field borders, grasslands along creeks and lakes, and swamps (Svendsen 1982). Dens are located in dense-brushy vegetation in, or bordering, dry creeks or ravines. Nests are often located in burrow constructed by another animal or under rocks or brush piles (Sheffield and Thomas 1997).

Status and Distribution

Long-tailed weasel has the largest distribution of any mustelid in the western hemisphere, and, except for deserts, inhabits most life zones from alpine to tropical. It occurs from southern Canada to Bolivia, including all 48 contiguous states (Hall 1981, Sheffield and Thomas 1997). Due to the low densities and periodic fluctuations of North America long-tailed weasels populations, this species is listed as endangered, threatened, rare, or as a Species of Special Concern in many states and provinces (Sheffield and Thomas 1997). The subspecies *M. f. latirostra* occurs in a very small area of southern California, primarily in portions of eastern Orange County, western Riverside County and northern San Diego County (Hall 1981). Hall (1981) lists records for this subspecies from Cuyama Valley, Bluff Lake, Cabazon, Julian, Chula Vista, Rincon Point and Baja.

Threats

Threats to long tailed weasel are expected to include collision with vehicles, predation by cats and dogs, shooting, trapping, poisoning, and habitat loss, fragmentation, and isolation due to urban development.

Conservation Needs

The conservation needs of long tailed weasel include maintenance of large habitat patches and linkages throughout its range. In fragmented and urbanizing areas, this includes providing for long tailed weasel movement across (under) roads.

Environmental Baseline

Though the current long tailed weasel population size and distribution in the Plan Area is unknown, it is expected throughout western Riverside County in suitable habitat. Our dataset includes seven recent records, primarily located throughout the MSHCP's Riverside lowland bioregion. The vegetation communities used to model habitat for this species were agricultural lands, chaparral, coastal sage scrub, grassland, meadow/marsh, montane coniferous forest, peninsular juniper woodland and scrub, playa/vernal pool, riparian scrub woodland and forest, Riversidean alluvial fan sage scrub, and woodland/ forests. Based on these vegetation communities, the Plan Area supports approximately 932,423 acres of habitat for the long-tailed weasel. Approximately 325,913 acres of the modeled habitat are within PQP Lands. Because

the long-tailed weasel may be partially restricted to habitats in close proximity to standing water, modeled habitat likely overestimates the extent of suitable habitat for this species.

Effects of the Action

Direct Effects

The Plan Area includes 932,423 acres of modeled habitat for the long-tailed weasel. Given the presumed widespread distribution of this species in appropriate habitat, proposed residential, commercial and urban development outside of the MSHCP Conservation Area will result in direct mortality of long-tailed weasels, particularly from crushing of their dens or nests during clearing, grading, and associated construction activities that occur during the rearing season. Without detailed information on long-tailed weasel distribution and density within the Plan Area, we cannot determine how many individuals or populations will be affected by planned development. However, we anticipate the loss of 459,806 acres (49 percent) of modeled long-tailed weasel habitat within the Plan Area over the 75-year permit. Some individuals, outside of the MSHCP Conservation Area, may be able to escape to adjacent habitats, and some will survive in rural/mountainous areas with suitable habitat. Approximately 108,420 acres (24 percent) of the non-conserved modeled habitat for the long-tailed weasel are designated as rural/mountainous land where development impacts are expected to occur at a slower rate and at lower densities.

To offset the loss of long-tailed weasel habitat within the Plan Area, implementation of the MSHCP will conserve and manage large areas containing modeled habitat for the weasel and linkages among these areas. Conserved habitat within the Additional Reserve Lands will include 146,704 acres (16 percent) of modeled long-tailed weasel habitat. An additional 325,913 acres (35 percent) of long-tailed weasel modeled habitat will remain within PQP Lands. In total, 51 percent of the modeled habitat for long-tailed weasel will be conserved or remain in the Plan Area.

At least 18 Core Areas will support the long-tailed weasel within the MSHCP Conservation Area at the Santa Ana River-Prado Basin, Santa Ana Mountain (Cleveland National Forest), Lake Mathews/Estelle Mountain, Santa Rosa Plateau, Santa Margarita Ecological Reserve, San Jacinto Wildlife Area-Lake Perris, San Bernardino Mountain, Lake Skinner-Diamond Valley lake, San Jacinto Mountain, Beauty Mountain Management Area/Anza Borrego Desert State Park, Agua Tibia Mountain, Alberhill Area, Antelope Valley, Badlands/Portrero, East Cactus Valley, upper San Jacinto River, Silverado Ranch, and the Vail Lake/Sage and Wilson Valley areas.

Approximately 52,400 acres of habitat for dispersal and movement of long-tailed weasels will be included within several existing and proposed Linkages/Constrained Linkages as PQP Lands or Additional Reserve Lands (Section 3.2.3).

The Permittees will implement management and monitoring activities within the Additional Reserve Lands including surveys for the long-tailed weasel. Cooperative management and monitoring are anticipated on PQP Lands. Surveys for the long-tailed weasel will be conducted

at least every eight years to verify occupancy of 75 percent of the known locations. If a decline in the distribution of the long-tailed weasel is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP.

Management actions to benefit long-tailed weasels (*e.g.*, trapping, habitat manipulations) or other Covered Species may result in impacts, including death, to a small number of individual long-tailed weasels. It is anticipated that any impacts to long-tailed weasels from management actions will be minimized by adherence to appropriate trapping protocols and other guidelines described in Section 7.4 of the MSHCP.

Indirect Effects

The long-tailed weasel could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These include the indirect effects described in the “General Effects” section of this biological opinion. Existing and proposed roads and road widening projects will likely result in the increase in mortality due to collisions with vehicles and may increase fragmentation and isolation of long-tailed weasel populations. The guidelines and recommendations described in Section 7 and summarized in the Conservation Measures of this biological opinion will help minimize the impacts of roads on habitat connectivity.

Conclusion

We anticipate the proposed action will directly and indirectly affect the long-tailed weasel as described in the analyses above, including the loss of 49 percent of the modeled habitat for this species in the Plan Area. Implementation of the avoidance, minimization, and mitigation measures identified in the Plan will reduce the impacts to this species. We anticipate that this species will persist in the remaining 51 percent of the modeled habitat within both the existing PQP Lands and the Additional Reserve Lands. Together these lands form a system of large, contiguous habitat blocks that are relatively inter-connected within the Plan Area. We anticipate that these areas will be monitored and managed cooperatively to benefit this species.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service’s biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the long-tailed weasel. We reached this conclusion based on the widespread distribution of the long-tailed weasel in the Plan Area and because the impacts associated with loss of this species’ modeled habitat, when viewed in conjunction with the protection and management of the MSHCP Conservation Area, is not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Amount or Extent of Take

We anticipate the take of all long-tailed weasels within up to 459,807 acres of modeled habitat outside of the MSHCP Conservation Area. A small, but undeterminable, number of long-tailed weasels are anticipated to be taken as a result of management actions. Take will be in the form

of harm, death, and injury. This level of take is not likely to result in jeopardy to the long-tailed weasel.

Los Angeles pocket mouse (*Perognathus longimembris brevinasus*)

Status of the Species

Listing Status

The Los Angeles pocket mouse is not federally listed; however, it is considered a Species of Special Concern by the California Department of Fish and Game.

Species Description

The Los Angeles pocket mouse, a rodent of the family Heteromyidae, is 1 of 16 subspecies of the little pocket mouse *Perognathus longimembris* (Williams *et al.* 1993b). Very little biological information is available specifically for the Los Angeles pocket mouse (*P. l. brevinasus*). Therefore, the common name used in this section where appropriate, is the little pocket mouse, which refers to the species *P. longimembris*.

Habitat Affinities

Based on anecdotal evidence, soil characteristics are probably more important for the Los Angeles pocket mouse than vegetation associations, but specific habitat characteristics have not been defined for the Los Angeles pocket mouse. Grinnell (1933) indicated that the species “inhabits open ground of fine sandy composition” (cited in Brylski *et al.* 1993). This observation is supported by others who also state that the Los Angeles pocket mouse is associated with fine, sandy soils and may utilize these soil types for burrowing (*e.g.*, Jameson and Peters 1988). This species may be restricted to lower elevation grassland and coastal sage scrub (Patten *et al.* 1992) and like other heteromyid species, may prefer sparsely vegetated habitats. Data suggest that the Pacific pocket mouse (*P. l. pacificus*) avoids dense grass cover because it is difficult to move through and find seeds in thick cover (M. Pavelka 1998-99 cited in Spencer and Schaefer 2000).

Life History

Little pocket mice are primarily granivorous and may specialize on grass seeds. Reichman and Price (1993) provide a comprehensive treatment of heteromyid foraging that may be relevant to the Los Angeles pocket mouse. Little pocket mice have external, fur-lined cheek pouches that enable them to collect and cache seeds. They tend to forage under shrub and tree canopies, near clumps of vegetation, or around rock crevices (Brown and Lieberman 1973; Kenagy 1973).

The daily activities of the Los Angeles pocket mouse have not been studied, but various studies of the little pocket mouse indicate that its daily activity patterns are similar to other heteromyid rodents (*e.g.*, Kenagy 1973; O’Farrell 1974). Little pocket mice are primarily nocturnal and may

exhibit distinct seasonal patterns in surface activity (Chew and Butterworth 1964; Kenagy 1973; O'Farrell 1974). The little pocket mouse is active on the surface during warmer months and may enter into torpor and not be active on the surface during colder months. During this period of dormancy, pocket mice may survive on the food they have cached in their burrows.

As with other heteromyids, *P. longimembris* are not prolific breeders although females apparently are capable of breeding in their natal season. In the laboratory, Hayden *et al.* (1966) recorded typical gestation periods of 22-23 days. In the wild, little pocket mice may produce 1 or 2 litters per year with typical litter sizes of 3-4 pups.

Little pocket mice probably do not disperse long distances (Spencer and Schaefer 2000) and exhibit high site fidelity from year to year (Chew and Butterworth 1964). Heteromyids in general are asocial, solitary animals; however, O'Farrell (1980) reported that little pocket mouse home ranges overlapped during the peak breeding season and characterized it as relatively more social than other heteromyids studied. In Joshua Tree, California, Chew and Butterworth (1964) reported that the circular home ranges of little pocket mice were 0.1 hectare (0.25 acre) to 0.5 hectare (1.2 acres), with an average of 0.3 hectare (0.74 acre), and population densities were 0.7 to 1.7 individuals per hectare. Maza *et al.* (1973) reported home ranges of females were 0.5 hectare (1.2 acres) to 3.1 hectare (7.6 acres) and males were 0.3 hectare (0.7 acre) to 1.9 hectare (4.7 acres) in the Nevada desert.

Little pocket mice have relatively low rates of evaporative water loss compared to most mammals due to a reduction in respiratory and cutaneous water losses (French 1993). Potential behavioral adaptations for maintaining water balance, energy, and thermoneutrality are remaining in day burrows during periods of climatic extremes, plugging burrow entrances to retain moisture (*i.e.*, humidity) in the burrow (Kenagy 1973), and ingestion of herbaceous and succulent plants (possibly to support lactation).

Status and Distribution

The historic range of the Los Angeles pocket mouse was estimated to be from Burbank and San Fernando in Los Angeles County east to the City of San Bernardino, San Bernardino County (Hall 1981). Its range extends eastward to the vicinity of the San Geronio Pass in Riverside County, southeast to Hemet and Aguanga, and possibly to Oak Grove, in north-central San Diego County (Hall 1981, Patten *et al.* 1992).

According to the MSHCP database, the Los Angeles pocket mouse was captured in the 1990s in the Anza Valley, Cactus Valley, at several locations along the San Jacinto River between Valle Vista in the south and the San Jacinto Wildlife Area in the north, east of the current terminus of Murrieta Hot Springs Road, along SR-79 in the Temecula-Pauba Valley area, and in Moreno Valley near March Air Reserve Base (ARB) and adjacent to Alessandro Avenue. There are also known or historic locations in San Bernardino County at Slover Mountain in Colton and along Etiwanda Creek in Fontana (CNDDDB 2000). Other known locations in the 1990s, not in the database, include along the southern base of Double Butte and open grassland just east of Lake Perris. Historic records include Beaumont, Banning and Cabazon (CNDDDB 2000).

The current status of the Los Angeles pocket mouse is unknown, but some biologists believe it to be in serious decline in the region because it is seldom trapped and much of its suitable habitat has been lost to agriculture and urban development (Steven Montgomery, pers. comm., 2003).

Threats

Habitat loss, degradation, and fragmentation due to urban development, agriculture, sand and gravel mining, and flood control projects are serious threats to the Los Angeles pocket mouse. Losses of and disruptions in the continuity of drainages and alluvial fan habitats that support patchy distributions of the species probably result in isolation of local populations, which may preclude or limit the amount of genetic exchange between populations. Such isolation can result in genetic drift and loss of heterogeneity in the populations, leaving small local populations at high risk of extirpation. Furthermore, the loss of large areas of sandy loam habitats in occupied bottom lands may also adversely affect this species.

Conservation Needs

Conservation of this species will require more precise descriptions of habitat preferences and identification of currently occupied localities. It will also be important to identify areas with high density populations, which will become higher priority locations.

Environmental Baseline

The distribution of the Los Angeles pocket mouse within the Plan Area is not well known (Hafner *et al.* 1998). According to the CNDDDB database, captures of the Los Angeles pocket mouse since the 1990 occurred southeast of Temecula, east and southeast of Murrieta Hot Springs, south of Hemet in the St. Johns, Cactus and Crown Valleys, near Gilman Hot Springs, west of the March Air Reserve Base in Moreno Valley, and in the vicinity of Lake Perris and the San Jacinto Wildlife Area. NDDDB records of unknown quality were reported from Rawson Canyon, three miles east of Sun City and south of Polly Butte. This species was also recently collected near Double Butte, Santa Gertrudis Creek, March Air Reserve Base, near Gilman Hot Springs, along the San Jacinto River, and in the San Jacinto Wildlife Area (P. Behrends pers. obs., Steven Montgomery, pers. comm., 2003, Michael O'Farrell, pers. comm., 2003).

The species may be present in several other locations with suitable habitat; however, lacking quantitative data on habitat preference, it is difficult to predict potential locations (Williams 1986). It is possible that the Los Angeles pocket mouse is fairly widespread but rarely detected because densities appear to be low in most locations (Williams 1986). In addition, this species may remain dormant during the breeding season under poor weather conditions, which complicates census data (O'Farrell 1974).

Historic records suggest that this species was found in western Riverside County west of the San Gorgonio pass and southeast to Hemet and Aguanga (Patten *et al.* 1992). The historic southwestern boundary is not known. Most of these records were collected before 1940 when urbanization and agricultural development had not yet occurred on a large scale within the Plan

Area (Williams 1986). Most of the known locations for this species occur within the Plan Area (Williams 1986).

The vegetation communities used to model Los Angeles pocket mouse habitat include agricultural land, chaparral, coastal sage scrub, desert scrub, grassland, playas and vernal pools, and Riversidian alluvial fan sage scrub. Given the lack a definitive understanding of habitat associations, expert opinion was used in the MSHCP to outline areas with high potential to support Los Angeles pocket mouse populations within the Plan Area, and areas containing appropriate vegetation communities within these outlines were included in the modeled habitat. We added areas to this outline based on known locations from our dataset or local biologists. We also expanded potential habitat outlines as described in the Aguanga kangaroo rat and San Bernardino kangaroo rat analyses. Based on this analysis, the Plan Area supports 65,387 acres of modeled habitat for the Los Angeles pocket mouse. Approximately 19,143 acres of this modeled habitat are within PQP Lands. About 9,402 acres of this modeled habitat, including 2,880 acres in PQP Lands, are in agricultural lands. While agricultural lands are not considered ideal Los Angeles pocket mouse habitat, populations of this species have been observed within active agricultural areas (Michael O'Farrell, pers. comm., 2003). In general, the lack of survey data and appropriate GIS soil overlays limits our ability to produce a precise model, and there may be large occupied areas beyond the boundaries of our habitat model.

Effects of the Action

Direct Effects

The Plan Area includes approximately 65,387 acres of modeled habitat for the Los Angeles pocket mouse. There are 24,831 acres (38 percent) outside of the MSHCP Conservation Area; of that 21,906 (34 percent of total modeled habitat) occur within the Mammal Species Survey Area for the Los Angeles pocket mouse (Figure 6-5, pp. 6-68). The Los Angeles pocket mouse is considered an Additional Survey Needs and Procedures species. Until such time that the Additional Reserve Lands can be assembled and conservation objectives for Los Angeles pocket mouse are met, surveys will be conducted for public and private projects within the Los Angeles pocket mouse survey area. Populations detected as a result of survey effort shall be avoided according to the procedures outlined in the Additional Survey Needs and Procedures (Section 6.3.2 of the Plan; *i.e.*, 90 percent of portions of property with long-term conservation value shall be avoided until the species conservation goals are met).

Within the 21,906 acres of modeled habitat outside the MSHCP Conservation Area, but within the Los Angeles pocket mouse survey area (34 percent of total modeled habitat), we anticipate that up to 10 percent of the area with long-term conservation value for this species (as discussed above) will be lost to individual projects, including up to all individuals within project footprints. For those locations found to contain large numbers of individuals or otherwise determined to be important to the overall conservation of the Los Angeles pocket mouse, the Plan allows flexibility to acquire these locations for inclusion into the Additional Reserve Lands (Section 6, pp. 6-70).

Los Angeles pocket mice will be subject to impacts associated with development and other proposed Covered Activities within 2,926 acres of modeled habitat outside both the MSHCP Conservation Area and the Los Angeles pocket mouse survey area (4 percent of total modeled habitat). Thus, all individual Los Angeles pocket mice outside of the MSHCP Conservation Area and outside of the Los Angeles pocket mouse survey area are anticipated to be lost over the 75-year permit term as a result of the proposed Covered Activities.

To offset the loss of Los Angeles pocket mouse habitat within the Plan Area, implementation of the MSHCP will conserve and manage large areas containing modeled habitat for the Los Angeles pocket mouse. Additional Reserve Lands will include 21,413 acres (33 percent) of modeled Los Angeles pocket mouse habitat in the Plan Area. An additional 19,143 acres (29 percent) of modeled Los Angeles pocket mouse habitat will remain within PQP Lands. In total, 62 percent of the modeled habitat for the Los Angeles pocket mouse will be conserved or remain in the Plan Area. We also anticipate the loss of the Los Angeles pocket mouse population and associated habitat on the March Air Reserve Base when and if these lands are traded for land in Potrero Valley. If this land trade is completed, an additional 806 acres and a total of 25,637 acres (39 percent) of modeled Los Angeles pocket mouse habitat may be lost, and 39,750 acres (61 percent) of modeled habitat will be conserved or remain in the Plan Area.

Because the distribution of Los Angeles pocket mice is not well defined within the Plan Area, specific conservation objectives are provided in the MSHCP (Section 9, pp. 9-99) to ensure that large, stable Los Angeles pocket mouse populations will persist. Implementation of the Plan will provide protection of Los Angeles pocket mouse populations in at least 7 Core Areas, which will contain at least 2,000 acres of occupied Los Angeles pocket mouse habitat each. Surveys will be conducted to identify these Core Areas. Reserve managers shall demonstrate that each of these Core Areas supports stable or increasing populations that occupy at least 30 percent of the suitable habitat as measured over any 8-year consecutive period. A minimum of 10,000 additional acres of suitable habitat for the Los Angeles pocket mouse will be protected outside of these 7 Core Areas.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands including surveys for the Los Angeles pocket mouse. Cooperative management and monitoring are anticipated on PQP Lands. Outside of the Core Areas, which will receive additional management as described above, surveys for the Los Angeles pocket mouse will be conducted at least every eight years to verify occupancy at a minimum of 75 percent of the known locations. If a decline in the distribution or density of the Los Angeles pocket mouse is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP.

Other management actions described in Section 5, Table 5.2 will help maintain habitat and populations of Los Angeles pocket mouse. These management actions include maintaining and enhancing the floodplain processes, including intermittent flooding and periodic pooling; preventing alteration of hydrology and floodplain dynamics; and addressing farming, fire and fire suppression activities, off-road vehicle use, and invasion from non-native plants. Implementation of these management actions will help to avoid and minimize adverse effects to the Los Angeles pocket mouse.

Management actions to benefit the Los Angeles pocket mouse (*e.g.*, trapping, habitat manipulations) or other Covered Species or surveys for the species may result in impacts, including death, to a small number of individual Los Angeles pocket mice. It is anticipated that any impacts to the Los Angeles pocket mouse from management actions and surveys will be minimized by adherence to appropriate trapping protocols and other guidelines described in Section 7.4 of the MSHCP.

Indirect Effects

The Los Angeles pocket mouse could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These effects generally include the indirect effects discussed in the “General Effects” section of this biological opinion. Proposed road and trail construction may increase fragmentation and isolation for the Los Angeles pocket mouse. The guidelines and recommendations described in Section 7 and summarized in the Conservation Measures of this biological opinion will help minimize the impact of road construction on habitat connectivity.

Conclusion

We anticipate the proposed action will directly and indirectly affect the Los Angeles pocket mouse as described in the analyses above, including the loss of up to 4 percent of its modeled habitat (6 percent with the loss of habitat on the March Air Reserve Base) in the Plan Area. An additional 34 percent of Los Angeles pocket mouse modeled habitat outside the MSHCP Conservation Area will be subject to surveys. Once the conservation objectives for the Los Angeles pocket mouse have been met, avoided areas, which have not been otherwise conserved, may be impacted. We anticipate that occurrences determined to be important to the overall conservation of the species will be considered for inclusion in the Additional Reserve Lands and that at least some of the avoided areas may be maintained as open space habitat.

Implementation of the avoidance, minimization, and/or mitigation measures included in the Plan will reduce the impacts to the Los Angeles pocket mouse. We anticipate that this species will persist in the remaining 62 percent of the modeled habitat (61 percent with the loss of habitat on the March Air Reserve Base) within both the existing PQP Lands and Additional Reserve Lands. Together these lands form a system of large, contiguous habitat blocks that are interconnected within the Plan Area. We anticipate that these areas will be monitored and managed cooperatively to benefit this species.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service’s biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the Los Angeles pocket mouse. We reached this conclusion based on the premise that any large, stable Los Angeles pocket mouse population identified within the Los Angeles pocket mouse survey area will be avoided until specific conservation objectives for this species are met. In addition, the impacts associated with the loss of this species’ modeled habitat, when viewed in conjunction with the protection and management of the MSHCP Conservation Area, is not

anticipated to result in an appreciable reduction in the numbers, reproduction or distribution of this species throughout its range.

Amount or Extent of Take

We anticipate the take of all Los Angeles pocket mice within up to 24,831 acres (25,831 acres with the loss of March ARB) of modeled habitat outside of the MSHCP Conservation Area. A small, but undeterminable, number of Los Angeles pocket mice are anticipated to be taken as a result of surveys and management actions. Take will be in the form of harm, death, and injury. This level of take is not likely to result in jeopardy to the Los Angeles pocket mouse.

Mountain lion (*Puma concolor*)

Status of the Species

Listing status

The mountain lion was designated as a California Department of Fish and Game Specially Protected Mammal in 1990. It may not be directly taken or possessed without a permit from the California Department of Fish and Game. It is not federally listed in the western United States; however, a petition to list the Santa Ana Mountains population of the California mountain lion (*Puma concolor californica*) under the Federal Endangered Species Act was submitted in 1992. The Fish and Wildlife Service (59 Federal Register 56457) did not list the population because the petition did not present substantial information that the Santa Ana Mountains population of the California mountain lion meets the definition of a “species” under section 3(15) of the Act.

Species Description

The mountain lion, a large carnivore of the family Felidae, is the only species of the genus *Puma*. There are generally 30 recognized subspecies of *P. concolor* (Currier 1983). The subspecies *P. c. californica* occurs in western Riverside County. The pelage of adults is yellowish brown to grayish brown. Young are similar in color but also spotted with black.

Habitat Affinities

Mountain lions occur in a wide variety of habitats, from desert to tropical rainforest to cold coniferous forests. While some studies have documented that habitat with a dense understory is preferred (Seidensticker *et al.* 1973; Logan and Irwin 1985; Laing 1988), mountain lions can live in open habitats with minimum vegetative cover (Lindzey 1987; Seidensticker 1991). In general, mountain lions require large tracts of land with low levels of human disturbance and development, sufficient horizontal cover for hiding, resting, and stalking prey, and a sufficient amount of prey (Currier 1983; Laing and Lindzey 1991; Beier and Barrett 1993). In a study in the Santa Ana and Santa Margarita mountains in southern California, Padley (1991) located mountain lions most frequently in coastal sage scrub, oak woodland, and riparian habitats.

Life History

Mountain lions are solitary and secretive. They are primarily nocturnal and crepuscular but exhibit some diurnal activity (Van Dyke *et al.* 1986; Beier and Barrett 1993; Laundré *et al.* 1996). Mountain lions feed on a wide variety of prey, ranging from birds, reptiles, and small rodents to moose. In North America, their primary prey is large ungulates, particularly deer (Beier and Barrett 1993). In the Santa Ana Mountains, Beier and Barrett (1993) reported mountain lions primarily consumed deer but also consumed coyote, opossum, foxes, gophers, rabbits, and voles, as well as a variety of other small and medium sized mammals and some domestic animals, such as cats and cattle calves.

Mountain lions are polygamous, but often the same lions mate year after year because of the stability of the home ranges. Females can come into estrus any time of the year, though most births occur in the warmer months of April through September in the northern hemisphere (Currier 1983). The gestation period lasts from 82 to 96 days (Currier 1983). Litters vary in size from 1 to 6 cubs with an average of 2.4 (Currier 1983). Young may remain with their mother until age 1 ½ to 2 years. Mountain lions reach sexual maturity at about 2 to 3 years, but time of first breeding probably depends on when a female is able to establish a territory. Females usually give birth every other year.

In the Santa Ana Mountains in southern California, Beier (1996) reported a mother initiated dispersal of her young by abandoning her cub of about 18 months at the edge of her range. Beier (1996) also observed dispersing individuals used corridors along well-covered travel routes, underpasses, areas lacking artificial lighting, and areas with low residential densities (<one dwelling unit/39.5 acres). In the San Anders Mountains of southern New Mexico, Sweanor *et al.* (1996) reported the average age of dispersal was 13.5 months for females and 15.7 months for males. Sixty percent of the females did not disperse from their natal range, whereas all males did. Females dispersed an average of 7.7 miles, and males dispersed an average of 62.8 miles (Sweanor *et al.* 1996).

In southern New Mexico, a study of lion cub survival rates indicated the annual survival rate of a population of un hunted mountain lions was about 70 percent (Logan *et al.* 1996). Natural causes of mortality, in order of frequency, were cannibalism, starvation, disease, accidental fall and coyote predation (Logan *et al.* 1996). Mean annual subadult survival was 87 percent for females and 60 percent for males, and all deaths were from intraspecific killing. Mean annual adult female survival was 81 percent, and male survival was 90 percent. In the Santa Ana Mountains, Beier and Barrett (1993) reported the survival rate was 52 percent for juveniles and 75 percent for adults. Collisions with vehicles caused 32 percent of the 27 documented mountain lion deaths in all age classes (Beier and Barrett 1993). In hunted and controlled populations, most deaths are caused by hunting and predator control (Beier and Barrett 1993). Disease may contribute to mortality in some populations. Mountain lions may carry a variety of endo- and ecto-parasites and diseases, including feline immunodeficiency virus, feline leukemia virus, feline infectious peritonitis, canine distemper, panleukopenia, and rabies (Foley 1996).

Home range size, amount of spatial overlap, and population densities of mountain lions is variable and depends on a variety of factors such as geographic location of the population, prey

abundance, season, and whether the population is hunted. Average home range sizes range from 32.5 square kilometers (8,031 acres) to 1,032 square kilometers (255,013 acres) and often vary in size among seasons and years (Anderson 1983). Adult female home ranges typically overlap with each other and with male home ranges. Adult male home range overlap occurs, but less frequently (Currier 1983).

In the Santa Ana Mountains, Padley (1989, 1996) reported annual home ranges varied from 51 square kilometers (12,602 acres) to 140 square kilometers (34,595 acres), with a mean home range of 69 square kilometers (17,050 acres), and that home ranges of females with kittens were smaller than those of males. Padley also found that home ranges were stable from year to year and suggested that this stability may be related to the abundance of mule deer populations.

Mountain lion densities vary from 0.5 to 4.9 mountain lions per 100 square kilometers (24,710 acres) (Anderson 1983). In the Santa Ana Mountains, Beier and Barrett (1993) estimated density of adult mountain lions was approximately 1 mountain lion per 100 square kilometers (24,710 acres). Prey density is an important factor regulating mountain lion populations.

Using a simulation model to identify the minimum area and immigration rate needed to avoid extinction of mountain lions caused by demographic and environmental stochasticity, Beier (1993) estimated, in the absence of immigration, a habitat area of 386 to 850 square miles is needed to support a mountain lion population of 15 to 20 adults. With immigration, smaller areas (232 to 617 square miles) may support mountain lion populations; however, without immigration the risk of local extinction increases in smaller areas. He did not take into consideration risk of extinction due to inbreeding and subsequent loss of genetic variability in the model and cautioned that his minimum area estimates are likely not large enough to support populations without loss of genetic variability, particularly in the absence of viable habitat corridors. He therefore advocated the protection and enhancement of wildlife corridors in areas where mountain lion populations are fragmented such as in western Riverside County.

Crooks (1999) reported that within coastal southern California, mountain lions appear to be the predator most sensitive to habitat fragmentation and isolation because of their requirement for large tracts of intact habitat. The probability of occurrence of mountain lions declined as habitat fragments became smaller and more isolated and was zero in all but the largest habitat blocks (*e.g.*, > 100 square kilometers). Further, Crooks (1999) stated that it is expected that the probability of residency (as opposed to occurrence or use) or long-term viability of mountain lion populations is even lower in small, isolated fragments.

In general, mammalian carnivores are particularly vulnerable to environmental disturbances (*e.g.*, habitat fragmentation) and play important structuring roles in ecological communities (Crooks 1999). For example, apex predators such as mountain lions, bobcats, and coyotes may not be able to persist in habitat fragments, especially small isolated remnants not connected by movement corridors (Soule *et al.* 1988 as cited by Crooks 1999; Beier 1993). The decline or disappearance of these top predators from fragmented areas may lead to an increase in smaller predators that are often considered the principle predation threats on birds and other small vertebrates (Crooks 1999). Such “mesopredator release” (Soule *et al.* 1988 as cited by Crooks 1999) has been implicated in the decline and extinction of prey species worldwide (Crooks

1999). The conservation of large tracts of intact habitat and movement corridors and linkages are essential to the maintenance of apex predators, such as mountain lion, in urbanizing landscapes. In turn, the continued presence of top predators in these landscapes will contribute to the maintenance of other native fauna, such as birds.

Status and Distribution

Historically, mountain lions ranged from northern British Columbia to southern Chile and Argentina, and from coast to coast in North America (Currier 1983). Within the United States, their range is now restricted primarily to relatively unpopulated regions in the west, mainly due to hunting pressures and changes in land management practices (Currier 1983). The distribution of the mountain lion is probably limited by human interference, lack of prey, or lack of stalking cover (Currier 1983).

P. c. californica occurs in most of California, southern Oregon, western Nevada, and northern Baja California, Mexico (Currier 1983). In California, mountain lion populations were suppressed due to human persecution when the species was classified as a bountied predator from 1907 to 1969 (Weaver 1982). A moratorium on hunting mountain lions was passed in California in 1971, and the species was given special protection under State Proposition 117 in 1990, which has generally led to an increase in mountain lion numbers in some areas (Weaver 1982, Beier and Barrett 1993, Mountain Lion Foundation). In other areas, however, it is declining because of habitat loss and fragmentation due to urban development (Beier and Barrett 1993). According to Beier and Barrett (1993), the mountain lion population in the Santa Ana Mountains is in jeopardy of becoming extinct due to these factors.

Threats

The primary threats to the mountain lion are loss of large areas of undeveloped land, habitat fragmentation, collision with vehicles, indiscriminate shootings, animal control measures, and loss of natural prey base (Currier 1983). Loss of large, relatively undisturbed blocks of habitat and adequate linkages between blocks of habitat, as well as lack of functional wildlife crossings over or under major roadways and subsequent mortality due to vehicle collision are serious threats to the persistence of mountain lions in urban and urbanizing environments such as Riverside County.

Conservation Needs

The conservation needs of the mountain lion include the persistence and protection of large tracts of suitable habitat and functional habitat linkages and movement corridors. "Regional" corridors should link large habitat tracts to maintain demographic and genetic exchange between mountain lion populations and "Local" corridors should allow resident animals access to necessary resources (*e.g.*, water, food, cover, and den sites) within large habitat tracts (Mock *et al.* 1992). Movement corridors and habitat linkages should be continuous with habitat blocks on either end, have buffers that reduce light and noise from adjacent human development and activity, and be appropriately vegetated to make the linkage more attractive to and functional for mountain lions. Maintenance of mountain lions in urbanizing areas, such as western Riverside County, will

require functional wildlife crossings at major roadways to be designed, installed, monitored, and maintained. Fencing should be used to funnel mountain lions to crossings and to keep them off roadways. Predator control programs should emphasize education to minimize conflicts between people and mountain lions and reduce the need for lethal control.

Specific linkages have been identified within western Riverside County that are essential to the movement of mountain lions throughout the County and to adjacent counties, as well as to the overall maintenance of mountain lion populations in the County. For example, Beier (1993) reported that the movement corridors that connect the Santa Ana Mountains to the Palomar Mountain Range to the east (*i.e.*, Pechanga Corridor) and the Chino Hills in the north were the only potential links between the large habitat blocks on either end and were important for sustaining the population of about 20 mountain lions in the Santa Ana Mountains. The South Coast Wildlands Project identifies three connectivity “choke points” for the mountain lion within western Riverside County, including the connections between the Santa Margarita Ecological Reserve area and the Agua Tibia Mountains, between the northern Santa Ana Mountains and Chino Hills, and between the northern San Jacinto Mountains and the San Bernardino Mountains (Hunter 1999). They defined connectivity choke points as narrow and threatened habitat patches that are essential in linking larger areas of core mountain lion habitats. They recommend that conservation actions within choke-points should not be limited to culvert design and that habitat restoration, overpasses, conservation easements, riparian setbacks, and other opportunities must be assessed and identified. Other critical linkages for the mountain lion in Riverside County, such as the link between the southern Santa Ana Mountains and the Santa Margarita Ecological Reserve area, as well threats to these linkages, are identified in the Missing Linkages Report (Penrod 2000).

Mock *et al.* (1992) provide some general and specific guidelines for corridor design based on their study of corridor use by animals (including mountain lion) at the Otay Ranch in Southern California. Corridor design must be site- and species-specific. Corridors should exploit natural topography to the greatest extent possible because it can help direct animal movement in the appropriate direction; it can separate development from the corridor, acting as a natural buffer between the corridor and human activities; and because topographic relief can provide cover for animals. Because longer corridors are more difficult for animals to traverse, longer corridors must be wider than shorter corridors and contain more vegetative cover to reduce the constraining effect of a long, narrow passage. Corridors should have buffers, but the buffer width may vary depending on adjacent land use and adequacy of the screening material at the interface between the development and buffer boundary. Buffers should not be used by people at night or have artificial night lighting, structures within them, or anything within them that produces noise.

Mock *et al.* (1992) further recommend that manmade corridor elements (*i.e.*, underpasses) must be designed to overcome the behavioral reluctance of animals to use them. Underpasses must be relatively wide in relation to their length, and animal movements must be funneled toward the manmade elements by using existing topography, vegetation, and fencing. In addition, proper vegetative cover must be provided adjacently to each end of the underpass, and where possible, within the manmade element. Where feasible, roads should not cross, be built within, or run adjacent to wildlife corridors since noise and light from passing vehicles may discourage use of

the corridors by animals and increase risk of collision. New and existing roads should be fitted with appropriately designed underpasses and 10-foot high fencing to funnel animals into the underpass and minimize the potential for road killed animals. The length-to-width ratio of wildlife underpasses should be less than two and the height should be at least 12 feet. Corridors and underpasses should be shielded from artificial lighting to the greatest extent feasible, and skylight openings within underpasses are recommended to allow for the development of vegetative cover beneath the underpass.

Beier (1995) recommends that corridors be placed along natural travel routes for mountain lions. Radio-telemetry is ideal for identifying such routes if data are gathered when lands are still intact (Beier 1993). If such data are not available for an area, scour zones in canyon bottoms are the most probable travel routes for mountain lions, followed by ridgelines free of artificial light (Beier 1995). Beier (1995) reports lights are especially detrimental to mountain lions in road undercrossings or in open habitats but may be used as an effective tool to deter an animal from entering a habitat peninsula that dead-ends in an urban area. Beier (1995) further reports that bridged undercrossings are preferable to culverts. Lotz *et al.* (1997) found that precast concrete box wildlife crossings, a relatively new and less expensive wildlife crossing design, were effectively used by Florida panthers to cross roadways. The crossings varied in size depending on the width of the road spanned by the crossings; for example some crossings were 2.4 meters high, 7.3 meters wide, and 14.6 meters long, while others were 2.4 meters high, 24.4 meters wide, and 48.5 meters long. Fencing must be used along roads to guide mountain lions into underpasses and to keep them off the road, which may prevent vehicle accidents. Lotz (1997) found that 3.4-meter chain-link fence with a 1-meter overhang of barbed wire helped Florida panthers stay off roads and use underpasses.

Environmental Baseline

Though the current population size and distribution of the mountain lion in the Plan Area are unknown, mountain lions generally occur in low densities within suitable habitats throughout the Plan Area. Though they primarily use large tracts of habitat (*i.e.*, mountainous areas) with low-levels of human disturbance and development, they will use smaller patches of habitat near developed areas, particularly to move between large blocks of habitat. Our dataset includes eight recent records of mountain lion from the Plan Area, primarily from the Riverside Lowlands Bioregion.

Beier (1993) estimated that about 20 adult mountain lions occupied an area of 799 square miles in the Santa Ana Mountains. Based on field data and a simulation model, Beier concluded the Santa Ana mountain lion to be demographically unstable.

The vegetation communities used to model habitat for the mountain lion were chaparral, coastal sage scrub, desert scrub, grassland, montane coniferous forest, peninsular juniper woodland and scrub, riparian scrub woodland and forest, Riversidean alluvial fan sage scrub, woodland and forest habitats within all Bioregions, with the exception of the Riverside Lowlands Bioregion, where only part of it was included. Within the Riverside Lowlands Bioregion, vegetation communities were only mapped in Prado Basin, the area south of SR-79, Lake Skinner/Diamond Valley Lake, and the Badlands area. Based on this analysis, the Plan Area supports

approximately 536,208 acres of modeled habitat for the mountain lion. Approximately 276,944 acres of modeled habitat occur within PQP Lands. Because mountain lions are sensitive to habitat fragmentation and isolation and are not likely to occur in small, disturbed, and/or isolated habitat fragments within the Plan Area (Beier 1993, Crooks 1999), modeled habitat likely overestimates the extent of suitable habitat for this species within the Plan Area.

Effects of the Action

Direct Effects

The Plan Area includes 536,208 acres of modeled habitat for the mountain lion. Given the widespread distribution of this species, proposed residential, commercial and urban development outside of the MSHCP Conservation Area will result in direct impacts to mountain lion, including mortality, from loss of suitable breeding, feeding, and sheltering habitat. In particular, mortality of immobile young is anticipated from the crushing or removal of dens during clearing, grading, and associated construction activities that occur during the rearing season. Without detailed information on mountain lion density within the Plan Area, we cannot determine how many individuals will be affected by planned development. However, we anticipate the loss of 165,949 acres (31 percent) of modeled mountain lion habitat within the Plan Area over the 75-year permit term. Though mountain lions will not survive in most modeled habitat outside the MSHCP Conservation Area, some will survive in rural/mountainous areas in suitable habitat. Approximately 68,653 acres (41 percent) of the non-conserved modeled habitat for the mountain lion are designated as rural/mountainous land where development impacts are expected to occur at a slower rate and at lower densities.

To offset the loss of mountain lion habitat within the Plan Area, 93,315 (17 percent) of the modeled habitat will be conserved within the Additional Reserve Lands. An additional 276,944 acres (52 percent) of modeled habitat will remain within PQP Lands. In total, 370,259 (69 percent) of the modeled habitat for mountain lion will be conserved or remain in the Plan Area.

According to the three Conservation Objectives for the mountain lion identified in the Plan, large contiguous habitat blocks and linkages and road crossings for movement of mountain lions throughout the Plan Area and to areas outside of the Plan Area will be included within the MSHCP Conservation Area. Additionally, the Plan considers the mountain lion a Planning Species for multiple Cores and Linkages as described in Section 3.2.3 (Cores and Linkages within the MSHCP Conservation Area) of the Plan.

Conservation Objective 1 for the mountain lion identifies four primary habitat blocks to be included in the MSHCP Conservation Area, including the Santa Rosa Plateau-Santa Ana Mountains, Agua Tibia Wilderness-Palomar Mountains, Badlands-San Jacinto Mountains-Santa Rosa Mountains, and San Bernardino Mountains. The Plan states that additional areas likely to be used by the mountain lion include Lake Mathews-Estelle Mountain, Lake Skinner-Diamond Valley Lake, and Vail Lake-Sage-Wilson Valley. The mountain lion is a planning species for 9

Existing Core Areas (A, B, F, G, I, J, K, L, M), two Proposed Extensions of Existing Cores (6 and 7), and four Proposed Cores (3, 5, 6, 7)¹.

Based on our analysis, the Santa Rosa Plateau (also referred to as Existing Core F in Section 3.2.3 of the Plan) - Santa Ana Mountains (Existing Core B), the Agua Tibia Wilderness area (Existing Core M), Badlands (Proposed Core 3) - San Jacinto Mountains (Existing Core K and Proposed Core 4), San Bernardino Mountains (Existing Core I), Lake Skinner-Diamond Valley Lake (Existing Core J and Proposed Extension of Existing Cores 6 and 7), and Vail Lake-Sage-Wilson Valley (Proposed Core 7) likely contains an adequate amount of modeled habitat to provide for the life history requirements of mountain lions. Some of these Core Areas, however, are relatively small and isolated from other Core Areas, such as the Santa Rosa Plateau and Santa Ana Mountains areas. Mountain lions are not likely to persist in these areas in an isolated state. Based on the Conservation Objectives for the mountain lion, we anticipate that habitat connections, corridors, and dispersal routes will be maintained or improved to allow for movement of mountain lions between and among all Core Areas, and this will increase the likelihood of long-term persistence of mountain lions in these areas. Mountain lions are not likely to persist in the Lake Mathews-Estelle Mountain area because this area does not provide high quality habitat for mountain lions, and it is relatively small and isolated.

Conservation Objective 1 for the mountain lion also states that the Palomar Mountains and the Santa Rosa Mountains areas will be included within the MSHCP Conservation Area; however, these areas fall outside of the Plan Area. We anticipate, however, that connectivity will be maintained from Core Areas within the MSHCP Conservation Area to the Palomar Mountains and Santa Rosa Mountains areas to allow for movement of mountain lions to areas outside the Plan Area as stated in Conservation Objective 2.

Most Core Areas for which the mountain lion is a Planning Species are recognized in Conservation Objective 1 for this species. However, a few are not addressed in this Objective, including, Existing Cores A, G, L and Proposed Cores 5 and 6. Existing Cores A and G are small and relatively isolated from other Core Areas inside the Reserve. Mountain lions are not likely to persist in these areas without connectivity to other Core Areas. We anticipate, based on the Conservation Objectives for the mountain lion, that connectivity to other Core Areas will be maintained or improved to enable mountain lions to move throughout the Plan Area.

Additionally, existing Cores A and G provide important linkages to mountain lion habitat outside the Plan Area. Proposed Core 6 is small, however, it is adjacent to Existing Core L which is relatively large and well connected with habitat inside and outside of the Plan Area. They both contain modeled habitat and together will likely provide for the life history requirements of mountain lions. Proposed Core 5 is long and narrow and contains little modeled habitat for the mountain lion. It is not likely to provide for the life history requirements of this species, though

¹ The Plan identifies the mountain lion as a Planning Species for Existing Core C and Proposed Extension of Existing Core 2 (the Lake Mathews-Estelle Mountain area); however, these were errors in the document (J. Collins, DUDEK, pers. comm. to D. Stadlander, September 30, 2003).

the southeastern portion of this proposed Core area may serve as a small extension of Existing Core K.

Conservation Objective 2 for the mountain lion identifies upland and riparian linkages to be included in the MSHCP Conservation Area, including Lake Skinner-Diamond Valley Lake to Sage-San Jacinto Mountains via Tocalota Creek and adjacent uplands in the MSHCP Conservation Area; Badlands to San Jacinto Mountains and Santa Rosa Mountains; Santa Ana Mountains to Lake Mathews-Estelle Mountain via Indian Canyon and Horsethief Canyon; Santa Ana Mountains to Chino Hills via Fresno Canyon-Green River; Santa Ana Mountains to Agua Tibia Wilderness-Palomar Mountains via Pechanga Creek or a future wildlife overpass over Interstate-15 north of Rainbow (possibly in San Diego County); and San Jacinto Mountains to San Bernardino Mountains via San Gorgonio Wash. The mountain lion is considered a Planning Species for one Existing Linkage (A), eight Proposed Constrained Linkages (1, 2, 5, 9, 10, 11, 12, 14), and five Proposed Linkages (9, 1, 14, 15, 16)².

Based on our analysis, mountain lions are likely to successfully move through the linkages from Lake Skinner-Diamond Valley Lake to Sage-San Jacinto Mountains via Tocalota Creek and adjacent uplands in the MSHCP Conservation Area (Proposed Linkages 13 and 14) and from Badlands to San Jacinto Mountains and Santa Rosa Mountains because they are continuous with habitat blocks on either end, contain modeled habitat, and are relatively wide.

Mountain lions may use the linkage from Santa Ana Mountains to Lake Mathews-Estelle Mountain via Indian Canyon and Horsethief Canyon (Proposed Linkage 1 and Proposed Constrained Linkage 5); however, they are not likely to persist in the Lake Mathews-Estelle Mountain Core Area as described in the analysis above.

The Santa Ana Mountains to Chino Hills via Fresno Canyon-Green River linkages (Proposed Constrained Linkages 1 and 2) correspond to one of the “choke points” identified in the *Conservation Needs* section above. Both linkages are connected to PQP Lands to the south and to SR-91 to the north. Based on our analysis, Proposed Constrained Linkage 1 is approximately 1.6 miles long and 0.08 miles wide in the narrowest part. Proposed Constrained Linkage 2 is approximately 1.4 miles long, 0.10 miles wide, and is intersected by an existing road. These linkages are narrow, contain little modeled habitat, and terminate at a highway; thus it is questionable whether mountain lions are able to successfully move through these linkages. We anticipate, however, that these linkages will be maintained or improved to increase the functionality of dispersal routes for mountain lions as provided for in Conservation Objective 3. Additionally, we anticipate that road crossings, with appropriate fencing to funnel mountain lions to the crossings and to keep them off the road, will be installed and maintained and/or improved and maintained at existing or planned roads that intersect linkages as identified in Conservation Objective 3 for the mountain lion and in Section 7.5.2 (Guidelines for Construction of Wildlife Crossings) of the Plan.

² The Plan identifies the mountain lion as a Planning Species for Proposed Linkage 1; this was an error in the document (J. Collins, DUDEK, pers. comm. to D. Stadlander, September 30, 2003).

The Plan states that the following linkages will be captured within the MSHCP Conservation Area: Santa Ana Mountains to Agua Tibia Wilderness-Palomar Mountains via Pechanga Creek (Proposed Constrained Linkage 14) or future wildlife overpass over I-15 north of Rainbow (possibly in San Diego County) and San Jacinto Mountains to San Bernardino Mountains via San Gorgonio Wash (The Pass Area Plan Special Linkage, Section 3, pp. 3-245 and 249). Based on our analysis, however, these linkages, which generally correspond to two of the “choke points” identified in *Conservation Needs* section above, are not entirely captured within the MSHCP Conservation Area as described below.

The Plan indicates that Santa Ana Mountains and the Agua Tibia Wilderness-Palomar Mountains are connected by the Pechanga Creek linkage; however, this linkage does not, by itself, connect the Santa Ana Mountains to the Agua Tibia Mountains as described by the following: the Santa Ana Mountains are connected to the Santa Rosa Plateau via Proposed Linkage 9; the Santa Rosa Plateau is connected to the Santa Margarita Ecological Reserve via Proposed Linkage 10; both this Linkage and the Santa Margarita Ecological Reserve are connected to Existing Linkage A via the Pechanga Creek linkage (Proposed Constrained Linkage 14); Existing Linkage A is adjacent to rural/mountainous land located west of the Pechanga Indian Reservation, which is adjacent to the Agua Tibia Mountains.

Based on our analysis of the MSHCP Conservation criteria, the Pechanga Creek linkage is approximately 2.3 miles long and less than 0.03 miles wide. It terminates at the I-15 on the north end and a proposed road will eventually intersect this linkage approximately 0.6 miles to the north of Existing Linkage A. A golf course is located directly to the east of the linkage and I-15 parallels the linkage to the west. Mountain lions are not likely to successfully move through this linkage because it is narrow; not adequately buffered from human activity, lights, and noise from the I-15, a golf course, and other nearby human development; terminates at I-15; and it will be intersected by a proposed road. We anticipate that measures will be taken to increase the likelihood that mountain lions will successfully use this linkage or that an alternative linkage, such as the “future wildlife overpass over Interstate 15 north of Rainbow” as identified in Conservation Objective 2, will be included within the MSHCP Conservation Area to provide for mountain lion movement from Proposed Linkage 10 and the Santa Margarita Ecological Reserve to Existing Linkage A.

According to our analysis of the MSHCP Conservation Area, there are no connections from the Santa Margarita Ecological Reserve to Existing Linkage A, or from Existing Linkage A to the Agua Tibia Mountains (Existing Core M). The Plan considers the area between the Santa Margarita Ecological Reserve (Existing Core G) and the Pechanga Indian Reservation, as the “Southwest Area Plan Special Linkage Area” described in Section 3, pp. 3-391 to 392 of the Plan and depicted on pp. 3-17 (Figure 3-1). The Special Linkage Area is comprised of rural/mountainous lands, Existing Linkage A, and development area (area outside the MSHCP Conservation Area and not rural/mountainous lands). As stated on pp. 3-391-392 of the Plan, Local Permittees will apply the following rebuttable presumptions of significance, taken from Appendix G of the 1998 State CEQA Guidelines, in CEQA review of proposed public and private projects within this Special Linkage Area and apply mitigation measures as appropriate: “Would the project interfere substantially with the movement of any native resident or migratory fish or wildlife species or with an established native resident or migratory wildlife corridors, or

impede the use of native wildlife nursery sites?” We therefore anticipate that any development proposed for this area would address and provide for movement of mountain lions from Existing Core G to the Pechanga Indian Reservation. We further anticipate that installation of an overpass across I-15, north of Rainbow, will be considered to allow mountain lions to successfully cross I-15 and move through the Special Linkage Area to blocks of habitat on either end as indicated in Conservation Objectives 2 and 3.

According to our analysis of the MSHCP Conservation Area, none of the linkage between the San Jacinto Mountains to San Bernardino Mountains via San Gorgonio Wash is captured within the Conservation Area as described in Conservation Objective 2 for the mountain lion. The area between Existing Core K (San Jacinto Mountains) and Existing Core I (San Bernardino Mountains) is comprised of Morongo Indian Lands, rural/mountainous lands, and development area. The Plan considers a portion of this area “The Pass Area Plan Special Linkage Area” described in Section, pp. 3-245 and 246 and depicted on page 3-17 (Figure 3-1). The same rebuttable presumption of significance following the CEQA Guidelines noted above will be applied to CEQA review of proposed public and private projects within this Special Linkage Area. We therefore anticipate that any development proposed for this area would address and provide for movement of mountain lions between the two parcels of the Morongo Indian Reservation. We further anticipate, based on Conservation Objective 3, that an underpass under I-10 will be installed or an existing underpass improved, to allow mountain lions to successfully cross I-10 and move through the Special Linkage Area to blocks of habitat on either end.

Based on our analysis of modeled habitat and the MSHCP Conservation Area, mountain lions are likely to successfully move through Proposed Linkages 9, 11, 15, and 16 because they are continuous with habitat blocks on either end, contain modeled habitat, and are sufficiently wide. Mountain lions are less likely to successfully move through Proposed Linkage 10 and Proposed Constrained Linkages 9, 10, 11, and 12 because they are long and narrow. Based on our analysis, Proposed Linkage 10 is about 5.5 miles long and 0.5 miles wide, and only the northwestern half of the linkage contains modeled habitat. Proposed Constrained Linkages 9, 10, 11, and 12 are approximately 1.6, 2.0, 3.6, and 4.9 miles long, respectively, and 0.1 miles wide.

Conservation Objective 3 for the mountain lion states that functionality of dispersal routes will be maintained or improved within the MSHCP Conservation Area. Existing undercrossings in key areas will be evaluated for their adequacy and improved as necessary to convey mountain lions. Key crossings that will be evaluated include, but are not limited to, the following: the crossing of State Highway 91 that connects the Santa Ana Mountains with the Chino Hills via Fresno Canyon-Green River, the crossings of Interstate-15 that connect the Santa Ana Mountains with Lake Mathews-Estelle Mountain via Indian Canyon and Horsethief Canyon, the crossing(s) of Interstate-15 that connect the Santa Ana Mountains with the Agua Tibia Wilderness-Palomar Mountains via Pechanga Creek or the possible “Rainbow” overpass, the undercrossings of State Highway 60 in the Badlands, and the possible undercrossing at Interstate-10 in the Banning area (as described in Section 5, Table 5.2). Mountain lions may use the crossings of Interstate-15 that connect the Santa Ana Mountains with Lake Mathews-Estelle Mountain via Indian Canyon and Horsethief Canyon; however, they are not likely to persist in the Lake Mathews-Estelle Mountain Core Area as described in the analysis above.

We anticipate that with increased growth and urbanization in areas surrounding cores and linkages, there will be increased conflicts between mountain lions and humans at the wildland-urban interface. The increased interaction between mountain lions and people is likely to result in the loss of mountain lions due to predator control activities as evidenced by the occurrences on the Santa Rosa Plateau. The California Department of Fish and Game has killed mountain lions in recent years on the Santa Rosa Plateau after receiving complaints that people had seen mountain lions and that mountain lions had killed domesticated animals in the area. We anticipate implementation of the Guidelines Pertaining to the Urban/Wildlands Interface as described in Section 6.1.4 of the Plan will help reduce conflicts between mountain lions and humans.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands including surveys for the mountain lion. Cooperative management and monitoring are anticipated on PQP Lands. Surveys for the mountain lion will be conducted at least every eight years to verify occupancy of 75 percent of known locations. If a decline in the distribution of the mountain lion is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP.

Other management actions described in Section 5, Table 5.2 of the MSHCP, such as maintaining and improving the functionality of dispersal routes and road crossings, will help convey mountain lion throughout the Plan Area. Management actions (*e.g.*, habitat manipulations) to benefit mountain lion or other Covered Species may result in impacts, including death, to a small number of individual mountain lions. It is anticipated that any impacts to mountain lions from management actions will be minimized by adherence to appropriate protocols and other guidelines described in Section 7.4 of the MSHCP. The presence of the mountain lion will contribute to the function of the Conservation Area by controlling mesopredators, thereby reducing predation pressures on other Covered Species.

Indirect Effects

The mountain lion could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. The detrimental effects of fragmentation are described in the “General Effects” section of this biological opinion. Existing and proposed roads and road widening projects will likely result in increased mortality due to collisions with vehicles and increased fragmentation and isolation of mountain lion populations. The guidelines and recommendation described in Section 7 and summarized in the Conservation Measures of this biological opinion will help minimize the impact of roads on habitat connectivity.

Conclusion

We anticipate the proposed action will directly and indirectly affect the mountain lion as described in the analyses above, including the loss of 31 percent of the modeled habitat for this species in the Plan Area. Implementation of the avoidance, minimization, and mitigation measures identified in the Plan will reduce the impacts to this species. We anticipate that this species will persist in the remaining 69 percent of the modeled habitat within both the existing

PQP Lands and the Additional Reserve Lands. Together these lands form a system of large, contiguous habitat blocks that are interconnected within the Plan Area. We anticipate that these areas will be monitored and managed cooperatively to benefit this species.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the mountain lion. We reached this conclusion based on the distribution of the mountain lion in the western United States and because the impacts associated with loss of this species' modeled habitat, when viewed in conjunction with the protection and management of the MSHCP Conservation Area, is not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Amount or Extent of Take

Because it will be difficult to quantify the number of individual mountain lions that will be taken as a result of the proposed action over the 75-year permit term, the Service is quantifying incidental take as the number of acres of modeled mountain lion habitat that will be impacted in the Plan Area as a result of the proposed action. We anticipate that up to 165,949 acres of habitat within the Plan Area will become unsuitable for the mountain lion. A small, but undeterminable, number of mountain lions are anticipated to be taken as a result of management actions within the Additional Reserve Lands. Take will be in the form of harm, death, and injury. This level of anticipated take is not likely to result in jeopardy to the mountain lion.

Northwestern San Diego pocket mouse (*Chaetodipus fallax fallax*)

Status of the Species

Listing Status

The northwestern San Diego pocket mouse is not a federally listed species. It is considered a Species of Special Concern by the California Department of Fish and Game.

Species Description

The northwestern San Diego pocket mouse, a rodent of the family Heteromyidae is 1 of 6 subspecies of *C. fallax* (Williams *et al.* 1993b).

Habitat Affinities

The northwestern San Diego pocket mouse occurs in coastal sage scrub, sage scrub/grassland ecotones, and chaparral communities. It inhabits open, sandy areas of both the Upper and Lower Sonoran life-zones of southwestern California and northern Baja California (McClenaghan 1983). Bleich (1973) recorded the highest populations of the San Diego pocket mouse in coastal sage scrub supporting a mixture of coastal sagebrush and California buckwheat on the Naval Weapons Station, Fallbrook Annex in northwestern San Diego County, but it was also relatively

abundant in chaparral. The San Diego pocket mouse generally exhibits a strong microhabitat affinity for moderately gravelly and rocky substrates (Bleich 1973; Price and Waser 1984), and, to a lesser extent, shrubby areas (MWD and RCHCA 1995). In western Riverside County, the San Diego pocket mouse occurs in sage scrub (coastal sage scrub, Riversidean sage scrub, alluvial scrub), disturbed grassland, and chaparral (Montgomery 1998).

Life History

Like other desert-adapted heteromyid rodents, the San Diego pocket mouse is primarily granivorous. Meserve (1976) reported the pocket mouse harvested seeds of the shrubs *Eriogonum*, *Rhus*, and *Artemisia* in the winter and spring and grass seeds in the summer. Herbaceous forbs and green grasses were seldom utilized except in the latter part of the spring. Some insects were also consumed (Meserve 1976). Likely predators of the San Diego pocket mouse include coyotes, badgers, foxes, owls, and snakes.

Little is known of the specific daily activities of the San Diego pocket mouse, but heteromyids primarily are nocturnal, with peaks of activity shortly after dusk and again before dawn (Reichman and Price 1993). The time and temporal pattern of surface activity probably relates to the availability of food resources, predation risk, energy costs, and other important activities (e.g., breeding). During the day, pocket mice remain in their day burrows.

McClenaghan (1983) suggests that the San Diego pocket mouse may become torpid (dormant) during periods of cold weather, but because this species inhabits a relatively mild, coastal environment, it probably forages on the surface year-round. It has been trapped on the surface in all months (Bleich 1973). Average home ranges were reported by MacMillen (1964) to be 0.89 acres for males and 0.62 acres for females.

There is little information regarding the reproduction of the San Diego pocket mouse, and the few studies that have been conducted were of relatively short-term. McClenaghan (1983) and Bleich (1973) both noted seasonal reproduction in the San Diego pocket mouse, with peak activity in the spring and early summer. McClenaghan conducted a two-year study of the San Diego pocket mouse in Jacumba in extreme southeastern San Diego County (possibly *C. f. pallidus*) and found that 55 percent to 100 percent of the individuals were in reproductive condition in the spring. Reproductive condition was temporally correlated with peak herbaceous plant production.

Like other heteromyids, the San Diego pocket mouse likely has a relatively low reproductive output. According to data summarized by Jones (1993), the typical litter size of the San Diego pocket mouse is four pups. Most heteromyids show flexible reproductive strategies, with the capacity to produce at least two litters in good years and with females capable of breeding in their natal season, while foregoing reproduction altogether in poor years (see Jones 1993 for discussion of life history traits). It is expected that the San Diego pocket mouse employs similar reproductive flexibility.

Status and Distribution

Northwestern San Diego pocket mouse is known from southwestern San Bernardino County, Riverside County and eastern San Diego County (Hall 1981). Marginal records for the northwestern San Diego pocket mouse include Claremont, San Bernardino, Banning, Jacumba (Hall 1981), and San Jacinto Lake (Mearns 1901). The northwestern San Diego pocket mouse has been collected at elevations from 389 feet at Palm Springs to 5,175 feet on the northern slopes of the San Bernardino Mountains (in San Bernardino County) (Lackey 1996). This species is still relatively common in sage scrub, chaparral, and grassland habitats throughout western Riverside County.

Threats

The San Diego pocket mouse appears to be sensitive to habitat fragmentation and degradation from urban and agricultural development. Bolger *et al.* (1997a) studied rodent diversity and abundance in isolated habitat fragments of varying size and age in San Diego County. The San Diego pocket mouse tended to occur in habitat patches with 90-100 percent shrub cover. Bolger *et al.* (1997a) tentatively concluded that canyon fragments under 62 acres and isolated for more than 30 years support few populations of native rodents, including the San Diego pocket mouse. Their data also suggest that isolated habitat patches must be at least 62 to 198 acres to sustain native rodent populations.

Conservation Needs

Because a large portion of the range of the northwestern San Diego pocket mouse is found in western Riverside County, the conservation needs of this species include conservation of interconnected blocks of suitable habitat in western Riverside County.

Environmental Baseline

The northwestern San Diego pocket mouse is widely distributed throughout the Plan Area in open, sandy areas of sage scrub, chaparral and non-native grassland. Our dataset includes more than 50 general locations in the Plan Area ranging from Pedley in the west, Reche Canyon in the north, Temecula in the south, and Anza in the east. Additional localities for this species within western Riverside County include Lake Mathews/Estelle Mountain/Gavilan Hills, the Badlands, Potrero Valley, Domenigoni Valley, Cactus Valley, Crown Valley, the Sage/Vail Lake area, Aguanga, Santa Rosa Plateau, and the Anza Valley. The vegetation communities used to model habitat for this species include chaparral, coastal sage scrub, desert scrub, grassland, Riversidean alluvial fan sage scrub, and peninsular juniper woodland and scrub. Based on this analysis, 705,256 acres of modeled habitat exist for this species in the Plan Area, and approximately 265,283 acres of this modeled habitat are within PQP Lands. Twenty of the 80 (25 percent) known occurrences in our dataset were located within existing PQP Lands. Because northwestern San Diego pocket mice prefer open, sandy habitat within these vegetation communities, modeled habitat likely overestimates the extent of suitable habitat for this species.

Effects of the Action

Direct Effects

Given the presumed widespread distribution of this species, residential, commercial and urban development outside of the MSHCP Conservation Area will likely result in direct mortality of northwestern San Diego pocket mice from crushing of their burrows during clearing, grading, and associated construction activities. Forty-seven of the 80 (59 percent) occurrences of the northwestern San Diego pocket mouse in our dataset are outside of the MSHCP Conservation Area. Without detailed information on distribution and density of the species within the Plan area and the precise locations of MSHCP Conservation Areas, we cannot predict how many individuals or populations will be affected by planned development. We anticipate the loss of 305,507 acres (43 percent) of modeled northwestern San Diego pocket mouse habitat within the Plan Area over the 75-year permit term. This habitat loss will result in death and injury to individual northwestern San Diego pocket mice in the Plan Area; however, some individuals may be able to escape to adjacent habitats, and some will survive in rural/mountainous areas with suitable habitat. Approximately 95,932 acres (31 percent) of the non-conserved modeled habitat for the northwestern San Diego pocket mouse are designated as rural/mountainous land where development impacts are expected to occur at a slower rate and at lower densities.

To offset the loss of northwestern San Diego pocket mouse habitat within the Plan Area, implementation of the MSHCP will conserve and manage large areas containing modeled habitat and linkages among these areas. Additional Reserve Lands will include 134,466 acres (19 percent) of modeled northwestern San Diego pocket mouse habitat (chaparral, coastal sage scrub, desert scrub, grassland, Riversidean alluvial fan sage scrub, and peninsular juniper woodland and scrub) in the Plan Area. An additional 265,283 acres (38 percent) will remain within PQP Lands. In total, 57 percent of modeled habitat for the northwestern San Diego pocket mouse will be conserved or remain in the Plan Area. An additional 18,000 acres of habitat for dispersal or movement will be retained or conserved within several existing and proposed Cores and Linkages as PQP or Additional Reserve Lands (Section 3.2.3).

Four main habitat complexes will support this species within the MSHCP Conservation Area: the Santa Ana Mountain foothills-Santa Rosa Plateau complex, the Lake Mathews/Estelle Mountain-Steele Peak-Kabian Park-Sedco Hill complex, the Badlands-San Jacinto Mountain foothills-Agua Tibia Wilderness complex, and the Banning Bench complex. Smaller habitats assumed to be isolated from these large habitat complexes will be in the Jurupa Hills, Box Springs Mountains, Lakeview Mountains, Sycamore Canyon Regional Park, Norco Hills, Double Butte, Motte-Rimrock Reserve, and Warm Springs Mountain. Each area contains a minimum of 1000 acres.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands including surveys for the northwestern San Diego pocket mouse. Cooperative management and monitoring are anticipated on PQP Lands. Surveys for the northwestern San Diego pocket mouse will be conducted at least every eight years to verify occupancy at a minimum of 75 percent of the known locations. If a decline in the distribution of the northwestern San Diego pocket mouse is documented below this threshold, management

measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP. Other management measures described in Section 5 of the Plan will help to avoid and minimize impacts to the northwestern San Diego pocket mouse by using appropriate fencing, gates and signage, trash removal, trespass control in response to illegal dumping, managing off-road vehicle use, and controlling vandalism.

Management actions to benefit northwestern San Diego pocket mice (*e.g.*, trapping, habitat manipulations) or other Covered Species may result in impacts, including death, to a small number of individual northwestern San Diego pocket mice. It is anticipated that any impacts to northwestern San Diego pocket mice from management actions will be minimized by adherence to appropriate trapping protocols and other guidelines described in Section 7.4 of the MSHCP.

Indirect Effects

The northwestern San Diego pocket mouse could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These include the indirect effects described in the “General Effects” section of this biological opinion. Each of the major habitat complexes identified above is bisected by at least one major road artery. Road widening is proposed for several of these roads as described in Section 7.3.5 in the MSHCP. Existing and proposed roads and road widening projects may increase fragmentation among northwestern San Diego pocket mouse populations. The detrimental effects of fragmentation are described in the “General Effects” section of this biological opinion. The guidelines and recommendations described in Section 7 and summarized in the Conservation Measures of this biological opinion will help minimize the impact of road construction on habitat connectivity.

Conclusion

We anticipate the proposed action will directly and indirectly affect the northwestern San Diego pocket mouse as described in the analyses above, including the loss of 43 percent of the modeled habitat for this species in the Plan Area. Implementation of the avoidance, minimization, and mitigation measures identified in the Plan will reduce the impacts to this species. We anticipate that this species will persist in the remaining 57 percent of the modeled habitat within both the existing PQP Lands and the Additional Reserve Lands. Together these lands form a system of large, contiguous habitat blocks that are inter-connected within the Plan Area. We anticipate that these areas will be monitored and managed cooperatively to benefit this species.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service’s biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the northwestern San Diego pocket mouse. We reached this conclusion based on the widespread distribution of the northwestern San Diego pocket mouse in the Plan Area and because the impacts associated with loss of this species’ modeled habitat, when viewed in conjunction with the protection and management of the MSHCP Conservation Area, are not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Amount or Extent of Take

We anticipate the take of all northwestern San Diego pocket mice within up to 305,507 acres of habitat outside of the MSHCP Conservation Area. A small, but undeterminable, number of northwestern San Diego pocket mice are anticipated to be taken as a result of management actions. Take will be in the form of harm, death, and injury. This level of anticipated take is not likely to result in jeopardy to the northwestern San Diego pocket mouse.

San Bernardino flying squirrel (*Glaucomys sabrinus californicus*)

Status of the Species

Listing Status

The San Bernardino flying squirrel is not federally listed. However, it is considered a Species of Special Concern by the California Department of Fish and Game.

Species Description

The San Bernardino flying squirrel, a rodent of the family Sciuridae, is 1 of 25 subspecies of *G. sabrinus* (Hall 1981). There are few specific studies of the subspecies San Bernardino flying squirrel (*G. s. californicus*), and therefore, the information in this species account refers to *G. sabrinus* in general.

Habitat Affinities

Northern flying squirrels (*Glaucomys sabrinus*) inhabit a wide variety of woodland habitats primarily consisting of conifers, mixed coniferous-deciduous forest and occasionally broad-leaf-deciduous forest (Wells-Gosling and Heaney 1984; Witt 1992; Ransome and Sullivan 1997). Flying squirrels primarily inhabit old growth forests but also are found in second growth stands (Witt 1992; Ransome and Sullivan 1997). Doyle (1990) found similar abundances of flying squirrels in riparian and upland areas of montane forests, although juveniles tended to be more common in uplands and breeding adults more common in riparian areas. In southern California, the San Bernardino flying squirrel occurs in the San Bernardino Mountains and possibly in the San Jacinto Mountains.

According to Holland (1986), the San Jacinto Mountains contain several intergrading associations of conifer forests, including Jeffrey pine-fir forest, southern California white fir forest, lodgepole pine forest, and western Ponderosa pine forest. Common fir and pine species in the San Jacinto Mountains include white fir, coulter pine, Jeffrey pine, sugar pine, and Ponderosa pine (San Jacinto Mountains Digital Library 2000).

Life History

Virtually nothing is known of the specific biology and habits of the subspecies San Bernardino flying squirrel. Therefore the information in this species account is for other subspecies

inhabiting different regions, primarily the Sierra Nevada and Cascade ranges of northern California and Oregon, British Columbia, and Alaska. The life history traits of these subspecies may or may not pertain to the San Bernardino flying squirrel.

Most studies indicate that fungi and lichens are primary food sources for the northern flying squirrel (Hall 1991; Maser *et al.* 1985; Witt 1992; Waters and Zabel 1995; Ransome and Sullivan 1997). Flying squirrels also are known to eat certain seeds, buds, fruit, staminate cones, sap, and insects (McKeever 1960; Foster and Tate 1966). Hall (1991) examined stomach and fecal samples of flying squirrels in the central Sierra Nevada and found that hypogeous (subterranean) fungi were most common, followed by puffballs, lichens, and gill fungi. Common fungi genera in their diets were *Gautiera*, *Rhizopogon*, and *Geopora* regardless of season. Fungi may be cached in tree cavities for the winter. Flying squirrels may obtain free water from their foods, rain, dew, and snow. A perennial water source does not appear to be an important habitat requirement (ADFG 1994).

Northern flying squirrels are primarily nocturnal and show a biphasic activity pattern in the summer (Wells-Gosling and Heaney 1984; Witt 1992). In western Oregon, Witt (1992) reported squirrels typically began foraging approximately 1 hour after sunset, foraged for 3 to 4 hours, returned to their dens, and then emerged for another 3 to 4 hour foraging bout. Northern flying squirrels can make maximum nightly movements up to 1.2 miles (ADFG 1994). They primarily move by gliding from tree to tree, but they also travel on the ground (Wells-Gosling and Heaney 1984). Mowrey and Zasada (1982) recorded a maximum gliding distance of 155 feet (48 meters).

Home ranges of northern flying squirrels are estimated to be 3 to 12 hectares (Witt 1992; ADFG 1994) and appear to overlap. Densities range from 0.12 to 3.29 squirrels per hectare depending on location and type and maturity of forest, with higher densities normally occurring in more mature forests (Witt 1992; Waters and Zabel 1995; Ransome and Sullivan 1997). There is some evidence that population densities are correlated with the availability of food.

Northern flying squirrels primarily nest inside tree cavities, though they also use nests outside protective enclosures, sometimes made of dried grass and lichens (Howell 1918; Cowan 1936; Rust 1946; Weigl and Osgood 1974). In Alaska, individuals nest in tree cavities approximately 25 feet above the ground (range 5-45 feet) (ADFG 1994). Reproduction and breeding season appear to vary geographically and may reflect physiological and/or behavioral adaptations to local climatic and environmental conditions. In Alaska, the peak breeding season is March to late June, depending on the length and severity of the winter (ADFG 1994). In the southern Appalachian, breeding occurs in the early spring (United States Fish and Wildlife Service 1991). In western Oregon, Witt (1992) reported breeding occurred in the summer months.

Their gestation period is 37-42 days (Muul 1969). The number of litters produced per year varies geographically, but they typically produce 1 and sometimes 2 litters per year (Muul 1969; ADFG 1994) with 2 to 4 young per litter (Rust 1946). Young are fully grown by 240 days, and females are reproductively mature by 11 months (ADFG 1994). Females raise their litters without the help of males (Madden 1974). Northern flying squirrels appear to live in family

groups of adults and juveniles at least outside the breeding season, are relatively gregarious and known to share nests (United States Fish and Wildlife Service 1991).

There are little data on survival by flying squirrels. In Alaska, the annual mortality rate is about 50 percent for one- and two-year-old squirrels (ADFG 1994). Few individuals live more than four years (Wells-Gosling and Heaney 1984) and complete population turnover can occur in three years (ADFG 1994).

Predators of Northern flying squirrels include the spotted owl, great horned owl, barn owl, goshawk, red-tailed hawk, marten, wolf, lynx, foxes, and domestic cats (ADFG 1994). The northern flying squirrel is the primary prey of the northern and California spotted owls throughout much of their range (Waters and Zabel 1995) and a pair of spotted owls can consume about 500 squirrels per year (Wells-Gosling and Heaney 1984).

Flying squirrels may play an important role in forest regeneration because they disperse spores of fungi that are dependent on animals digging them up (ADFG 1994). Squirrels consume the spores and disperse them in fecal material. Through this dispersal mechanism, northern flying squirrels may help inoculate disturbed areas such as clear cuts and burns with mycorrhizae that are symbiotic with plant roots, improving their ability to absorb nutrients and maintain health (ADFG 1994).

Status and Distribution

The species *G. sabrinus* occurs throughout boreal (northern) forests from Alaska in the northwest, across Canada to Labrador in the northeast, south to Tennessee in the east and south to disjunct populations (*G. sabrinus californicus*) in the San Bernardino and San Jacinto mountain ranges (Hall 1981) in the west. Relatively little is known about the distribution of habitat actually occupied by the San Bernardino flying squirrel in southern California. Within the San Bernardino Mountains in the Big Bear area, flying squirrels were trapped in 1990 and apparently again in 1998 on the west side of Bear Mountain, Barton Flats, Deer Canyon and Little Green Valley (U.S. Forest Service 1995, Driessen *et al.* 1998). Historic and recent locations of individuals of the San Bernardino flying squirrel in the Plan Area include the Idyllwild area along Highway 243, west of Pine Cove, Strawberry Creek west of Idyllwild, and near Apple Creek north of Lake Hemet.

The San Bernardino flying squirrel is disjunct from other subspecies of the Northern flying squirrel, separated from the southern Sierra Nevada by the Mojave Desert. Furthermore, the populations in the San Bernardino and Jacinto mountain ranges are themselves geographically isolated by the Banning Pass. Thus, the San Jacinto population is functionally an island population.

Threats

Known threats to the San Bernardino flying squirrel have not been identified. However, it can be assumed that threats include habitat loss and fragmentation, timber and firewood harvesting, fungi harvesting, and recreation. Northern flying squirrels may be particularly sensitive to

habitat fragmentation and edge effects. Rosenberg and Raphael (1984 as cited in Dudek 2002) studied the effects of fragmentation in northwestern California. They found frequency of occurrence of northern flying squirrels was positively correlated with size of the stand with only 1 occurrence in a stand less than 49 acres (20 hectares). Approximately 75 percent of stands over 247 acres (100 hectares) had flying squirrels. They also found a significant negative correlation between frequency of occurrence of northern flying squirrels and percentage of stand perimeter surrounded by clearcut edge. A sharp decline of squirrels occurred in stands with over 75 percent edge. Air pollution could potentially negatively impact food resources (fungi and lichens) of flying squirrels. Northern flying squirrels carry many parasites that can be potential threats. Density estimates for flying squirrels tend to increase in old growth forests, but they are also found in second growth forests (Ransome and Sullivan 1997; Witt 1992; Waters and Zabel 1995). The potential deleterious effects of air pollution on food resources (fungi and lichens) are unknown. If a San Jacinto Mountain population still exists, it may be demographically and genetically unstable, and without a direct connection to the population in the San Bernardino Mountains, the risk of local extinction may be relatively high despite all conservation efforts.

Conservation Needs

Focused surveys will be necessary to identify currently occupied locations within the action area. Occupied areas within the San Jacinto Mountains should be maintained. Without a San Jacinto Mountains population, the entire subspecies will be susceptible to a single catastrophic event to the San Bernardino Mountains population. In addition, the subspecies will be susceptible to loss of genetic variation without a San Jacinto Mountains population and a habitat linkage between this population and the San Bernardino Mountains population.

Maintenance of San Bernardino flying squirrel habitat will require protection of forested areas. Specific studies in currently occupied habitats will be necessary to establish precise habitat affinities for this species.

Environmental Baseline

Relatively little is known about the distribution of the San Bernardino flying squirrel (Hafner *et al.* 1991). The San Jacinto and San Bernardino Mountain Range populations are the only known locations for this species (Hall 1981). The San Jacinto population may be extirpated (Stephenson and Calcarone 1999); however, local wildlife biologists remain hopeful that the species persists within the San Jacintos (Michael Hamilton, University of California James Reserve, pers. comm.; Steve Loe, San Bernardino National Forest, pers. comm.). Historic and recent locations of individuals of the San Bernardino flying squirrel in the Plan Area include the Idyllwild area along Highway 243, west of Pine Cove, Strawberry Creek west of Idyllwild, and near Apple Creek north of Lake Hemet. The San Bernardino flying squirrel is not known within the Plan Area portion of the San Bernardino Mountains, which mostly includes the south-facing foothills of the range above Cherry Valley and Banning/Beaumont (Steve Loe, San Bernardino National Forest, pers. comm.).

The Service's habitat model for the San Bernardino flying squirrel includes montane coniferous forest, riparian scrub/woodland/forest, and woodland/forest habitats in the San Jacinto and San

Bernardino Mountains Bioregions. Based on this analysis, 27,568 acres of modeled habitat for the San Bernardino flying squirrel exist in the Plan Area, and approximately 20,783 of these acres are within PQP Lands.

Effects of the Action

Direct Effects

The San Bernardino flying squirrel will not be considered a Covered Species Adequately Conserved by the MSHCP until occupation of 2,470 acres (1000 hectares) of habitat with a mean density of at least two individuals per 2.47 acres (2 hectares) is confirmed within the MSHCP Conservation Area within the San Jacinto Mountains and 247 acres (100 hectares) of occupied habitat is confirmed within the San Bernardino Mountains. The Plan Area includes 27,568 acres of modeled habitat for the San Bernardino flying squirrel. Without detailed information on San Bernardino flying squirrel distribution and density within the Plan Area, we cannot determine how many individuals or populations will be affected by planned development. However, if the species-specific conservation objective above is met for the San Bernardino flying squirrel, the incidental take permit for the MSHCP will authorize impacts associated with development and other proposed Covered Activities over the 75-year permit term within 6,763 acres (25 percent) of the modeled habitat for the San Bernardino flying squirrel. It is anticipated that most San Bernardino flying squirrels in the proposed development areas will be injured or killed as a result of habitat loss from clearing, grading, and other construction-related activities. A few may be able to escape if adjacent habitats contain adequate forested cover with suitable den trees. However, displaced animals will be subject to increased predation and increased competition for any remaining suitable habitat.

Two projects that have been identified as Covered Activities in the Plan that could include development of habitat for the San Bernardino flying squirrel. These projects are the proposed expansion of State Route 243 (Section 7.3.5, Figure 7-1, pp. 7-26) and the reinitiation of waste-related activities in the Idyllwild Landfill and Old Idyllwild Burn Site Landfill (Section 7.3.8, pp. 7-61).

To offset the loss of San Bernardino flying squirrel habitat within the Plan Area, implementation of the MSHCP will conserve and manage areas containing modeled habitat for the San Bernardino flying squirrel. Additional Reserve Lands will include 22 acres (< 1 percent) of modeled San Bernardino flying squirrel habitat in the San Jacinto (4 acres) and San Bernardino Mountains (18 acres) Bioregions. An additional 20,783 acres (75 percent) of modeled habitat for the San Bernardino flying squirrel will remain within PQP Lands. In total, 75 percent of the modeled habitat for the San Bernardino flying squirrel will be conserved or remain in the Plan Area.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands including surveys for the San Bernardino flying squirrel. Cooperative management and monitoring is anticipated on PQP Lands. Surveys for San Bernardino flying squirrel will be conducted to confirm occupancy as described above and then at least every eight years to verify occupancy at a minimum of 75 percent of the known locations identified. If a

decline in the distribution of the San Bernardino flying squirrel is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP.

Other management actions described in Section 5 of the MSHCP, such as control of unauthorized public access, maintenance of existing habitat, and management of specific threats to the species, will help maintain habitat for the San Bernardino flying squirrel.

Management activities that include habitat manipulations could result in a low level of death or injury to San Bernardino flying squirrels. It is anticipated that any impacts to San Bernardino flying squirrels from management actions will be minimized by adherence to appropriate trapping protocols and other guidelines described in Section 7.4 of the MSHCP.

Indirect Effects

The San Bernardino flying squirrel could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. The detrimental effects of fragmentation are described in the “General Effects” section of this biological opinion. The guidelines and recommendation described in section 7 and summarized in the Conservation Measures of this biological opinion will help minimize the impact of road construction on habitat connectivity.

Conclusion

We anticipate the proposed action will directly and indirectly affect the San Bernardino flying squirrel as described in the analyses above, including the loss of 25 percent of its modeled habitat in the Plan Area. Implementation of the avoidance, minimization, and mitigation measures identified in the Plan will reduce impacts to this species. We anticipate that this species will persist in the remaining 75 percent of the modeled habitat primarily within the existing PQP Lands. The PQP Lands include large, habitat blocks that we anticipate will be monitored and managed cooperatively to benefit this species.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service’s biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the San Bernardino flying squirrel. We reached this conclusion because most of the modeled habitat for the San Bernardino flying squirrel is within PQP Lands that will not be impacted by the Plan. In addition, the impacts associated with loss of this species’ modeled habitat, when viewed in conjunction with the protection and management of the MSHCP Conservation Area, is not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Amount or Extent of Take³

We anticipate the take of all San Bernardino flying squirrels within up to 6,763 acres of habitat outside of the MSHCP Conservation Area. A small, but undeterminable, number of San Bernardino flying squirrels are anticipated to be taken as a result of management actions. Take will be in the form of harm, death, and injury. This level of anticipated take is not likely to result in jeopardy to the San Bernardino flying squirrel.

San Diego black-tailed jackrabbit (*Lepus californicus bennettii*)

Status of the Species

Listing Status

The San Diego black-tailed jackrabbit (*Lepus californicus bennettii*) is not a federally listed species. However, it is considered a Species of Special Concern by the California Department of Fish and Game.

Species Description

The San Diego black-tailed jackrabbit, a lagomorph of the family Leporidae, is one of 17 recognized subspecies of *L. californicus* (Hall 1981). There are 30 species in the genus *Lepus* (Wilson and Reeder 1993). The information in this species account is based on *L. californicus* in general and not necessarily the subspecies *Lepus californicus bennettii*.

Habitat Affinities

The black-tailed jackrabbit occupies many diverse habitats but is primarily found in arid regions with open, sparsely-vegetated habitats such as desert scrub and grazed grasslands (Baker 1956; Flinders and Hansen 1975; Hoffmeister 1986). Jackrabbits do not typically use tall grass or forest where visibility is obscured (Jones *et al.* 1983). In Riverside County, black-tailed jackrabbits are found in most areas that support annual grassland, Riversidean sage scrub, alluvial fan sage scrub, Great Basin sagebrush, chaparral, disturbed habitat, and agriculture. Jackrabbits also have also been observed in southern willow scrub and juniper woodland (MWD and RCHCA 1995).

Life History

Black-tailed jackrabbits are primarily nocturnal and are considered generalist herbivores (Johnson and Anderson 1984). In semidesert and desert rangelands in New Mexico, Nevada and Idaho, for example, grasses and forbs are the largest components of their diet, with shrubs less important (Johnson and Anderson 1984; Hayden 1966; Wansi *et al.* 1992). However, their diet

³ This take is not authorized unless the conditions for coverage in Section 9 (Table 9.3, pp. 9-22) are met and concurred with by the Service.

shifts between season, locations, years, and vegetation types, suggesting that jackrabbits are opportunistic foragers. Black-tailed jackrabbits typically do not burrow but take shelter at the base of shrubs in shallow depressions.

Black-tailed jackrabbits can breed throughout the year, though breeding season may vary regionally. For example the breeding season in northern latitudes is shorter than in southern latitudes (Vorhies and Taylor 1933; French *et al.* 1965). The length of the breeding season appears to be related to the production of herbaceous vegetation (Lechleitner 1959). Populations may dramatically vary in size and distribution in relation to reproduction and shifting distributions and densities of food resources (French *et al.* 1965). Lechleitner estimated productivity of about 10 young per female per year in California. French *et al.* (1965) found that population increases were followed by decreases in the breeding season and an overall decline in population productivity (*i.e.*, a decline in fertility), while population declines were followed by increases in the breeding season and productivity. They concluded that black-tailed jackrabbits exhibit density-dependent reproduction. In general, populations are thought to fluctuate widely on 7 to 10 year cycles (Wagner and Stoddart 1972; Smith 1990).

Wagner and Stoddart (1972) reported mortality rates for juveniles and adults were about the same. Predation by coyotes was a primary cause of mortality (Wagner and Stoddart 1972). Other predators of jackrabbits include bobcats, badger, golden eagle, red-tailed hawk, northern harrier, and great-horned owl (Wagner and Stoddart 1972). Other causes of mortality include hunting, automobiles, eradication efforts by landowners, fires, and domestic dogs (Vorhies and Taylor 1933; Lechleitner 1958).

Typical dispersal distances may be relatively short, but black-tailed jackrabbits are capable of dispersing long distances. French *et al.* (1965) recorded most dispersal distances at less than 0.25 mile, but 18 percent of juveniles dispersed greater distances and one individual dispersed 28 miles in 17 weeks. Most seasonal movements involve short distances and may be related to food availability (Bronson and Tiemeir 1959). Home ranges of the black-tailed jackrabbit are variable but typically range from 49 to 346 acres (Best 1996). There was substantial overlap in home ranges among individuals, with no relationship to sex or age-group. The apparent density and spacing of the black-tailed jackrabbit may be related to changes in the distribution of food resources. Johnson and Anderson (1984) concluded that jackrabbits in Idaho were found in higher densities in areas that had large amounts of grassland and that this distribution was related to diet rather than nesting cover.

Status and Distribution

The black-tailed jackrabbit is widespread throughout the western United States, from western Arkansas and Missouri westward to the Pacific coast, and from Washington and Idaho south to Hidalgo and Querétaro, Mexico (Jones *et al.* 1983). It is found up to 3,750 m in elevation and is absent from the higher elevations of the Rocky Mountains, the Sierra Nevada, and the Cascades (Hall 1981). The subspecies *L.c. bennettii* is confined to coastal regions from approximately Santa Barbara, California to Ensenada in Baja California, Mexico (Hall 1981), with unverified records in Mt. Piños, Arroyo Seco, Pasadena, San Felipe Valley, and Jacumba (Hall 1981).

Threats

Urban development, habitat loss, and habitat fragmentation and isolation are all potential long-term risks to jackrabbits. They may disappear from an area when the size of the habitat patch declines to an unknown critical point. Assuming San Diego black-tailed jackrabbits exhibit the drastic population fluctuations characteristic of other subspecies (Smith 1990; Wagner and Stoddart 1972), the risk of extirpation from marginal isolated habitat patches is high. Suitable habitat linkages, which can include agricultural areas, may be important for colonization of unoccupied habitat patches. Throughout their range, jackrabbits suffer substantial mortality from road kills, hunting, and landowner kills. It is possible that pet dogs from residential developments are a source of mortality (Lechleitner 1958).

Conservation Needs

The conservation needs of San Diego black-tailed jackrabbit include maintenance of large tracts of interconnected blocks of suitable habitat throughout its range.

Environmental Baseline

The San Diego black-tailed jackrabbit is found throughout western Riverside County in suitable grassland, open sage scrub and chaparral habitat. It is also found in agricultural and rural residential settings. A focused survey to census the jackrabbit population in western Riverside County and systematically identify key populations has not been undertaken. Even in principle, a complete census would be difficult because of the natural population fluctuations exhibited by this species.

Clusters of occurrences in areas that appear to be important for the conservation of this species in the Plan Area are in the Lake Skinner-Diamond Valley Lake area, Sycamore Canyon Regional Park, Wildomar-Sedco Hills-Kabian Park, Sage-Wilson Valley, Tule Valley, Gavilan Hills-Lake Mathews, and the Jurupa Hills. Other areas with less frequently recorded occurrences in our dataset are the Santa Rosa Plateau, the Badlands, the Vail Lake-Aguanga area, and the Anza Valley. Smaller, more isolated populations occur north of the Santa Ana River in the Jurupa Hills and Mira Loma-Glen Avon area, and the abandoned vineyards and disturbed habitats in this region support a surprising number of jackrabbits (Phil Behrends, pers. obs. as cited in the MSHCP). Most records in the MSHCP database are from the 1990 to the present, which probably reflects heightened concern for the species due to its potential decline in coastal southern California in the face of increasing pressure from urbanization.

The vegetation communities used to model San Diego black-tailed jackrabbit habitat include agricultural, coastal sage scrub, desert scrub, grassland, Riversidean alluvial fan sage scrub, peninsular juniper woodland/scrub, and playa/vernal pool habitats. Based on this analysis, the Plan Area supports 418,243 acres of habitat for this species, of which approximately 70,623 acres (18 percent) are within PQP Lands. Eighteen of the 151 (12 percent) known occurrences of San Diego black-tailed jackrabbits in our dataset were located within PQP Lands.

Effects of the Action

Direct Effects

Given the presumed widespread distribution of this species, proposed residential, commercial and urban development outside of the MSHCP Conservation Area will result in direct mortality of San Diego black-tailed jackrabbits from construction activities. Without detailed information on San Diego black-tailed jackrabbit distribution and density within the Plan Area, we cannot determine how many individuals or populations will be affected by planned development. However, we anticipate the loss of 268,662 acres (64 percent) of modeled San Diego black-tailed jackrabbit habitat within the Plan Area over the 75-year permit term, which includes 117 of the 151 (77 percent) San Diego black-tailed jackrabbit occurrences in our dataset. This habitat loss will result in death and injury to San Diego black-tailed jackrabbits in the Plan Area; however, some individuals in the impacted areas may be able to escape to adjacent habitats, and some will survive in rural/mountainous areas with suitable habitat. Approximately 38,901 acres (14 percent) of the non-conserved modeled habitat for the San Diego black-tailed jackrabbit are designated as rural/mountainous land where development impacts are expected to occur at a slower rate and at lower densities.

To offset the loss of San Diego black-tailed jackrabbit habitat within the Plan Area, implementation of the MSHCP will conserve and manage large areas containing modeled habitat for the San Diego black-tailed jackrabbit and linkages among these areas. Additional Reserve Lands will include 78,958 acres (19 percent) of modeled San Diego black-tailed jackrabbit habitat in the Plan Area. An additional 70,623 acres (17 percent) of modeled habitat will remain within PQP Lands. In total, 36 percent of the modeled habitat for the San Diego black-tailed jackrabbit will be conserved or remain in the Plan Area. An additional 27,700 acres of habitat for dispersal or movement corridors will be retained or conserved within several existing and proposed Cores and Linkages as PQP or Additional Reserve Lands (MSHCP Section 3.2.3).

The Permittees will implement management and monitoring practices within the Additional Reserve Lands including surveys for the San Diego black-tailed jackrabbit. Cooperative management and monitoring are anticipated on PQP Lands. Surveys for the San Diego black-tailed jackrabbit will be conducted at least every eight years to verify occupancy at a minimum of 75 percent of known locations. If a decline in the distribution of the San Diego black-tailed jackrabbit is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP.

Management actions to benefit San Diego black-tailed jackrabbits (*e.g.*, trapping, habitat manipulations) or other Covered Species may result in impacts, including death, to a small number of individual San Diego black-tailed jackrabbits. It is anticipated that any impacts to San Diego black-tailed jackrabbits from management actions will be minimized by adherence to appropriate trapping protocols and other guidelines described in Section 7.4 of the MSHCP.

Indirect Effects

San Diego black-tailed jackrabbit could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These include the indirect effects described in the “General Effects” section of this biological opinion. New road construction or road widening, as described in Section 7.3.5 of the MSHCP, is proposed for several of the habitat blocks proposed for San Diego black-tailed jackrabbit conservation. Existing and proposed roads and road widening projects may increase fragmentation among San Diego black-tailed jackrabbit populations. The detrimental effects of fragmentation are described in the “General Effects” section of this biological opinion. The guidelines and recommendations described in Section 7 and summarized in the Conservation Measures of this biological opinion will help minimize the impacts of road construction on habitat connectivity.

Conclusion

We anticipate the proposed action will directly and indirectly affect the San Diego black-tailed jackrabbit as described in the analyses above, including the loss of 64 percent of its modeled habitat in the Plan Area. Implementation of the avoidance, minimization, and mitigation measures identified in the Plan will reduce the impacts to this species. We anticipate that this species will persist in the remaining 36 percent of the modeled habitat within both the existing PQP Lands and the Additional Reserve Lands. Together these lands form a system of large, contiguous habitat blocks that are inter-connected within the Plan Area. We anticipate that these areas will be monitored and managed cooperatively to benefit this species.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service’s biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the San Diego black-tailed jackrabbit. We reached this conclusion based on the widespread distribution of the San Diego black-tailed jackrabbit in the Plan Area and because the impacts associated with loss of this species’ modeled habitat, when viewed in conjunction with the protection and management of the MSHCP Conservation Area, is not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Amount or Extent of Take

We anticipate the take of all San Diego black-tailed jackrabbits within up to 268,662 acres of habitat outside of the MSHCP Conservation Area. A small, but undeterminable, number of San Diego black-tailed jackrabbits are anticipated to be taken as a result of management actions within the Additional Reserve Lands. Take will be in the form of harm, death, and injury. This level of anticipated take is not likely to result in jeopardy to the San Diego black-tailed jackrabbit.

San Diego desert woodrat (*Neotoma lepida intermedia*)Status of the Species*Listing Status*

The San Diego desert woodrat is not a federally listed species. However, it is considered a Species of Special Concern by the California Department of Fish and Game.

Species Description

The San Diego desert woodrat, a rodent of the family Muridae, is one of 23 recognized subspecies of the desert woodrat (*N. lepida*). The information in this species account is based both on the subspecies *N. l. intermedia* and on other subspecies of *N. lepida* in general.

Habitat Affinities

The desert woodrat primarily occurs in rock outcroppings, boulders, cacti, or areas of dense undergrowth within a variety of shrub and desert habitats, such as chaparral, coastal sage scrub, and oak and juniper woodlands (Brown *et al.* 1972; Cameron and Rainey 1972; Bleich 1973; Bleich and Schwartz 1975; Thompson 1982; MWD and RCHCA 1995). Bleich and Schwartz (1975) recorded 81 percent of captures of San Diego desert woodrats in rocky areas on the Naval Weapons Station, Fallbrook Annex in northern San Diego County, substantiating other work on habitat selection by this species (Cameron and Rainey 1972; Thompson 1982). Desert woodrats are also often associated with cactus, which they use for water and dens (Thompson 1982; Montgomery 1998).

Life History

Desert woodrats primarily are herbivorous, and their diet may include leaves, seeds, berries, and parts of flowers (Cameron and Rainey 1972). Woodrat foraging behavior entails venturing from a sheltered area or den to a plant, usually within 8.5 feet of the den, clipping the vegetation, and then returning to the sheltered area or den to consume the food morsel (Thompson 1982). According to Thompson, little time is spent feeding at the site of the plant and feeding usually occurs in areas sheltered on three sides with good protection from aerial predators (*e.g.*, owls).

Desert woodrats are mainly nocturnal but also exhibit crepuscular and some diurnal behavior (Stones and Hayward 1968; Miller and Stebbins 1964). Thompson's (1982) radiotelemetry study of desert woodrats in Joshua Tree in the Mojave Desert indicated that woodrats spent about 70 percent of the day in their diurnal den site, 21 percent at feeding sites, and less than 10 percent traveling or exploring. Woodrats tend to be relatively sedentary and do not venture far from their diurnal dens. They are aggressively solitary and may defend succulent plants (water sources) against other species, and perhaps prevent other species from obtaining water during droughts (MacMillen 1964). Bleich and Schwartz (1975) reported the home ranges of males and females were 0.091 acre and 0.107 acre, respectively on the Naval Weapons Station, Fallbrook Annex, California. In coastal sage habitat, desert woodrat density averaged 3.5 to 12.3 per ha

(1.4 to 4.9 acre) in one study (MacMillen 1964) and 30 per ha (12 per acre) in another (Bleich and Schwartz 1975). In jumping cholla cactus habitat, density averaged 38 per ha (15 per acre) (Brown *et al.* 1972). In sagebrush-juniper habitat densities averaged 2.8 ha (1.1 per acre) (Stones and Hayward 1968).

Desert woodrat litter sizes typically are 2-3 pups (Bleich 1973, Bleich and Schwartz 1975). Bleich (1973) found pregnant San Diego desert woodrats on the Naval Weapons Station, Fallbrook Annex in February, March, April, and December. Juveniles 3-4 weeks of age were trapped in December, indicating breeding in late October or early November (Schwartz and Bleich 1975). Bleich (1973) concluded that San Diego desert woodrats breed year-round at Fallbrook, but that the peak breeding season appears to be November to April.

Desert woodrats are noted for their flexibility or plasticity in utilizing various materials, such as twigs and other debris to build elaborate dens or "middens," which typically include multiple chambers for nesting and food, as well as several entrances. Middens may be used by several generations of woodrats (Cameron and Rainey 1972). Predators of desert woodrats include snakes, owls, and predatory mammals. This woodrat is commonly parasitized by bot fly larvae.

Status and Distribution

The desert woodrat is widespread throughout central and southern California and the Great Basin, Mojave, and Colorado deserts. The exact distribution and current status of (*N. l. intermedia*) is unknown (Hafner *et al.* 1998); however, it generally occurs from San Luis Obispo, California to approximately, San Fernando, Baja California. Records for the San Diego desert woodrat in the United States include San Luis Obispo, San Fernando, San Bernardino Mountains, Redlands, and Julian (Hall 1981). Significant populations probably currently occur in the Lake Mathews/Estelle Mountain area, Kabian Park, the Badlands, Lake Skinner/Crown Valley, Vail Lake/Sage, and on the Santa Rosa Plateau.

Threats

The major threats to the desert woodrat are the loss and degradation of coastal sage scrub habitat due to urban development and agricultural activities (*i.e.*, farming, discing, cattle and sheep grazing). A potential long-term threat to the species is isolation and fragmentation of habitat. The woodrat is relatively sedentary and may not be capable of dispersing long distances between suitable habitat patches (Smith 1965). It is patchily distributed among rock outcrops and dense patches of vegetation and loss of habitat between these microhabitats may prevent woodrats from dispersing or colonizing suitable habitats when a resident woodrat dies. Isolation may also result in problems associated with loss of genetic diversity and inbreeding depression.

Conservation Needs

The conservation needs of the San Diego desert woodrat include conservation and management of populations with long term conservation value throughout its range. Areas designated for San Diego desert woodrat conservation should be large enough to support self sustaining populations, or they should be connected to other conservation areas through dispersal corridors

with high quality habitat. Without these reserve design considerations, this species will likely experience high levels of genetic isolation.

Environmental Baseline

The San Diego desert woodrat is generally considered common in Riversidean and coastal sage scrub and chaparral throughout western Riverside County (P. Behrends, pers. comm.); however Hafner *et al.* (1998) consider the data deficient for this species. Our dataset includes 48 records of the San Diego desert woodrat located primarily throughout the Riverside lowland and San Jacinto Foothill bioregions.

The vegetation communities used to model habitat for this species were chaparral, coastal sage scrub, desert scrub, peninsular juniper woodland and scrub, and Riversidean alluvial fan sage scrub within all bioregions. Based on these habitats, the Plan Area supports approximately 572,772 acres of modeled habitat for the San Diego desert woodrat. Approximately 243,467 acres of modeled habitat occur within PQP Lands. However, because the San Diego desert woodrat is generally restricted to specific microhabitats, such as rock outcroppings, boulders, cacti, or areas of dense undergrowth within the general habitat types, modeled habitat likely overestimates the extent of suitable habitat for this species.

Effects of the Action

Direct Effects

The Plan Area includes 572,772 acres of modeled habitat for the San Diego desert woodrat. Given the presumed widespread distribution of this species in appropriate habitat, proposed residential, commercial and urban development outside of the MSHCP Conservation Area will result in direct mortality of San Diego desert woodrats from crushing of their dens during clearing, grading, and associated construction activities. Without detailed information on San Diego desert woodrat distribution and density within the Plan Area, we cannot determine how many individuals or populations will be affected by planned development. However, we anticipate the loss of 213,821 acres (37 percent) of modeled San Diego desert woodrat habitat within the Plan Area over the 75-year permit term. Some individuals, outside of the MSHCP Conservation Area, may be able to escape to adjacent habitats, and some will survive in rural/mountainous areas with suitable habitat. Approximately 84,516 acres (40 percent) of the non-conserved modeled habitat for the San Diego desert woodrat are designated as rural/mountainous land where development impacts are expected to occur at a slower rate and at lower densities.

To offset the loss of San Diego desert woodrat habitat within the Plan Area, implementation of the MSHCP will conserve and manage large areas containing modeled habitat for the San Diego desert woodrat. Conserved habitat within the Additional Reserve Lands will include 115,483 acres (20 percent) of modeled San Diego desert woodrat habitat. An additional 243,467 acres (43 percent) of modeled habitat will remain within PQP Lands. In total, 63 percent of the modeled habitat for the San Diego desert woodrat will be conserved or remain in the Plan Area.

Four main contiguous habitat complexes will support the San Diego desert woodrat within the MSHCP Conservation Area: the Santa Ana Mountain foothills-Santa Rosa Plateau complex, the Lake Mathews/Estelle Mountain-Steele Peak-Kabian Park-Sedco Hill complex, the Badlands-San Jacinto Mountain foothills-Agua Tibia Wilderness complex, and the Banning Bench complex. Smaller habitats assumed to be isolated from these large habitat complexes will be in the Jurupa Hills, Box Springs Mountains, Lakeview Mountains, Sycamore Canyon Regional Park, Norco Hills, Double Butte, Motte-Rimrock Reserve, and Warm Springs Mountain.

The Permittees will implement management and monitoring activities within the Additional Reserve Lands including surveys for the San Diego desert woodrat. Cooperative management and monitoring are anticipated on PQP Lands. Surveys for the San Diego desert woodrat will be conducted at least every eight years to verify occupancy of 75 percent of the known locations. If a decline in the distribution of the San Diego desert woodrat is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP.

Management actions to benefit San Diego desert woodrats (*e.g.*, trapping, habitat manipulations) or other Covered Species may result in impacts, including death, to a small number of individual San Diego desert woodrats. It is anticipated that any impacts to San Diego desert woodrats from management actions will be minimized by adherence to appropriate trapping protocols and other guidelines described in Section 7.4 of the MSHCP.

Indirect Effects

San Diego desert woodrat could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These include the indirect effects described in the “General Effects” section of this biological opinion. Each of the major habitat complexes identified above is bisected by at least one major road artery. Road widening is proposed for several of these roads as described in Section 7.3.5 in the MSHCP. Existing and proposed roads and road widening projects may increase fragmentation among San Diego desert woodrat populations. The detrimental effects of fragmentation are described in the “General Effects” section of this biological opinion. The guidelines and recommendations described in Section 7 and summarized in the Conservation Measures of this biological opinion will help minimize the impact of road construction on habitat connectivity.

Conclusion

We anticipate the proposed action will directly and indirectly affect the San Diego desert woodrat as described in the analyses above, including the loss of 37 percent of the modeled habitat for this species in the Plan Area. Implementation of the avoidance, minimization, and mitigation measures identified in the Plan will reduce the impacts to this species. We anticipate that this species will persist in the remaining 63 percent of the modeled habitat within both the existing PQP Lands and the Additional Reserve Lands. Together these lands form a system of large, contiguous habitat blocks that are interconnected within the Plan Area. We anticipate that these areas will be monitored and managed cooperatively to benefit this species.

PLANTS

Beautiful hulsea (*Hulsea vestita* ssp. *callicarpha*)

Status of the Species

Listing Status

Beautiful hulsea (*Hulsea vestita* ssp. *callicarpha*) is not a State or federally listed species. This subspecies is on the California Native Plant Society's List 4 (RED 1-2-3).

Species Description

Beautiful hulsea is a herbaceous perennial that is a member of the Asteraceae (sunflower family). The flowering stems are 0.4 to 2.5 decimeters in height above the basal tufts (Munz 1974; Wilken 1993). The disk flowers are bisexual, and the ray flowers are pistillate; both floral types are fertile. The ray flowers are 8 to 12 millimeters long, yellow on the inside, and orange-red to red on the outside (Munz 1974).

Beautiful hulsea is one of five subspecies of *Hulsea vestita* that are distinguished by morphological characteristics, range and elevation (Wilken 1977). *Hulsea vestita* intergrades with *Hulsea californica* and *H. heterochroma* (Wilken 1975; Wilken 1993; Boyd and Banks 1995; Reiser 1996).

Habitat Affinities

Beautiful hulsea occurs at elevations between 915 and 3,050 meters on rocky (granitic) or gravelly soils in openings in chaparral and lower montane coniferous forests on dry slopes (Munz 1974, Wilken 1975, Wilken 1993, CNPS 2001). This species is a fire follower (Reiser 1996) and also does well in other disturbed areas (D. Wilken, pers comm. to Dudek, as cited in the MSHCP). The species' association with fire and other disturbances indicates that suitable and occupied habitat for the beautiful hulsea are expected to shift over time.

Life History

Beautiful hulsea flowers from May through October (Munz 1974; CNPS 2001). Wilken (1993) reported this genus, *Hulsea*, to consist of self-sterile species. Very little is known about abundance, reproduction, recruitment, dispersal or other pertinent information for beautiful hulsea.

Status and Distribution

Beautiful hulsea is endemic to southern California and is restricted to the San Jacinto, Santa Rosa and Palomar Mountains of Riverside and San Diego counties (Munz 1974; CNPS 2001; Wilken 1993). In Riverside County, beautiful hulsea occurs on Cahuilla Mountain and in the

vicinity of Lake Fulmor, Pine Cove, Idyllwild, Mountain Center, Pine Meadow and Hemet Lake in the San Jacinto Mountains (UCR database).

Threats

Beautiful hulsea may be threatened by development within the foothill ranges (Reiser 1996). Some potential habitat occurs on private lands located in/around the communities of Pine Cove, Idyllwild, Mountain Center, and Pine Meadow. Past and present residential development threatens the beautiful hulsea in these areas. Potential habitat within the San Bernardino National Forest may be affected by grazing allotments such as the Rouse, Garner, Wellman, and Paradise allotments. The effects of grazing on this species are unknown.

Conservation Needs

The conservation needs of beautiful hulsea include protection and management of occurrences with long-term conservation value in the San Jacinto, Santa Rosa, and Palomar Mountains in a manner that provides for their long-term viability. Any newly discovered occurrences with long-term conservation value should be treated in the same manner. Actions that would increase the likelihood of deleterious effects from any identified threat should be avoided.

Environmental Baseline

Our dataset includes records of beautiful hulsea from Strawberry Creek in Idyllwild and on PQP Lands in the San Bernardino National Forest near Cahuilla Mountain and Little Thomas Mountain. Additional locations identified in the MSHCP (Lake Fulmor, Pine Cove, Mountain Center, Pine Meadow and Hemet Lake) were not included in our dataset due to the date or precision of the records. Reiser (1996) also reports this species from North Mountain, east of Hemet, along the summit fire road. The MSHCP did not identify core locations for beautiful hulsea in the Plan Area.

In the Plan Area, modeled habitat for beautiful hulsea includes all chaparral and montane coniferous forest habitats between elevations of 3,000 and 10,000 feet (915 and 3,050 meters) within the San Jacinto Mountains, San Jacinto Foothills, and Agua Tibia Mountains Bioregions. There are 144,099 acres of modeled habitat for beautiful hulsea within the Plan Area. Approximately 103,408 acres (72 percent) of modeled habitat occurs on PQP Lands. The majority of the modeled habitat within PQP Lands is in the San Bernardino National Forest, with a small amount within Mount San Jacinto State Park. The PQP Lands are subject to the Forest Service and State Park management plans. Within the PQP Lands, approximately 4,658 acres (3 percent) of modeled habitat are designated Wilderness Areas and 7,796 acres (5 percent) are within designated Roadless Areas that do not include Range Allotments.

Effects of the Action

Direct Effects

Beautiful hulsea will not be considered a Covered Species Adequately Conserved by the MSHCP until occupation of at least 16 localities is confirmed (Section 9, Table 9.3) within “Conserved Habitat” as defined in the MSHCP. A locality can not be smaller than one quarter section (160 acres) and must contain at least 50 individuals. Smaller populations may contribute to the locality count if they are demonstrably self-sustaining. The Plan Area includes 144,099 acres of modeled habitat for the beautiful hulsea. If the species-specific conservation objective above is met, an estimated 33,411 acres (23 percent) of modeled beautiful hulsea habitat outside of the MSHCP Conservation Area could be lost, through degradation or destruction. Thus, any individual beautiful hulsea plants or populations persisting in these areas, including the population near Strawberry Creek in Idyllwild, are anticipated to be impacted over the 75-year permit term by proposed Covered Activities; however, some plants may survive in rural mountainous areas where development impacts are anticipated to occur at a slower rate and at lower densities. Approximately 8,401 acres (25 percent) of the non-conserved modeled habitat for beautiful hulsea are designated as rural/mountainous land.

Because beautiful hulsea has a restricted distribution to the Agua Tibia, San Jacinto Mountains, and San Jacinto Foothills bioregions within the Plan Area, species-specific conservation objectives are provided in the MSHCP (Section 9, pp. 9-107) to ensure that suitable habitat and known populations of the beautiful hulsea will persist. The Plan states that at least twelve of the known locations of beautiful hulsea will be included within the MSHCP Conservation Area, including Lake Fulmore, Pine Cove, Idyllwild, Mountain Center, Pine Meadow, and Lake Hemet. In addition, the Plan states that at least 106,440 acres of chaparral and montane coniferous forest at appropriate elevations in the Agua Tibia, San Jacinto Foothills and Mountains bioregions will be included within the MSHCP Conservation Area.

To offset the loss of beautiful hulsea modeled habitat in the Plan Area, our analysis indicates that the MSHCP will conserve and manage approximately 7,280 acres (5 percent) of the modeled habitat within the Additional Reserve Lands. Approximately 103,408 acres (72 percent) of modeled habitat will remain within PQP Lands. A total of 110,688 acres (77 percent) of the beautiful hulsea modeled habitat will be included within the MSHCP Conservation Area.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands including surveys for beautiful hulsea. Cooperative management and monitoring are anticipated on PQP Lands. Surveys for beautiful hulsea will be conducted at least every eight years to verify occupancy at a minimum of 75 percent of known locations. If a decline in the distribution of the beautiful hulsea is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP. Other management measures described in Section 5, Table 5.2 will avoid or minimize adverse effects to existing and new locations of beautiful hulsea populations.

Indirect Effects

Beautiful hulsea could be subject to indirect effects both inside and outside of the MSHCP Conservation Area. These generally include the indirect effects mentioned in the “General Effects” section of this biological opinion. Fragmentation of habitats resulting from the MSHCP can negatively impact local populations, including: 1) increased competition with exotic plants, 2) increased human disturbance, 3) increased fire frequency, and 4) a change in floral and faunal communities that may be deleterious to the species. Implementation of the management provisions listed above and the Urban Wildlands Interface policy will help to reduce the indirect effects to this species.

Conclusion

We anticipate the western Riverside MSHCP will directly and indirectly affect populations of beautiful hulsea as described in the analysis above, including the loss of 23 percent of modeled habitat in the Plan Area. Implementation of the avoidance, minimization, and/or mitigation measures included in the Plan will reduce the impacts to this species. We anticipate that this species will persist in the remaining 77 percent of the modeled habitat within both the existing PQP Lands and Additional Reserve Lands and that these areas will be monitored and managed cooperatively to benefit this species.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service’s biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of beautiful hulsea. We reached this conclusion because implementation of the species conservation objectives and the inclusion of 77 percent of modeled habitat within the MSHCP Conservation Area will provide for the persistence of beautiful hulsea within the Plan Area. Thus, impacts to this species and its modeled habitat, when viewed in conjunction with the protection and management of the MSHCP Conservation Area, are not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Brand’s Phacelia (*Phacelia stellaris*)

Status of the Species

Listing Status

Brand’s phacelia is a candidate species for listing under the Federal Endangered Species Act (69 Federal Register 24876). It is also on the California Native Plant Society’s List 1B (RED 3-3-2).

Species Description

Brand’s phacelia is a small herbaceous annual in the Hydrophyllaceae (water-leaf) family. Plants are spreading to erect and grow to a height of 6 to 25 centimeters (Wilken *et al.* 1993). The leaves are basal and deeply lobed and the flowers are light blue to purple in color. Brand’s phacelia can be distinguished from similar co-occurring taxa by its pinnately deeply lobed

leaves, calyx lobes that are 3 to 4 millimeters long in flower, small generally deciduous corollas, corolla scales under 0.5 millimeters long, and coarsely pitted seeds.

Based on variations in the corolla scales, Howell (1945) considers Brand's phacelia to be an intermediate between *P. douglasii* and *P. insularis*. Some Brand's phacelia plants from near the southeastern Western Traverse Range foothills are intermediate to *Phacelia douglasii* var. *cryptantha* (CNPS 2001; Wilken *et al.* 1993).

Habitat Affinities

Brand's phacelia is primarily associated with coastal dunes and/or coastal scrub between elevations of 5 and 400 meters (CNPS 2001). This species typically occurs in sandy openings, sandy benches, dunes, sandy washes, or floodplains of rivers (CNDDDB 2001; Wilken *et al.* 1993). Commonly associated species along the coast include: *Abronia umbellata*, *Lotus nuttallianus*, *Nemacaulis denudata* var. *denudata*, *Agave shawii*, *Camissonia lewisii*, *Dudleya attenuata*, *Carpobrotus edulis*, and *Carpobrotus chilensis*.

Life History

Brand's phacelia produces a short, stiff, hairy flower that is widely bell-shaped and light blue to purplish in color. The ovoid fruit is approximately 4.5 to 6 millimeters in length. There are typically 8 to 20 pitted seeds per fruit, and each seed is approximately 0.5 to 1 millimeter in size (Howell 1945; Wilken *et al.* 1993). Little to no information on reproduction, recruitment, and/or seed dispersal is known for this species.

Status and Distribution

Brand's phacelia was historically found in Los Angeles, Riverside, and San Diego counties and coastal Baja California, Mexico (CNPS 2001; Reiser 1994). However, over half of the linear extent of the coastal range of this species has been lost, presumably to urbanization and habitat degradation (Dudek 2001).

Currently, Brand's phacelia is known from three populations in the United States. There are records of several populations in Baja California, but none are known to be extant (Dudek 2001). Reiser (1994) refers to the species as quite rare in Baja California and nearly extirpated within the United States.

Within Riverside County, the species appears restricted to sandy benches along the Santa Ana River; however, undeveloped dunes (*e.g.*, the Colton Dunes) may also provide suitable habitat for this species (Andy Sanders, UCR Herbarium, pers. comm. to M. McDonald, Carlsbad Fish and Wildlife Office, 2003). This species was first collected in Riverside County at Fairmont Park in 1925 (UCB, Jepson Herbarium specimen). The only known extant population of Brand's phacelia in the Plan Area was documented in 2000 by Oscar Clark about 1 mile southwest of Fairmont Park in western Riverside County (UCR Herbarium specimen). Brand's phacelia was again documented at this location on January 12, 2002, by Andy Sanders, UCR Herbarium Curator. This population occurs on sandy alluvial substrate immediately adjacent to the Santa

Ana River on County lands and occupies an area approximately 2,000 square meters (0.49 acre) in size. The Riverside Regional Park and Open Space District recently installed a fence to prevent horses from trampling this population.

This species has also been recently observed in two locations in San Diego County: on the Santa Margarita Dunes at Camp Pendleton (BioSystems Analysis, Inc. 1994) and within the Tijuana Border Field State Park within a few hundred feet of the international border fence. The population near the border fence occurs on unprotected property on Litche Mesa. Annual plants typically fluctuate in population numbers depending upon annual weather conditions. The occurrences within the Litche Mesa population have been documented to range from less than 50 plants during a dry year to 350 to 1,000+ plants under favorable environmental conditions.

Threats

Historical occurrences of Brand's phacelia have been extirpated by development (CNPS 2001). The extremely limited number of populations and their small size make Brand's phacelia particularly vulnerable to extinction resulting from environmental and/or genetic stochasticity (*e.g.*, localized habitat loss or degradation, changes in hydrological processes, fire or prolonged drought, and/or loss of genetic variation through genetic drift).

All three extant populations in the United States face significant threats. These populations are susceptible to destruction from pedestrian, vehicle and/or off-highway vehicle traffic (Zedler *et al.* 1997). The population in Lichte Mesa occurs in a sandy opening that is readily accessible to foot traffic from numerous tourists, as well as illegal immigrants crossing the border immediately to the south (Reiser 1994). The Camp Pendleton population is threatened by trampling, but it is at a greater risk from the invasive spread of iceplant. Iceplant is a particular threat to the population on the north side of the mouth of the Santa Margarita River (The Nature Conservancy 1994). The Riverside County occurrence is threatened by flood control maintenance activities, trampling, and activities associated with farming in the adjacent field. The operation of the Seven Oaks Dam may affect the availability of sandy benches along the Santa Ana River (appropriate habitat for this species) by reducing sediment load in flood waters (U.S. Fish and Wildlife Service, Biological Opinions 1-6-88-F-6 and 1-6-02-F-1000.10).

Conservation Needs

In the United States, the conservation needs of Brand's phacelia include protection and management of known occurrences in San Diego and Riverside counties in a manner that provides for their long-term viability (*i.e.*, removal of existing threats and protection of the hydrologic processes that support the species' habitat). Any newly discovered populations should be similarly conserved as well. The detection and protection of additional populations of Brand's phacelia would decrease the probability of extinction.

Managers of flood control activities of the Santa Ana River floodplain need to consider the habitat needs of this species. The agricultural lands adjacent to the Riverside County occurrence are owned by the Riverside County Parks Department and leased to agricultural operators.

Measures should be taken to ensure that agricultural activities do not affect the adjacent Brand's phacelia population.

Environmental Baseline

Currently, the only known occurrence of Brand's phacelia in the Plan Area is a population in western Riverside County near Fairmont Park. This population is located within existing PQP Lands. There are no records for this species in our dataset.

We attempted to model habitat for the Brand's phacelia using identified vegetation communities in which the species is known to occur (*i.e.*, coastal sage scrub, riparian scrub/woodland/forests, and all undeveloped, non-agricultural Delhi sand's flower-loving fly habitat). However, Brand's phacelia requires specific microhabitat features, such as sandy openings, sandy benches, dunes, sandy washes, or floodplains of rivers. We did not have access to digital overlays mapping the extent of these habitat features within the Plan Area; therefore, modeled habitat did not correspond well to the documented distribution of the species. Thus, due to its extremely limited range and the difficulty in capturing appropriate habitat types in a model for this species, we did not use a habitat model in our analysis of effects to the Brand's phacelia.

Effects of the Action

Direct Effects

Brand's phacelia is considered a Narrow Endemic Plant Survey Species and will be subject to surveys within 64,514 acres of the Narrow Endemic Plant Species Survey Area (NEPSSA) 7 in the Plan Area (Figure 6-1, pp. 6-30). Within the Plan Area, the only known occurrence for this species exists on County property within the Plan Area on existing PQP Lands (*i.e.*, Riverside County Parks Department, near Fairmont Park in the Santa Ana Wilderness Area). Until such time that the Additional Reserve Lands are assembled and conservation objectives for this species are met, surveys will be conducted as part of the project review process for public and private projects where suitable habitat for Brand's phacelia is present within the Narrow Endemic Plant Species Area (NEPSSA) 7. Populations detected as a result of survey efforts will be avoided according to the procedures outlined in the Narrow Endemic Plant Species policy (Section 6.1.3 of the Plan; *i.e.*, 90 percent of portions of property with long-term conservation value will be avoided until the species conservation objectives are met). For those locations found to contain large numbers of individuals or otherwise determined to be important to the overall conservation of the species, the Plan allows flexibility to acquire these locations for inclusion into the Additional Reserve Lands (pp. 6-40).

Brand's phacelia could be subject to impacts associated with development and other proposed Covered Activities within suitable habitat that is outside the MSHCP Conservation Area and outside of the NEPSSA for Brand's phacelia. Any individual Brand's phacelia plants and populations existing in these areas could be impacted over the 75-year permit term as a result of the proposed Covered Activities. However, as noted above, the only known occurrence of Brand's phacelia occurs within PQP Lands. Thus, based on current knowledge of the species,

direct impacts to Brand's phacelia would only include up to a 10 percent loss of any areas with long-term conservation value for this species (as discussed above).

Because there is only one known location of Brand's phacelia in the Plan Area, specific conservation objectives are provided in the MSHCP (Section 9, pp. 9-108) to ensure that suitable habitat and known populations of the Brand's phacelia will persist. The Plan states that at least two known localities (one historic and one extant) of Brand's phacelia will be included within the MSHCP Conservation Area, including the occurrence along the Santa Ana River at Fairmont Park and within the Riverside Regional Park and Open Space District Santa Ana Wilderness Area. In addition, the Plan states that at least 6,100 acres of meadows/marshes and playas/vernal pools below 1,640 feet (500 meters) elevation within the Riverside Lowlands Bioregion will be included within the MSHCP Conservation Area. We anticipate this species will also benefit from the implementation of the Riparian/Riverine Area and Vernal Pools policy.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands including surveys for Brand's phacelia. Cooperative management and monitoring are anticipated on PQP Lands. Surveys for Brand's phacelia will be conducted at least every eight years to verify occupancy at a minimum of 75 percent of the known locations. If a decline in the distribution of Brand's phacelia is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP. Other management actions described in Section 5, Table 5.2 of the MSHCP will help maintain Brand's phacelia habitat, such as the prevention off-road vehicle use and trampling. Implementation of these management actions will help to avoid and minimize adverse effects to Brand's phacelia.

Indirect Effects

Brand's phacelia could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These generally include the indirect effects discussed in the "General Effects" section of this biological opinion. Implementation of the Guidelines Pertaining to the Urban/Wildlands Interface policy, Riparian/Riverine Area and Vernal Pools policy, and the management provisions listed above will help to reduce the indirect effects to this species.

Conclusion

We anticipate the proposed action will directly and indirectly affect Brand's phacelia as described in the analyses above. Once the conservation objectives for Brand's phacelia have been met, avoided areas, which have not been otherwise conserved, may be impacted. We anticipate that occurrences determined to be important to the overall conservation of the species will be considered for inclusion in the Additional Reserve Lands and that at least some of the avoided areas may be maintained as open space habitat. Implementation of the avoidance, minimization, and mitigation measures identified in the Plan will further reduce the impacts to Brand's phacelia. We anticipate that the MSHCP Conservation Area will be monitored and managed cooperatively to benefit this species.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of Brand's phacelia. We reached this conclusion because the only known location of Brand's phacelia occurs in PQP Lands that will not be impacted by the Plan. In addition, NEPSSA surveys for Brand's phacelia may result in newly discovered occurrences being included in the MSHCP Conservation Area. Thus, impacts to this species and its habitat, when viewed in conjunction with the protection and management of the MSHCP Conservation Area, are not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of Brand's phacelia throughout its range.

California beardtongue (*Penstemon californicus*)

Status of the Species

Listing Status

California Beardtongue is not a State or federally listed species. California Beardtongue is a U.S. Forest Service Sensitive Species and is on the 2001 California Native Plant Society List 1B (RED Code 3-2-2).

Species Description

California Beardtongue is an herbaceous perennial (10-30 cm tall) in the Scrophulariaceae (snapdragon family) that is spreading to erect (Munz 1974). The erect stems form matted tufts with long dark-brown prostrate branches. The purplish-blue flowers are 1.4-1.8 cm long. The many seeded capsular fruit are septicidal (Holmgren 1993). This species is one of 27 species of *Penstemon* present in southern California (Holmgren 1993).

Habitat Affinities

California beardtongue occurs on sandy or granitic soils with pleistocene non-marine deposits of eroded clay and stony slopes in chaparral, coniferous forest, and pinyon-juniper woodland habitats (California Native Plant Society 2001; Holmgren 1993; Munz 1974; California Natural Diversity Database 2000). This species can also be found within openings of chaparral on ridgetops and in the ecotone between chaparral and lower montane conifer forests (Stephenson and Calcarone 1999). California beardtongue co-occurs with Johnston's rock cress, Munz's mariposa lily and Ziegler's aster (California Natural Diversity Database 2000).

Life History

California beardtongue flowers from May through June (Holmgren 1993; California Native Plant Society 2001) and into August in Baja California (Pierce and Beauchamp 1979). Very little is known about the abundance, reproduction, recruitment, and dispersal of this species.

Status and Distribution

The historical distribution of California beardtongue is not well-documented but is expected to have been not much broader than its current range. Currently, California beardtongue is restricted to the Santa Rosa and San Jacinto Mountains of Riverside County and the mountains of northern Baja California, Mexico, at elevations of 1,000 m to 2,100 m (California Native Plant Society 2001). About 126 acres of potential California beardtongue habitat are reportedly in the San Bernardino National Forest (Stephenson and Calcarone 1999). The majority of known or historic occurrences for California beardtongue are in the San Jacinto Mountains, particularly Garner Valley, Pyramid Peak and Desert Divide (Reiser 1996; UCR database; CNDDDB 2000; Munz 1974; Scott Eliason, San Bernardino National Forest, pers. comm. 2003). Older CNDDDB records (1882 - 1982) list 12 occurrences for this species, 9 of which are in the San Bernardino National Forest (San Jacinto Mountains). Two of the remaining CNDDDB records are from outside of the Plan Area, and the data for the other record was collected from Aguanga in 1882. Two outlier localities have been recorded: Cactus Valley and north of Sage. The only other known populations outside of the action area were recorded from Baja California, Mexico (Pierce and Beauchamp 1979).

Threats

This species is threatened by grazing, firebreak construction and maintenance, trail construction, off-trail traffic by hikers and residential development in Garner Valley (CNDDDB 2000).

Conservation Needs

There are few known occurrences of this species outside of Riverside County. Management on National Forest land should seek to protect known populations from effects from residential or recreational development.

Environmental Baseline

Currently, known occurrences of the California beardtongue in the Plan Area are restricted to the San Jacinto Mountains, particularly Garner Valley (Scott Eliason, San Bernardino National Forest, pers. comm. 2003).

Vegetation communities used to model California beardtongue habitat were chaparral, montane coniferous forest, and penninsular juniper woodland and scrub habitats within the Desert Transition, San Jacinto Foothills and San Jacinto Mountains bioregions between 3,280 and 6,890 feet. Based on these criteria, the Plan Area includes 161,798 acres of habitat for the California beardtongue. About 107,333 acres of the modeled habitat will remain within PQP Lands. Because the California beardtongue is limited to sandy and granitic soils within stony slopes and shrubby openings within the modeled vegetation communities, the modeled habitat likely overestimates the extent of suitable habitat for this species in the Plan Area. While distribution data are not current or precise enough to confirm occurrences on PQP Lands, older NDDB records indicate that most of the Garner Valley occurrences are on PQP Lands.

Effects of the Action

Direct Effects

The Plan Area includes 161,798 acres of modeled habitat for the California beardtongue. California beardtongue will be subject to impacts associated with proposed residential, commercial, urban and agricultural development within 47,500 acres (29 percent) of modeled habitat that are outside the MSHCP Conservation Area. Thus, any individual plants or populations persisting in these areas are anticipated to be impacted over the 75-year permit term as a result of proposed development.

To offset the loss of California beardtongue within the Plan Area, implementation of the MSHCP will provide for the protection of 6,966 acres (4 percent) of modeled California beardtongue habitat within Additional Reserve Lands. An additional 107,333 acres (66 percent) of modeled habitat will remain in PQP Lands. In total, 71 percent of the modeled habitat for the California beardtongue will be conserved or remain in the Plan Area. A species-specific conservation objective for this species is to conserve at least 15 locations in the vicinity of Aguanga, Blackburn Canyon and Garner Valley. However, we are aware of no recent data that would confirm the presence of a California beardtongue population in Aguanga.

The permittees will implement management and monitoring practices including grazing control within the Additional Reserve Lands, and cooperative management and monitoring is anticipated on PQP Lands (MSHCP Section 9, Table 9.2). Surveys for California beardtongue will be conducted at least every 8 years to verify occupancy at a minimum of 75 percent of known locations. If a decline in the distribution of the California beardtongue is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP.

Indirect Effects

The California beardtongue could be subject to indirect effects from Covered Activities both inside and outside of the Preserve. These generally include the indirect effects mentioned in the “General Effects” section of this biological opinion. The management provisions listed above will help to reduce the indirect effects to this species.

Conclusion

We anticipate the proposed action will directly and indirectly affect the California beardtongue as described in the analyses above, including the loss of 29 percent of the modeled habitat for this species. Implementation of the avoidance, minimization, and/or mitigation measures included in the Plan will reduce the impacts to this species. We anticipate that this species will persist within the remaining 71 percent of the modeled habitat within both the PQP Lands and Additional Reserve Lands. Together these lands form a system of large, contiguous habitat blocks that likely contain suitable habitat and occurrences of California beardtongue within the Plan Area. We anticipate that these areas will be monitored and managed cooperatively to benefit this species.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the California beardtongue. We reached this conclusion because most of the reported occurrences in the Plan Area are located within PQP Lands. In addition, other large areas containing modeled habitat that may support California beardtongue populations will be included within the MSHCP Conservation Area. Thus, the impacts associated with loss of this species' modeled habitat, when viewed in conjunction with the protection and management of the MSHCP Conservation Area, are not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

California bedstraw (*Galium californicum* ssp. *primum*)Status of the Species*Listing Status*

California bedstraw is not a State or federally listed species. It is considered a Sensitive Species by the U.S. Forest Service and the U.S. Bureau of Land Management and is on the 2001 California Native Plant Society List 1B (RED 3-2-3).

Species Description

California bedstraw is a perennial herb in the Rubiaceae family (California Native Plant Society 2001). California bedstraw has a relatively tufted or decumbent habit and ranges in height from 9 to 16 cm. The leaves occur in whorls of four (4 to 12 mm long) (Dempster 1993a). California bedstraw is one of seven subspecies of *G. californicum* (Dempster 1993a). In addition, California bedstraw is known to hybridize with *G. nuttallii* (Dempster 1993a; California Natural Diversity Database 2000).

Habitat Affinities

California bedstraw occurs on granitic or sandy soils in shaded areas at the ecotone of chaparral and lower montane coniferous forest and in the lower edge of the pine belt (California Native Plant Society 2001; California Natural Diversity Database 2000).

Life History

California bedstraw blooms from May through July (California Native Plant Society 2001). The staminate flowers occur in small clusters. The pistillate flowers occur singly in the leaf axils. The rotate corollas are yellow (Dempster 1993a). Fertilized California bedstraw flowers produce berries sparsely covered with hair (Dempster 1993a). Little to no information on reproduction, recruitment and/or seed dispersal is known for this species.

Status and Distribution

The historic distribution of California bedstraw is not well known. Similarly, the current distribution of California bedstraw, a California endemic, is not well known or documented. However, this species appears to be limited to elevations of 1,350 to 1,700 m on the western side of the San Jacinto Mountains in western Riverside County in the San Bernardino National Forest (California Native Plant Society 2001; California Natural Diversity Database 2000; Dempster 1993a). California bedstraw occurs in swarms with *G. nuttallii* in the San Jacinto Mountains (California Natural Diversity Database 2000). *G. nuttallii*, which shares a number of morphological characters with California bedstraw, has a similar habitat (chaparral and coniferous forest), imperfect flowers, berry fruits (although glabrous) and whorls of four leaves.

The only verified occurrence of this species is in Alvin meadows in the San Jacinto Mountains. The Bee Canyon Fire occurred near Alvin Meadows in 1996. This area was surveyed in 1997 and 1998, and vegetative regrowth was observed (Scott Eliason and Deveree Kopp, San Bernardino National Forest, pers. comm. 2003). The Alvin Meadows population has a fairly high density of California bedstraw based on these recent surveys.

There are several historic and unverifiable records from western Riverside County. The UCR database includes mapped localities in San Timoteo Canyon west of Beaumont and in the vicinity of Diamond Valley Lake. These disjunct localities are not verified and were not included in the MSHCP analysis. There is also an historic record from Reche Canyon. This occurrence was not verified in a 1967 survey, and the population may have been extirpated due to genetic swamping (CNDDDB 2000).

Threats

This species is threatened by genetic swamping by *Galium nuttallii* (California Natural Diversity Database 2000). Alvin meadows is near the town of Idyllwild and is subject to frequent use by recreationalists. The population there may be subject to trampling or other disturbances from recreationalists (Deveree Kopp, San Bernardino National Forest, pers. comm. 2003). Important information on other potential threats is unavailable at this time.

Conservation Needs

The conservation needs of California bedstraw include protection and management of the population at Alvin Meadows in a manner that provides for the long term persistence of the population. Any newly discovered populations should be protected in the same manner. Current surveys will be required to determine if this species still exists outside of Alvin Meadows. If a population is found, genetic studies will be necessary to assess the extent of genetic swamping from the San Diego bedstraw.

Environmental Baseline

The only verified occurrence of this species in the Plan Area is the Alvin meadows occurrence described above.

The vegetation communities used to model California bedstraw habitat include chaparral, red shank chaparral, Jeffrey Pine, lower montane coniferous forest, mixed evergreen forest, and southern California white fir forest habitats between 4,429 and 5,577 feet (1,350 - 1,700 meters) in the San Jacinto Mountains Bioregion. Based on the results of this analysis, the Plan Area supports 53,126 acres of California bedstraw habitat. About 41,349 acres of this modeled habitat are within PQP Lands. Because California bedstraw would only be expected to occur on granitic or sandy soils in shaded areas at the ecotone of chaparral and lower montane coniferous forest and in the lower edge of the pine belt, the modeled habitat likely overestimates the extent of suitable habitat for this species in the Plan Area.

Effects of the Action

Direct Effects

The California bedstraw will not be considered a Covered Species Adequately Conserved by the MSHCP unless the Forest Service agrees through an MOU to manage populations of this species on their lands cooperatively with the Permittees as “Conserved Habitat” as defined by the MSHCP. The Plan Area includes 53,126 acres of modeled habitat for the California bedstraw. If the MOU with the Forest Service is executed, California bedstraw will be subject to impacts associated with proposed residential, commercial, urban and agricultural development within 11,774 acres (22 percent) of modeled habitat that are outside of the MSHCP Conservation Area. Thus, any individual California bedstraw plants or populations persisting in these areas are anticipated to be impacted over the 75-year permit term as a result of proposed development. All of the recent occurrences of this species are within PQP Lands of the San Bernardino National Forest (Deveree Kope, San Bernardino National Forest, pers. comm. 2003). One of the historic known locations of the California bedstraw is predominately outside of Forest Service land in a privately owned inholding (CNDDDB 2000).

If the MOU with the Forest Service is signed, additional monitoring and management would occur in habitat for the California bedstraw within Forest Service lands included in the MSHCP Conservation Area. To offset the loss of California bedstraw habitat within the Plan Area, implementation of the MSHCP will conserve and manage large areas containing modeled California bedstraw habitat including 41,349 acres (78 percent) within PQP Lands. An additional 3 acres (<1 percent) of modeled habitat for the California bedstraw is within the Additional Reserve Lands. In total, 78 percent of modeled habitat for the California bedstraw will be conserved or remain in the Plan Area.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands, and cooperative management and monitoring is anticipated on PQP Lands (MSHCP Section 9, Table 9.2). Surveys for California bedstraw will be conducted at least every 8 years to verify occupancy at a minimum of 75 percent of the known locations. If a decline in the distribution of the California bedstraw is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP. Other management actions described in Section 5, Table 5.2 of the MSHCP such as avoidance of impacts to California bedstraw populations and management of genetic swamping by *Gallium nuttallii* will help maintain habitat for this species.

Indirect Effects

The California bedstraw could be subject to indirect effects from Covered Activities both inside and outside of the Preserve. These generally include the indirect effects mentioned in the “General Effects” section of this biological opinion. The management provisions listed above will help to reduce the indirect effects to this species.

Conclusion

We anticipate the proposed action will directly and indirectly affect the California bedstraw as described in the analyses above, including the loss of 22 percent of the modeled habitat for this species. We anticipate that the California bedstraw will persist in the remaining 78 percent of modeled habitat within the Plan Area. The existing PQP Lands form large habitat blocks that we anticipate will be monitored and managed cooperatively to benefit this species.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service’s biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the California bedstraw. We reached this conclusion because the recent known occurrences and most of the modeled habitat for the California bedstraw are within PQP Lands that will not be impacted by the Plan. Thus, the impacts to this species and its modeled habitat, when viewed in conjunction with the protection and management of the MSHCP Conservation Area, is not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

California black walnut (*Juglans californica* var. *californica*)

Status of the Species

Listing Status

The California black walnut is not a State or federally listed species. However, this taxon has Forest Service Local Viability Concern status and is on the California Native Plant Society List 4 (RED 1-2-3).

Species Description

California black walnut is one of two native-Californian species in the genus *Juglans* of the walnut family (Juglandaceae) (Munz 1974). Dempster (1993) combines the southern California black walnut, *J. californicus*, with the northern California black walnut *J. hinsii*, and considers them separate varieties of the same species *J. californicus* var. *californicus* and *J. c.* var. *hinsii*. Other publications consider the southern California black walnut a distinct species. California black walnut is a low-growing (3-10+ m tall), winter-deciduous tree that is found only in southern California. The California black walnut has thin bark, and the shells of the mature fruits are very thick (Quinn 1989).

Habitat Affinities

California black walnut is found in a variety of vegetation communities in southern California, including cismontane woodland, chaparral and coastal scrub between 50-900 meters in elevation (California Native Plant Society 2001). This species typically occurs on deep, friable tertiary marine shales that have a high water-holding capacity (Keeley 1990; Holstein 1981). Scattered individuals commonly co-occur with laurel sumac on alluvium located at the base of hills and in canyons. Individuals also occur infrequently on south-facing slopes, and more commonly, on west-facing slopes (Mullally 1992). On mesic north-facing slopes this walnut is primarily a member of open woodland communities of various types and sometimes produces pure stands (Mullally 1992). Along intermittent streams California black walnut tolerates high salinity and alkalinity (Mullally 1992). In these riparian areas, this species prefers the dryer slopes that are almost never subject to flooding and erosional activity yet are in close proximity to groundwater and seasonal surface water.

Black walnut riparian woodlands in southern California may be dominated by California black walnut alone or in association with sclerophyllous evergreen trees that include California live oak and toyon (Keeley 1990). In oak-walnut woodlands, especially those with a preponderance of coast live oak, this species often is located on the periphery of the woodland where it can obtain sufficient sunlight (Mullally 1992). Engelmann oaks occasionally co-occur with this species in various settings.

Life History

California black walnut is a tree that flowers from March to May. Fruits develop to full size in the spring and reach maturity in the fall (Quinn 1989). California walnut seedlings appear in the spring; seedling densities of 2,000 per hectare have been measured in Ventura County (Swanson 1976). This species requires full sunlight and wet, summer conditions for successful propagation (Holstein 1981). Seedlings mature rapidly in moist, sunny conditions. Sprouting is common at the base of burned trees or when a trunk dies, breaks, or is cut. Mature walnut fruits are actively sought and subsequently stored, buried or eaten by both California ground squirrels and western gray squirrels (Quinn 1989).

Keeley (1990) concluded from an assessment of the demographic structure of the species that the oldest surviving individuals were nearing 100 years. Moreover, 50 percent of the trees were estimated to be seedlings, suggesting a high mortality rate. In the San Jose Hills, trees older than 20 to 30 years tend to develop heart rot, with the interior portions of the trunk and older limbs becoming infested with termites, wood-boring beetles, and fungi (Quinn 1989).

Status and Distribution

California black walnut is a hardwood tree endemic to southern California (Keeley 1990). Swanson (1976) determined the range of California black walnut woodlands to be north of Santa Barbara County to the southeast along the Santa Ana River (Orange County), eastward to Riverside County, and as far north as Yucaipa in San Bernardino County. Outside of this range

in Santa Barbara County, western San Bernardino County, and south to San Diego County, the California black walnut occurs in mixed stands, especially with oaks (Quinn 1989).

Threats

Due to urban sprawl much of southern California's California black walnut woodland has been destroyed or is threatened. This community is considered to be one of California's rare and imperiled natural communities (Jones and Stokes Associates 1987). Additionally, cattle as well as other livestock pose a significant threat to the regeneration of the species by preventing the establishment of seedlings by crushing seeds and compacting soil, or eliminating seedlings through trampling. As a result of these combined activities, California black walnut is now considered to be a custodial species, which is defined by Quinn (1989) as a species with a remnant natural population found only in areas of limited size. Many remaining trees are remnants from abandoned orchards or landscaping uses (Steven Boyd, Rancho Santa Ana Botanical Gardens, pers. comm., 2003). The California black walnut is also subject to hybridization with cultivated species (Reiser 1996).

Conservation Needs

Conservation should focus on maintenance and restoration of known California black walnut woodlands. There are no known stands of this community within the Plan Area, but stands may occur in Riverside County near the Chino Hills State Park and at other locations in the northern Santa Ana Mountains (Steven Boyd, Rancho Santa Ana Botanical Gardens, pers. comm., 2003).

Environmental Baseline

According to our dataset, there are 7 recent records of California black walnut scattered throughout the Plan Area. In addition, the MSHCP reports several localities for the California black walnut throughout the Plan Area, including the Santa Rosa Plateau. While the scattered locations reported in our dataset and the MSHCP from Riverside County are likely correct, most are probably the result of planted nursery stock that used the California black walnut as rootstock, or individuals that dispersed naturally from cultivated individuals. There are natural stands of California black walnut between State Route 60 and the Riverside-San Bernardino county line (Andrew Sanders, University of California at Riverside, pers. comm., 2003). Other natural stands may exist near Chino Hills State Park and other locations in the northern Santa Ana Mountains (Steven Boyd, Rancho Santa Ana Botanic Gardens, pers. comm., 2003, Andrew Sanders, University of California at Riverside, pers. comm., 2003). There are no occurrences for California Walnut Woodlands habitat within Riverside County in the CNDDDB database (CNDDDB 2000).

The vegetation communities used to model habitat for the California black walnut include riparian scrub, woodland and forest, and woodlands and forest below 3000 feet in the Santa Ana Mountains bioregion. Based on this analysis, the Plan Area supports 9,858 acres of California black walnut habitat, of which 5,036 acres will remain in PQP Lands. Both the known location along the Santa Ana River and the potential location near the Chino Hills are outside of our modeled habitat area because they are outside the Santa Ana Mountain Bioregion. We chose to

exclude the Riverside Lowlands Bioregion because its inclusion would severely overestimate the amount of suitable habitat for the California black walnut within the Plan Area.

Effects of the Action

Direct Effects

The Plan Area includes 9,858 acres of modeled habitat for the California black walnut. California black walnuts will be subject to impacts associated with development over the 75-year permit term within 3,671 acres (37 percent) of this habitat. Implementation of the MSHCP will provide for the protection of 1,151 acres (12 percent) of modeled California black walnut habitat within Additional Reserve Lands. An additional 5,036 acres (51 percent) of modeled habitat will remain in PQP Lands. In total, 63 percent of modeled habitat for the California black walnut will be conserved or remain in the Plan Area.

According to the Plan, at least 7 known occurrences of the California black walnut will be protected in the Plan Area. While it is likely that there are at least 7 locations where California black walnut grows in the Plan Area, the population along the Santa Ana River between State Route 60 and the Riverside-San Bernardino County line is the only naturally occurring population known. Substantial, naturally occurring populations may exist in the northern Santa Ana Mountains, especially the Chino Hills area; however, these areas have not been surveyed for California black walnuts. Other locations proposed for California black walnut protection in the MSHCP, including the Santa Rosa Plateau and Lake Skinner, are not known to support naturally occurring populations, and any individual California black walnuts found in these areas were probably introduced directly or indirectly as rootstock (Zack Principe, Santa Rosa Plateau Ecological Reserve, pers. comm., 2003, Steven Boyd, Rancho Santa Ana Botanical Garden, pers. comm., 2003, David Bramlet, pers. comm., 2003). Therefore, it is unlikely that 7 occurrences with long-term conservation value will be protected through implementation of the Plan. Nonetheless, all of the locations most likely to support naturally occurring California black walnut stands in the Plan Area will be protected within the MSHCP Conservation Area.

The permittees will implement management and monitoring practices including grazing control within the Additional Reserve Lands, and cooperative management and monitoring is anticipated on PQP Lands (MSHCP Section 9, Table 9.2). Surveys for California black walnut will be conducted at least every 8 years to verify occupancy at a minimum of 75 percent of known locations. If a decline in the distribution of the California black walnut is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP. The California black walnut may also be afforded additional protection through implementation of the Riparian/Riverine Areas and Vernal Pools policy (Section 6.1.2).

Indirect Effects

The California black walnut could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These include the indirect effects described in the “General Effects” section of this biological opinion.

Conclusion

We anticipate the proposed action will directly and indirectly affect the California black walnut as described in the analyses above, including the loss of 37 percent of its modeled habitat in the Plan Area. Implementation of the avoidance, minimization, and mitigation measures identified in the Plan will reduce the impacts to this species. We anticipate that this species will persist in the remaining 63 percent of the modeled habitat and other known appropriate habitat outside of our model boundary in Additional Reserve Lands and existing PQP Lands.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the California black walnut. We reached this conclusion because no known naturally occurring California black walnut populations or areas with high potential to support naturally occurring populations will be affected through implementation of the MSHCP. In addition, the impacts associated with loss of this species's modeled habitat, when viewed in conjunction with the protection and management of the MSHCP Conservation Area, are not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of the California black walnut throughout its range.

California muhly (*Muhlenbergia californica*)

Status of the Species

Listing Status

California muhly is not a State or federally listed species. This species is on the California Native Plant Society List 4 (RED 1-1-3).

Species Description

California muhly is an herbaceous rhizomatous perennial (CNPS 2001). The rhizomes are short, scaly and creeping (Peterson 1993). California muhly stems range in height from 3 to 7 decimeters (Peterson 1993). California muhly is one of 18 species of *Muhlenbergia* and belongs to the Poaceae family (Peterson 1993).

Habitat Affinities

California muhly occurs from cismontane southern California to the edge of the deserts (Munz 1959) in mesic micro habitat in various vegetation communities including chaparral, coastal sage scrub, lower montane coniferous forest and meadows, usually near seeps or along streambanks (CNPS 2001).

Life History

This species blooms from July through September (Munz 1974; CNPS 2001). The inflorescence is narrow with ascending to erect branches that are 5 to 13 centimeters long. The glumes are 2.5 to 4 millimeters, and the lemma is 2.8 to 4 millimeters. California muhly also spreads vegetatively with creeping rhizomes (Peterson 1993). Little to no information is available on reproduction, recruitment or dispersal for this species.

Status and Distribution

The historic distribution for this species is not well known. Currently, California muhly is known from Los Angeles, Riverside and San Bernardino counties at elevations between 100 to 2,000 meters (CNDDB 2000, CNPS 2001, Peterson 1993).

Threats

California muhly is threatened by development, road construction, grazing and recreational activities.

Conservation Needs

The conservation needs of California muhly include protection and management of known occurrences in Los Angeles, San Bernardino and Riverside counties in a manner that provides for their long-term viability. Actions that would modify the hydrology that supports the species' habitat or increase the likelihood of deleterious effects from any identified threat should be avoided.

Environmental Baseline

This species is thought to occur near Sage, Aguanga, Estelle Mountain, Gavilan Hills, Gavilan Plateau, near Prado Dam, La Paz Canyon, Temescal Canyon, and Sitton Peak in the Santa Ana Mountains and may occur elsewhere throughout the Plan Area in mesic microclimates within appropriate vegetation communities. No locations have been verified by recent survey data. The vegetation communities used to model California muhly habitat include chaparral, coastal sage scrub, meadow, marsh, and montane coniferous forest between 328 and 6,562 feet (100 and 2000 meters) in elevation. Based on this analysis, the Plan Area supports 577,210 acres of California muhly modeled habitat, of which 254,605 acres (44 percent) are within existing PQP Lands. Because the California muhly is limited to mesic microhabitats within these vegetation communities, the modeled habitat likely overestimates the extent of suitable habitat for this species in the Plan Area.

Effects of the Action

Direct Effects

The California muhly will not be considered a Covered Species Adequately Conserved by the MSHCP until occupation is confirmed for at least 10 localities (Section 9, Table 9.3) within “Conserved Habitat” as defined in the MSHCP. A locality can not be smaller than one quarter section (160 acres) and must contain at least 50 clumps. Smaller populations may contribute to the locality count if they are demonstrably self-sustaining. The Plan includes 577,210 acres of modeled habitat for the California muhly. Without detailed information on California muhly distribution within the Plan Area, we cannot determine how many individuals or populations will be affected by planned development. If the species-specific conservation objective above is met, California muhly will be subject to impacts associated with residential, commercial, urban and agricultural development within 213,454 acres (37 percent) of modeled habitat that are outside of the MSHCP Conservation Area. Thus, any individual California muhly plants or populations persisting in these areas are anticipated to be impacted over the 75-year permit term as a result of proposed development; however, some plants may survive in rural mountainous areas where development impacts are anticipated to occur at a slower rate and at lower densities. Approximately 84,341 acres (40 percent) of the non-conserved modeled habitat for the California muhly are designated as rural/mountainous land.

To offset the loss of California muhly habitat within the Plan Area, the MSHCP will conserve and manage approximately 109,151 acres (19 percent) of modeled California muhly habitat within the Additional Reserve Lands. Another 254,605 acres (44 percent) of modeled habitat will remain on PQP Lands. In total, 363,756 acres (63 percent) of the modeled habitat for the California muhly will be conserved or remain in the Plan Area. Historically known locations at Sage, Aguanga, Estelle Mountain, near Prado Dam, Temescal Canyon and Sitton Peak will be targeted for protection. Because precise locations are unknown within the Plan Area, it is not possible to predict whether or not these locations are currently within the MSHCP Conservation Area. Surveys will be conducted in order to determine the distribution of California muhly within the MSHCP Conservation Area. At a minimum, surveys will be conducted at historically occupied locations (Yvonne Moore, California Department of Fish and Game, pers. comm. 2003).

In addition, the Permittees will implement management and monitoring practices within the Additional Reserve Lands, and cooperative management and monitoring is anticipated on PQP Lands. Surveys for California muhly will be conducted at least every 8 years to verify occupancy at a minimum of 75 percent of known locations. If a decline in the distribution of the California muhly is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP. Although the California muhly is not on the list of species afforded protection by the Riparian/Riverine Areas and Vernal Pools policy, the species may benefit from implementation of this policy because it is sometimes present near seeps or along streambanks.

Indirect Effects

The California muhly could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These generally include the indirect effects mentioned in the “General Effects” section of this biological opinion.

Conclusion

We anticipate the proposed action will directly and indirectly affect the California muhly as described in the analysis above, including the loss of 37 percent of the modeled habitat within the Plan Area. Implementation of the avoidance, minimization, and/or mitigation measures included in the Plan will reduce the impacts to this species. We anticipate that this species will persist in the remaining 63 percent of its modeled habitat within both the existing PQP Lands and Additional Reserve Lands.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service’s biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the California muhly. We reached this conclusion because implementation of the species conservation objectives will provide for California muhly persistence within the Plan Area. Thus, impacts to this species and its modeled habitat, when viewed in conjunction with the protection and management of the MSHCP Conservation Area, are not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Chickweed oxytheca (*Oxytheca caryophylloides*)

Status of the Species

Listing Status

Chickweed oxytheca is not a State or federally listed species. This species is on the California Native Plant Society’s List 4 (RED 1-1-3).

Species Description

Chickweed oxytheca is an herbaceous annual that has a spreading to prostrate habit, reaching heights of 1 to 2.5 decimeters and widths of 1 to 5 decimeters. Individual plant color ranges from yellowish-green to reddish-brown (Ertter 1980).

This species has two forms. The more common phase, as represented by the typical herbarium specimen, has a dense inflorescence and the upper involucre are sessile. The less common phase has a looser inflorescence and the upper involucre are pedunculate (Ertter 1980).

Oxytheca is a genus of the Polygonaceae family (buckwheat family) that includes seven species (Ertter 1980). Most authors recognize *Oxytheca* as a separate genus; however, a few have

reduced *Oxytheca* and included it in *Eriogonum* (Stokes 1936; Davis 1952; Raven 1963 as cited in Ertter 1980). Based on morphological characters Ertter (1980) believes that *Oxytheca* arose from a complex of closely-related *Eriogonum* species, rather than a single ancestor.

Habitat Affinities

Chickweed oxytheca occurs in lower montane coniferous forests, specifically, in sandy soils (CNPS 2001) in association with yellow pine forest (Munz 1974; Hickman 1993c).

Life History

Chickweed oxytheca blooms from July to September (Munz 1974; CNPS 2001). The small (1 to 2 millimeters long) flowers develop in clusters of two to three per involucre. The petals range in color from green to yellow to red. The achenes are golden to red-brown and 1.2 to 1.5 millimeters long (Ertter 1980, Reveal 1989). Little to no information on reproduction, recruitment, and dispersal is available for this species.

Status and Distribution

Chickweed oxytheca is endemic to California and is ranked by CNPS (2001) as rare. It is restricted to mountains from the southern Sierra Nevada in Tulare County, east through Ventura County and the San Gabriel Mountains (Los Angeles County), to the San Jacinto Mountains (Riverside County) at elevations of approximately 1,200 to 2,600 meters (Munz 1974; Ertter 1980; Reveal 1989; Hickman 1993c; Stephenson and Calcarone 1999). There is also a record for this species in Santa Barbara County (Calflora Occurrence Database 2001). There are eight mapped locations of this species with western Riverside County that occur along SR-243 and in the vicinity of Idyllwild and date from 1924 to 1999 (UCR GIS database).

Threats

This species occurs in the southern Sierra Nevada Mountains, the San Gabriel Mountains, and mostly on Forest Service lands in the San Jacinto Mountains. Timber logging, fire suppression, and recreation may be threats to this species. In areas where this species occurs outside of Forest Service lands, urbanization and development may pose threats.

Conservation Needs

The Conservation needs of chickweed oxytheca include protection and management of occurrences with long-term conservation value in the southern Sierra Nevada, San Gabriel, and San Jacinto Mountains in a manner that provides for long-term viability of the species at these locations. Any newly discovered occurrences with long-term conservation value should be treated in the same manner. Actions that would increase the likelihood of deleterious effects from any identified threat should be avoided.

Because most of the literature on chickweed oxytheca is limited to its taxonomic treatments (Ertter 1980; Munz 1974; Hickman 1993c), the determination of more specific conservation

needs will require more studies regarding the species' status, distribution, life history (reproductive biology, pollinators, germination, dispersal, etc.), population genetics or biology, habitat requirements, and threats. In areas where the plant is discovered and is likely to be exposed to human-related disturbances (*i.e.*, recreational activities such as climbing), adequate buffer zones need to be provided for the protection of chickweed oxytheca.

Environmental Baseline

Within the Plan Area, there is one record for chickweed oxytheca in our dataset. This location is in the vicinity of Soboba Hot Springs in the San Jacinto Mountains. According to the information provided in the MSHCP, the only known locations of chickweed oxytheca within the Plan Area are from the San Jacinto Mountains. The eight mapped locations included in the MSHCP occur along SR-243 and in the vicinity of Idyllwild. However, these records date back to 1924, with the most recent occurrence in 1999. According to the MSHCP, four of the mapped locations are on private lands or within road right-of-ways. Of these four mapped locations, however, three are dated 1924 and one is from 1978. There is also an occurrence for this species near the San Jacinto River and Mountain Center in the Rancho Santa Ana Botanic Gardens herbarium records. The MSHCP does not identify core locations for the species in the Plan Area.

The chickweed oxytheca is associated with sandy soils in yellow pine forests between elevations of 3,937 to 8,531 feet (1,200 to 2,600 meters) within the San Jacinto Mountains Bioregion in western Riverside County. Modeled habitat for chickweed oxytheca includes montane coniferous forest, specifically Jeffrey pine and lower montane coniferous forest, within the San Jacinto Mountains Bioregion. There are 16,738 acres of modeled habitat for chickweed oxytheca within the Plan Area. Approximately 11,255 acres (67 percent) of modeled habitat occur in PQP Lands (specifically in the San Bernardino National Forest).

Effects of the Action

Direct effects

The chickweed oxytheca will not be considered a Covered Species Adequately Conserved by the MSHCP until occupation is confirmed for at least 10 localities (Section 9, Table 9.3) within "Conserved Habitat" as defined in the MSHCP. A locality can not be smaller than one quarter section (160 acres) and must contain at least 1000 individuals. Smaller populations may contribute to the locality count if they are demonstrably self-sustaining. The Plan Area includes 16,738 acres of modeled habitat for the chickweed oxytheca. If the species-specific conservation objective above is met, chickweed oxytheca will be subject to impacts associated with residential, commercial, urban and agricultural development within 5,483 acres (33 percent) of modeled habitat that are outside of the MSHCP Conservation Area. Thus, any individual chickweed oxytheca plants or populations persisting in these areas are anticipated to be impacted over the 75-year permit term as a result of proposed development.

To offset the loss of chickweed oxytheca habitat within the Plan Area, approximately 11,255 acres (67 percent) of modeled chickweed oxytheca habitat will remain within PQP Lands. No

modeled habitat will be included in Additional Reserve Lands. Thus, 67 percent of the modeled habitat for the chickweed oxytheca will remain in the Plan Area, including the one known location in our dataset. These measures should help to offset the direct impacts to the species.

Cooperative management and monitoring are anticipated on PQP Lands. Surveys for the chickweed oxytheca will be conducted at least every eight years to verify occupancy at a minimum of 75 percent of the known locations. If a decline in the distribution of the chickweed oxytheca is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP. As stated in Section 5 of the MSHCP, Reserve Managers will avoid or minimize adverse effects to chickweed oxytheca to the maximum extent practicable. Reserve Managers will manage this species in areas where timber logging and recreation occur (Section 5, Table 5.2).

Indirect Effects

Chickweed oxytheca could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area, depending on where populations are discovered during surveys. These impacts generally include the indirect effects discussed in the “General Effects” section of this biological opinion. Implementation of the Guidelines Pertaining to the Urban/Wildlands Interface policy and the management provisions listed above will help to reduce the indirect effects to this species.

Conclusion

We anticipate the proposed action will affect the chickweed oxytheca as described in the analysis above, including the loss of 33 percent of the modeled habitat within the Plan Area. Implementation of the avoidance, minimization, and/or mitigation measures included in the Plan will reduce the impacts to this species. We anticipate that this species will persist in the remaining 67 percent of modeled habitat within PQP Lands of the San Bernardino National Forest, including the San Jacinto Mountains. We anticipate that these PQP Lands will be monitored and managed cooperatively to benefit the chickweed oxytheca.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service’s biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the chickweed oxytheca. We reached this conclusion because implementation of the species conservation objectives will provide for chickweed oxytheca persistence within the Plan Area. Thus, impacts to this species and its modeled habitat, when viewed in conjunction with the protection and management of the MSHCP Conservation Area, are not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Cleveland's bush monkeyflower (*Mimulus clevelandii*)Status of the Species*Listing Status*

The Cleveland's bush monkeyflower is not a State or federally listed species. However, this species is on the California Native Plant Society's List 4 (RED 1-1-2).

Species Description

Cleveland's bush monkeyflower is a woody perennial herb with stems 30 to 90 centimeters long (Thompson 1993). It is one of more than 100 species in the genus *Mimulus*, which belongs to the family Scrophulariaceae. Cleveland's bush monkeyflower is sometimes segregated into the genus *Diplacus* (Boyd and Banks 1995) and hybridizes at low elevations with *M. aurantiacus* (Thompson 1993).

Habitat Affinities

Cleveland's bush monkeyflower occurs mostly at elevations above 914 meters (3,000 feet) in chaparral and lower montane coniferous forests, especially on peaks and ridgelines (Boyd and Banks 1995). The microhabitat generally consists of open locales in xeric chaparral dominated by chamise, with exposed rocks nearby and shallow soils available (Reiser 1996). Chaparral pea, southern mountain misery and *Calamagrostis koelerioides* commonly co-occur with this species (Reiser 1996). The species appears to strictly follow metavolcanic and gabbroic soils in San Diego County (Reiser 1996). Cleveland's bush monkeyflower is a pioneering species that responds well to fire and to physical soil disturbance (Boyd and Banks 1995).

Life History

Cleveland's bush monkeyflower blooms from May to July (CNPS 2001). The tube-shaped yellow flowers are 35 to 40 millimeters long; the many seeded fruits are 10 to 12 millimeters long and split into four parts at the tip (Thompson 1993). There is limited information on reproduction, recruitment and dispersal available for this species.

Status and Distribution

The historical distribution for Cleveland's bush monkeyflower is not well known. Cleveland's bush monkeyflower is currently restricted to the Peninsular Ranges, occurring in the Santa Ana Mountains and Agua Tibia Mountains (Palomar Mountain) southward into northern Baja California (Thompson 1993). The elevation range for this species is primarily between 915 and 2,000 meters (3,002 and 6,562 feet) (CNPS 2001). Most records for this species occur within San Diego County, but there are also occurrences within Riverside and Orange counties.

Historically, Munz (1923) located this species on Santiago Peak along Glen Ivy Trail in the Santa Ana Mountains (Calflora 2001). There is also a record by Raven (1962) for this species on

Santiago Peak 2.9 miles south of the Main Divide Truck Trail, as well as a second record for the species within the same area along a disturbed roadside bank (Calflora 2001). In 1945, McMinn and Van located Cleveland's bush monkeyflower on the east side of Indian Truck Trail in the Santa Ana Mountains (Calflora 2001).

Threats

Recreational activities threaten the Cleveland's bush monkeyflower (CNPS 2001).

Conservation Needs

Conservation needs for Cleveland's bush monkeyflower within the Plan Area partially depend on the identification and protection of suitable habitat, including chaparral and lower montane coniferous forests above elevations of 914 meters (3,000 feet). Maintaining a disturbance regime should also be considered for the species' habitat, because it is a pioneering species that responds well to fire and physical soil disturbance (*i.e.*, landslides, firebreaks, road cuts, and along trails) (Boyd and Banks 1995). Because most of the literature on this species is limited to its taxonomic treatments, the determination of more specific conservation needs will require more studies regarding the species' status, distribution, life history (reproductive biology, pollinators, germination, dispersal, etc.), population genetics or biology, habitat requirements, and threats.

Environmental Baseline

According to our dataset, there are five records of Cleveland's bush monkeyflower within the Plan Area. However, two of these records are duplicates. Therefore, for the purposes of our analysis, we considered only three records for this species in the Plan Area. All records are within PQP Lands in the Agua Tibia Mountains, south of Vail Lake. According to the information provided in the Plan, Cleveland's bush monkeyflower has been documented in several locations on Santiago Peak in the Santa Ana Mountains, although the observation in 1994 is the most recent record after 1962. The Plan considers both the Santa Ana Mountains locality and the Agua Tibia Mountains locality to be core locations.

Cleveland's bush monkeyflower occurs in chaparral and lower montane coniferous forests above elevations of 3,002 feet (915 meters), especially on peaks and ridgelines, within the Santa Ana and Agua Tibia Mountains of western Riverside County. Thus, we modeled habitat for Cleveland's bush monkeyflower in the Plan Area by capturing the following vegetation communities: chaparral, lower montane coniferous forests, and woodland/forests at elevations above 3,002 feet (915 meters) within the Santa Ana Mountains and Agua Tibia Mountains bioregions. Based on this analysis, the Plan Area supports approximately 11,588 acres of modeled habitat for Cleveland's bush monkeyflower. Approximately 10,842 acres (94 percent) of modeled habitat occur within PQP Lands. However, due to the species' microhabitat associations (*i.e.*, open locales in xeric chaparral dominated by chamise, with exposed rocks nearby and shallow soils available) (Reiser 1996), the modeled habitat likely overestimates the amount of suitable habitat for Cleveland's bush monkeyflower in the Plan Area.

Effects of the Action

Direct Effects

The Cleveland's bush monkeyflower will not be considered a Covered Species Adequately Conserved by the MSHCP until the Forest Service agrees through an MOU to manage populations of this species on their lands cooperatively with the Permittees as "Conserved Habitat" as defined by the MSHCP. The Plan Area includes approximately 11,588 acres of modeled habitat for the Cleveland's bush monkeyflower. If the MOU with the Forest Service is executed, the MSHCP will authorize impacts associated with development and other proposed Covered Activities within 747 acres (6 percent) of the modeled habitat for Cleveland's bush monkeyflower. Thus, any individual Cleveland's bush monkeyflower plants or populations persisting in these areas are anticipated to be impacted over the 75-year permit term as a result of proposed development. It is anticipated that most Cleveland's bush monkeyflowers in these areas will be lost, as a result of habitat loss and activities such as grading and construction; however, some plants may survive in rural mountainous areas where development impacts are anticipated to occur at a slower rate and at lower densities. Approximately 617 acres (83 percent) of the non-conserved modeled habitat for the Cleveland's bush monkeyflower are designated as rural/mountainous land.

If the MOU with the Forest Service is signed, additional monitoring and management would occur in habitat for the Cleveland's bush monkeyflower within Forest Service lands included in the MSHCP Conservation Area. To offset the loss of Cleveland's bush monkeyflower habitat within the Plan Area, the MSHCP will conserve and manage large areas containing modeled habitat for the monkeyflower. Approximately 10,842 acres (94 percent) of modeled Cleveland's bush monkeyflower habitat will remain within PQP Lands. No modeled habitat will be included in Additional Reserve Lands. Thus, 94 percent of the modeled habitat for the Cleveland's bush monkeyflower will remain in the Plan Area, including all known locations of the species.

At least two Core Areas can support the Cleveland's bush monkeyflower within the MSHCP Conservation Area including at the Santa Ana Mountains and Agua Tibia Mountains. Following development of the MOU with the Forest Service, cooperative management and monitoring are anticipated on PQP Lands. Surveys for the Cleveland's bush monkeyflower will be conducted at least every eight years to verify occupancy at a minimum of 75 percent of the Core Areas identified above. If a decline in the distribution of the Cleveland's bush monkeyflower is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP. Reserve managers will manage this species in ridgeline and mountaintop areas where trails, roads and transmitting equipment are existing or proposed. Other management actions described in Section 5, Table 5.2 of the MSHCP, such as control of unauthorized public access, maintenance of existing habitat, including control of invasive weeds, and management of specific threats to the species will help maintain habitat and populations of the Cleveland's bush monkeyflower in the Plan Area.

Indirect Effects

Cleveland's bush monkeyflower could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These generally include the indirect effects discussed in the "General Effects" section of this biological opinion.

Conclusion

We anticipate the proposed action will directly and indirectly affect the Cleveland's bush monkeyflower as described in the analyses above, including the loss of 6 percent of its modeled habitat in the Plan Area. Implementation of the avoidance, minimization, and mitigation measures identified in the Plan will reduce the impacts to this species. We anticipate that this species will persist in the remaining 94 percent of its modeled habitat within PQP Lands. We anticipate that the PQP Lands will be monitored and managed cooperatively to benefit the Cleveland's bush monkeyflower.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the Cleveland's bush monkeyflower. We reached this conclusion because most of the modeled habitat for the Cleveland's bush monkeyflower and all known occurrences are within PQP Lands that will not be impacted by the Plan. In addition, the impacts associated with loss of this species' modeled habitat, when viewed in conjunction with the protection and management of the MSHCP Conservation Area, are not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Cliff cinquefoil (*Potentilla rimicola*)

Status of the Species

Listing Status

Cliff cinquefoil is not a State or federally listed species. This species is a U.S. Forest Service Sensitive Species and is on the California Native Plant Society (CNPS) List 1B (RED Code 2-1-2).

Species Description

Cliff cinquefoil is an herbaceous perennial that hangs from a taproot anchored in granitic crevices. The stems range in length from 5 to 20 centimeters (Ertter 1993). Cliff cinquefoil is one of 24 species in the genus *Potentilla*, in the Rosaceae family (Ertter 1993).

Habitat Affinities

Cliff cinquefoil occurs in granite crevices and rocky sites within upper-montane coniferous forest and subalpine coniferous forest, at elevations of 2,400 to 2,800 meters (CNPS 2001). At a

location mapped near Deer Springs, cliff cinquefoil was recorded as occurring in crevices in a rock pinnacle (CNDDDB 2000).

Life History

This species blooms from July through September (CNPS 2001). The inflorescence consists of five to 20 yellow flowers. The fruit consists of smooth, red-tipped achenes (1.5 millimeters long) (Ertter 1993). Very little information on reproduction, recruitment or dispersal is available for this species.

Status and Distribution

Cliff cinquefoil is restricted to the San Jacinto Mountains in Riverside County and the San Pedro Martir Mountains in northern Baja California (Munz 1974; Ertter 1993; CNPS 2001). This species is known in California only from five occurrences in the San Jacinto Mountains (CNPS 2001), some historical information, and one recent collection made in 1987 (Stephenson and Calcarone 1999).

In 1908, this species was located by Reed on the summit of Tahquitz Peak in the San Jacinto Wilderness (CNDDDB 2000). Cliff cinquefoil was also found on the north side of Red Tahquitz Peak in the San Jacinto Wilderness by Ertter, Bittman and Berg in 1987 (CNDDDB 2000). There are records of this species near Dark Canyon in the San Jacinto Mountains from Munz and Johnson (undated and in 1924) (CNDDDB 2000). There is also a record of cliff cinquefoil by Pierson (1924) located 0.5 miles west of Deer Spring in the San Jacinto Mountains. Kessler and Hoffman located this species in 1921 and 1929 on San Jacinto Peak. And most recently, 17-20 individual cliff cinquefoil plants were observed by Fields and Hendrickson (1999) on the north side of Fuller Ridge, east of the Pacific Crest Trail in the San Jacinto Mountains (CNDDDB 2000).

Threats

The Forest Service Assessment (Stephenson and Calcarone 1999) reports that rock-climbing activities may impact this species within the San Jacinto Wilderness Area. Therefore, human disturbance is a primary threat to the cliff cinquefoil.

Conservation Needs

The conservation needs of cliff cinquefoil in the United States include the protection and management of known populations in the San Jacinto Mountains of Riverside County. Newly discovered populations should be conserved in the same manner. Actions that increase the likelihood of deleterious effects from any identified threat should be avoided. Where known populations are likely to be exposed to human impacts and disturbance (*i.e.*, recreational activities such as climbing), adequate buffer zones need to be provided for protection of the cliff cinquefoil. Moreover, since most of the literature on this species is limited to its taxonomic treatments, the determination of more specific conservation needs will require more studies regarding the species' status, distribution, life history (reproductive biology, pollinators, germination, dispersal, etc.), population genetics or biology, habitat requirements, and threats.

Environmental Baseline

Cliff cinquefoil is associated with granite crevices and rocky sites within upper-montane coniferous forest and subalpine coniferous forest (CNPS 2001). This species has a limited distribution within the Plan Area. There are no records for the cliff cinquefoil in our dataset. However, there is a record from Fields and Hendrickson in 1999, where 17-20 individual plants were observed on the north side of Fuller Ridge, east of the Pacific Crest Trail in the San Jacinto Mountains (CNDDDB 2000). This population is located within PQP Lands of the San Bernardino National Forest, specifically Mount San Jacinto State Park.

Modeled habitat for cliff cinquefoil includes montane coniferous forest, specifically lodgepole pine, within the San Jacinto Mountains Bioregion between elevations of 7,842 and 9,941 feet (2,390 and 3,030 meters). There are 467 acres of modeled habitat for cliff cinquefoil within the Plan Area. Most of this habitat, aside from approximately one acre, is within PQP Lands (specifically the San Bernardino National Forest). However, the modeled habitat likely overestimates the area of suitable habitat for the species in the Plan Area because the species' microhabitat associations (*i.e.*, granite crevices and rocky sites) are a smaller component of the modeled habitat.

Effects of the Action

Direct effects

The cliff cinquefoil will not be considered a Covered Species Adequately Conserved by the MSHCP until occupation is confirmed for at least 5 localities (Section 9, Table 9.3) within "Conserved Habitat" as defined in the MSHCP. Each locality must be one quarter section (160 acres) or larger. Smaller populations may contribute to the locality count if they are demonstrably self-sustaining. The Plan Area includes approximately 467 acres of modeled habitat for the cliff cinquefoil, and only one acre of this habitat is outside of the MSHCP Conservation Area. The species will remain in PQP Lands of the San Bernardino National Forest within 466 acres (nearly 100 percent) of the modeled habitat. The location on Fuller Ridge in the San Jacinto Mountains, although not included in our dataset, will remain within PQP Lands. Because the cliff cinquefoil is not widely distributed within the Plan Area, specific conservation objectives are provided in the MSHCP (Section 9, pp. 9-112) to ensure that suitable habitat and known populations of the cliff cinquefoil will persist. The Plan states that at least 1,500 acres of montane coniferous forest between elevations of 7,842 and 9,941 feet (2,390 and 3,030 meters) within the San Jacinto Mountains Bioregion will be conserved (Section 9, Table 9.2). These measures should offset any direct impacts to the species; however, the success of conserving this species is contingent upon cooperation of the Forest Service in the San Jacinto Mountains.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands including surveys for the cliff cinquefoil. Cooperative management and monitoring is anticipated on PQP Lands. Surveys for the cliff cinquefoil will be conducted at least every 8 years to verify occupancy at a minimum of 75 percent of the known locations. If a decline in the distribution of the cliff cinquefoil is documented below this threshold,

management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP. As stated in the MSHCP (Section 5, Table 5.2), Reserve Managers will avoid or minimize adverse effects to cliff cinquefoil to the maximum extent practicable. Reserve Managers will manage this species where rock-climbing activities are allowed or proposed. Implementation of these management actions will help to avoid and minimize adverse effects to the cliff cinquefoil.

Indirect Effects

Cliff cinquefoil could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area, depending on where populations are discovered during surveys. These impacts generally include the indirect effects discussed in the “General Effects” section of this biological opinion.

Conclusion

We anticipate the proposed action will affect the cliff cinquefoil as described in the analysis above, including the loss of one acre of modeled habitat within the Plan Area. Implementation of the avoidance, minimization and mitigation measures identified in the Plan will reduce impacts to the cliff cinquefoil. This species is anticipated to persist within the 466 acres (nearly 100 percent) of modeled habitat within the PQP Lands of San Bernardino National Forest. Several larger blocks of habitat supporting the cliff cinquefoil are located within PQP Lands, including the San Jacinto Mountains. The Forest Service lands are organized into large blocks of habitat which will protect this species from edge effects and provide the potential to expand into suitable habitat. We anticipate that these PQP Lands will be monitored and managed cooperatively to benefit this species.

After reviewing the current status of this species, the environmental baseline for the Plan Area, the effects of the proposed action, and the cumulative effects, it is the Service’s biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the cliff cinquefoil. We reached this conclusion because nearly 100 percent of cliff cinquefoil modeled habitat will remain within the MSHCP Conservation Area. Thus, impacts to this species and its modeled habitat, when viewed in conjunction with the protection and management of the MSHCP Conservation Area, are not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of cliff cinquefoil throughout its range.

Coulter’s goldfields (*Lasthenia glabrata* ssp. *coulteri*)

Status of the Species

Listing Status

Coulter’s goldfields is not a State or federally listed species. It is considered a sensitive species by the U.S. Bureau of Land Management and is on the California Native Plant Society’s List 1B (RED 2-3-2).

Species Description

Coulter's goldfields is an annual herb in the Asteraceae (sunflower) family (CNPS 2001). It is a low, often succulent, plant with yellow flowers (Ornduff 1966; Munz 1974). Coulter's goldfields is one of 17 species within the genus *Lasthenia* and is one of a group of three species, within the Section Hologymne, distinguished by achene and receptacle morphology (Ornduff 1993a). All three members of the Section Hologymne are associated with alkali habitats and are similar in overall appearance and low genetic diversity (Ornduff 1966). Ornduff found that the members of the genus *Lasthenia* do not hybridize readily outside Sections.

Habitat Affinities

Coulter's goldfields is associated with low-lying alkali habitats along the coast and inland valleys (Ornduff 1966). This species may occur in coastal salt marshes and swamps, playas, and vernal pools up to elevations of 1,220 meters (CNPS 2001). Coulter's goldfields occurs primarily in the alkali vernal plains community (Ferren and Fiedler 1993; Bramlet 1993b). These are floodplains dominated by alkali scrub, alkali playas, vernal pools, and alkali grasslands (Bramlet 1993a; CNDDDB 2000). These habitats form mosaics that are largely dependent on salinity and micro-elevational differences. Coulter's goldfields is restricted to wetter areas within the alkali habitat, particularly lake margins, playa borders, and vernal pools. In Riverside County, Coulter's goldfields and California goldfields (*L. californica*) occur sympatrically, both at Salt Creek and along the San Jacinto River; but the two species do not hybridize. California goldfields is the dominant of the pair at Salt Creek. The reverse is true at the San Jacinto Wildlife Area and along the San Jacinto River (Dave Bramlet 1993; F. Roberts, pers. comm. to Dudek, 1999 as cited in the MSHCP).

In Riverside County, Coulter's goldfields is associated with seablite, alkali weed, wire-stem popcorn flower, sand spurry, California goldfields, Mojave silver scale, bracted saltbush, five-hook bassia, sharp-tooth peppergrass, dwarf peppergrass, alkali heath, and toad rush (Bramlet 1993b; Bramlet 1993a; CNDDDB 2000). Coulter's goldfields is frequently associated with other rare species, including San Jacinto Valley crownscale, Davidson's saltscale, vernal barley, smooth tarplant, and thread-leaved brodiaea (Bramlet 1993a).

Like other species dependent on alkali wetlands, Coulter's goldfields requires significantly more habitat than is occupied during any one season to maintain population dynamics within the watershed and microhabitat diversity upon which this taxon depends (Ornduff 1966; Bramlet 1993a; F. Roberts, pers. comm. to Dudek, 1999 as cited in the MSHCP). Coulter's goldfields requires irregular seasonal inundation or flooding for seed dispersal, germination, and habitat maintenance.

Life History

Coulter's goldfields flowers from February through June (CNPS 2001). The plant may not be in evidence from late summer to early spring. Studies by Ornduff (1966) summarized the reproductive biology of the genus *Lasthenia*, including Coulter's goldfields. Coulter's goldfields has well-developed disk flowers and pistate ray flowers and, like the majority of *Lasthenia*

species, is strongly self-incompatible and is a strong outbreeder (Ornduff 1966). The anthers of self-incompatible species elongate rapidly and produce much pollen, which is available for flies, solitary bees, beetles, and moths. Several Hymenopterans have been collected on species of the genus *Lasthenia* (Krombein et al 1979). Flower-loving flies (Syrphidae) have been identified as one of the most important pollinators for the genus *Lasthenia*. Coulter's goldfields has united and persistent bracts. Ornduff (1966) speculates that this cup-like structure may serve as a catapult to throw the fruit when moved by strong wind or passing animals. Once dispersed, fruits have a short dormancy period when they do not germinate (Ornduff 1966).

Status and Distribution

The historical distribution of Coulter's goldfields is not well known. Coulter's goldfields distribution ranges from coastal San Luis Obispo County south through coastal Santa Barbara County, Ventura County to San Diego County, and northwestern Baja California (Ornduff 1966; Munz 1974; Ornduff 1993a; Reiser 1996). Coulter's goldfields has also been reported from Santa Rosa Island (Ornduff 1966). Interior valley populations have been recorded from the Carrizo Plain of San Luis Obispo County south through Tehachapi (Kern County), Twenty-Nine Palms (San Bernardino County), and cismontane western Riverside County to the Ojos Negros Valley east of Ensenada, Mexico (Munz 1974; Ornduff 1993a; Reiser 1996; CNDDDB 2000). While having a relatively broad distribution, Coulter's goldfields is extremely spotty and isolated within that distribution (Ornduff 1966). According to the MSHCP, the largest and most significant occurrences of Coulter's goldfields are within the San Jacinto Wildlife Area and southern shores of Mystic Lake. The Mystic Lake and San Jacinto Wildlife Area population represents the largest known remaining concentration of this species throughout its known range.

Threats

Coulter's goldfields is presumed to be extirpated from Kern, Los Angeles, and San Bernardino counties (CNPS 2001). This species is severely declining in Orange County and San Diego County. In Riverside County, Coulter's goldfields and its habitat are threatened by habitat destruction and fragmentation from urban and agricultural development, pipeline construction, alterations of hydrology and flood plain dynamics, excessive flooding, channelization, off-road vehicle activity, trampling by cattle and sheep, weed abatement, fire suppression practices (including discing and plowing), and competition from alien plant species (CNDDDB 2000, 63 Federal Register 54975). Populations on the San Jacinto River and in the upper Salt Creek drainage may be affected by roadway improvements that could change surface topography and thereby negatively affect the local hydrology supporting the species. The populations on the San Jacinto River are threatened by a proposed flood control project: the San Jacinto River Improvement Project. This project design includes channelization of all or a portion of the river. Depending on the alignment, extent of channelization, and resulting alteration of the hydrologic regime that supports the species, the known occurrences along the River could be lost. The proposed realignment of SR-79 could eliminate habitat, remove occurrences, and further alter the hydrologic regime that supports Coulter's goldfields in the upper Salt Creek drainage.

Conservation Needs

The conservation needs of Coulter's goldfields include protection and management of known occurrences in San Diego and Riverside counties in a manner that provides for their long-term viability. This includes conservation of the hydrologic processes (irregular seasonal inundation or flooding) that provide for seed dispersal, germination, and habitat maintenance. In order to maintain population dynamics within the watershed and microhabitat diversity upon which this taxon depends (Ornduff 1966; Bramlet 1993; F. Roberts, pers. comm. to Dudek, 1999 as cited in the MSHCP), long-term conservation of the species will require preservation of more area than is occupied during any one season. This is needed to allow for patchy distribution within its habitat and shifts in spatial distribution over time as conditions and seed banks change. Any newly discovered populations with long-term conservation value should be conserved in the same manner. Actions that would modify the hydrology of the species' habitat or increase the likelihood of deleterious effects from any identified threat should be avoided.

Ornduff (1966) found that most viable seeds germinated with rains following seed set. Thus, it is likely that there is little long-term seed storage. Coulter's goldfields may have to recolonize disturbed areas rather than rely on seed banks. This would appear true in Riverside County where the species is very common in moist undisturbed sites and rare in disturbed areas. Conservation of occupied habitat may not be enough to assure long-term conservation of the species. It may also be necessary to restore hydrologic conditions within these areas to allow Coulter's goldfields to recolonize and/or to reintroduce this plant to the restored areas.

Environmental Baseline

Our dataset includes 68 records of Coulter's goldfields in the Plan Area; however, 39 of these records are duplicates. Coulter's goldfields is known primarily from along the San Jacinto River just north of Nuevo Road, up through the San Jacinto Wildlife Area to the southern shores of Mystic Lake. Our dataset also includes records from alkali wetlands near Nichols Road in the City of Lake Elsinore, the vicinity of Salt Creek, along the Colorado Aquaduct near Sanderson Avenue and northeast of the intersection of Van Buren Boulevard and Mockingbird Canyon Road. While fairing better than some other alkali dependent species, about half of the remaining suitable habitat for this species has been impacted by discing for fuel modification or dry land farming activities. The near absence of Coulter's goldfields from the Salt Creek, aside from the population in the upper Salt Creek wetland area, may be a result of drains installed in the late 1980s. Strongly dependent wetland plants, such as spike rush, were still relatively common in the area until about 1992 but have retreated as the site has dried out and discing has become more frequent (Bramlet 1993b).

Small or historic populations of Coulter's goldfields have also been reported from Anza, the vicinity of Murrieta and Temecula, and the lake bed of Lake Elsinore. The current status of many of these smaller populations is unknown. The San Jacinto River population complex is the largest remaining population representing 70 to 90 percent of all known Coulter's goldfields (CNDDDB 2000; F. Roberts, pers. comm. to Dudek, 1999 as cited in the MSHCP). A significant portion of this population is on the San Jacinto Wildlife Area. Along the San Jacinto River between Ramona Expressway and southwest of Railroad Canyon reservoir, including the

adjacent floodplain areas extending to the limits of the 100-year floodplain, a population of 337,700 Coulter's goldfields existed on an aggregate of 31.6 acres in October 2000 (Glenn Lukos Associates, Inc. 2000b). This population may be affected by the San Jacinto River Improvement Project. The alkali wetlands in Warm Springs Valley near Nichols Road support a moderate-sized population reported to be at least 1,500 individuals or larger.

The population of Coulter's goldfields in the upper Salt Creek Drainage, on Metropolitan Water District's Upper Salt Creek wetland mitigation parcel, was detected in 1996, 1997, and 1998 but was not surveyed or counted in 2001 (Metropolitan Water District of Southern California 2001). However, it was evident from dried standing plant material that the species did flower during the spring of 2001. The population estimation was 5,500,000 individuals in 1996; 2,800,000 individuals were found in 1997; and 5,800,000 individuals were estimated to exist there in 1998. The aerial extent increased from 4.95 acres in 1996 to 8.49 acres in 1997, and to 8.54 acres in 1998. Although Coulter's goldfields was not counted in 2001, it was detected in all other years surveyed and, therefore, expected to remain viable depending on climatic conditions.

The MSHCP identifies three Core Areas for the species within the Plan Area. The largest and most significant occurrences are within the San Jacinto Wildlife Area and southern shores of Mystic Lake. As stated in the Plan, this is largest remaining concentration of this species throughout its known range. Another core location is the middle segment of the San Jacinto River, although the species is currently suppressed by discing and dryland farming. This population of Coulter's goldfields is at risk from the proposed San Jacinto River Improvement Project. That project includes channelization of the river, which may result in changes in floodplain processes essential to the species persistence at that location. The third core location is on the alkali flats between Alberhill and Lake Elsinore.

The vernal pool model was used to capture potential habitats supporting Coulter's goldfields. The vernal pool model included these parameters within the Riverside Lowlands and the Santa Ana Mountains bioregions: 1) vernal pools and playas and 2) clayey soils (Altamont, Auld, Bosanko, Claypit, and Porterville), alkali soils (Willows, Traver, and Domino), and Santa Rosa Plateau basalt flow soils. Based on our analysis, 42,349 acres of modeled habitat, with the potential to harbor vernal pools suitable for the species, occur within the Plan Area. Approximately 8,831 acres (21 percent) of modeled habitat occur within PQP Lands. We were unable to include additional soil types that harbor vernal pools, such as Murrieta stony clay loam, in our model because we do not have access to digital overlays mapping the extent of these soil types in the Plan Area.

Effects of the Action

Direct effects

The Plan Area includes approximately 42,349 acres of modeled habitat for Coulter's goldfields. There are 25,831 acres (61 percent) of modeled habitat outside the MSHCP Conservation Area; of that 9,869 acres (23 percent of total modeled habitat) occur within Criteria Area Species Survey Areas (CASSA) 1, 2, 3, 3a, 4, and 7 (Section 6.3.2, Figure 6-2). The Coulter's goldfields is considered an Additional Survey Needs and Procedures species. Surveys will be conducted in

these areas as part of the project review process for public and private projects where suitable habitat is present. Until such time that the Additional Reserve Lands can be assembled and conservation objectives for Coulter's goldfields are met, surveys will be conducted for public and private projects within CASSA 1, 2, 3, 3a, 4, and 7, where suitable habitat for the Coulter's goldfields is present. Populations detected will be avoided according to the procedures outlined in the Additional Survey Needs and Procedures policy (Section 6.3.2; *i.e.*, 90 percent of portions of property with long-term conservation value will be avoided until the species conservation goals are met). We anticipate that new locations of Coulter's goldfields may be confirmed through these survey efforts. For those locations found to contain large numbers of individuals or otherwise determined to be important to the overall conservation of the species, the Plan allows flexibility to acquire these locations for inclusion into the Additional Reserve Lands (pp. 6-70).

Within the 9,869 acres of modeled habitat that occurs outside of the Conservation Area but within the CASSA for Coulter's goldfields (23 percent of total modeled habitat), we anticipate that up to 10 percent of the area with long-term conservation value for Coulter's goldfields (as discussed above) will be lost to individual projects, including all individual plants within the project footprint.

Coulter's goldfields will be subject to impacts associated with development and other proposed Covered Activities within 15,962 acres (38 percent of total modeled habitat) that are outside of the MSHCP Conservation Area and outside of CASSA 1, 2, 3, 3a, 4, and 7. Thus, all individual Coulter's goldfields plants and populations outside of the MSHCP Conservation Area and outside the CASSA for this species are anticipated to be impacted over the 75-year permit term as a result of the proposed Covered Activities.

Because the Coulter's goldfields is not widely distributed within the Plan Area, specific conservation objectives are provided in the MSHCP (Section 9, pp. 9-113) to ensure that suitable habitat and known populations of the Coulter's goldfields will persist. The Plan states that within the MSHCP Conservation Area, Core Areas for at least 20 known occurrences of the Coulter's goldfields in Riverside County will either remain on PQP Lands or be conserved within the Additional Reserve Lands. In addition, at least 6,900 acres of grassland and playa/vernal pool habitat within the San Jacinto River, Mystic Lake and Salt Creek areas will be included within the MSHCP Conservation Area. Floodplain areas along the San Jacinto River will be included in this acreage total to preserve floodplain processes important to the survival of the Coulter's goldfields. We anticipate that implementation of the Protection of Species Associated With Riparian/Riverine and Vernal Pool Area policy will assist in providing some protection to this species' habitats by avoiding and/or minimizing direct impacts to riparian, riverine, and vernal pool habitats.

Based on our dataset, it appears that more than the 6,900 acres of grasslands and playas and vernal pool habitat proposed for inclusion in the MSHCP Conservation Area will remain in the Plan Area. Approximately 8,831 acres (21 percent) of the modeled Coulter's goldfields habitat occur within PQP Lands and 7,686 acres (18 percent) occur within the Additional Reserve Lands. Thus, the MSHCP Conservation Area will include 16,517 acres (39 percent) of the

modeled Coulter's goldfields habitat in the Plan Area. As indicated above, this species will also benefit from implementation of the Riparian/Riverine Area and Vernal Pools policy.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands including surveys for the Coulter's goldfields. Cooperative management and monitoring are anticipated on PQP Lands. Surveys for the Coulter's goldfields will be conducted at least every eight years to verify occupancy at a minimum of 75 percent of the known locations. If a decline in the distribution of Coulter's goldfields is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP. According to the MSHCP (Section 5, Table 5.2), Reserve Managers will ensure habitat support functions within the MSHCP Conservation Area by maintaining and enhancing the floodplain processes of the San Jacinto River, upper Salt Creek and the alkali wetlands near Nichols Road, including intermittent flooding and periodic pooling. Particular management emphasis will be given to preventing alteration of hydrology and flood plain dynamics, weed abatement/fire and fire suppression activities, off-road vehicle use, trampling, and competition from non-native plant species. Implementation of these management actions will help to avoid and minimize adverse effects to Coulter's goldfields.

Indirect Effects

Coulter's goldfields could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These generally include the indirect effects discussed in the "General Effects" section of this biological opinion. Implementation of the Guidelines Pertaining to the Urban/Wildlands Interface policy, Protection of Species Associated With Riparian/Riverine Areas and Vernal Pools policy, and the management provisions listed above will help to reduce the indirect effects to this species.

Conclusion

We anticipate the proposed action will directly and indirectly affect Coulter's goldfields as described in the analyses above, including total loss of 38 percent of its modeled habitat. An additional 23 percent of Coulter's goldfields' modeled habitat outside the MSHCP Conservation Area will be subject to surveys within CASSA 1, 2, 3, 3a, 4, and 7. Once the conservation objectives for Coulter's goldfields have been met, avoided areas, which have not been otherwise conserved, may be impacted. We anticipate that occurrences determined to be important to the overall conservation of the species will be considered for inclusion in the Additional Reserve Lands and that at least some of the avoided areas may be maintained as open space habitat. Implementation of the avoidance, minimization, and mitigation measures identified in the Plan will further reduce the impacts to Coulter's goldfields. This species is anticipated to persist within the remaining 39 percent of its modeled habitat within both the PQP Lands and the Additional Reserve Lands. We anticipate that these areas will be monitored and managed cooperatively to benefit this species.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological

opinion that the action, as proposed, is not likely to jeopardize the continued existence of the Coulter's goldfields. We reached this conclusion because 39 percent of Coulter's goldfields habitat and 72 percent of the unique records in our dataset will be protected or will remain within the MSHCP Conservation Area. In addition, required surveys for the Coulter's goldfields may result in newly discovered occurrences being included in the MSHCP Conservation Area. Thus, impacts to this species and its modeled habitat, when viewed in conjunction with the protection and management of the MSHCP Conservation Area, are not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of Coulter's goldfields throughout its range.

Coulter's matilija poppy (*Romneya coulteri*)

Status of the Species

Listing Status

Coulter's matilija poppy is not a State or federally listed species. The species is on the California Native Plant Society's List 4 (RED 1-2-3).

Species Description

Coulter's matilija poppy is a large perennial herb that is a member of the Papaveraceae family (CNPS 2001). It ranges in height from 1.0 to 2.5 meters (Munz 1974). The petals are crinkled and white and range in length from 6 to 10 centimeters. The dehiscent fruit capsules are 3 to 4 centimeters long and contain dark brown seeds (1.3 to 1.5 millimeters long) (Munz 1974; Clark 1993).

Habitat Affinities

Coulter's matilija poppy occurs in dry washes and canyons below 1,200 meters in open, mildly disturbed sage scrub, chaparral and along rocky drainages (Munz 1974; Clark 1993). Mature chaparral and sage scrub may limit expansion of this species (Reiser 1996). This species often occurs in burned areas. Its predilection to disturbance may result in shifts in appropriate habitat types (CNPS 2001).

Life History

The showy flowers of Coulter's matilija poppy bloom from May through July (Munz 1974; CNPS 2001). Very little is known about abundance, reproduction, recruitment, dispersal or other pertinent information on this species.

Status and Distribution

This species is known from the Santa Ana Mountains and areas adjacent to the eastern slope and foothills of the Santa Ana Mountains and Chino Hills in Los Angeles, Orange, Riverside and San Diego counties (Reiser 1996). Historic distribution information is limited. This species most

frequently occurs on the western and eastern flanks and base of the northern half of the Santa Ana Mountains, but it is also associated with the southern quarter of the Gavilan Hills (Steve Boyd, pers. comm. to Dudek, as cited in the MSHCP).

Coulter's matilija poppy is known in western Riverside County from the confluence of Leach and Dickey Canyons; Alberhill (Mountain Avenue and canyons near Alberhill); Fresno Canyon and Wardlow Canyon west of Corona; the Gavilan Plateau; Temescal Canyon near Glen Eden and Hagador Canyon; and Horsethief Canyon (herbarium records at UCR and Rancho Santa Ana Botanic Gardens, Reiser 1996). There is also a location of Coulter's matilija poppy near Pechanga, southeast of Temecula (Banks 1999).

Threats

In general, Coulter's matilija poppy is threatened by urbanization, agricultural conversion, flood control measures, and road widening and maintenance activities (CNPS 2001).

Conservation Needs

Conservation needs of Coulter's matilija poppy include preservation and management of populations with long-term conservation value in Los Angeles, Orange, San Diego and Riverside counties in a manner that provides for long-term viability of the species at these locations. Any newly discovered populations with long-term conservation value should be conserved in the same manner. Because this species is a disturbance follower and mature habitat conditions may limit the species (Reiser 1996), long-term conservation will require preservation of more area than is occupied by the species during any one season, as well as the maintenance of a disturbance regime. Actions that would modify the ecology or hydrology of the species' habitat or increase the likelihood of deleterious effects from any identified threat should be avoided.

Environmental Baseline

Coulter's matilija poppy is associated with dry washes and canyons below 3,937 feet (1,200 meters) elevation in open, mildly disturbed sage scrub, chaparral and along rocky drainages (Munz 1974; Clark 1993). There are 18 records for Coulter's matilija poppy in our dataset, but one record was found to be a duplicate. This record is located northwest of Lake Elsinore. Therefore, for the purposes of our analysis, we considered only 17 records for Coulter's matilija poppy in our dataset. Two of these locations occur within PQP Lands. The species is currently found along the eastern slopes of the Santa Ana Mountains south and west of Corona, west of Temescal Canyon, east of Temescal Valley, north of Alberhill Ranch and hills west of Walker Canyon, northwest of Lake Elsinore, and in Sycamore Canyon Regional Park. There are no core areas identified for this species in the Plan Area.

Modeled habitat for Coulter's matilija poppy includes 180,786 acres of chaparral and coastal sage scrub below 3,937 feet (1,200 meters) in elevation within the Santa Ana Mountains and Riverside Lowlands Bioregions of the Plan Area. Based on extant and historic occurrences of the species within the western portion of Plan Area, the modeled habitat was limited to an area west of I-15/I-215 and Pechanga: the western most portion of the Pechanga Band of Luiseno

Mission Indians land boundary, north/northeast to Fairview Avenue; Fairview Avenue northeast to Anza Road to SR-79; SR-79 west to I-15 and north to I-215 to the northern county line. Based on this analysis, approximately 82,929 acres (46 percent) of the modeled habitat are within PQP Lands. However, the modeled habitat likely overestimates the amount of suitable habitat available for the species within the Plan Area because the species' microhabitat associations (*i.e.*, dry washes and canyons in mildly disturbed habitat) are a smaller component of the mapped vegetation communities.

Effects of the Action

Direct effects

The Coulter's matilija poppy will not be considered a Covered Species Adequately Conserved by the MSHCP until occupation is confirmed for at least 30 localities (Section 9, Table 9.3) within "Conserved Habitat" as defined in the MSHCP. A locality can not be smaller than one quarter section (160 acres). Smaller populations may contribute to the locality count if they are demonstrably self-sustaining. The Plan includes 180,786 acres of modeled habitat for the Coulter's matilija poppy. If the species-specific conservation objective above is met, Coulter's matilija poppy will be subject to impacts associated with residential, commercial, urban, and agricultural development within 74,358 acres (41 percent) of modeled habitat that is outside of the MSHCP Conservation Area. Thus, any individual Coulter's matilija poppy plants or populations persisting in these areas, including the occurrences west of Interstate 15 and El Cerrito and south of Highway 91 and Corona, are anticipated to be impacted over the 75-year permit term as a result of proposed development; however, some plants may survive in rural mountainous areas where development impacts are anticipated to occur at a slower rate and at lower densities. Approximately 35,664 acres (48 percent) of the non-conserved modeled habitat for the Coulter's matilija poppy are designated as rural/mountainous land.

Implementation of the MSHCP will conserve and manage approximately 23,499 acres (13 percent) of modeled Coulter's matilija poppy habitat within the Additional Reserve Lands, including 2 records for the species in the Plan Area. Another 82,929 acres (46 percent) of modeled habitat will remain in PQP Lands. Thus, based on our analysis, 106,428 acres (59 percent) of the modeled habitat and 4 of the 17 records (24 percent) for the Coulter's matilija poppy will be conserved or remain in the Plan Area. The Coulter's matilija poppy is widely distributed throughout the Plan Area in appropriate habitat types. The Plan states that 65,350 acres of chaparral and 5,300 acres of coastal sage scrub below 3,937 feet (1,200 meters) elevation on Forest Service and PQP Lands within the Santa Ana Mountains Bioregion will be conserved (Section 9, pp. 9-114). These measures should help offset the direct impacts to the species.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands including surveys for the Coulter's matilija poppy. Cooperative management and monitoring are anticipated on PQP Lands. Surveys for the Coulter's matilija poppy will be conducted at least every 8 years to verify occupancy at a minimum of 75 percent of the known locations. If a decline in the distribution of Coulter's matilija poppy is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific

objectives identified in Section 9, Table 9.2 of the MSHCP. As stated in the MSHCP (Section 5, Table 5.2), General Management Measure 1 will control unauthorized public access to the MSHCP Conservation Area using appropriate fencing, gates and signage, trash removal, trespass control in response to illegal dumping, off-road vehicle use, and vandalism. Implementation of these management actions will help to avoid and minimize adverse effects to Coulter's matilija poppy.

Indirect Effects

Coulter's matilija poppy could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These generally include the indirect effects discussed in the "General Effects" section of this biological opinion. Many of the locations within our dataset occur along a border between the Conservation Area and an area of proposed development; therefore, they are highly vulnerable to indirect effects. Implementation of the Guidelines Pertaining to the Urban/Wildlands Interface and the management provisions listed above will help to reduce the indirect effects to this species.

Conclusion

We anticipate the proposed action will affect the Coulter's matilija poppy as described in the analysis above, including the loss of 41 percent of its modeled habitat in the Plan Area. This species is anticipated to persist within the remaining 59 percent of its modeled habitat within both the PQP Lands and Additional Reserve Lands. These lands include large, contiguous habitat blocks that support 24 percent of the known occurrences and may harbor additional locations of the species in the Plan Area. Implementation of the avoidance, minimization and mitigation measures identified in the Plan will further reduce impacts to the Coulter's matilija poppy. We anticipate that the PQP Lands and Additional Reserve Lands will be monitored and managed cooperatively to benefit this species.

After reviewing the current status of this species, the environmental baseline for the Plan Area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the Coulter's matilija poppy. We reached this conclusion because implementation of the species conservation objectives will provide for Coulter's matilija poppy persistence within the Plan Area. Thus, impacts to this species and its modeled habitat, when viewed in conjunction with the protection and management of the MSHCP Conservation Area, are not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Davidson's saltscale (*Atriplex serenana* var. *davidsonii*)Status of the Species*Listing Status*

Davidson's saltscale is not a State or federally listed species. It is included on the California Native Plant Society's List 1B (RED 3-2-2).

Species Description

Davidson's saltscale is a low annual herb that is a member of the Chenopodiaceae family (CNPS 2001). Davidson's saltscale branches reach one meter in length (Taylor and Wilken 1993) and often form tangled mats (Munz 1959). The identification of Davidson's saltscale in Riverside County is problematic and is often confused with the south coast saltscale.

Habitat Affinities

Davidson's saltscale occurs in coastal bluff scrub, coastal scrub, and alkaline habitats (CNPS 2001). In Riverside County, Davidson's saltscale is found in the Domino, Willows and Traver soils series in association with the alkali vernal pools, alkali annual grassland, alkali playa, and alkali scrub components of alkali vernal plains (Munz 1974; Bramlet 1993; CNPS 2001; Ogden 1996; Ferren and Fielder 1993). At the upper Salt Creek, where presumably the largest remaining Davidson's saltscale population occurs, this Davidson's saltscale is associated with woolly marbles, alkali weed, wire-stem popcorn flower, California goldfields, hairgrass, Mojave silver scale, bracted saltbush, sharp-tooth peppergrass, dwarf peppergrass, alkali plantain, little mousetail and toad rush (Bramlet 1993a, 1993b). At the upper Salt Creek, Davidson's saltscale is also associated with the San Jacinto Valley crowscale, Parish's brittle-scale, vernal barley, smooth tarplant, and thread-leaved brodiaea (Bramlet 1993a).

Like other species dependent on alkali wetlands, Davidson's saltscale likely requires significantly more habitat than is occupied during any single season to maintain population dynamics and microhabitat diversity upon which this species depends (Bramlet 1993a).

Life History

Davidson's saltscale flowers from May to October producing male and female flowers in separate clusters (Munz 1974). The plant may not be visible from late fall to early spring. The flower is obscure and small. The seeds are 1 to 1.3 millimeters long (Munz 1974). Because of the species's annual habit and reliance on periodic inundation, population sizes vary considerably from year to year, and its presence can be difficult to recognize in dry years or after recent disturbance such as discing. Little is known about abundance, reproduction, recruitment, or dispersal of Davidson's saltscale.

Status and Distribution

Historically, Davidson's saltscale had been reported from coastal Santa Barbara County, within Ventura County, three locations in Los Angeles County, western Orange County, Riverside County and possibly three locations in San Diego County (Taylor and Wilken 1993; Reiser 2001; Roberts 1997; CNDDDB 2000). There is also a 1930 record for Santa Cruz Island (CNDDDB 2000).

Currently, Davidson's saltscale is only known to occur in Ventura County (Ojai), western Orange County (Seal Beach, San Joaquin Freshwater Marsh, Newport Back Bay) and western Riverside County (Bramlet 1993a; Roberts 1997; CNDDDB 2000). It is currently considered extremely rare outside of Riverside County. The elevation range for this species is between 10 and 200 meters (CNPS 2001). The distribution of Davidson's saltscale outside of the United States is poorly known.

Threats

Davidson's saltscale is declining throughout much of its range. In Riverside County, Davidson's saltscale habitat is threatened by the same activities that threaten many vernal pool plants, including habitat destruction and fragmentation from urban and agricultural development (*e.g.*, dry land farming), pipeline construction, alteration of hydrology and floodplain dynamics, excessive flooding, channelization, off-road vehicle activity, trampling by cattle and sheep, weed abatement, fire suppression practices (including discing and plowing), and competition from alien plant species (CNDDDB 2000, U.S. Fish and Wildlife 1998h). Davidson's saltscale populations that are affected by discing or dry land farming activities may require several years without disturbance before reforming after flooding events or a wet winter. About half of the remaining suitable habitat for Davidson's saltscale in Riverside County has been affected by discing for fuel modification or dry land farming activities.

Conservation Needs

The conservation needs of Davidson's saltscale include protection and management of known occurrences in Ventura, Orange, and Riverside counties in a manner that provides for their long-term viability. Any new discoveries should be conserved in the same manner. Actions that would modify the hydrology of its habitat or increase the likelihood of deleterious effects from any identified threat should be avoided.

The Plan Area contains the largest known population of this species. Long-term conservation of Davidson's saltscale within the Plan Area requires the conservation and management of suitable habitat, including highly alkaline, silty-clay soils in association with the Traver, Domino and Willows soils, and preservation of the hydrologic processes (seasonal inundation or flooding) that provide for seed dispersal, germination, and habitat maintenance. In order to maintain population dynamics within the watershed and the microhabitat diversity upon which this plant depends (Bramlet 1993a; Fred Roberts, pers. comm. to Dudek, 1999), long-term conservation of the species will require preservation of more area than is occupied during any single season to account for shifts in spatial distribution over time as conditions and seed banks change.

Environmental Baseline

Within the Plan Area, Davidson's saltscale is known to occur in the upper Salt Creek drainage area west of Hemet and in small, patchy populations along the San Jacinto River floodplain from Mystic Lake south to the Ramona Expressway (Bramlet 1993a, 1993b; CNDDDB 2000). The CNDDDB locations used in this analysis are listed as the south coast saltbush; however, based on review by local botanists, these records likely represent Davidson's saltscale within the Plan Area (David Bramlet, pers. comm., 2003). There are four CNDDDB records from eight populations for Davidson's saltscale within the Plan Area. We have three records in our dataset that overlap with the CNDDDB records from the Old Salt Creek area and three records that are from the vicinity of the San Jacinto Wildlife Area. There are a total of 11 separate records for the species within our dataset and the CNDDDB dataset. Population sizes in the CNDDDB database range from 7 to 150 individuals. A population of 100 individuals was reported from a Metropolitan Water District mitigation parcel in the Old Salt Creek area in 1998 (AMEC 2001). Glen Lukos and Associates, Inc. (2000) surveyed the San Jacinto River drainage from the Ramona Expressway to Railroad Canyon and observed one population with 133 individuals near the Ramona Expressway.

Suitable habitat along the San Jacinto River extends south to I-215 and possibly to the Perris Airport. The upper Salt Creek populations likely represent the largest concentrations of this species known to exist. Suitable habitat for the Davidson's saltscale may also occur in the vicinity of the Nichols Road wetlands at Alberhill and Murrieta Hot Springs.

The vernal pool model was used to capture potential habitats supporting Davidson's saltscale. The vernal pool model included these parameters within the Riverside Lowlands and the Santa Ana Mountains bioregions: 1) vernal pools and playas and 2) clayey soils (Altamont, Auld, Bosanko, Claypit, and Porterville), alkali soils (Willows, Traver, and Domino), and Santa Rosa Plateau basalt flow soils. Based on our analysis, 42,349 acres of modeled habitat, with the potential to harbor vernal pools suitable for the species, occur within the Plan Area. Approximately 8,831 acres (21 percent) of modeled habitat occur within PQP Lands, including 2 of the 11 records from our dataset and the CNDDDB. We were unable to include additional soil types that harbor vernal pools, such as Murrieta stony clay loam, in our model because we do not have access to digital overlays mapping the extent of these soil types in the Plan Area.

Effects of the Action

Direct Effects

The Plan Area includes 42,349 acres of modeled habitat for Davidson's saltscale. There are 25,831 acres (61 percent) of modeled habitat outside of the MSHCP Conservation Area; of that 9,869 acres (23 percent of total modeled habitat) occur within the Criteria Area Species Survey Areas (CASSA) 1, 2, 3, 3a, 4, and 7 (Figure 6-2, pp. 6-64). Davidson's saltscale is considered an Additional Survey Needs and Procedures species. Until such time that the Additional Reserve Lands can be assembled and species conservation objectives for this species are met, surveys will be conducted as part of the project review process within CASSA 1, 2, 3, 3a, 4, and 7. Populations detected as a result of survey efforts will be avoided according to the procedures

outlined in the Additional Survey Needs and Procedures policy (Section 6.3.2 of the Plan; *i.e.*, 90 percent of portions of property with long-term conservation value will be avoided until the species conservation objectives are met). For those locations found to contain large numbers of individuals or otherwise determined to be important to the overall conservation of the species, the Plan allows flexibility to acquire these locations for inclusion into the Additional Reserve Lands (pp. 6-70).

Within the 9,869 acres of the modeled habitat for Davidson's saltscale outside of the MSHCP Conservation Area, but within the CASSA for Davidson's saltscale (23 percent of total modeled habitat), we anticipate that up to 10 percent of the area with long-term conservation value for this species (as discussed above) will be lost to individual projects, including all individual plants within project footprints.

Davidson's saltscale will be subject to impacts associated with proposed residential, commercial, urban, and agricultural development within 15,962 acres (38 percent of total modeled habitat) that are outside of the MSHCP Conservation Area and CASSA 1, 2, 3, 3a, 4, and 7. Thus, all individual Davidson's saltscale plants and populations outside of the MSHCP Conservation Area and outside the CASSA for this species are anticipated to be impacted over the 75-year permit term as a result of the proposed Covered Activities.

Any populations existing in the lower San Jacinto River may be at risk from the San Jacinto River Flood Control Project. We assume that a population will not be impacted by this proposed Covered Activity unless criteria in Section 7.3.7 of the Plan are met. The criteria includes conservation of land (called "mitigation lands") and providing hydrology for the continued survival of Davidson's saltscale (among other species). Like other plants on the floodplains of the San Jacinto River, Davidson's saltscale depends on specific hydrology: sporadic flooding in combination with slow drainage in alkaline soils characterized by alkali scrub, alkali playa, alkali vernal pool and alkali annual grassland habitat. These habitats form a dynamic matrix that allows the populations of Davidson's saltscale to expand into favorable sites and retreat from less favorable sites in response to disturbance and annual rainfall. As stated in the MSHCP, flooding at irregular intervals is an important process that maintains saltscale habitat in a successional state, restores disturbed alkali habitats, and probably disperses seed. We anticipate that any reduction in the population size will be minimized through adherence to the criteria of the flood control project of providing hydrology and the species-specific conservation objective of maintaining floodplain processes. Also, conservation lands may include acreage located outside the Lakeview/Nuevo and Mead Valley Area Plans if the Wildlife Agencies determine that such acreage provides the same or greater conservation value and acreage to the MSHCP Conservation Area. We anticipate that any reduction in the population size will be minimized through adherence to these criteria, such that the distribution of this species will be maintained in the Plan Area.

Because the Davidson's saltscale is not widely distributed within the Plan Area, specific conservation objectives are provided in the MSHCP (Section 9, pp. 9-115) to ensure that suitable habitat and known populations of the Davidson's saltscale will persist. The Plan states that three known locations of Davidson's saltscale will be included within the MSHCP Conservation Area, including Salt Creek, the San Jacinto River, and the San Jacinto Wildlife Area. In addition, at

least 6,900 acres of grassland and playas and vernal pools within the San Jacinto River, Mystic Lake and Salt Creek Areas will be included within the MSHCP Conservation Area. Floodplain areas along the San Jacinto River will be included in this acreage total to preserve floodplain processes important to the survival of Davidson's saltscale. The Plan also states that the Salt Creek floodplain, in its existing condition (from Warren Road to Newport Road), and vernal pools in Upper Salt Creek will be included within the MSHCP Conservation Area and hydrologic processes will be maintained to provide for persistence of the species. We anticipate this species will also benefit from the implementation of the Riparian/Riverine Area and Vernal Pools policy.

Approximately 8,831 acres (21 percent) of the modeled Davidson's saltscale habitat occur within PQP Lands and 7,686 acres (18 percent) occur within the Additional Reserve Lands. Thus, based on our analysis, the MSHCP Conservation Area will include 16,517 acres (39 percent) of the modeled Davidson's saltscale habitat in the Plan Area, including 8 of the 11 (73 percent) known occurrences from our dataset and the CNDDDB.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands including surveys for Davidson's saltscale. Cooperative management and monitoring are anticipated on PQP Lands. Surveys will be conducted at least every eight years to ensure a minimum level of occupancy of 75 percent of known populations. If a decline in the distribution of Davidson's saltscale is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP. Reserve Managers will ensure habitat support functions within the MSHCP Conservation Area by maintaining and enhancing floodplain processes of the San Jacinto River, Salt Creek, and Mystic Lake, including intermittent flooding and periodic pooling. Particular management emphasis will be given to preventing alteration of hydrology and floodplain dynamics, farming, fire, and fire suppression activities, off-road vehicle use, grazing, and competition from non-native plant species (Section 5, Table 5.2). Implementation of these management actions will help to avoid and minimize adverse effects to Davidson's saltscale.

Indirect Effects

Davidson's saltscale could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These generally include the indirect effects mentioned in the "General Effects" section of this biological opinion. Implementation of the Guidelines Pertaining to the Urban/Wildlands Interface policy, Riparian/Riverine Area and Vernal Pools policy, and the management provisions listed above will help to reduce the indirect effects to this species.

Conclusion

We anticipate the proposed action will directly and indirectly affect Davidson's saltscale as described in the analyses above, including total loss of 38 percent of its modeled habitat. An additional 23 percent of Davidson's saltscale modeled habitat outside the MSHCP Conservation Area will be subject to surveys within CASSA 1, 2, 3, 3a, 4, and 7. Once the conservation objectives for Davidson's saltscale have been met, avoided areas, which have not been otherwise

conserved, may be impacted. We anticipate that occurrences determined to be important to the overall conservation of the species will be considered for inclusion in the Additional Reserve Lands and that at least some of the avoided areas may be maintained as open space habitat. Implementation of the avoidance, minimization, and mitigation measures identified in the Plan will further reduce the impacts to this species. We anticipate that this species will persist in the remaining 39 percent of modeled habitat within both the PQP Lands and Additional Reserve Lands. We anticipate that these areas will be monitored and managed cooperatively to benefit this species.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the Davidson's saltscale. We reached this conclusion because 39 percent of Davidson's saltscale modeled habitat and 73 percent of the documented occurrences will be protected or will remain in the MSHCP Conservation Area. In addition CASSA surveys for Davidson's saltscale may result in newly discovered occurrences being included in the MSHCP Conservation Area. In addition, areas with suitable habitat surrounding known locations will be protected and natural hydrological processes will be maintained in much of this habitat. Thus, impacts to this species and its modeled habitat, when viewed in conjunction with the protection and management of the MSHCP Conservation Area, are not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of Davidson's saltscale throughout its range.

Engelmann Oak (*Quercus engelmannii*)

Status of the Species

Listing Status

The Engelmann oak is not a State or federally listed species, but it is listed as a Local Viability Concern species by the U.S. Forest Service. This species is on the California Native Plant Society's List 4 (RED 1-2-2).

Species Description

The Engelmann oak is a medium-sized, drought-deciduous tree in the beech family, Fagaceae (Pavlik *et al.* 1991; California Native Plant Society 2001). Engelmann oak is not easily confused with any other species of oak within its range. This species has distinctive blue-green oblong leaves and cylindrical acorns with a rounded tip (Scott 1990). In addition, Engelmann oak has an open and rounded canopy and has fewer leaves and lateral shoots than other southern California oaks (Scott 1990).

Engelmann oak belongs to the white oak subdivision of the genus *Quercus*. This group occurs across the Northern Hemisphere and has seventy species in North America (Scott 1990). Engelmann oak routinely hybridizes with *Q. berberifolia* and *Q. cornelius-mulleri* (Flora of North America Editorial Committee 1997).

Habitat Affinities

Stands of Engelmann oak are limited to sites above dry, coastal plains and below cold, montane areas that receive at least 15 inches of precipitation per year, rarely experience frost, and have warm or hot summers (Pavlik, *et al.* 1991). This species is typically not found above 4,300 feet (1,323 m) in elevation. Engelmann oak is associated with alluvial fans, interior valleys and occasionally slopes with a mesic aspect (Roberts 1995). Underlying soils are often deep loamy clay, but the species also does well in rocky or shallow soils with some sort of summer moisture such as an intermittent stream or spring (Pavlik *et al.* 1991). Engelmann oak has been coined “mesa oak” because of its tendency to grow near basalt caps of mesas (Pavlik *et al.* 1991).

This species commonly occurs in two types of foothill habitats: southern oak woodlands, where oak canopies cover from 10 to 50 percent of the landscape, and riparian/oak woodlands, where there is a closed-canopy of mixed hardwood species along canyon bottoms and watercourses (Scott 1990). Approximately 76 percent of woodlands containing Engelmann oaks are southern oak woodlands, and 24 percent are riparian woodlands (Scott 1990). Southern oak woodlands with Engelmann oaks are often associated with grassland and sage scrub vegetation (Scott 1990). Within riparian woodlands, Engelmann oaks are typically subdominant to coast live oak or other riparian trees such as willows, cottonwoods or sycamores (Scott 1990).

Life History

The Engelmann oak is wind pollinated and flowers from April to May (Proctor *et al.* 1996). There are three main phases of reproduction for this species: acorn production; acorn germination; and seedling/sapling establishment and survival. Acorn production varies tremendously between trees, and to a lesser degree spatially (Lathrop and Osborne 1990). Acorn yields also vary significantly on an annual basis, although the precise reason is unknown. Germination of Engelmann oaks occurs in the early winter. Both germination and propagation of seedlings and young saplings are dependent on the availability of shady areas. Osborne (1989) and Lathrop and Osborne (1990) concluded from field experiments that seedlings occur no more than ten feet from the outside of the closest canopy where the minimal amount of shading exists.

Acorns are transported and subsequently buried, stored or consumed by a wide variety of wildlife including pocket gophers, coyotes, California ground squirrels, California jays and California acorn woodpeckers. Burying of acorns increases the probability of survival since they are less susceptible to drying and predation (Lathrop and Osborne 1990).

Engelmann oaks typically live from 50 to 80 years; however, a few trees in every woodland live 150 to 350 years (Scott 1990). On the Santa Rosa Plateau, the average age is between 80 and 130 years (Lathrop and Yeung 2000).

Status and Distribution

Historically, Engelmann oak woodlands were found from the San Gabriel Mountains to the foothills of Baja California (Scott 1990). Currently, Engelmann oaks inhabit the smallest range

of any oak tree in the southwestern United States (Scott 1990). The two remaining major populations occur around Black Mountain in central San Diego County and Santa Rosa Plateau in southern Riverside County. Scattered stands can be found between coastal terraces and desert scarp while some individual trees occur along the southern and western edges of the Perris Plain and the scarp between the Coachella Valley and mountains south of Santa Rosa Peak (Scott 1990). The vast majority of extant stands (93 percent) exist in San Diego County, while Riverside and Orange counties contain 6 and 0.5 percent, respectively (Scott 1991).

Threats

Engelmann oak has been nearly extirpated throughout most of its historic range by encroaching urban sprawl in the foothills near Pasadena and Pomona in Los Angeles County (Pavlik *et al.* 1991). A similar pattern is unfolding in San Diego and Riverside counties where the only two major populations are currently safeguarded from continued regional growth. While Engelmann oaks are often avoided in rural mountainous areas, landscaping practices in these areas often severely limit recruitment (Zachary Principe, Santa Rosa Plateau Ecological Reserve, pers. comm. 2003).

Cattle, deer and small rodents such as deer mice, woodrats and ground squirrels threaten the regeneration of the Engelmann oak by feeding and trampling upon acorns and seedlings (Lathrop and Osborne 1990; Osborne 1989; Snow 1972). Dunning *et al.* (2002) showed that Engelmann oak acorns are more susceptible to insect herbivory than coast live oak in the Santa Rosa Plateau Ecological Reserve; however, acorn damage was slight for both species. Pocket gophers have been shown to inhibit resprouting because of the damage they inflict to the roots of seedlings and young saplings (Lathrop and Yeung 2000). Non-native grasses compete for soil moisture with the seedlings and appear to contribute to low recruitment rates (Stephenson and Calcarone 1999).

Engelmann oaks appear to tolerate or resprout from low intensity fires that occur in grasslands or savannas, but they are not likely to survive or regenerate after intense fires such as those that occur in chaparral or coastal sage scrub (Zachary Principe, Santa Rosa Plateau Ecological Reserve, pers. comm. 2003).

Because the average age of Engelmann oaks within the population on the Santa Rosa Plateau was between 80 and 130 years and favorable conditions for seedling establishment were rarely met in this location, it was thought that natural regeneration may be too slow to maintain the existing stands (Lathrop and Osborne 1990). Recent observations suggest that, in the absence of grazing by domestic animals, Engelmann oak recruitment has increased considerably within the Santa Rosa Plateau Ecological Reserve, and most populations in the area will likely remain stable or increase (Zachary Principe, Santa Rosa Plateau Ecological Reserve, pers. comm. 2003). Engelmann oak recruitment in San Diego county appears to be far more limited than in the Santa Rosa Plateau Ecological Reserve due primarily to continued grazing by domestic animals.

Conservation Needs

Due to the narrow range of this species and numerous threats to its existence in the Plan Area steps need to be taken to ensure not only the preservation but the propagation of Engelmann Oak within its range. Known locations of Engelmann oaks should be preserved wherever possible.

Environmental Baseline

According to our dataset, there are 42 recent records of Engelmann oak in the Plan Area. However, we found 2 duplicate records in our dataset, both records are in Murrieta in the vicinity of where I-215 and I-15 merge. Therefore, for the purposes of our analysis, we considered only 40 records for Engelmann oak in our dataset. The majority of stands in the Plan Area occur in a 12-by-12-mile area around the Santa Rosa Plateau (Scott 1990). Other locations include the northern boundary of Cleveland National Forest in the vicinity of Vail Lake, Wilson Creek, Sycamore Canyon (near Canyon Springs), Avery Canyon (east of Diamond Lake), Lamb Canyon (near Gilman Hot Springs) and west of I-215 near Murrieta Hot Springs. In addition, small stands occur across the Perris Plain and the foothills of the San Jacinto Mountains (Scott 1991). Vegetation communities used to model Engelmann oak habitat included riparian scrub/ woodlands/ forest and woodlands/ forest below 4,347 feet (1,325 meters) in the Santa Ana Mountains, Riverside Lowlands and San Jacinto Foothills bioregions. Based on this analysis, 27,411 acres of modeled habitat exist for this species in the Plan Area. About 13,374 acres of this modeled habitat are within PQP Lands.

Effects of the Action

Direct Effects

Engelmann oaks will be subject to impacts associated with proposed residential, commercial, urban and agricultural development within 8,817 acres (32 percent) of modeled habitat that are outside of the MSHCP Conservation Area, which encompasses 31 of the 40 known records in our dataset. Thus, any individual or population in these areas is anticipated to be impacted over the 75-year permit term as a result of proposed development. While some individual trees may be avoided in rural mountainous areas, landscaping practices often severely limit the potential for recruitment in these areas (Zachary Principe, Santa Rosa Plateau Ecological Reserve, pers. comm. 2003). Habitat loss in the Santa Rosa South area will increase isolation of the core area in the Santa Rosa Plateau Ecological Reserve by further disrupting the connection between this population and the large populations in San Diego County.

To offset the loss of Engelmann oak habitat within the Plan Area, implementation of the MSHCP will provide for protection of approximately 5,221 acres (19 percent) of modeled Engelmann oak habitat within the Additional Reserve Lands. Another 13,374 acres (49 percent) of modeled habitat will remain on PQP Lands. In total, 18,595 acres (68 percent) of the modeled habitat for the Engelmann oak will be conserved or remain in the Plan Area, encompassing 9 of the 40 known records in our dataset. Within the MSHCP Conservation Area, Engelmann oak recruitment will be maintained at a minimum of 80 percent of the conserved populations as measured by presence/absence sampling of seedlings and/or saplings across any consecutive five

year period. Implementation of the Riparian/Riverine Areas and Vernal Pools policy may provide additional protection to this species by avoiding and/or minimizing direct impacts to riparian and riverine habitats where the species may occur.

The Permittees will implement management and monitoring practices including grazing control within the Additional Reserve Lands, and cooperative management and monitoring is anticipated on PQP Lands (MSHCP Section 9, Table 9.2). Surveys for Engelmann oak will be conducted at least every 8 years to verify occupancy at a minimum of 75 percent of known locations. If a decline in the distribution of the Engelmann oak is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP.

Indirect Effects

The Engelmann oak could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These include the indirect effects described in the “General Effects” section of this biological opinion.

Conclusion

We anticipate the proposed action will directly and indirectly affect the Engelmann oak as described in the analyses above, including the loss of 32 percent of its modeled habitat in the Plan Area. Implementation of the avoidance, minimization, and mitigation measures identified in the Plan will reduce the impacts to this species. We anticipate that this species will persist in the remaining 68 percent of the modeled habitat within both the existing PQP Lands and the Additional Reserve Lands. These lands include large, contiguous habitat blocks that support most of the core population for this species in the Plan Area. In addition to managing existing populations for recruitment, we anticipate that these areas will be monitored and managed cooperatively to benefit this species in general.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service’s biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the Engelmann oak. We reached this conclusion because the large core population in the Santa Rosa Plateau will remain within the MSHCP Conservation Area. In addition, other large areas containing modeled habitat, some of which may support Engelmann oak individuals or populations, will be protected within the MSHCP Conservation Area. Thus, the impacts associated with loss of this species’ modeled habitat, when viewed in conjunction with the protection and management of the MSHCP Conservation Area, are not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Fish's milkwort (*Polygala cornuta* var. *fishiae*)Status of the Species*Listing Status*

Fish's milkwort is not a State or federally listed species. This species is included on the California Native Plant Society's List 4 (RED 1-1-2).

Species Description

Polygala cornuta var. *fishiae* is a deciduous perennial shrub in the Polygalaceae family (CNPS 2001). This variety has many slender stems that range in height from 2 to 5 decimeters (Munz 1974). The flowers are green to pink in bud and vary in length from 7 to 11.2 millimeters. The capsular fruit is two-chambered and ranges in length from 5.9 to 10 millimeters. The seeds are generally hairy, and each has a prominent white aril on one end (Wendt 1993).

Polygala cornuta var. *fishiae* is one of two varieties of *Polygala cornuta* that are differentiated by minor floral characters (Wendt 1993), although *P. cornuta* var. *pollardii* has been included under *Polygala cornuta* var. *fishiae* by the California Native Plant Society (2001). The genus *Polygala* is the only representative of the Polygalaceae in California (Munz 1974).

Habitat Affinities

Fish's milkwort is often associated with shaded areas in cismontane oak woodlands with coast live oaks and riparian woodlands (CNPS 2001; Munz 1974; Boyd and Banks 1995). It occurs in xeric, open locales within chamise chaparral and sometimes on mesic, north-facing slopes beneath tall tree canopies in dense shade. Genetic variability may account for these very different habitat preferences (Reiser 2001).

Life History

Fish's milkwort flowers from May through August (CNPS 2001). Very little is known about abundance, reproduction, recruitment, dispersal or other pertinent information on this variety.

Status and Distribution

The historical distribution for Fish's milkwort is not well known. Fish's milkwort occurs in cismontane southern California and northwestern Baja California, Mexico, from elevations of 100 to 1,100 meters (Munz 1974; Wendt 1993; Reiser 2001). In the United States, it has been reported from Santa Barbara, Ventura, Los Angeles, Orange, Riverside and San Diego counties (CNPS 2001). As stated in the MSHCP, it is not well-known within its range, and occurrences typically consists of a few individuals.

Threats

No information on threats to Fish's milkwort is available in the literature at this time. Within the Plan Area, threats to Fish's milkwort are expected to include habitat loss and degradation due to development and urbanization. Fish's milkwort may also be affected by trampling and trail maintenance within San Mateo Canyon.

Conservation Needs

Fish's milkwort is often obscure and difficult to see, even when in bloom. Therefore, it may be more widespread than is currently suspected (Reiser 2001). In the United States, the conservation needs of Fish's milkwort include protection and management of occurrences with long-term conservation value in southern California in a manner that provides for their long-term viability. Any newly discovered occurrences with long-term conservation value should be treated in the same manner. Actions that would increase the likelihood of deleterious effects from any identified threat should be avoided.

Environmental Baseline

Our dataset includes five records of Fish's milkwort in the Plan Area, including one from the east wall of Hagador Canyon in Corona and four within PQP Lands in San Mateo Canyon, Cleveland National Forest. However, the four records from San Mateo Canyon include two duplicate records. Therefore, for the purposes of our analysis, we considered the three unique records for Fish's milkwort in the Plan Area. Fish's milkwort is also found in the Santa Margarita Ecological Reserve (San Diego State University 2000), but this record was not included in our dataset. Additional locations identified in the MSHCP (Cole Canyon, Santa Rosa Plateau, and Temecula Canyon) were not included in our dataset due to the age or the precision level of the records. Records just outside the southern boundary of Riverside County, along the southern flank of the Agua Tibia Mountains, indicate that this species may also be found along the northern slopes of the Agua Tibia Mountains (Boyd and Banks 1995).

The vegetation communities used to model habitat for this species were chaparral, riparian scrub/woodland/forests, and woodlands/forests below 3,609 feet (1,100 meters) in elevation. There are approximately 195,668 acres of modeled habitat for Fish's milkwort within the Santa Ana Mountains, Riverside Lowlands, and Agua Tibia Mountains bioregions. Approximately 90,364 acres (46 percent) of this modeled habitat occurs within PQP Lands. Due to the species variable microhabitat associations (*i.e.*, xeric, open locales within chamise chaparral and sometimes on mesic, north-facing slopes beneath tall tree canopies in dense shade), the modeled habitat likely overestimates the amount of suitable habitat in the Plan Area.

Effects of the Action

Direct Effects

The Fish's milkwort will not be considered a Covered Species Adequately Conserved by the MSHCP until occupation of at least 10 localities is confirmed (Section 9, Table 9.3) within "Conserved Habitat" as defined in the MSHCP. A locality can not be smaller than one quarter section (160 acres) and contain at least 50 individuals. Smaller populations may contribute to the locality count if they are demonstrably self-sustaining. The Plan Area includes 195,668 acres of modeled habitat for Fish's milkwort. If the species-specific conservation objective above is met, an estimated 72,924 acres (37 percent) of modeled Fish's milkwort habitat outside of the MSHCP Conservation Area could be lost, through degradation or destruction. Thus, any individual Fish's milkwort plants or populations persisting in these areas, including the population on the east wall of Hagador Canyon in Corona, are anticipated to be impacted over the 75-year permit term by proposed Covered Activities; however, some plants may survive in rural mountainous areas where development impacts are anticipated to occur at a slower rate and at lower densities. Approximately 40,775 acres (56 percent) of the non-conserved modeled habitat for the Fish's milkwort are designated as rural/mountainous land.

Specific conservation objectives are provided in the MSHCP (Section 9, pp. 9-116) to ensure that suitable habitat and known populations of Fish's milkwort will persist. The Plan states that at least three of the known locations of Fish's milkwort will be included within the MSHCP Conservation Area, including the Santa Rosa Plateau, Santa Margarita Ecological Reserve, and San Mateo Canyon. Based on our analysis, the MSHCP will also conserve and manage 32,380 acres (17 percent) of modeled habitat for Fish's milkwort within the Additional Reserve Lands. Approximately 90,364 acres (46 percent) of modeled habitat will remain in PQP Lands, including the two locations of Fish's milkwort in San Mateo Canyon, Cleveland National Forest. In total, approximately 122,744 acres or 63 percent of the modeled habitat for Fish's milkwort will be conserved or remain in the Plan Area. We anticipate this species will also benefit from the implementation of the Riparian/Riverine Area and Vernal Pools policy.

The Permittees will implement management and monitoring practices within Additional Reserve Lands, including surveys for Fish's milkwort. Cooperative management and monitoring are anticipated on PQP Lands. Surveys for the Fish's milkwort will be conducted at least every eight years to verify occupancy at a minimum level of 75 percent of the known locations. If a decline in the distribution of the Fish's milkwort is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP. As stated in Section 5, Table 5.2, Reserve managers will avoid or minimize adverse effects to this species to the maximum extent practicable. Other management actions described in Section 5 of the MSHCP, such as control of unauthorized public access, prevention of grazing and competition from non-native plants, and management of specific threats to the species will help maintain habitat for the Fish's milkwort. Implementation of these management actions will help to avoid and minimize adverse effects to Fish's milkwort.

Indirect Effects

The Fish's milkwort could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These generally include the indirect effects mentioned in the "General Effects" section of this biological opinion. Implementation of the Guidelines Pertaining to the Urban/Wildlands Interface policy and Riparian/Riverine Area and Vernal Pools policy and the management provisions listed above will help to reduce the indirect effects to this species.

Conclusion

We anticipate the proposed action will directly and indirectly effect Fish's milkwort as described in the analyses above, including the loss of 37 percent of its modeled habitat in the Plan Area. Implementation of the avoidance, minimization, and mitigation measures identified in the Plan will reduce the impacts to this species. We anticipate that this species will persist in the remaining 63 percent of the modeled habitat within both the existing PQP Lands and Additional Reserve Lands that support 2 of the 3 known occurrences of Fish's milkwort in the Plan Area. We anticipate that these areas will be monitored and managed cooperatively to benefit this species.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the Fish's milkwort. We reached this conclusion because implementation of the species conservation objectives will provide for Fish's milkwort's persistence within the Plan Area. Thus, impacts to this species and its modeled habitat, when viewed in conjunction with the protection and management of the MSHCP Conservation Area, are not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Graceful tarplant (*Holocarpha virgata* ssp. *elongata*)

Status of the Species

Listing Status

Graceful tarplant is not a State or federally listed species. However, this species is a Forest Service Sensitive Species and is included on the California Native Plant Society's List 4 (RED 1-2-3).

Species Description

Graceful tarplant is an annual herb in the Asteraceae (sunflower) family (CNPS 2001). This subspecies ranges in height from 2 to 12 decimeters and has slender, gracefully curved stems with many branches. The ray flowers and disk flowers are yellow (Keil 1993). Graceful tarplant

is one of two subspecies of *Holocarpha virgata*. These subspecies are differentiated by range and morphological characters (Munz 1974).

Habitat Affinities

Graceful tarplant occurs in chaparral, cismontane woodland, coastal sage scrub, and valley and foothill grasslands between elevations of 60 and 1,100 meters (CNPS 2001). This subspecies has been found in rocky clay soils in open grassland as well as rocky benches (Rancho Santa Ana Botanical Garden, Claremont California, data from herbarium specimens). Generally, shrub cover is not well-developed at graceful tarplant localities, and the species occurs on level, mildly disturbed terrain. It may be found among non-native grasses and invasive herbs (Reiser 2001).

Life History

Graceful tarplant flowers from June through November (Munz 1974). The ray flowers are fertile, and most disk flowers are sterile. The genus *Holocarpha* is self-sterile (Munz 1974). Little is known about abundance, reproduction, recruitment, dispersal or other pertinent information for this subspecies.

Status and Distribution

The historical distribution for graceful tarplant is not well known. This subspecies is endemic to Orange, Riverside and San Diego counties between 60 and 1,100 meters in elevation (CNPS 2001).

Threats

Graceful tarplant usually occurs in mildly disturbed or overgrazed grasslands on comparatively level, sparsely vegetated terrain. Therefore, it is threatened by development and urbanization within the Plan Area (Reiser 2001). Because little is known about this subspecies, additional threats may exist that are not currently described in the literature (Reiser 2001).

Conservation Needs

The conservation needs of graceful tarplant include protection and management of known occurrences in San Diego, Orange, and Riverside counties in a manner that provides for their long-term viability. Any new discoveries with long-term conservation value should be conserved in the same manner. Actions that would modify the hydrology that supports the species habitat or increases the likelihood of deleterious effects from any identified threat should be avoided.

Environmental Baseline

Based on our dataset, the graceful tarplant occurs within PQP Lands in San Mateo Canyon, Cleveland National Forest and in the Santa Rosa Plateau Ecological Reserve. Our dataset includes three records for graceful tarplant in the Plan Area; however, one of the records is a

duplicate record. Therefore, for the purposes of our analysis, we considered two occurrences of graceful tarplant in the Plan Area. Graceful tarplant has also been reported from southwest of Cherry Street in Temecula and south of Polly Butte near Hemet in open grasslands (Reiser 2001), but there are no records from these locations in our dataset.

The vegetation communities used to model habitat for this species were chaparral, coastal sage scrub, grassland, meadows/marshes, and woodland/forests below 3,609 feet (1,100 meters) in elevation and west of I-15. The boundaries for modeled habitat were based on known and verifiable occurrences of the species throughout the Plan Area and expert opinions of suitable habitat for the graceful tarplant (Steve Boyd and Gary Wallace, Rancho Santa Ana Botanic Gardens, pers. comms., 2004; Andy Sanders, UCR Herbarium, pers. comm., 2004). Based on these criteria, the Plan Area supports approximately 137,046 acres of modeled habitat for the graceful tarplant. Approximately 79,591 acres (58 percent) of this modeled habitat occur within PQP Lands.

Effects of the Action

Direct Effects

The graceful tarplant will not be considered a Covered Species Adequately Conserved by the MSHCP until occupation is confirmed for at least 10 localities (Section 9, Table 9.3) within “Conserved Habitat” as defined in the MSHCP. A locality can not be smaller than one quarter section (160 acres) and must contain at least 1,000 individuals. Smaller populations may contribute to the locality count if they are demonstrably self-sustaining. The Plan Area includes 137,046 acres of modeled habitat for graceful tarplant. If the species-specific conservation objective above is met, an estimated 48,468 acres (35 percent) of modeled graceful tarplant habitat outside of the MSHCP Conservation Area could be lost, through degradation or destruction. Thus, any individual graceful tarplants or populations persisting in these areas are anticipated to be impacted over the 75-year permit term by proposed Covered Activities; however, some plants may survive in rural mountainous areas where development impacts are anticipated to occur at a slower rate and at lower densities. Approximately 32,427 acres (67 percent) of the non-conserved modeled habitat for the graceful tarplant are designated as rural/mountainous land.

Specific conservation objectives are provided in the MSHCP (Section 9, pp. 9-117) to ensure that suitable habitat and known populations of the graceful tarplant will persist. The Plan states that at least eight of the known locations of graceful tarplant will be included within the MSHCP Conservation Area, including four occurrences on the Santa Rosa Plateau and four occurrences in the San Mateo Canyon Wilderness. However, we only have two verifiable occurrences in our dataset. Based on our analysis, the MSHCP will also conserve and manage 8,987 acres (7 percent) of modeled habitat for the graceful tarplant within the Additional Reserved Lands. Approximately 79,591 acres (58 percent) of modeled habitat will remain within PQP Lands, including both of the known occurrences in the Plan Area. In total, 65 percent of the modeled habitat for graceful tarplant will be conserved or remain in the Plan Area.

The Permittees will implement management and monitoring practices within Additional Reserve Lands, including surveys for graceful tarplant. Cooperative management and monitoring are anticipated on PQP Lands. Surveys for the graceful tarplant will be conducted at least every eight years to verify occupancy at a minimum level of 75 percent of the known locations. If a decline in the distribution of the graceful tarplant is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP. Reserve managers will avoid or minimize adverse effects to this species to the maximum extent practicable (Section 5, Table 5.2). Other management actions described in Section 5 of the MSHCP, such as control of unauthorized public access, prevention of grazing and competition from non-native plants, and management of specific threats to the species will help maintain habitat for the graceful tarplant.

Indirect Effects

The graceful tarplant could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These generally include the indirect effects mentioned in the “General Effects” section of this biological opinion. Implementation of the management provisions listed above will help to reduce the indirect effects to this species.

Conclusion

We anticipate the proposed action will directly and indirectly affect the graceful tarplant as described in the analyses above, including the loss of 35 percent of its modeled habitat in the Plan Area. Implementation of the avoidance, minimization, and mitigation measures identified in the Plan will reduce the impacts to this species. We anticipate that this species will persist in the remaining 65 percent of the modeled habitat within both the Additional Reserve Lands and the existing PQP Lands that support the two known occurrences of graceful tarplant in the Plan Area. We anticipate that these areas will be monitored and managed cooperatively to benefit this species.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service’s biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the graceful tarplant. We reached this conclusion because implementation of the species conservation objectives will provide for graceful tarplant persistence within the Plan Area. Thus, impacts to this species and its modeled habitat, when viewed in conjunction with the protection and management of the MSHCP Conservation Area, are not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Hall's Monardella (*Monardella macrantha* ssp. *hallii*)Status of the Species*Listing Status*

Hall's monardella is not a State or federally listed species. It was a Federal category 2 candidate until September 27, 1985 (50 Federal Register 39526). However, it is a U.S. Forest Service Sensitive Species and is on the California Native Plant Society's List 1B (RED 2-1-3).

Species Description

Hall's monardella is a rhizomatous, perennial herb and ranges in height from 1 to 5 decimeters (CNPS 2001; Munz 1974). Hall's monardella inflorescences contain 10 to 20 flowers per head (Abrams 1951). The slightly hairy, slender-funnelform corolla is yellow, orange, or scarlet and 3 to 4.5 centimeters long (Munz 1974).

The genus *Monardella* belongs to the Lamiaceae (mint) family (Munz 1974). Hall's monardella is one of two subspecies of *M. macrantha* that are differentiated by morphological characters (primarily presence/absence of hair on stems and leaves). Hall's monardella commonly intergrades with *M. macrantha* ssp. *macrantha* (CNPS 2001).

Habitat Affinities

Hall's monardella occurs on dry, rocky slopes, and ridges in openings within broad-leaved upland forest, chaparral, lower montane coniferous forest, cismontane woodland, and valley and foothill grasslands between elevations of 730 and 2,195 meters (Munz 1974; Jokerst 1993; CNPS 2001).

Life History

Hall's monardella flowers from June through August (Munz 1974; CNPS 2001). No species-specific studies have been conducted regarding dispersal of this species; however, Boyd and Banks (1995) believe that some seeds may be dispersed via the stream channels where some populations are found. Little is known about abundance, reproduction or recruitment of this species but, where present, Hall's monardella often forms extensive carpets consisting of tens of thousands of stems (Boyd and Banks 1995).

Status and Distribution

Hall's monardella is known to occur in Orange, San Bernardino, Riverside, and San Diego counties (CNPS 2001). It has been reported from the Laguna, San Gabriel, San Bernardino, Agua Tibia, Palomar, Santa Ana, San Jacinto, and Cuyamaca mountains (CNDDDB 2000).

Threats

This species may be threatened by damage from recreational hikers (Reiser 2001), fire-suppression activities (Boyd and Banks 1995), road construction, and road and trail maintenance (CNDDDB 2000).

Conservation Needs

The conservation needs of Hall's monardella include protection and management of known occurrences in San Diego, San Bernardino, Orange, and Riverside counties in a manner that provides for their long-term viability. Any new discoveries with long-term conservation value should be conserved in the same manner. Actions that would modify the hydrology that supports the species' habitat or increase the likelihood of deleterious effects from any identified threat should be avoided.

Environmental Baseline

Our dataset includes five records of Hall's monardella in the Plan Area: one on the northeast slope of Santiago Peak along Coldwater Trail in the Santa Ana Mountains; one on the north slope of Agua Tibia Mountain in the Agua Tibia Wilderness Area; one on the north slope of Cahuilla Mountain along Trail 2E45 in the San Bernardino National Forest; and one in Toll Road Canyon, San Bernardino National Forest. Our dataset includes one duplicate record; therefore, we analyzed the four unique records for Hall's monardella in the Plan Area. All of the known locations of Hall's monardella in the Plan Area are within PQP Lands. The MSHCP also reports this species from southwest of Pine Cove in the San Jacinto Mountains.

The vegetation communities used to model habitat for Hall's monardella were chaparral, grassland, montane coniferous forest, and woodland/forests between 2,400 and 7,200 feet (730 and 2,195 meters) in elevation. Based on these criteria, the Plan Area provides approximately 229,372 acres of modeled habitat for Hall's monardella within the Santa Ana, San Jacinto, San Bernardino, and Agua Tibia Mountains Bioregions. Approximately 164,897 acres (72 percent) of this modeled habitat occurs within PQP Lands.

Effects of the Action

Direct Effects

The Plan Area includes 229,372 acres of modeled habitat for Hall's monardella. Hall's monardella will be subject to impacts associated with proposed residential, commercial, urban, and agricultural development over the 75-year permit term within 53,926 acres (24 percent) of modeled habitat that is outside the MSHCP Conservation Area. It is anticipated that any individual Hall's monardella plants and populations persisting in these areas will be impacted as a result of the planned development. However, no populations of Hall's monardella are currently known from outside of the MSHCP Conservation Area.

Because Hall's monardella has a scattered distribution within the Plan Area, specific conservation objectives are provided in the MSHCP (Section 9, pp. 9-117) to ensure that suitable habitat and known populations of Hall's monardella will persist. The Plan states that at least five of the known locations of Hall's monardella will be included within the MSHCP Conservation Area. However, we only have four verifiable occurrences in our dataset.

Based on our analysis, the MSHCP will conserve and manage 10,550 acres (5 percent) of modeled habitat for Hall's monardella within the Additional Reserve Lands. The majority (164,897 acres or 72 percent) of modeled habitat will remain within PQP Lands. In total, 175,447 acres or 76 percent of the modeled habitat for Hall's monardella will be conserved or remain in the Plan Area, including all known occurrences of the species. Large blocks of habitat will support Hall's monardella within the MSHCP Conservation Area in the Santa Ana Mountains, Agua Tibia Mountains, and San Jacinto Mountains.

The Permittees will implement management and monitoring practices within Additional Reserve Lands, including surveys for Hall's monardella. Cooperative management and monitoring are anticipated on PQP Lands. Surveys for the Hall's monardella will be conducted at least every eight years to verify occupancy at a minimum level of 75 percent of the known locations. If a decline in the distribution of the Hall's monardella is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP. Reserve managers will avoid or minimize adverse effects to this species to the maximum extent practicable. Known and future occurrences of this species will be managed where recreational and fire suppression activities are allowed or planned (Section 5, Table 5.2). Other management actions described in Section 5 of the MSHCP, such as control of unauthorized public access, prevention of grazing and competition from non-native plants, and management of specific threats to the species will help maintain habitat for Hall's monardella. Implementation of these management actions will help to avoid and minimize adverse effects to Hall's monardella.

Indirect Effects

Hall's monardella could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These generally include the indirect effects mentioned in the "General Effects" section of this biological opinion. The management provisions listed above will help to reduce the indirect effects to this species.

Conclusion

We anticipate the proposed action will directly and indirectly effect Hall's monardella as described in the analyses above, including the loss of 24 percent of its modeled habitat in the Plan Area. Implementation of the avoidance, minimization, and mitigation measures identified in the Plan will reduce the impacts to this species. We anticipate that this species will persist in the remaining 76 percent of its modeled habitat within both PQP Lands and Additional Reserve Lands. We anticipate that these areas will be monitored and managed cooperatively to benefit the Hall's monardella.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of Hall's monardella. We reached this conclusion because most of the modeled habitat for Hall's monardella and all known occurrences are within PQP Lands that will not be impacted by the Plan. Thus, impacts associated with loss of this species' modeled habitat, when viewed in conjunction with the protection and management of the MSHCP Conservation Area, are not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Hammitt's clay-cress (*Sibaropsis hammittii*)

Status of the Species

Listing Status

Hammitt's clay-cress is not a State or federally listed species. However, it is a Forest Service Sensitive Species and on the California Native Plant Society's List 1B (RED 3-2-3).

Species Description

Hammitt's clay-cress is an annual herb in the Brassicaceae (mustard family) (CNPS 2001). This species is freely branched at the base with ascending branches 10 to 15 centimeters long (Boyd and Ross 1997). The flowers are light purplish-lavender or pinkish-lavender with darker purplish veins, which produce narrowly linear and somewhat flattened fruits (siliques) that grow to approximately 20 millimeters in length. The recently described Hammitt's clay-cress is unique in many of its morphological characters and, therefore, was proposed to be placed in a new genus (*Sibaropsis*) (Boyd and Ross 1997).

Habitat Affinities

Hammitt's clay-cress occurs on clay soils derived from basalt outcrops or gabbro granite within valley and foothill grasslands and openings in chaparral habitats at elevations between 730 and 1,065 meters (2,395 and 3,495 feet) (CNPS 2001; Stephenson and Calcarone 1999). Within the Cleveland National Forest, all known occurrences of Hammitt's clay-cress were found on saturated clay soils, within purple needlegrass grasslands surrounded by chamise-chaparral (Stephenson and Calcarone 1999). The species may also occur in coastal sage scrub in Riverside County (Steve Boyd, Rancho Santa Ana Botanic Garden, pers. comm., 2003).

Life History

Hammitt's clay-cress flowers between March and April (CNPS 2001). At maturity, the leaves wither and fall away, leaving the branch architecture and ascending siliques, which dry to a light tan to brown color (Boyd and Ross 1997). The functional dispersal unit of Hammitt's clay-cress is the mature silique, which disarticulates at abscission zones along the central axis of the plant (Boyd and Ross 1997). Other than the limited information mentioned above, little is known

about abundance, reproduction, recruitment, dispersal, or other pertinent information on this species.

Status and Distribution

Due to the recent description of Hammit's clay-cess, the historical distribution of the species is not known (Boyd and Ross 1997). Currently, this species is only known to occur within the Cleveland National Forest in Riverside and San Diego counties in the Santa Ana (Elsinore Peak), Poser, and Viejas mountains. However, this species is also expected to occur on gabbro and metavolcanic soils in the mountains of northwestern Baja California, Mexico (Stephenson and Calcarone 1999).

Threats

Threats to Hammit's clay-cess include urbanization, increasing fire frequency, post-fire seeding of invasive non-native species, trampling, habitat damage by off-road vehicles, and the concomitant invasion of the clay soil habitat by aggressive alien weeds (Boyd and Ross 1997).

Conservation Needs

The conservation needs of Hammit's clay-cess include the conservation and management of the known occurrences in San Diego and Riverside counties in a manner that provides for long-term viability at these locations. Due to the rarity and recent description of this species, high priority should be given to conserving any newly discovered locations of Hammit's clay-cess. This species does not tolerate competition from other invasive species (Stephenson and Calcarone 1999). Actions that would increase the likelihood of deleterious effects from any identified threat, including non-native invasive species, should be avoided. Depending on local conditions, management actions to control invasive plant species may be necessary for long-term persistence of the species.

Environmental Baseline

Based on our dataset, there are five recent records of Hammit's clay-cess within the Plan Area. These five records are concentrated at two locations in the vicinity of Elsinore Peak within the Santa Ana Mountains. The information on these records indicates that only two of the occurrences are located within PQP Lands; however, based on information from the Forest Service, we believe that all known records of Hammit's clay-cess occur within PQP Lands (Kirsten Winter, Forest Service, pers. comm., 2003). There is one duplicate record within our dataset. Thus, for the purposes of our analysis, we considered four records of Hammit's clay-cess within the Plan Area.

In the Plan Area, this species is only known to occur in the vicinity of Elsinore Peak west of Lake Elsinore, on "Onion Hill," a grassy knoll about 0.5 miles southeast of Elsinore Peak on the crest of the range (Boyd and Ross 1997) within PQP Lands (Kirsten Winter, U.S. Forest Service, pers. comm., 2003). All known localities are primarily within the Cleveland National Forest in Riverside and San Diego counties. Because Hammit's clay-cess was recently described and

focused surveys have not been conducted in the Plan Area, it is probable that the species exists in additional locations within suitable habitat. According to Stephenson and Calcarone (1999), the species may occur in basalt outcrops on the Santa Rosa Plateau.

We attempted to model habitat for the Hammitt's clay-crec using identified vegetation communities in which the species is known to occur (*i.e.*, chaparral, coastal sage scrub, grasslands, and peninsular juniper/woodland/scrub). However, Hammitt's clay-crec requires specific microhabitat features, such as clay soils and openings within chaparral. We did not have access to digital overlays mapping the extent of certain soil types within the Plan Area; therefore, available mapping of clay substrates was incomplete, and modeled habitat did not correspond well to the documented distribution of the species. Thus, due to its extremely limited range and the difficulty in capturing appropriate habitat types in a model for this species, we did not use a habitat model in our analysis of effects to the Hammitt's clay-crec.

The recent catastrophic fires throughout San Diego county burned the two known locations of Hammitt's clay-crec in San Diego on Viejas and Poser Mountains (Kirsten Winter, U.S. Forest Service, pers. comm., 2003). Effects to this species at these important localities is unknown. However, increased fire frequency and competition by non-native plants after fire threaten this species. The Elsinore Peak location within the Plan Area is the only known location of this species that remains unaffected by this fire.

Effects of the Action

Direct Effects

Hammitt's clay-crec is considered a Narrow Endemic Plant Survey Species and will be subject to surveys within 135,810 acres of the Narrow Endemic Plant Species Survey Area (NEPSSA) 1, 2, and 9 in the Plan Area (Figure 6-1, pp. 6-30). Within the Plan Area, the only known locations (four records) for this species occur in NEPSSA 9. Until such time that the Additional Reserve Lands are assembled and conservation objectives for this species are met, surveys will be conducted, as part of the project review process for public and private projects where suitable habitat or soils for Hammitt's clay-crec are present within NEPSSA 1, 2, and 9. Populations detected as a result of survey efforts will be avoided according to the procedures outlined in the Narrow Endemic Plant Species policy (Section 6.1.3 of the Plan; *i.e.* 90 percent of portions of property with long-term conservation value will be avoided until the species conservation objectives are met). We anticipate that new locations of Hammitt's clay-crec may be confirmed through these survey efforts, and survey results may be used to prioritize areas for acquisition into the MSHCP Conservation Area. For those locations found to contain large numbers of individuals or otherwise determined to be important to the overall conservation of the species, the Plan allows flexibility to acquire these locations for inclusion into the Additional Reserve Lands (pp. 6-40).

Hammitt's clay-crec could be subject to impacts associated with development and other proposed Covered Activities within suitable habitat that is outside the MSHCP Conservation Area and outside of the NEPSSA for Hammitt's clay-crec. Any individual Hammitt's clay-crec plants and populations existing in these areas could be impacted over the 75-year permit

term as a result of the proposed Covered Activities. However, as noted above, all known locations of Hammitt's clay-cress are believed to occur in PQP Lands, and all known locations are within the NEPSSA for this species. Thus, based on current knowledge of the species, direct impacts to Hammitt's clay cress would only include up to a 10 percent loss of any areas with long-term conservation value for this species (as discussed above).

Hammitt's clay-cress is only known from two locations (four records within the Elsinore Peak vicinity) in the Plan Area and is considered fairly endangered in California (CNPS 2001); therefore, specific conservation objectives are provided in the MSHCP (Section 9, pp. 9-118) to ensure that suitable habitat and known populations of the Hammitt's clay-cress will persist. The Plan states that at least 21,260 acres of suitable habitat for Hammitt's clay-cress will be included in the MSHCP Conservation Area. This estimated habitat acreage will include at least 2,070 acres of clay soils; Altamount (190 acres), Auld (250 acres), Bosanko (600 acres), Claypit (100 acres) and Porterville (930 acres) soils underlying the suitable habitat. The Plan also states that the Core Areas for Hammitt's clay-cress, including at least the known occurrences near Elsinore Peak in the Santa Ana Mountains, and suitable habitat adjacent to these occurrences, will either remain on PQP Lands or be conserved on Additional Reserve Lands within the MSHCP Conservation Area. Other potential Core Areas for this species, such as the Santa Rosa Plateau, may be identified in the future as a result of the NEPSSA surveys. At such time, at least 90 percent of these areas with long-term conservation value will be avoided and prioritized for potential inclusion into the Additional Reserve Lands.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands including surveys for the Hammitt's clay-cress. Cooperative management and monitoring are anticipated on PQP Lands. Surveys for the Hammitt's clay-cress will be conducted at least every eight years to verify occupancy at a minimum of 75 percent of the known locations. If a decline in the distribution of Hammitt's clay-cress is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP. Other management actions described in Section 5, Table 5.2 of the MSHCP include managing off-road vehicle use, competition from non-native plants, trampling, and alteration of natural fire regimes. Implementation of these management actions will help to avoid and minimize adverse effects to Hammitt's clay-cress.

Indirect Effects

Hammitt's clay-cress could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These generally include the indirect effects discussed in the "General Effects" section of this biological opinion. Implementation of the Guidelines Pertaining to the Urban/Wildlands Interface policy and the management provisions listed above will help to reduce the indirect effects to this species.

Conclusion

We anticipate the proposed action will directly and indirectly affect Hammitt's clay-cress as described in the analyses above. Once the conservation objectives for Hammitt's clay-cress have

been met, avoided areas, which have not been otherwise conserved, may be impacted. We anticipate that occurrences determined to be important to the overall conservation of the species will be considered for inclusion in the Additional Reserve Lands and that at least some of the avoided areas may be maintained as open space habitat. Implementation of the avoidance, minimization, and mitigation measures identified in the Plan will further reduce the impacts to Hammitt's clay-cress. We anticipate that the MSCHP Conservation Area will be monitored and managed cooperatively to benefit this species.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the Hammitt's clay-cress. We reached this conclusion because all of the known locations of Hammitt's clay-cress occur in PQP Lands that will not be impacted by the Plan. In addition, NEPSSA surveys for Hammitt's clay-cress may result in newly discovered occurrences being included in the MSHCP Conservation Area. Thus, impacts to this species and its habitat, when viewed in conjunction with the protection and management of the MSHCP Conservation Area, are not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of Hammitt's clay-cress throughout its range.

Heart-leaved pitcher sage (*Lepechinia cardiophylla*)

Status of the Species

Listing Status

Heart-leaved pitcher sage is not a State or federally listed species. It is a Forest Service Sensitive Species and on the California Native Plant Society's List 1B (RED 3-2-2).

Species Description

Heart-leaved pitcher sage is a broad-leaved, perennial shrub in the Lamiaceae family (Munz 1974; CNPS 2001). This species ranges in height from 3 to 12 decimeters (Munz 1974). The flowers are white to lavender-tinged in color. The flowers are funnel-form in shape. The calyx becomes scarlet purple and enlarges in fruit. The round to oblong fruit is glabrous, one-seeded, and 2 to 4 millimeters in diameter (Munz 1974). Heart-leaved pitcher sage is one of four species of the genus *Lepechinia*. The four species are geographically disjunct.

Habitat Affinities

Heart-leaved pitcher sage occurs at elevations between 550 and 1,370 meters in closed-cone coniferous forest, chaparral and cismontane woodland (Epling 1948; CNPS 2001; Reiser 1996). Within the Santa Ana Mountains, heart-leaved pitcher sage has been recorded along Indian Truck Trail, associated with southern oak woodland forest with scattered Coulter pine and big cone spruce. Along Horsethief Trail, this species is associated with chaparral-oak woodland and decomposed granite soils. In addition, on Pleasants Peak, this species is associated with a stand of knobcone pine, as well as friant soil, sandy loam with rocky outcrops (CNDDDB 2000).

Life History

This species flowers from April through July (CNPS 2001). According to Stephenson and Calcarone (1999), heart-leaved pitcher sage is a fire follower. Very little is known about abundance, reproduction, recruitment, dispersal or other pertinent information on heart-leaved pitcher sage.

Status and Distribution

This species is restricted to the Santa Ana Mountains in Orange and Riverside counties, the Peninsular Ranges (a disjunct Iron Mountain population) in San Diego County, and the coastal mountains of northern Baja California (Epling 1948; Munz 1974; CNPS 2001; Reiser 1996). The majority of the records for heart-leaved pitcher sage are from western Riverside County and from along the border between Orange and Riverside counties. Within western Riverside County, historic records for this species occur along Indian Truck Trail/Mayhew Canyon from 1982, Bald Peak from 1983, Trabuco Peak from 1983, and Pleasants Peak from 1987 (CNDDDB 2000).

Threats

In general, this species is threatened by development (CNPS 2001), installation of transmission lines, and fire-suppression activities (CNDDDB 2000).

Conservation Needs

Conservation needs of the heart-leaved pitcher sage include protection and management of the known occurrences in Riverside, Orange, and San Diego counties in a manner that provides for their long-term viability. This includes maintenance of the ecological processes that sustain the species' habitat. Newly discovered populations that are determined to have long-term conservation value should be conserved in the same manner. Actions that increase the likelihood of deleterious effects from any identified threat should be avoided. Because most of the literature on this species is limited to its taxonomic treatments (*e.g.*, Munz 1974), the determination of more specific conservation needs will require more studies regarding the species' status, distribution, life history (reproductive biology, pollinators, germination, dispersal, etc.), population genetics or biology, habitat requirements, and threats.

Environmental Baseline

According to our dataset, there are two recent records of heart-leaved pitcher sage in the Plan Area. One location is in the vicinity of Sierra Peak in the Santa Ana Mountains, Cleveland National Forest (PQP Lands). The other location is west of Lake Elsinore, near the Cleveland National Forest boundary. Most of the current and historic records for this species are within Forest Service lands (Andy Sanders, UCR Herbarium, pers. comm., 2003). The MSHCP does not identify any core locations for this species.

The heart-leaved pitcher sage is associated with closed-cone coniferous forest, chaparral and cismontane woodland at elevations between 1,805 and 4,495 feet (550 and 1,370 meters) (Epling 1948, CNPS 2001, Reiser 1996). Therefore, our modeled habitat includes chaparral and woodland/forests between elevations of 1,805 and 4,495 feet within the Santa Ana Mountains Bioregion. Based on these criteria, there are approximately 70,695 acres of modeled habitat for the heart-leaved pitcher sage within the Plan Area. Approximately 54,916 acres (78 percent) of the modeled habitat occur within PQP Lands.

Effects of the Action

Direct effects

The Plan Area includes approximately 70,695 acres of modeled habitat for heart-leaved pitcher sage. There are 14,237 acres (20 percent) of this modeled habitat outside the MSHCP Conservation Area; of that, 996 acres (1 percent of total modeled habitat) occur within Criteria Area Species Survey Area (CASSA) 7 and 8 (Figure 6-2, pp. 6-64). The heart-leaved pitcher sage is considered an Additional Survey Needs and Procedures species. Until such time that the Additional Reserve Lands are assembled and conservation objectives for heart-leaved pitcher sage are met, surveys will be conducted for the heart-leaved pitcher sage where suitable habitat for the species is present within CASSA 7 and 8. Populations detected as a result of survey efforts will be avoided according to the procedures outlined in the Additional Survey Needs and Procedures (Section 6.3.2; *i.e.*, 90 percent of portions of property with long-term conservation value will be avoided until the species conservation goals are met). For those locations found to contain large numbers of individuals or otherwise determined to be important to the overall conservation of the species, the Plan allows flexibility to acquire these locations for inclusion into the Additional Reserve Lands (pp. 6-70).

Within the 996 acres (less than 1 percent) of modeled habitat that occurs outside of the Conservation Area, but within the CASSA for the heart-leaved pitcher sage, we anticipate that up to 10 percent of the area with long-term conservation value for heart-leaved pitcher sage (as discussed above) will be lost to individual projects.

Heart-leaved pitcher sage will be subject to impacts associated with development and other proposed Covered Activities within 13,242 acres (19 percent of total modeled habitat) that are outside of the MSHCP Conservation Area and outside of CASSA 7 and 8. Thus, all individual heart-leaved pitcher sage plants and populations persisting in these areas are anticipated to be impacted over the 75-year permit term as a result of the proposed development. Approximately 12,818 acres (90 percent) of the non-conserved modeled habitat for the heart-leaved pitcher sage are designated as rural/mountainous land where development impacts are expected to occur at a slower rate and at lower densities. This includes the heart-leaved pitcher sage location west of Lake Elsinore within the Santa Ana Mountains.

Because the heart-leaved pitcher sage is not widely distributed within the Plan Area, specific conservation objectives are provided in the MSHCP (Section 9, pp. 9-119) to ensure that suitable habitat and known populations of the heart-leaved pitcher sage will persist. The Plan states that the MSHCP Conservation Area will include at least six known populations of the heart-leaved

pitcher sage in the Santa Ana Mountains Bioregion. In addition, our analysis indicates that the MSHCP will conserve and manage approximately 1,542 acres (2 percent) of modeled heart-leaved pitcher sage habitat within the Additional Reserve Lands. Another 54,916 acres (78 percent) of modeled habitat will remain within PQP Lands, including the Sierra Peak occurrence of heart-leaved pitcher sage. In total, 56,458 acres (80 percent) of the modeled habitat for the heart-leaved pitcher sage will be conserved or remain in the Plan Area. These measures should help offset the direct impacts to the species

The Permittees will implement management and monitoring practices within the Additional Reserve Lands including surveys for the heart-leaved pitcher sage. Cooperative management and monitoring are anticipated on PQP Lands. Surveys for the heart-leaved pitcher sage will be conducted at least every eight years to verify occupancy at a minimum of 75 percent of the known locations. If a decline in the distribution of heart-leaved pitcher sage is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP. According to the MSHCP (Section 5, Table 5.2), Reserve Managers will avoid or minimize adverse effects to heart-leaved pitcher sage to the maximum extent practicable. Other management actions described in Section 5 of the MSHCP will help maintain habitat and populations of heart-leaved pitcher sage by managing known and future occurrences of the species where transmission lines and fire suppression activities are allowed or planned. Implementation of these management actions will help to avoid and minimize adverse effects to heart-leaved pitcher sage.

Indirect Effects

Heart-leaved pitcher sage could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These generally include the indirect effects discussed in the “General Effects” section of this biological opinion. Implementation of the Guidelines Pertaining to the Urban/Wildlands Interface policy and the management provisions listed above will help to reduce the indirect effects to this species.

Conclusion

We anticipate the proposed action will directly and indirectly affect heart-leaved pitcher sage as described in the analyses above, including the total loss of 19 percent of its modeled habitat. An additional 1 percent of its modeled habitat outside the MSHCP Conservation Area will be subject to surveys within CASSA 7 and 8. Once the conservation objectives for heart-leaved pitcher sage have been met, avoided areas, which have not been otherwise conserved, may be impacted. We anticipate that occurrences determined to be important to the overall conservation of the species will be considered for inclusion in the Additional Reserve Lands and that at least some of the avoided areas may be maintained as open space habitat. Implementation of the avoidance, minimization, and mitigation measures identified in the Plan will further reduce the impacts to heart-leaved pitcher sage. This species is anticipated to persist within the remaining 80 percent of its modeled habitat within both the PQP Lands and the Additional Reserve Lands. We anticipate that these areas will be monitored and managed cooperatively to benefit this species.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the heart-leaved pitcher sage. We reached this conclusion because implementation of the species conservation objectives will provide for heart-leaved pitcher sage persistence within the Plan Area. Thus, impacts to this species and its modeled habitat, when viewed in conjunction with the protection and management of the MSHCP Conservation Area, are not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Intermediate mariposa lily (*Calochortus weedii* var. *intermedius*)Status of the Species*Listing Status*

Intermediate mariposa lily (*Calochortus weedii* var. *intermedius*) is not a State or federally listed species. However, it is a U.S. Forest Service Sensitive Species and on the California Native Plant Society's List 1B (RED 2-2-3).

Species Description

Intermediate mariposa lily is a perennial bulb and a member of the Liliaceae family (CNPS 2001). Intermediate mariposa lily leaves are basal and vary in length from 20-40 centimeters and the stems are 30-90 centimeters high (Fiedler and Ness 1993). Intermediate mariposa lily inflorescences consist of 2-6 bell-shaped flowers. The purple petals are fringed with dark or yellow hairs and are bearded on the inner face with long yellow hairs. Each petal also has a round gland bordered with a ring of yellow hairs. The erect capsules are 4-5 centimeters long (Munz 1974; Fiedler and Ness 1993).

Intermediate mariposa lily is one of three varieties of *C. weedii*; these varieties are differentiated by geographical range and morphological characters (Fiedler and Ness 1993). This variety is a member of subsection Weediani, section Cyclobothra, genus *Calochortus* (Ness 1989). Intermediate mariposa lily hybridizes with Plummer's mariposa lily (*C. plummerae*), also a member of subsection Weediani, where the two are sympatric in the San Jose Hills and Puente Hills (Ness 1989; CNPS 2001).

Habitat Affinities

Intermediate mariposa lily occurs at elevations from 120-850 meters on dry, rocky open slopes and rock outcrops in coastal scrub and chaparral (CNDDDB 2000; CNPS 2001). In addition, intermediate mariposa lily occurs in valley and foothill grasslands and is more detectable after burns due to an increase in flower production stimulated by fire (F. Roberts, pers. comm., 2003).

Life History

Intermediate mariposa lily flowers from May through July (CNPS 2001). Little is known about abundance, reproduction, recruitment, dispersal, or other pertinent information on this variety.

Status and Distribution

Intermediate mariposa lily is known from Ventura, Los Angeles, Orange, and Riverside counties (CNPS 2001); Ventura and Los Angeles counties each contain only one known location (T. Bomkamp, pers. comm. 2003; CNDDDB 2003). The majority of the known populations are in the foothill regions of Orange County (CNDDDB 2003; F. Roberts, pers. comm., 2003). The populations in Orange County occur primarily in chaparral and coastal sage scrub and are currently the most viable populations of the intermediate mariposa lily (F. Roberts, pers. comm., 2003). An estimate of over 89,000 individuals occur within conserved areas in the NCCP Central Subregion of Orange County (LSA Associates 2002b). There are historic records for this variety from Sierra Peak, Santa Ana Mountains, Riverside County (RSABG 1940) and from the lower Santa Ana River on Oak Flat Fire Road, Riverside County (RSABG 1958).

Threats

This variety is threatened by urban development, road construction, and fire-suppression activities (CNPS 2001).

Conservation Needs

The conservation needs of intermediate mariposa lily include the protection and management of populations with long-term conservation value in Orange, Los Angeles, and Riverside counties in a manner that provides for their long-term viability. Newly discovered populations with long-term conservation value should be treated in the same manner. Actions that increase the likelihood of deleterious effects from any identified threat should be avoided. Because most of the literature on this variety is limited to its taxonomic treatments (Ness 1989), the determination of more specific conservation needs will require more studies regarding the status, distribution, life history (reproductive biology, pollinators, germination, dispersal, etc.), population genetics or biology, habitat requirements, and threats.

Environmental Baseline

According to our dataset, there are 10 recent records of the intermediate mariposa lily in the Plan Area. However, we found that three of the records from the Santa Ana Mountains are actually records for *Calochortus weedii* var. *weedii*. One occurrence is east of I-15 in the Alberhill area; however, we are unable to verify the source of this occurrence within the UCR database. The Plan also states that there is an occurrence in the vicinity of Sierra Peak of the Santa Ana Mountains, along the border between Orange and Riverside counties. However, according to CNDDDB (2003), it is not clear if this occurrence from 1940 is within Riverside County or Orange County. Therefore, for the purposes of our analysis, we considered six recent records in the Plan Area for the intermediate mariposa lily. There is only one known record of *Calochortus*

weedii var. *intermedius* in the Santa Ana Mountains (south of Corona, vicinity of Hagadoor Canyon) within our dataset. Five of the records are in the San Jacinto Foothills Bioregion: one record is in the hills west of Crown Valley and south of Diamond Valley Lake within a private inholding; and four occurrences are west of Vail Lake. The MSHCP does not identify any core locations for this species in the Plan Area.

Modeled habitat for the intermediate mariposa lily includes 339,283 acres of coastal sage scrub, chaparral, and valley/foothill grasslands at elevations between 394 and 2,789 feet (120 and 850 meters) in the Riverside Lowlands, Santa Ana Mountains, and San Jacinto Foothills bioregions of the Plan Area. Approximately 105,435 acres of this modeled habitat occur within PQP Lands. Due to the species' microhabitat associations (*i.e.*, dry, rocky, open slopes and rock outcrops), the modeled habitat likely overestimates the extent of suitable habitat for this species in the Plan Area.

Effects of the Action

Direct effects

The Plan Area includes approximately 339,283 acres of modeled habitat for the intermediate mariposa lily. The species will be subject to proposed impacts associated with residential, commercial, urban, and agricultural development within 145,009 acres (43 percent) of the modeled habitat that is outside of the MSHCP Conservation Area. Thus, any individual intermediate mariposa lily plants and populations persisting in these areas are anticipated to be impacted over the 75-year permit term as a result of the proposed development. This includes five of six occurrences including the location near Hagadoor Canyon, the location west of Crown Valley, and three of the locations west of Vail Lake.

Because the intermediate mariposa lily has a scattered but restricted distribution within particular habitat associations in the Plan Area, specific conservation objectives are provided in the MSHCP (Section 9, pp. 9-119) to ensure that suitable habitat and known populations of the intermediate mariposa lily will persist. The Plan states that at least 195,730 acres of chaparral and coastal sage scrub between 394 and 2,789 feet (120 and 850 meters) in elevation will be included in the MSHCP Conservation Area. The Plan also states that at least two populations located at Vail Lake and Crown Valley and possibly a third population in the Sierra Peak area of the Santa Ana Mountains will be conserved. However, based on our analysis, only one record in the vicinity of Vail Lake falls fully within the MSHCP Conservation Area. The other three RSABG data points that fall outside of the Conservation Area have a lower mapping precision and likely represent the multiple observations of the same CNDDDB occurrence. The occurrence at Crown Valley is located outside the Criteria Area, and as noted above, it is questionable whether the Sierra Peak occurrence falls within Riverside County.

To offset the loss of intermediate mariposa lily modeled habitat within the Plan Area, the MSHCP will conserve and manage approximately 88,839 acres (26 percent) of modeled habitat for the intermediate mariposa lily within Additional Reserve Lands, including one occurrence west of Vail Lake. Approximately 105,435 acres (31 percent) of modeled habitat will remain

within PQP Lands. In total, 194,274 acres (57 percent) of modeled habitat for the intermediate mariposa lily will be conserved or remain in the Plan Area.

Based on our interpretation of the Criteria Area, only one known occurrence will be conserved within Additional Reserve Lands in the area west of Vail Lake. The others fall outside of the Criteria Area and outside of PQP Lands. Therefore, we have proposed a permit condition that the intermediate mariposa lily shall be considered a “Species Adequately Conserved” only after the species-specific conservation objectives are met. Through compliance with this permit condition, we anticipate that the Permittees will meet the species-specific conservation objective of conserving 2 to 3 occurrences of intermediate mariposa lily within the MSHCP Conservation Area on “Conserved Habitat” as defined by the MSHCP.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands including surveys for the intermediate mariposa lily. Cooperative management and monitoring are anticipated on PQP Lands. Surveys for the intermediate mariposa lily will be conducted at least every eight years to verify occupancy at a minimum of 75 percent of the known locations. If a decline in the distribution of intermediate mariposa lily is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific conservation objectives identified in Section 9, Table 9.2 of the MSHCP. According to the MSHCP (Section 5, Table 5.2), Reserve Managers will avoid or minimize adverse effects to intermediate mariposa lily to the maximum extent practicable. Other management actions described in Section 5 of the MSHCP will help maintain intermediate mariposa lily habitat by managing known and future occurrences of this species where fire, fire-suppression, or road construction activities are allowed or proposed.

Indirect Effects

Intermediate mariposa lily could be impacted by indirect effects both inside and outside of the MSHCP Conservation Area. These generally include the indirect effects discussed in the “General Indirect Effects” section, above. Implementation of the Guidelines Pertaining to the Urban/Wildlands Interface Policy and the management provisions listed above will help to reduce the indirect effects to this species.

Conclusion

We anticipate the proposed action will affect the intermediate mariposa lily as described in the analysis above, including the loss of up to 43 percent of its modeled habitat and 50 to 67 percent of the known occurrences (3 to 4 of the 6 occurrences) within the Plan Area. Implementation of the avoidance, minimization and mitigation measures identified in the Plan will reduce impacts to the intermediate mariposa lily. This species is anticipated to persist within the remaining 57 percent of its modeled habitat within both the PQP Lands and the Additional Reserve Lands. In particular, we anticipate that surveys to meet the species-specific conservation objectives may result in newly discovered occurrences of the intermediate mariposa lily within the MSHCP Conservation Area. We anticipate that these areas will be monitored and managed cooperatively to benefit this species.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Fish and Wildlife Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the intermediate mariposa lily. We reached this conclusion because the stronghold for this species is within Orange County and the species is expected to persist in Riverside County within the MSHCP Conservation Area. Thus, the impacts to this species and its habitat in Riverside County, when viewed in conjunction with the protection and management of the MSHCP Conservation Area, are not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Jaeger's milk-vetch (*Astragalus pachypus* var. *jaegeri*)Status of the Species*Listing Status*

Jaeger's milk-vetch is not a State or federally listed species. It is a U.S. Forest Service Sensitive Species. This species is on the California Native Plant Society's List 1B (RED 3-3-3).

Species Description

Jaeger's milk-vetch belongs to the Legume family (Fabaceae) and is a perennial shrub with several to numerous stems that range in height from 1.5 to 8 decimeters. The clear-lemon colored flowers are 15 to 27 millimeters long, and the fruits consist of long pods that are 15 to 25 millimeters in length (Munz 1974). Jaeger's milk-vetch is one of two varieties of *Astragalus pachypus* that are differentiated by range and slight differences in morphological characters including flower color and leaflet number (Barneby 1964).

Habitat Affinities

Jaeger's milk-vetch occurs at elevations from 365 to 915 meters on dry ridges and valleys and open sandy or rocky slopes in coastal scrub, chaparral, valley and foothill grassland, and cismontane woodland habitats (CNDDDB 2000; CNPS 2001).

Life History

This variety blooms from December through June (Barneby 1964; CNPS 2001). No literature regarding this variety's reproduction, pollinators, germination, and dispersal could be located.

Status and Distribution

Jaeger's milk-vetch is endemic to northern San Diego and southern Riverside counties (CNPS 2001). The CNDDDB (2003) has nine localities for Jaeger's milk-vetch, ranging from Beaumont in Riverside County, to Warner Springs in San Diego County. Although this variety has a fairly scattered distribution, Jaeger's milk-vetch appears to be concentrated in the vicinity of Vail Lake near Kolb Creek, and at the base of the Agua Tibia Mountains.

Threats

In general, this variety may be threatened by urbanization, agricultural conversion, and grazing (CNPS 2001).

Conservation Needs

The conservation needs of Jaeger's milk-vetch include protection and management of known occurrences in Riverside and San Diego counties in a manner that provides for their long-term viability. Any newly discovered populations should be conserved in the same manner. Actions that would interfere with the ecological processes that support suitable habitat or increase the likelihood of deleterious effects from any identified threat should be avoided. Because most of the literature on Jaeger's milkvetch is limited to its taxonomic treatments, the determination of specific conservation needs will require more studies regarding life history (reproductive biology, pollinators, germination, dispersal, etc.), population genetics or biology, habitat requirements, and threats.

Environmental Baseline

Our dataset includes 13 records for Jaeger's milk-vetch from seven localities within the Plan Area. Jaeger's milk-vetch is found west of Sand Canyon in the San Bernardino National Forest, east of Dripping Springs Campground at the base of the Agua Tibia Mountains, and along Arroyo Seco Creek in the Cleveland National Forest. Our dataset also includes records from west of Potrero Creek, south of Vail Lake along Kolb Creek, Temecula Creek within Aguanga Valley, and north of the Pechanga Indian Reservation. According to information provided in the MSHCP, this species is also known to occur in the vicinity of Sage, Temecula Canyon, and Castile Canyon (CNDDDB 2000); however, these locations were not included in our dataset due to the age of the records. The MSHCP considers both the occurrences at Vail Lake near Kolb Creek and at the base of the Agua Tibia Mountains as core locations.

In the Plan Area, modeled habitat for Jaeger's milk-vetch includes 456,857 acres of chaparral, coastal sage scrub, grassland, and woodland/forests at elevations between 1,198 and 3,002 feet (365 and 915 meters) within the Santa Ana Mountains, Riverside Lowlands, San Jacinto Foothills, Desert Transition, and Agua-Tibia Mountains Bioregions. Approximately 135,842 acres (30 percent) of the modeled habitat are within PQP Lands. Due to this species' microhabitat associations (*i.e.*, dry ridges and valleys and open sandy or rocky slopes), the modeled habitat likely overestimates the extent of suitable habitat for this species in the Plan Area.

Effects of the Action

Direct effects

The Plan Area includes approximately 456,857 acres of modeled habitat for the Jaeger's milk-vetch. The species will be subject to proposed impacts associated with residential, commercial, urban, and agricultural development within 212,701 acres (47 percent) of this modeled habitat

that is outside of the MSHCP Conservation Area. Thus, any individual Jaeger's milk-vetch plants and populations persisting in these areas, including the populations in the Aguanga Valley and north of the Pechanga Indian Reservation, are anticipated to be impacted over the 75-year permit term as a result of the proposed development; however, some plants may survive in rural mountainous areas where development impacts are anticipated to occur at a slower rate and at lower densities. Approximately 80,739 acres (38 percent) of the non-conserved modeled habitat for the Jaeger's milk-vetch are designated as rural/mountainous land.

Because the Jaeger's milk-vetch has a scattered distribution within the Plan Area, specific conservation objectives are provided in the MSHCP (Section 9, pp. 9-120) to ensure that suitable habitat and known populations of the Jaeger's milk-vetch will persist. The Plan states that the MSHCP Conservation Area will include seven known localities (18 occurrences) of this species at Aguanga Valley, San Jacinto Mountains, Potrero Creek, Sage, Temecula Canyon, and the Core locations at Vail Lake and the base of the Agua Tibia. In addition, based on our analysis, the MSHCP will conserve and manage approximately 108,314 acres (24 percent) of the modeled habitat and six of the known occurrences for Jaeger's milkvetch in Additional Reserve Lands. Approximately 135,842 acres (30 percent) of modeled habitat and five known occurrences of Jaeger's milkvetch will remain in PQP Lands, including the occurrences west of Sand Canyon in the San Bernardino National Forest, east of Dripping Springs Campground at the base of the Agua Tibia Mountains, and along Arroyo Seco Creek in the Cleveland National Forest. In total, approximately 244,156 acres or 53 percent of modeled habitat for Jaeger's milkvetch and 85 percent of the known occurrences will either be conserved or remain in the Plan Area.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands including surveys for the Jaeger's milk-vetch. Cooperative management and monitoring are anticipated on PQP Lands. Surveys for the Jaeger's milk-vetch will be conducted at least every eight years to verify occupancy at a minimum of 75 percent of the known locations. If a decline in the distribution of Jaeger's milk-vetch is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP. As stated in the MSHCP (Section 5, Table 5.2), Reserve Managers will avoid or minimize adverse effects to Jaeger's milk-vetch to the maximum extent practicable. Other management actions described in Section 5 of the MSHCP will help maintain Jaeger's milk-vetch habitat by managing known and future occurrences of this species where agricultural conversion and grazing is allowed or proposed. Implementation of these management actions will help to avoid and minimize adverse effects to Jaeger's milk-vetch.

Indirect Effects

Jaeger's milk-vetch could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These generally include the indirect effects discussed in the "General Effects" section of this biological opinion. Implementation of the Guidelines Pertaining to the Urban/Wildlands Interface and the management provisions listed above will help to reduce the indirect effects to this species.

Conclusion

We anticipate the proposed action will affect the Jaeger's milk-vetch as described in the analysis above, including the loss of 47 percent of its modeled habitat in the Plan Area. Implementation of the avoidance, minimization and mitigation measures identified in the Plan will reduce impacts to the Jaeger's milk-vetch. This species is anticipated to persist within the remaining 53 percent of its modeled habitat within both the PQP Lands and the Additional Reserve Lands that will support 11 of the 13 (85 percent) known occurrences of Jaeger's milk-vetch in the Plan Area. We anticipate that these areas will be monitored and managed cooperatively to benefit this species.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the Jaeger's milk-vetch. We reached this conclusion because the majority of the known localities of Jaeger's milk-vetch will not be impacted by the Plan, and thus, the impacts associated with loss of this species' modeled habitat, when viewed in conjunction with the protection and management of the MSHCP Conservation Area, are not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Johnston's Rock Cress (*Arabis johnstonii*)

Status of the Species

Listing Status

Johnston's rock cress is not a State or federally listed species. This species was proposed for Federal listing as threatened in 1995 (60 Federal Register 39337), but the proposal was withdrawn in 1998 because the threats were being minimized by the actions of the San Bernardino National Forest in managing grazing activities and because of the lack of progress on proposed development in the Pine Meadow area (63 Federal Register 49063). Johnston's rock cress is a Forest Service Local Viability Concern Species and on the California Native Plant Society Inventory (2001) List 1B (RED 3-2-3).

Species Description

Johnston's rock cress is a perennial herb in the Brassicaceae (mustard family) (California Native Plant Society 2001). Johnston's rock cress has purple flowers and a densely pubescent basal rosette (60 Federal Register 39337).

Habitat Affinities

Johnston's rock cress occurs at elevations from 4,593 ft (1,400 m) to 7,054 ft (2,150 m) on eroded clay soils in open areas of chaparral (Stephenson and Calcarone 1999) and lower montane coniferous forest (60 Federal Register 39337; California Native Plant Society 2001).

Life History

Johnston's rock cress flowers from February to June and produces narrow, many-seeded fruits (siliques) that grow to three to five cm in length (60 Federal Register 39337). Most *Arabis* species are self-pollinating (Preston 1991), although this has not been confirmed in published literature for Johnston's rock cress. Very little is known about the abundance, reproduction, recruitment, dispersal or other pertinent information on this species.

Status and Distribution

Johnston's rock cress is endemic to the San Jacinto Mountains of western Riverside County (Munz 1974; Rollins 1941, 1993). It was first collected in 1922 by P. A. Munz and I. M. Johnston at Kenworthy, San Jacinto Mountains, Riverside (60 Federal Register 39337). In 1995, the Service reported that two distinct population centers were known; one in the vicinity of Garner Valley and the other along the Desert Divide approximately 4 miles (6.5 kilometers) east of Garner Valley (60 Federal Register 39337). The Desert Divide population is outside of the Plan Area. The CNDDDB (2000) has nine historic records of Johnston's Rock Cress. One record is from San Jacinto Peak (1937), seven are from Garner Valley (all from 1982), and one is from Palm View Peak (1982).

Threats

Johnston's rock cress was proposed for listing because it was threatened by grazing and trampling (forest occurrences are within grazing allotments), off-road vehicle activity, and residential and recreational development in Garner Valley (60 Federal Register 39337). Adverse effects to the species began around the late 1800's with the loss and degradation of habitat as a result of urbanization and cattle trampling in the Garner Valley and the construction of the Desert Divide trail. Urban and recreational pressures have substantially affected the species over the past 30 years (60 Federal Register 39337). Destruction and degradation of chaparral and forest habitats containing Johnston's rock cress due to livestock trampling and residential and recreational developments, including groundwater drawdown by numerous wells, have contributed to the decline of this species (60 Federal Register 39337).

Conservation Needs

The conservation needs of Johnston's rock cress include protection and management of the known occurrences in Riverside County in a manner that provides for their long-term viability. Ecological processes necessary to maintain suitable habitat also need to be protected. Specific threats to Johnston's rock cress should be clearly identified and addressed. Actions that would increase the likelihood of deleterious effects from any identified threat should be avoided. Fencing may be necessary in some areas to prevent trampling by livestock. Newly discovered occurrences with long term conservation value should be conserved in the same manner.

Environmental Baseline

No species-specific distribution surveys have been done for Johnston's rock cress throughout the Plan Area, though Johnston's Rock Cress was historically known from Garner Valley within the Plan Area (60 Federal Register 39337). There are no recent records (since 1988) in our dataset, though the MSHCP states that the UCR database and 3 herbaria collections (Rancho Santa Ana Botanic Gardens, UCR, and Pomona) include 11 occurrences within the San Jacinto Mountains. No dates or specific locations, however, are reported for these records.

The Forest Service reports eight occurrences of Johnston's rock cress distributed in two distinct population centers at Garner Valley (where it affected by livestock grazing) and along the Desert Divide (outside the Plan Area) as described above in *Status and Distribution* (Stephenson and Calcarone 1999). Most of the occurrences are located on the San Bernardino National Forest within two grazing allotments. In one of the grazing allotments it grows on stock driveways. In the second allotment, it grows in an area that cattle naturally avoid, and therefore Johnston's rock cress may not be heavily disturbed by cattle in the second allotment. Portions of some occurrences are protected within enclosures (Stephenson and Calcarone 1999).

Johnston's rock cress occurs at elevations from 4,593 ft (1,400 m) to 7,054 ft (2,150 m) in chaparral and pine forest habitats in the southern San Jacinto Mountains (60 Federal Register 39337). The vegetation types used to model habitat for this species were chaparral, montane coniferous forest, and juniper woodland (pine forest was categorized as montane coniferous and juniper woodland) between 4,593 ft and 7,054 ft within the Narrow Endemic Survey Area of the San Jacinto Mountain Bioregion. Based on this analysis, there are approximately 43,772 acres of modeled Johnston's rock cress habitat in the Plan Area. Approximately 34,855 acres (80 percent) of modeled habitat are within PQP Lands. Because Johnston's rock cress occurs in specific micro-habitats, such as in openings and on eroded clay soils, within chaparral and pine forests (Stephenson and Calcarone 1999; CNPS 2001) as described above, the modeled habitat likely overestimates the extent of suitable habitat for this species within the Plan Area.

Effects of the Action

Direct Effects

The Plan Area includes 43,772 acres of modeled habitat for Johnston's rock cress. There are 8,917 acres (20 percent) of modeled habitat for Johnston's rock cress outside the MSHCP Conservation Area, though all of this modeled habitat is included within the Narrow Endemic Plant Species Survey Area (NEPSSA) 6 (Figure 6-1, pp. 6-30). Johnston's rock cress is considered a Narrow Endemic Plant Species. Until such time that the Additional Reserve Lands are assembled and conservation objectives for this species are met, surveys will be conducted as part of the project review process for public and private projects where suitable habitat for Johnston's rock cress is present within NEPSSA 6. Populations detected as a result of survey efforts will be avoided according to the procedures outlined in the Narrow Endemic Plant Species policy (section 6.1.3 of the Plan; *i.e.*, 90 percent of portions of property with long-term conservation value will be avoided until the species conservation objectives are met). For those locations found to contain large numbers of individuals or otherwise determined to be important

to the overall conservation of the species, the Plan allows flexibility to acquire these locations for inclusion into the Additional Reserve Lands (pp. 6-40).

Within the 8,917 acres of modeled habitat outside of the MSHCP Conservation Area, but within the NEPSSA for Johnston's rock cress (20 percent of total modeled habitat), we anticipate that up to 10 percent of the area with long-term conservation value for this species (as discussed above) will be lost to individual projects.

Because is not widely distributed within the Plan Area, specific conservation objectives are provided in the MSHCP (Section 9, Table 9.2, pp. 9-121) to ensure that suitable habitat and known populations of the Johnston's rock cress will persist. The Plan states that two Core Areas, including at least 17 of the known occurrences in Garner Valley and Mountain Springs, and suitable habitat adjacent to these occurrences will be included within the MSHCP Conservation Area. We are unable, however, to verify the occurrence at Mountain Springs or the location of Mountain Springs.

Based on our analysis, approximately 34,855 acres (80 percent) of the modeled Johnston's rock cress habitat occur within PQP Lands, and no modeled habitat occurs within the Additional Reserve Lands. The center of the only known population of Johnston's rock cress in the Plan Area occurs within PQP Lands in Garner Valley; it is uncertain whether individuals of this population occur on private lands.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands if occurrences of Johnston's rock cress are detected within NEPSSA 6 and are acquired into the Additional Reserve Lands. Cooperative management and monitoring is anticipated on PQP Lands. Surveys for Johnston's rock cress will be conducted at least every 8 years to verify occupancy of 75 percent of known locations. If a decline in the distribution of Johnston's rock cress is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP. As stated in Section 5, Table 5.2 of the MSHCP, Reserve Managers will manage known and future occurrences of this species where fire and fire suppression, off-road vehicle use, and grazing activities are allowed or proposed. Implementation of these management actions will help to avoid and minimize adverse effects to Johnston's rock cress.

Indirect Effects

Johnston's rock cress could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These generally include the indirect effects described in the "General Effects" section of this biological opinion. Implementation of the Guidelines Pertaining to the Urban/Wildlands Interface policy and the management provisions listed above will help to reduce the indirect effects to this species.

Conclusion

We anticipate the proposed action will directly and indirectly affect Johnston's rock cress as described in the analyses above. Twenty percent of Johnston's rock cress modeled habitat

outside the MSHCP Conservation Area will be subject to surveys within NEPSSA 6. Once the conservation objectives for Johnston's rock cress have been met, avoided areas, which have not been otherwise conserved, may be impacted. We anticipate that occurrences determined to be important to the overall conservation of the species will be considered for inclusion in the Additional Reserve Lands and that at least some of the avoided areas may be maintained as open space habitat. Implementation of the avoidance, minimization, and mitigation measures identified in the Plan will further reduce impacts to Johnston's rock cress. This species is anticipated to persist within the remaining 80 percent of its modeled habitat within the PQP Lands. We anticipate that the PQP Lands and Additional Reserve Lands will be monitored and managed cooperatively to benefit this species.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the Johnston's rock cress. We reached this conclusion because 80 percent of Johnston's rock cress modeled habitat and most of the known occurrences will remain within the MSHCP Conservation Area. In addition, required surveys for this species may result in newly discovered occurrences being included in the MSHCP Conservation Area. Thus, impacts to this species and its modeled habitat, when viewed in conjunction with the protection and management of the MSHCP Conservation Area, are not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of Johnson's rock cress throughout its range.

Lemon Lily (*Lilium parryi*)

Status of the Species

Listing Status

The lemon lily is not a State or federally listed species. It is a Forest Service Sensitive Species and is on the California Native Plant Society's List 1B (RED 2-2-2).

Species Description

Lemon lily is an herbaceous perennial in the Liliaceae family (CNPS 2001). The bright, showy yellow flowers of *Lilium parryi* are large (8 to 10 centimeters long) and trumpet-shaped with red-orange spots in the throat (Munz 1974; Mistretta and Parra-Szjij 1991). This plant is a rhizomatous bulb and typically has a single stem with one to six flowers borne at the top of the stem (Munz 1974; Linhart and Premoli 1994).

Lemon lily may be closely related to Humbolt lily (*Lilium humboldtii*), as the species have been hybridized in cultivation. However, they are not known to hybridize in nature, as their distributions are separated by elevation. In the San Gabriel Mountains, *L. humboldtii* var. *ocellatum* occurs below 1,000 meters and lemon lily occurs above 1,300 meters (Mistretta and Parra-Szjij 1991; Skinner 1988).

Habitat Affinities

Lemon lily occurs in mesic habitats within lower and upper montane coniferous forests, meadows and seeps, and riparian scrub. It requires moisture year-round. The distribution of this species is limited to the banks of seeps, springs, and permanent streams higher than 1,300 meters above mean sea level. Typical habitat consists of forested, shady stream banks within narrow canyon bottoms (Skinner 1993; Linhart and Premoli 1994).

Life History

The lemon lily flowers from July through August. An analysis of the breeding system indicates that lemon lily is functionally self-incompatible. Some self-compatibility is apparent and limited self-pollination may be possible in the absence of pollinators (Skinner 1988; Mistretta and Parra-Szjij 1991; Linhart and Premoli 1994). The flowers remain open for six or seven days, secreting nectar evenly on the inner bases of both petals and sepals. This attracts flower visitors (*e.g.*, moths, butterflies, bees, and hummingbirds) to the throat of the flower where they encounter the anthers and stigma. The primary pollinators in California are hawkmoths and lemon lily appears to have evolved in response to the hawkmoths. The size and hovering behavior of the hawkmoths resulted in these species taking the greatest pollen loads. The scented flowers open in the late afternoon and early evening, coinciding with the moths' peak feeding time (Skinner 1985).

Pollination and fruit set success were very high in populations studied by Mistretta and Parra-Szjij (1991) and Skinner (1988). The erect capsules are approximately 45 millimeters long and 15 millimeters wide, bearing 200 to 250 seeds (Skinner 1988). Lemon lily seeds are believed to be short-lived, perhaps remaining viable for only one or two years under natural conditions (Newman 1990 as cited in Mistretta and Parra-Szjij 1991). Thus, there is essentially no seed bank in the soil. This species has shown no evidence of vegetative reproduction (Skinner 1988; Mistretta and Parra-Szjij 1991).

The three capsules of the ovary split open upon maturity. The seeds of lemon lily are heavy, and no seed dispersal mechanism is known. Possibly, the seeds are dispersed downstream in association with storm events (Mistretta and Parra-Szjij 1991).

In cultivation, the roots and bulb form during the first season with the first leaves developing the following spring. The first flower stalk appears three to five years after germination. Plants flower for several years before senescence and death (Newman 1990 as cited in Mistretta and Parra-Szjij 1991).

Because lemon lily requires a permanently moist habitat, populations occupy relatively insular locations. This insularity is believed to be the cause of lower than expected levels of heterozygosity for the species, but insularity may also be linked to the absence of adequate pollinators and subsequent self-pollination. Therefore, maintaining populations of native hawkmoths, the primary pollinator, in proximity to lemon lily populations is very important to the long-term survival of the species (Linhart and Premoli 1994).

Rangewide, the Arizona populations are more closely related to each other than to the California populations, and the California populations demonstrate higher levels of allelic diversity than the Arizona populations. The difference in heterogeneity levels between the California and the Arizona populations appears to be associated with lemon lily population sizes being significantly larger in California relative to Arizona (Linhart and Premoli 1994).

Status and Distribution

In California, lemon lily is known from several mountain ranges (*e.g.*, San Gabriel Mountains, San Jacinto Mountains, and San Bernardino Mountains) within San Diego (nearly extirpated), Riverside, Los Angeles (occurrences are very small), and San Bernardino counties (CNPS 2001). In Arizona, lemon lily is known to occur in lesser abundance at 10 locations within the Santa Rita Mountains, Huachuca Mountains, and Chiricahua Mountains (Linhart and Premoli 1994). Similarly, the lemon lily is known to occur in lesser abundance from northern Sonora, Mexico, in the Sierra los Ajos (CNPS 2001; Arizona Game and Fish Department 2001). In western Riverside County, lemon lily is thought to be limited to the San Jacinto Mountains (Reiser 1994; Skinner 1988).

The CNDDDB has 19 records (12 are from 1999 and 2000) from the San Jacinto Mountains and one (1974) from the Santa Rosa Mountains. The Santa Rosa Mountains' location was decimated by cattle grazing (Sanders 1989 as cited by NatureServe; Warren *et al.* 1989).

Threats

The lemon lily is threatened by horticultural over-collection, water diversion, grazing (CNPS 2001), unseasonal reduction of stream flows associated with flood control and water development activities (*i.e.*, damming), and competition with non-native plant species (Mistretta and Parra-Szjij 1991; Linhart and Premoli 1994). Other potential threats to the lemon lily include mining, air pollution, trampling by domestic livestock, timber cutting, and pesticide effects on the pollinators (NatureServe). Detrimental factors may pose a much greater threat to members of populations whose size has already been severely reduced (NatureServe).

Conservation Needs

The conservation needs of lemon lily include protection and management of known populations in a manner that provides for their long-term viability in the San Gabriel Mountains, San Jacinto Mountains, and San Bernardino Mountains in California, and the Santa Rita Mountains, Huachuca Mountains, and Chiricahua Mountains in Arizona. Newly discovered populations should be conserved in the same manner. Hydrological and other ecological processes necessary to maintain suitable habitat for this species should also be protected.

Proper watershed management is critical to the conservation of the lemon lily and hydrological studies may provide important information on characteristics of watersheds where the lemon lily exists (NatureServe). Known threats to lemon lily should be addressed. For example, non-native plants that compete with lemon lily should be controlled. Erosion should be prevented and controlled. Fencing to prevent trampling and grazing by livestock may be appropriate in certain areas. Future roads and trails should be placed away from lemon lily populations to

prevent direct (*i.e.*, removal, collection, or trampling) and indirect impacts (*i.e.*, erosion) to the species (NatureServe). Actions that would modify the hydrology that supports the species' habitat, reduce the viability of its pollinators, or increase the likelihood of deleterious effects from any identified threat should be avoided.

Environmental Baseline

The lemon lily occurs in mesic sites, typically on the edges of seeps and permanent streams within lower and upper montane coniferous forest, meadows, and riparian scrub/forest between 4,265 and 9,154 feet (1,300 and 2,790 meters) in elevation (CNPS 2001). No focused distribution surveys have been conducted for the lemon lily in western Riverside County, but our database includes 10 recent occurrences in the Plan Area. All known occurrences are located in the northeastern portion of the San Jacinto Mountains.

The vegetation types used to model habitat for this species were montane meadows, riparian scrub/woodland/forests, and woodland/forests above 4,265 feet (1,300 meters) in elevation within the San Jacinto Mountains Bioregion. Based on these vegetation communities, the Plan Area supports approximately 11,662 acres of modeled habitat for the lemon lily. Approximately 10,275 acres (88 percent) of the modeled habitat occur within PQP Lands. Because the lemon lily tends to occur in specific microhabitats (*e.g.*, mesic sites) (CNPS 2001) within the general habitat types described above, modeled habitat likely overestimates the extent of suitable habitat within the Plan Area.

Effects of the Action

Direct Effects

The lemon lily will not be considered a Covered Species Adequately Conserved by the MSHCP unless the Forest Service agrees through an MOU to manage populations of this species on their lands cooperatively with the Permittees as "Conserved Habitat" as defined by the MSHCP. The Plan Area includes approximately 11,662 acres of modeled habitat for the lemon lily. If the MOU with the Forest Service is executed, the MSHCP will authorize impacts associated with development and other proposed Covered Activities over the 75-year permit term within 1,388 (12 percent) of the modeled habitat for the lemon lily, which encompasses 4 of the 10 (40 percent) lemon lily observations in our dataset. Thus, all individual lemon lily plants and populations persisting in these areas would be impacted over the 75-year permit term as a result of the proposed development or other Covered Activities.

If the MOU with the Forest Service is signed, additional monitoring and management will occur on habitat for the lemon lily within Forest Service lands included in the MSHCP Conservation Area. To offset the loss of lemon lily habitat within the Plan Area, the MSHCP will conserve and manage large areas containing modeled lemon lily habitat within 10,275 acres (88 percent) of PQP Lands. Habitat for the lemon lily will not be conserved through the MSHCP as Additional Reserve Lands.

At least one Core Area in the San Jacinto Mountains will support the lemon lily within the MSHCP Conservation Area. Following development of the MOU with the Forest Service, cooperative management and monitoring is anticipated on PQP Lands. Surveys for the lemon lily will be conducted at least every eight years to verify occupancy at a minimum of 75 percent of the known locations. If a decline in the distribution of the lemon lily is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP. Reserve Managers will avoid and minimize impacts to this species by managing for pollinators and addressing threats from over-collection, flood control activities, and competition with non-native plant species (MSHCP Section 5, Table 5.2.). These actions will help maintain habitat and populations of the lemon lily within the San Jacinto Mountains.

Indirect Effects

The lemon lily could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These include the indirect effects described in the “General Effects” section of this biological opinion. The management provisions listed above and the Riparian/Riverine and Vernal Pools policy will help to reduce the indirect effects to this species.

Conclusion

We anticipate the proposed action will directly and indirectly affect the lemon lily as described in the analyses above, including the loss of four known occurrences and 12 percent of its modeled habitat in the Plan Area. We anticipate that this species will persist in the remaining 88 percent of the modeled habitat within the existing PQP Lands. The existing PQP Lands form a large, contiguous habitat block that support at least six known occurrences of the lemon lily. We anticipate that the PQP Lands will be monitored and managed to benefit this species.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service’s biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the lemon lily. We reached this conclusion because 88 percent of the modeled habitat for the lemon lily and six of the known occurrences occur within PQP Lands that will not be impacted by the Plan. Thus, the impacts to this species and its modeled habitat, when viewed in conjunction with the protection and management of the MSHCP Conservation Area, are not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Little mousetail (*Myosurus minimus* ssp. *apus*)Status of the Species*Listing Status*

Little mousetail is not a State or federally listed species. This species is on the California Native Plant Society's List 3 (RED 2-3-2).

Species Description

Little mousetail is an herb in the Ranunculaceae (buttercup) family. It is one of 10 to 15 species in the genus *Myosurus*, four of which occur in California (Wilken 1993). Taxonomic problems exist between this species and *M. sessiliflorus*. The concept of *M. minimus* ssp. *apus* is fairly universally recognized in southern California. However, plants from the Central Valley have been recognized as merely closely allied (Campbell 1952), or as a stabilized hybrid between *M. minimus* and *M. sessiliflorus* with a broader distribution including the Central Valley and southern California (Stone 1959). This short annual is 2 to 12 cm tall and has thread-like to narrowly oblanceolate leaves, 0.5 to 6 cm in length (Wilken 1993).

Habitat Affinities

In southern California, little mousetail occurs in association with vernal pools and within the alkali vernal pools and alkali annual grassland components of alkali vernal plains (Munz 1974; Bramlet 1993b; CNPS 2001; Ferren and Fielder 1993). It is also associated with clay soils (Dave Bramlet, personal communication to Erin Fernandez, September 18, 2003). Little mousetail is found in areas that have semi-regular inundation at elevations between 20 and 640 meters (CNPS 2001). On the Santa Rosa Plateau, little mousetail is associated with California Orcutt's grass, San Diego button celery, and Orcutt's brodiaea (CNDDDB 2000). At upper Salt Creek, little mousetail is associated with woolly marbles, alkali weed, wire-stem popcorn flower, California goldfields, hairgrass, Mojave silver scale, bracted saltbush, sharp-tooth peppergrass, dwarf peppergrass, alkali plantain, and toad rush (Bramlet 1993a; Bramlet 1993b).

Like other vernal pool associated species, little mousetail requires the vernal pool basin proper and enough of the surrounding matrix habitat to support the hydrologic processes that fill the pools with water and allow for natural population dynamics. Vernal pool formations on flat plains (like on upper Salt Creek or at the San Jacinto Wildlife Area) can be variable in areal extent, location, and configuration from year to year, depending upon timing and amount of rainfall, the degree and extent of regional or local flooding, and disturbance from human-related activities such as discing or farming. AMEC (2001) report little mousetail grows well in stable soils with little soil disturbance.

Life History

Little mousetail develops small greenish flowers from April through May on the Santa Rosa Plateau (Munz 1974). Within the Salt Creek drainage, little mousetail blooms earlier, coinciding

with the rains and cooler temperatures, often in March and April. Studying Central Valley plants, Stone (1959) found that members of the genus *Myosurus* were self-pollinated and that many "biotypes" could co-exist sympatrically and yet maintain floral isolation. Insects appear to play only a minor roll in reproduction (Stone 1959). Each plant produces about 70 achenes, each with a single seed (Campbell 1952). Seeds are viable for only a short number of years (Stone 1959).

Status and Distribution

Little mousetail is distributed in scattered areas of Orange, Riverside, San Bernardino and San Diego counties (Campbell 1952; Munz 1974). It is also known from Oregon and several sites in Baja California primarily from the Las Palmas-Tecate area, but as far south as Erendira near San Vicente (Reiser 1996; CNPS 2001). The exact geographic limit of this entity is unclear and maybe broader than the above interpretation. Additional populations of closely related plants in the Central Valley of northern California from Alameda, Contra Costa, Colusa, Butte, Kern, Solano, Stanislaus, and Tulare counties have been described as "having many characters in common with little mousetail" (Campbell 1952), or treated as little mousetail (Stone 1959, CNPS 2001).

Most southern California populations are relatively small. The two largest concentrations of little mousetail are on the Otay Mesa of San Diego County and at upper Salt Creek west of Hemet in Riverside County (Recon 1994; CNDDDB 2000). While more information is needed to clear up taxonomic problems and clarify the distribution of this species, CNPS (2001) has tentatively assigned the species to its list 1B, which means they consider it seriously endangered in California and rare outside of California. Resier (2001) reports little mousetail is declining throughout its limited Southern California Range.

The little mousetail was historically (1980) known from Harford Springs County Park in the Gavilan Hills (CNDDDB 2003). Populations are known from Edgemont (now known as Moreno Valley) and there are historic records from the March Air Reserve Base, Lake Elsinore, Menifee, and Wildomar (Bramlet 1993; D. Bramlet, pers. comm. to Erin Fernandez, USFWS, September 18, 2003). The current status of little mousetail at these locations is unknown.

Threats

General threats to little mousetail include off-road vehicle activity, grazing, and habitat (vernal pools, alkali grasslands) loss due to development and agriculture (CNPS 2001). In Riverside County, little mousetail occurs in similar habitat as the federally listed spreading navarretia. Threats to spreading navarretia, which include habitat degradation and destruction due to widespread urbanization and development, agricultural practices, off-road vehicles, and flood control (63 Federal Register 54975), would also likely threaten little mousetail. The "Generalized Baseline for Vernal Pools Within the Plan Area" discussion included in this biological opinion provides information on the threats to vernal pools in the Plan Area. Little mousetail may occur in the vernal pools identified in this information.

During the last several years, nearly continuous disturbances (discing, sludge dumping, etc.) have disrupted the ponding of vernal pools at upper Salt Creek in the Plan Area. Drains were installed in the upper Salt Creek area in about 1989. This has resulted in a decrease in the water available to portions of the upper Salt Creek complex. These factors have resulted in the loss of suitable habitat for little mousetail in what the MSHCP identifies as one of the most important known populations. This population is further threatened by the proposed realignment of HWY 79. This project could eliminate habitat, remove occurrences and further alter the hydrologic regime that supports the species in the upper Salt Creek drainage.

Houses have been constructed across the road from the Santa Rosa Plateau and within the watershed of Mesa de Colorado vernal pools. Runoff from the residential property can flow into the vernal pools through culverts or over the road (Carol Bell, The Nature Conservancy, pers. comm. to S. Brown, U.S. Fish and Wildlife Service, August 20, 2003).

Conservation Needs

The conservation needs of little mousetail include protection and management of the occurrences in San Diego and Riverside counties in a manner that provides for long-term viability of the species at these locations. This will require maintenance of hydrology that supports the species habitat and management of known threats. Actions that would modify the hydrology of the species habitat or increase the likelihood of deleterious effects from any identified threat should be avoided. Newly discovered occurrences with long term conservation value should be conserved in the same manner.

Environmental Baseline

Our database includes 32 recent occurrences of the little mousetail in the Plan Area from the Santa Rosa Plateau, Lake Elsinore, Hemet, and Salt Creek areas; 8 records are duplicates, so there are 24 known occurrences of little mousetail in the Plan Area. Four records, including one duplicate, are mapped incorrectly in our dataset. They were mapped northeast of Salt Creek, however, according to herbarium labels, they are located near the upper Salt Creek/Hemet area. The little mousetail was also recently observed by Dave Bramlet in French Valley in an MWD easement area (Dave Bramlet, pers. comm. to E. Fernandez, USFWS, 2003).

Surveys for little mousetail were conducted in 1996, 1997, 1998 and 2001 on the MWD Upper Salt Creek wetland mitigation parcel located on the west side of the San Diego Canal near California Avenue and Stetson Avenue (AMEC 2001). The population size of little mousetail ranged from 1,600,000 plants in 1996 to 3,700,000 plants in 1998, and the aerial extent of this population fluctuated from 2.35 to 2.7 acres over the survey period. Little mousetail was not counted in 2001 due to senescence; however, its extent was mapped. The number of individual plants and the extent of localized distribution are anticipated to fluctuate with annual conditions.

No species-specific distribution surveys have been done for little mousetail throughout the Plan Area. It is possible, however, that this species is present in vernal pools in localities other than the ones listed above. The "Generalized Baseline for Vernal Pools Within the Plan Area" discussion included in this biological opinion provides information on the status and distribution

of vernal pools in the Plan Area. Little mousetail may occur in the vernal pools identified in this information.

The little mousetail occurs in vernal pools and grasslands, typically on alkali soils (CNPS 2001) and clay soils (Dave Bramlet, pers. commun. to Erin Fernandez, U.S. Fish and Wildlife Service, September 18, 2003). The vernal pool model was used to capture potential habitats supporting the little mousetail. The vernal pool model included these parameters within the Riverside Lowlands and the Santa Ana Mountains Bioregions: 1) vernal pools and playas and 2) clayey soils (Altamont, Auld, Bosanko, Claypit, and Porterville), alkali soils (Willows, Traver, and Domino), and Santa Rosa Plateau basalt flow soils. Based on our analysis, 42,349 acres of modeled habitat, with the potential to harbor vernal pools suitable for the species, occur within the Plan Area. Approximately 8,831 acres (21 percent) of modeled habitat occur within PQP Lands. We were unable to include additional soil types that harbor vernal pools, such as Murrieta stony clay loam, in our model because we do not have access to digital overlays mapping the extent of these soil types in the Plan Area.

Effects of the Action

Direct Effects

The Plan Area includes 42,349 acres of modeled habitat for the little mousetail. There are 25,832 acres (61 percent) of modeled habitat outside the MSHCP Conservation Area; of that 9,711 acres (23 percent of total modeled habitat) occur within the Criteria Area Species Survey Areas (CASSA) 1, 2, 3, 3a, and 4 (Figure 6-2, pp. 6-64). The little mousetail is considered an Additional Survey Needs and Procedures species. Until such time that the Additional Reserve Lands are assembled and conservation objectives for this species are met, surveys will be conducted as part of the project review process for public and private projects where suitable habitat for little mousetail is present within CASSA 1, 2, 3, 3a and 4. Populations detected as a result of survey efforts shall be avoided according to the procedures outlined in the Additional Survey Needs and Procedures (section 6.3.2 of the Plan; *i.e.*, 90 percent of portions of property with long-term conservation value shall be avoided until the species conservation objectives are met). For those locations found to contain large numbers of individuals or otherwise determined to be important to the overall conservation of the species, the Plan allows flexibility to acquire these locations for inclusion into the Additional Reserve Lands (pp. 6-70).

Within the 9,711 acres of modeled habitat outside of the MSHCP Conservation Area, but within the CASSA for little mousetail (23 percent of total modeled habitat), we anticipate that up to 10 percent of the area with long-term conservation value for this species (as discussed above) will be lost to individual projects. Two records from our dataset occur outside of the MSHCP Conservation Area and within CASSA 3. If these occurrences of little mousetail are confirmed to contain large numbers of individuals or otherwise determined to be important to the overall conservation of the species, the Plan allows flexibility to acquire these locations for inclusion into the Additional Reserve Lands (pp. 6-70).

Little mousetail will be subject to impacts associated with development and other proposed Covered Activities within 16,121 acres of modeled habitat that is outside of the MSHCP

Conservation Area and outside of the CASSA for little mousetail (38 percent of total modeled habitat). Thus, all individual little mousetail plants and populations outside of the MSHCP Conservation Area and outside the CASSA for little mousetail are anticipated to be impacted over the 75-year permit term as a result of the proposed Covered Activities. This includes seven records in our dataset for little mousetail.

Of the 16,121 acres of modeled habitat for little mousetail that are outside of the MSHCP Conservation Area and outside of the CASSA for little mousetail, 158 acres of modeled habitat occur within CASSA 7. Little mousetail, however, is not considered a survey species within CASSA 7 and will therefore be subject to development impacts within this area.

Because the little mousetail is not widely distributed within the Plan Area, specific conservation objectives are provided in the MSHCP (Section 9, pp. 9-122) to ensure that suitable habitat and known populations of the little mousetail will persist. The Plan states that at least five of the known locations of little mousetail will be included within the MSHCP Conservation Area, including Harford Springs County Park on the Gavilan Plateau and three core locations: one along Salt Creek west of Hemet and two on the Santa Rosa Plateau. In addition, at least 6,900 acres of grassland and playas and vernal pools within the San Jacinto River, Mystic Lake and Salt Creek Areas will be included within the MSHCP Conservation Area, including 3,990 acres within Additional Reserve Lands and 2,910 within PQP Lands. Floodplain areas along the San Jacinto River will be included in this acreage total to preserve floodplain processes important to the survival of little mousetail. Salt Creek floodplain in its existing condition (from Warren Road to Newport Road) and vernal pools in Upper Salt Creek will be included within the MSHCP Conservation Area and floodplain processes will be maintained to provide for persistence of the species. We anticipate this species will also benefit from the implementation of the Riparian/Riverine Area and Vernal Pools policy.

Based on our dataset, it appears that more than the 6,900 acres of grasslands and playas and vernal pool habitat proposed for inclusion in the MSHCP Conservation Area will remain in the Plan Area. Approximately 8,831 acres (21 percent) of the modeled little mousetail habitat occur within PQP Lands and 7,686 acres (18 percent) occur within the Additional Reserve Lands. Thus, the MSHCP Conservation Area will include 16,517 acres (39 percent) of the modeled little mousetail habitat in the Plan Area. Fourteen percent of the 24 records from our dataset will be included within the MSHCP Conservation Area. Eleven of these (46 percent) will be conserved within Additional Reserve Lands. Three (13 percent) records will remain within PQP Lands.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands including surveys for little mousetail. Cooperative management and monitoring are anticipated on PQP Lands. Surveys for little mousetail will be conducted at least every eight years to verify occupancy of 75 percent of known locations. If a decline in the distribution of little mousetail is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP. Other management actions described in Section 5 of the MSHCP will help maintain little mousetail habitat, such as preventing alteration of hydrology and floodplain dynamics, off-road vehicle use, grazing and competition from non-native plants. Implementation of these management actions will help to avoid and minimize adverse effects to little mousetail.

Indirect Effects

Little mousetail could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These generally include the indirect effects discussed in the “General Effects” section of this biological opinion. Implementation of the Guidelines Pertaining to the Urban/Wildlands Interface policy, Riparian/Riverine Area and Vernal Pools policy, and the management provisions listed above will help to reduce the indirect effects to this species.

Conclusion

We anticipate the proposed action will directly and indirectly affect little mousetail as described in the analyses above, including total loss of 38 percent of its modeled habitat. An additional 23 percent of little mousetail modeled habitat outside the MSHCP Conservation Area will be subject to surveys within CASSA 1, 2, 3, 3a, and 4. Once the conservation objectives for little mousetail have been met, avoided areas, which have not been otherwise conserved, may be impacted. We anticipate that occurrences determined to be important to the overall conservation of the species will be considered for inclusion in the Additional Reserve Lands and that at least some of the avoided areas may be maintained as open space habitat. Implementation of the avoidance, minimization, and mitigation measures identified in the Plan will further reduce the impacts to little mousetail. This species is anticipated to persist within the remaining 39 percent of its modeled habitat within both the PQP Lands and the Additional Reserve Lands. We anticipate that these areas will be monitored and managed cooperatively to benefit this species.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service’s biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the little mousetail. We reached this conclusion because 39 percent of little mousetail modeled habitat and 58 percent of the documented occurrences will be protected or will remain within the MSHCP Conservation Area. In addition, required surveys for the little mousetail may result in newly discovered occurrences being included in the MSHCP Conservation Area. Thus, impacts to this species and its modeled habitat, when viewed in conjunction with the protection and management of the MSHCP Conservation Area, are not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of little mousetail throughout its range.

Long-spined spine flower (*Chorizanthe polygonoides* var. *longispina*)

Status of the Species

Listing Status

Long-spined spine flower is not a State or federally listed species. This species is on the California Native Plant Society’s List 1B (RED 2-2-2).

Species Description

Long-spined spine flower is an herb in the Polygonaceae (buckwheat) family. It comprises the *Parvattia* subsection of *Chorizanthe* and has a slightly longer involucre tube and more southerly distribution than *C. polygonoides* var. *polygonoides*. This prostrate to decumbent annual is generally reddish in color and of small stature (1 to 5 centimeters high and 3 to 25 centimeters across) (Hickman 1993).

Habitat Affinities

Long-spined spine flower is associated primarily with heavy, often rocky, clay soils in southern needlegrass grassland and openings in coastal sage scrub and chaparral (Dudek 2003). Reveal and Hardham (1989b) describe this species as occurring on sandy and gravelly soil, but this appears to be infrequently the case. Occasionally this species is associated with mountain meadows in sandy loam soil as at Cuyamaca State Park or in sandy or gravelly soils as on Kearney Mesa in San Diego County (Dudek 2003). The majority of populations are clearly associated with clay soils (Dudek 2003). Long-spined spine flower is often associated with needlegrass, wild oat, Douglas microseris, California sagebrush, Munz's onion, red-skinned onion, Palmer's grappling hook, prostrate spine flower, and small-flowered morning-glory (Dudek 2003).

Life History

The long-spined spine flower blooms from April through July (CNPS 2001). The small flowers vary in color from white to rose and produce brown achenes; both the perianth and achenes are about 1.5 to 2.5 millimeters (0.06 - 0.10 inches) in length (Hickman 1993d). Species-specific studies have not been conducted regarding reproduction, pollinators, germination, and dispersal of the long-spined spine flower.

Status and Distribution

The long-spined spine flower occurs within Riverside and San Diego counties and northwestern Baja California, Mexico; more specifically, it occurs from western Riverside County south, through San Diego County to the vicinity of Oso Negros, east of Ensenada, Mexico (Munz 1974; Reveal and Hardham 1989b; Hickman 1993d; Reiser 2001). Approximately 25 to 35 populations have been reported in the United States (Reveal and Hardham 1989b; CNDDDB 2001). At least six populations have been reported from Mexico (Reiser 2001).

Threats

Throughout much of its range, potential habitat for this species is threatened by urban development and competition with non-native grasses (CNPS 2001). Because it tends to grow on lower-elevation terrain devoid of much vegetation, much of its habitat has been developed for housing tracts and light industrial uses (Reiser 2001). Discing and other soil disturbing activities are likely detrimental to the long-spined spine flower because it does not appear to respond positively to habitat disturbance.

Historically, much of the low-lying areas of western Riverside County, which likely contained suitable habitat for this species, have been converted to agriculture and grazing uses (Carlsbad Fish and Wildlife Office GIS database 2004) and are likely routinely subject to discing for weed control. Many open space areas are subject to unauthorized off-road vehicle use. Within western Riverside County, the primary threat to this species is urban development and the conversion of open space areas to exotic annual grasslands. The effects of habitat fragmentation and isolation of occurrences could limit the species' ability to disperse and establish new populations (Primack and Miao 1992) or could result in an eventual loss of genetic variation (Ledig 1986).

Conservation Needs

Because the long-spined spine flower favors heavy clay and adobe soils and these soils typically occur in flat, lowland areas historically subject to development, this species' current range is largely restricted to upland clay soils. Species persistence will depend upon adequate conservation, protection, and management of large blocks of remaining, occupied habitat. Adequate consideration must be given to protection from edge effects, such as increased weediness, changes in the naturally occurring fire regime that tend to favor the conversion of native grasslands to exotic annual grasslands, and protection from off-road vehicle use, grazing, and other ground-disturbing activities. Proximity to and connectivity with existing reproductive occurrences must occur for any proposed unoccupied reserve areas to eventually support the species.

Environmental Baseline

According to the Plan, this species is found primarily within the western and southwestern portions of the Plan Area. Our dataset includes 56 records of long-spined spine flower within the Plan Area; however, many of these may represent an overlap between different reporting sources or multiple herbarium specimens collected over time from the same location. In the vicinity of the Gavilan Hills, the long-spined spine flower is found in the Temescal Canyon area, Lake Mathews-Estelle Mountain Reserve, Harford Springs Park, and the Motte Reserve. In the Santa Ana Mountains, it occurs within the San Mateo Wilderness, Elsinore Peak, and on the Redondo and Mesa de Burro areas of the Santa Rosa Plateau. Populations are also found on clay soils at Skunk Hollow and the Paloma Valley (Briggs and Scott Road), Bachelor Mountain (Lake Skinner Preserve), and along the north slopes of the Palomar Mountains (Dripping Springs Campground, Dorland Mountain, Woodchuck Road, Oak Mountain, and Arroyo Seco).

The Plan also identifies scattered populations from other areas, including a collection made in the Garner Valley and southern Alberhill. Populations have also been reported within the Sedco Hills and City of Riverside. The most important populations are the two largest populations at Dorland Mountain and at Woodchuck Road near Agua Tibia Mountain. However, the population complex at Lake Mathews, although considerably smaller in the number of individuals, indicates the presence of suitable habitat. Ten occurrences are reported from El Sobrante Road, Cajalco Road, and the eastern and southern shores of Lake Mathews, which appear to represent one extended population complex.

In western Riverside County, this species is often associated with heavy clay soils and openings of highly-weathered gabbro. We attempted to model habitat for the long-spined spine flower using identified vegetation communities in which the species is known to occur (*i.e.*, chaparral, coastal sage scrub, and grasslands intersected with Altamont, Auld, Bosanko, Claypit, and Porterville soils) within the Agua Tibia Mountains, Desert Transition, Riverside Lowlands, San Jacinto Mountains, San Jacinto Foothills, and Santa Ana Mountains bioregions of the Plan Area. However, we did not have access to digital overlays mapping the extent of certain soil types within the Plan Area; therefore, available mapping of clay substrates was incomplete, and modeled habitat did not correspond well to the documented distribution of the species. Thus, due to the difficulty in capturing appropriate habitat types in a model for this species, we did not use a habitat model in our analysis of effects to the long-spined spine flower.

Effects of the Action

Direct Effects

All individual long-spined spine flower plants and populations existing outside the MSHCP Conservation Area are anticipated to be impacted over the 75-year permit term as a result of proposed Covered Activities. Approximately 17 of the 56 (30 percent) known records of long-spined spine flower are located outside of the MSHCP Conservation Area.

According to the Plan, at least 56 of the known occurrences of the long-spined spine flower at 15 localities within the Plan Area, will be included within the MSHCP Conservation Area (Section 9, pp. 9-123). This includes the two locations at Lake Matthews and in the Agua Tibia Mountains (*e.g.*, Dorland Mountain and Woodchuck Road). The Plan also states that other occurrences in the Santa Rosa Plateau Ecological Reserve, the Santa Ana Mountains, and the San Jacinto Mountains will be included in the MSHCP Conservation Area. Additionally, at least 389,510 acres of suitable habitat (*i.e.*, chaparral, coastal sage scrub, and grassland containing Altamont, Auld, Bosanko, Porterville, and Claypit soils) will be conserved or will remain in the Plan Area. Based on our analysis, the MSHCP Conservation Area will include at least 32 records for long-spined spine flower in PQP Lands and 7 records in the Additional Reserve Lands.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands, including surveys for the long-spined spine flower. Cooperative management and monitoring are anticipated on PQP Lands. Surveys will be conducted at least every eight years to verify occupancy at a minimum of 75 percent of the known locations of long-spined spine flower. If a decline in the distribution of long-spined spine flower is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP. In addition, Reserve managers will manage known and future occurrences of long-spined spine flower and will help maintain long-spined spine flower habitat by managing competition from non-native species (*i.e.*, exotic annual grasses), farming and discing, sheep and cattle grazing, and off-road vehicle use (Section 5, Table 5.2). Implementation of these management actions will help to avoid and minimize adverse effects to long-spined spine flower.

Indirect Effects

The long-spined spine flower could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These generally include the indirect effects mentioned in the “General Effects” section of this biological opinion. The management provisions listed above will help to reduce the indirect effects to this species.

Conclusion

We anticipate the proposed action will directly and indirectly affect the long-spined spine flower as described in the analyses above, including the loss of 30 percent of the known records for long-spined spine flower in the Plan Area. Implementation of the avoidance, minimization, and mitigation measures identified in the Plan will reduce the impacts to this species. We anticipate that the species will persist in the Plan Area because 70 percent of the known records will be conserved or remain within the PQP Lands or Additional Reserve Lands. These lands include large, contiguous habitat blocks where potential habitat and additional occurrences of long-spined spine flower are likely to occur. We anticipate that these areas will be monitored and managed cooperatively to benefit this species.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service’s biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of long-spined spine flower. We reached this conclusion because most of the documented records for long-spined spine flower will be conserved or will remain in the Plan Area. In addition, the impacts associated with the loss of this species’ habitat, when viewed in conjunction with the protection and management of the MSHCP Conservation Area, are not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Many-stemmed dudleya (*Dudleya multicaulis*)

Status of the Species

Listing Status

Many-stemmed dudleya is not a State or federally listed species. It is considered a sensitive species by the Forest Service and the Bureau of Land Management. This species is on the California Native Plant Society’s List 1B (RED 1-2-3).

Species Description

Many-stemmed dudleya is a perennial herb in the Crassulaceae (stonecrop) family. It is one of about 45 species within the genus *Dudleya* (Moran 1960) and is a member of the subgenus *Hasseanthus*, which consists of 4 or 5 species of small, vernal perennials that originate from a subsurface corm (Bartel 1993; Doderer 1995). This species is most closely related to *Dudleya variegata*, another yellow-flowered species with fewer, shorter, and more flattened leaves.

Many-stemmed dudleya is a low, vernal succulent perennial originating from a corm. The corm is a specialized underground caudex (stem) that is adapted to dry conditions. The corm is filled with water and starch and allows the plant to survive extended dry periods. Dead outer layers form a protective coating around the corm that reduces water loss. Observations indicate that early rains followed by prolonged dry periods during midwinter may cause individuals to become dormant, while extended periods of rain throughout the rainy season encourage flowering (Dodero 1995).

Habitat Affinities

Many-stemmed dudleya is often associated with clay soils in barrens, rocky places, and ridgelines, as well as thinly vegetated openings in chaparral, coastal sage scrub, and southern needlegrass grasslands (Munz 1974; CNDDDB 2001). The majority of populations are associated with coastal sage scrub or open coastal sage scrub (Dodero 1995). In Riverside County, many-stemmed dudleya has been associated with Palmer's grappling hook, Munz's onion, chocolate lily, Douglas' lupine, purple needlegrass, foothill needlegrass, California buckwheat, California sagebrush, and California juniper (CNDDDB 2001).

Life History

Many-stemmed dudleya generally produces yellow flowers in May and June (Munz 1974), although flowering can take place as early as March in coastal locations (Caesares and Koopowitz 1989). Most members of the *Hasseanthus* produce from 1 to 15 flowers per inflorescence branch, and the flowers generate from 0 to 27 seeds (Dodero 1995). During the late spring, withering flowers produce five follicles. The seeds are about 0.8 millimeters long. One study at the University of California, Irvine found that the average flower produced about 12 seeds, and approximately 52 percent of these were viable under nursery conditions (Caesares and Koopowitz 1989). Field observations indicated a significantly lower viability in populations on the University of California, Irvine campus.

The insect pollinators of the many-stemmed dudleya have not been studied. Dodero (1995) noted that coastal species of *Hasseanthus* appear to be pollinated by honey bees, bumble bees, digger bees, bembicine wasp, metallic sweat bees, bee flies, bee mimic flower flies, and soft-winged flower beetles. Although the individual flowers are small, members of this group frequently flower in large masses and, thus, attract insects.

Many-stemmed dudleya seeds are dispersed by wind and water with the aid of gravity. In related species, seeds are sprinkled on the ground and occasionally blown along the surface in strong winds (Dodero 1995).

Status and Distribution

Many-stemmed dudleya is endemic to southwestern California from western Los Angeles County, through extreme southwestern portions of San Bernardino and Orange counties, and western Riverside County south to the northern edge of San Diego County. The species occurs

at elevations from 15 to 790 meters and is considered fairly rare throughout its range (CNPS 2001).

In 1999, 119 populations had been identified, of which 12 (about 10 percent) were known to be extirpated (CNDDDB 2000; Roberts 1999). More populations have since been discovered, but the cited studies provide a reasonable representation of the species' distribution. Of the extant populations, 15 populations, each averaging about 210 individuals, were reported from Los Angeles County; 2 small populations were reported from the Chino Hills of San Bernardino County; 74 populations (about 70 percent), varying in size from about a dozen plants to over 5,000 individuals were reported from Orange County; 9 populations (8 percent) were reported from Riverside County, and 7 populations (about 7 percent) were reported from San Diego County.

Threats

In Orange County, over half of the known localities are on conserved lands associated with the Central/Coastal Orange County Nature Reserve and the Irvine Ranch Land Reserve (LSA 2003). Many of these populations are still vulnerable to effects of human recreational activity, such as hiking and mountain biking. Other remaining many-stemmed dudleya populations are threatened by highway construction and urban development. In San Diego County, populations are also at risk from military construction and training activities. In Riverside County, two or three localities have been conserved within the Lake Mathews-Estelle Mountain Preserve, and three localities are within the Cleveland National Forest. These populations could be affected by human recreation activity. Other Riverside County populations are threatened by urban and transportation development and landfill expansion (Roberts 1999).

Populations may be suppressed by non-native species competition. Many-stemmed dudleya appear to thrive only in relatively thinly vegetated habitats, such as clay barrens, sparse grasslands, and openings in coastal sage scrub; thus, dense stands of non-native grass and forb species are expected to limit this species.

Conservation Needs

The conservation needs of many-stemmed dudleya include protection and management of populations with long-term conservation value in Riverside, Los Angeles, San Bernardino and Orange counties in a manner that provides for long-term viability of the population at those localities. Conservation is particularly important in Orange County, where most of the known occurrences are found. Conserved habitats should include the appropriate microhabitat features, such as thin, rocky soils, where the many-stemmed dudleya tends to occur. Within conserved habitats, activities that destroy or degrade habitat, such as hiking, mountain biking, and off-road vehicles, should be monitored and managed to reduce impacts to the many-stemmed dudleya. In addition, connectivity between conserved populations should be maintained to the maximum degree possible so that seed dispersal and pollinators can maintain ecological and genetic connectivity between populations.

Environmental Baseline

Our dataset includes 23 records of many-stemmed dudleya scattered throughout appropriate habitats along the western portion of the Plan Area. However, two records in our dataset are likely extirpated (Roberts 1999), and two are duplicate records; therefore, for the purposes of our analysis, we considered 19 records for the many-stemmed dudleya in the Plan Area. Six records are located within PQP Lands in the Lake Mathews Estelle Mountain Reserve and the San Mateo Wilderness Area. Our dataset also includes records from Bedford Canyon, northwest of Lake Elsinore, Arroyo de Toro (Gavilan Hills), the south side of Alberhill Mountain, Estelle Mountain, La Paz Canyon, and along Temescal Wash near Dawson, Indian, and Horsethief canyons. The MSHCP identifies additional populations of the many-stemmed dudleya from the Prado Basin and near Vail Lake.

The vegetation types used to model habitat for this species were coastal sage scrub, chaparral, and grasslands below elevations of 2,297 feet (700 meters) in the Santa Ana Mountains and Riverside Lowlands bioregions. Based on these criteria, the Plan Area supports approximately 311,155 acres of modeled habitat for the many-stemmed dudleya. Approximately 60,651 acres (20 percent) of the modeled habitat occur within PQP Lands. However, due to the specific microhabitat associations (*i.e.*, thin, rocky soils) of many-stemmed dudleya, the modeled habitat likely overestimates the amount of suitable habitat for the species in the Plan Area.

Effects of the Action

Direct Effects

The Plan Area includes 311,155 acres of modeled habitat for the many-stemmed dudleya. There are approximately 172,573 acres (55 percent) of modeled habitat for the many-stemmed dudleya outside the MSHCP Conservation Area; of this, approximately 53,111 acres (17 percent of total modeled habitat), including five of the many-stemmed dudleya occurrences in our dataset, occur within the Narrow Endemic Plant Species Survey Areas (NEPSSA) 1, 2, 3, 3a, 4, 5, 7, 8 and 9 (Figure 6.1, pp.6-30). The many-stemmed dudleya is considered a Narrow Endemic Plant Species. Until such time that the Additional Reserve Lands are assembled and conservation objectives for this species are met, surveys will be conducted as part of the project review process for public and private projects where suitable habitat for the many-stemmed dudleya is present within NEPSSA 1, 2, 3, 3a, 4, 5, 7, 8 and 9. Populations detected as a result of survey efforts will be avoided according to the procedures outlined in the Narrow Endemic Plant Species policy (Section 6.1.3 of the Plan; *i.e.*, 90 percent of portions of property with long-term conservation value will be avoided until the species conservation objectives are met). For those locations found to contain large numbers of individuals or otherwise determined to be important to the overall conservation of the species, the Plan allows flexibility to acquire these locations for inclusion into the Additional Reserve Lands (pp. 6-40).

Within the 53,111 acres of modeled habitat that is outside of the MSHCP Conservation Area but within NEPSSA 1, 2, 3, 3a, 4, 5, 7, 8 and 9 (17 percent of total modeled habitat), we anticipate that up to 10 percent of the area with long-term conservation value for this species (as discussed above) will be lost to individual projects. Many-stemmed dudleya, including four of the

occurrences in our dataset, will also be subject to impacts associated with development and other proposed Covered Activities within approximately 119,462 acres (38 percent of total modeled habitat) that are outside of the MSHCP Conservation Area and outside of the NEPSSA for many-stemmed dudleya.

Based on our analysis, to offset the loss of many-stemmed dudleya modeled habitat in the Plan Area, the MSHCP will conserve approximately 77,931 acres (25 percent) of modeled many-stemmed dudleya habitat within Additional Reserve Lands, including four of the occurrences in our dataset. Approximately 60,651 acres (20 percent) of modeled many-stemmed dudleya habitat will remain within PQP Lands, including six of the many-stemmed dudleya observations in our dataset. In total, 138,582 acres (45 percent) of the modeled habitat and 10 (53 percent) of the records in our dataset for many-stemmed dudleya will be conserved or will remain in the Plan Area.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands including surveys for the many-stemmed dudleya. Cooperative management and monitoring are anticipated on PQP Lands. Surveys for the many-stemmed dudleya will be conducted at least every eight years to verify occupancy at a minimum of 75 percent of the known locations. If a decline in the distribution of many-stemmed dudleya is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP. Other management actions described in Section 5, Table 5.2 of the MSHCP include avoiding and minimizing impacts to many-stemmed dudleya to the maximum extent practicable.

Indirect Effects

Many-stemmed dudleya could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These generally include the indirect effects discussed in the “General Effects” section of this biological opinion. Implementation of the management provisions described above will help to reduce the indirect effects to this species.

Conclusion

We anticipate the proposed action will directly and indirectly affect many-stemmed dudleya as described in the analyses above, including total loss of 38 percent of its modeled habitat. An additional 17 percent of many-stemmed dudleya modeled habitat outside the MSHCP Conservation Area will be subject to surveys within NEPSSA 1, 2, 3, 3a, 4, 5, 7, 8 and 9. Once the conservation objectives for many-stemmed dudleya have been met, avoided areas, which have not been otherwise conserved, may be impacted. We anticipate that occurrences in the NEPSSA for many-stemmed dudleya that are determined to be important to the overall conservation of the species will be considered for inclusion in the Additional Reserve Lands and that at least some of the avoided areas may be maintained as open space habitat. Implementation of the avoidance, minimization, and mitigation measures identified in the Plan will further reduce the impacts to many-stemmed dudleya. This species is anticipated to persist within the remaining 45 percent of its modeled habitat within both the PQP Lands and the Additional

Reserve Lands. We anticipate that these areas will be monitored and managed cooperatively to benefit this species.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the many-stemmed dudleya. We reached this conclusion because 45 percent of modeled habitat and 53 percent of the documented occurrences for many-stemmed dudleya will be protected or will remain within the MSHCP Conservation Area. In addition, NEPSSA surveys for the many-stemmed dudleya may result in newly discovered occurrences being included in the MSHCP Conservation Area. Thus, impacts to this species and its modeled habitat, when viewed in conjunction with the protection and management of the MSHCP Conservation Area, are not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of many-stemmed dudleya throughout its range.

Mojave tarplant (*Deinandra* [=*Hemizonia*] *mohavensis*)

Status of the Species

Listing Status

Mojave tarplant was listed as endangered by the State of California in August 1981. It is not federally listed. Mojave tarplant is a Forest Service Sensitive Species. This species on the California Native Plant Society's List 1B (RED 2-1-3).

Species Description

Mojave tarplant is a tall annual sunflower (Asteraceae) with yellow flower heads arranged in compact clusters. The herbage is soft-pubescent, viscid and pleasantly odorous (Keck 1935; Munz 1974). The stems commonly reach 1.0 meter in height, while some plants reach up to 1.5 meters (Sanders *et al.* 1997). Mojave tarplant is separable from related species by the combination of yellow anthers, a disk pappus of short scales, five ray flowers (and phyllaries), entire basal leaves, and a densely flowered inflorescence (Keil 1993). The nomenclature was recently revised by Baldwin (1999).

Habitat Affinities

Mojave tarplant occurs on clay, silty or gravelly soils that are seasonally saturated, on low sand bars in river beds, and along stream channels or in ephemeral grassy swales and seeps in riparian scrub and chaparral, at elevations between 850 and 1,575 meters. Habitat includes gentle slopes and low gradient reaches of streams in mountainous terrain, with limited overstory shrubs and trees. Most known sites are within the belt of desert edge chaparral, and the others are on arid coastal facing slopes (CNPS 2001; Sanders *et al.* 1997; CNDDDB 2003; CDFG 2000).

Life History

The Mojave tarplant blooms from July through September (CNPS 2001). The composite floral heads are dense and sessile and consist of six staminate disk flowers and five ray flowers. Both disk and ray flowers are yellow (Keil 1993). This species is self-fertile. Nothing is known about seed dispersal vectors. The relatively heavy dark-colored seeds may fall around the maternal plant and maintain the population in that site. There are no obvious mechanisms for long-distance dispersal of the seeds (*e.g.*, wings, hooks, etc.) (Bureau of Land Management 2003).

Status and Distribution

Mojave tarplant was originally known from the Mojave River at Deep Creek, San Bernardino County, and had not been seen since 1933. Despite repeated searches at the Mojave River site, the plant could not be found (Sanders *et al.* 1997). In 1994, the species was rediscovered on the north slope of the San Jacinto Mountains in Riverside County, along Twin Pines and Brown Creeks (Sanders *et al.* 1997; CNPS 2001). During the fall of 1994 and 1995, many suitable areas on the north and west sides of San Jacinto Mountains were searched by Sanders *et al.* (1997), and a number of additional populations were found, although several areas of suitable habitat that were searched in the San Jacinto Mountains and foothills failed to locate any additional occurrences. Since that time, several more occurrences have been described (CNDDDB 2003).

Mojave tarplant is now known from about 27 occurrences, including 19 in Riverside County and 8 in San Diego County (Sanders *et al.* 1997; CNDDDB 2003). An occurrence in the Cross Mountain area in Kern County has not been verified since 1977 (CNDDDB 2003). Occurrences in San Diego County include observations in the vicinity of Cutca Valley east of Eagle Crag Summit, Chihuahua Valley, and Indian Flats Campground (CNDDDB 2003). The Riverside County occurrences are scattered through appropriate habitat in the San Jacinto Mountains, with population clusters in the Brown Creek-Twin Pines Creek-Azalea Creek-Dutch Creek drainage complex (just east of the Plan Area) and around the Mountain Center area. In addition, a relatively disjunct population was observed in the San Jacinto Foothills Bioregion, several miles west of other observations in Riverside County. This population was discovered during surveys for the Mesa Grande development and is threatened by the development.

Threats

Known occurrences of this species are potentially threatened by flood control measures, off-road vehicle use, low and high density residential development, and grazing-related effects (Sanders *et al.* 1997; CNDDDB 2003). The type locality has been severely affected by construction of the Mojave River Forks Dam, off-road vehicle use below the dam, and upstream where the Mojave River is flooded under Silverwood Lake (Sanders *et al.* 1997). Suitable habitat on private lands has not been surveyed, and if present, the species may be subject to impacts such as overgrazing and related trampling around isolated water sources. Other habitat, and likely some populations, have been affected by low density residential development on private in-holdings in the San Bernardino National Forest.

Conservation Needs

Conservation of known occurrences in contiguous blocks of suitable habitat is necessary to ensure the long-term persistence of this species. Protection and management of existing occurrences within the boundaries of the San Bernardino National Forest will also be important for the persistence of this species in the Plan Area. Protection measures should include the provision of buffers against grazing, off-road vehicle use, and human activities to prevent trampling in sensitive habitat areas. Habitat enhancement may be necessary in some areas.

Environmental Baseline

Our dataset includes 15 records of Mojave tarplant within the Plan Area; however, one record is a duplicate, so for the purposes of our analysis, we considered 14 known occurrences of Mojave tarplant in the Plan Area. The occurrences are primarily scattered throughout appropriate habitat in the San Jacinto Mountains, with population clusters in the Brown Creek-Twin Pines Creek-Azalea Creek-Dutch Creek drainage complex (just east of the Plan Area) and around the Mountain Center area. In addition, a relatively disjunct population was observed in the San Jacinto Foothills Bioregion, several miles west of other observations in Riverside County. There are only eight occurrences identified in the MSHCP, and these locations are a subset of those in our database.

The primary vegetation types used to model habitat for this species were chaparral and riparian vegetation between 2,789 and 5,168 feet (850 and 1,575 meters) in the San Jacinto Mountains Bioregion. Based on this analysis, the Plan Area supports approximately 107,109 acres of modeled habitat for the Mojave tarplant. Approximately 72,910 acres (68 percent) of this modeled habitat occurs within PQP Lands. Because the Mojave tarplant needs specific microhabitat features, such as more mesic conditions, modeled habitat substantially overestimates the extent of suitable habitat available for this species in the Plan Area. Five of the 14 known occurrences in the Plan Area are located on PQP Lands.

Effects of the Action

Direct Effects

The Mojave tarplant will not be considered a Covered Species Adequately Conserved by the MSHCP until occupation of at least 100 acres is confirmed in at least 4 localities (Section 9, Table 9.3) within “Conserved Habitat” as defined in the MSHCP. A locality can not be smaller than one quarter section (160 acres) and contain at least 1,000 individuals. Smaller populations may contribute to the locality count if they are demonstrably self-sustaining. The Plan Area includes 107,109 acres of modeled habitat for the Mojave tarplant. Mojave tarplant will be subject to impacts associated with development and other proposed Covered Activities over the 75-year permit term within 26,401 acres (25 percent) of this modeled habitat, which encompasses 8 of the 14 (57 percent) of Mojave tarplant observations in our dataset. It is anticipated that most Mojave tarplant in these areas will be impacted as a result of habitat loss and activities such as grading and construction; however, some plants may survive in rural mountainous areas where development impacts are anticipated to occur at a slower rate and at

lower densities. Approximately 8,624 acres (33 percent) of the non-conserved modeled habitat for the Mojave tarplant are designated as rural/mountainous land.

The impact to known Mojave tarplant occurrences in the Plan Area is primarily a result of occurrences in the Mountain Center area that are on private land and a small cluster of occurrences in the Mesa Grande development area. Because the species was rediscovered only 10 years ago, it is not clear whether the occurrences that have been observed represent the majority of locations or whether additional populations will be discovered at new locations.

Specific conservation objectives are provided in the MSHCP (Section 9, pp. 9-124) to ensure that suitable habitat and known populations of the Mojave tarplant will persist. The Plan states that at least five of the known localities within the San Jacinto Mountains and Foothills and northeast of Vail Lake will be included within the MSHCP Conservation Area. In addition, at least four localities, not smaller than one quarter section and occupying at least 100 acres, will be included in the MSHCP Conservation Area.

Based on our analysis, implementation of the MSHCP will also conserve modeled habitat for the Mojave tarplant. Conserved habitat within the Additional Reserve Lands will include 7,799 acres (7 percent) of modeled Mojave tarplant habitat. One of 14 known occurrences of Mojave tarplant in the Plan Area is in the Additional Reserve Lands. Another 72,910 acres (68 percent) of modeled Mojave tarplant habitat will remain within PQP Lands. Five of the 14 known occurrences in the Plan Area occur on PQP Lands. In total, 75 percent of the modeled habitat for Mojave tarplant, including 6 of 14 known occurrences (43 percent) will be conserved or remain in the Plan Area.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands including surveys for the Mojave tarplant. Cooperative management and monitoring are anticipated on PQP Lands. Surveys for the Mojave tarplant will be conducted at least every eight years to verify occupancy at a minimum of 75 percent of the known locations. If a decline in the distribution of Mojave tarplant is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP. Other management actions described in Section 5, Table 5.2 of the MSHCP include avoiding and minimizing adverse effects to the species and managing populations of this species where flood control and grazing activities are allowed or proposed. Implementation of these management actions will help to avoid and minimize adverse effects to Mojave tarplant.

Indirect Effects

Mojave tarplant could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These generally include the indirect effects discussed in the “General Effects” section of this biological opinion. Implementation of the Guidelines Pertaining to the Urban/Wildlands Interface policy, Riparian/Riverine Area and Vernal Pools policy, and the management provisions listed above will help to reduce the indirect effects to this species.

Conclusion

We anticipate the proposed action will affect the Mojave tarplant as described in the analysis above, including the loss of 25 percent of its modeled habitat and 8 of 14 known occurrences (57 percent) in the Plan Area. Implementation of the avoidance, minimization and mitigation measures identified in the Plan will reduce impacts to the Mojave tarplant. This species is anticipated to persist within the remaining 75 percent of its modeled habitat within both the PQP Lands and the Additional Reserve Lands that will support 6 of the 14 (43 percent) known occurrences of Mojave tarplant in the Plan Area. We anticipate that these areas will be monitored and managed cooperatively to benefit this species.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the Mojave tarplant. We reached this conclusion because the impacts associated with loss of this species' habitat, when viewed in conjunction with the protection and management of the MSHCP Conservation Area, are not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Mud nama (*Nama stenocarpum*)

Status of the Species

Listing Status

Mud nama is not a State or federally listed species. This species is on the California Native Plant Society's List 2 (RED 3-2-1).

Species Description

Mud nama is an herb in the Hydrophyllaceae (waterleaf) family. Mud nama was traditionally placed within the monotypic genus *Zonolacus* because of its unique half-inferior ovary (Hitchcock 1933). However, Chance and Bacon (1984) have more recently suggested that based on seed and fruit morphology, *N. stenocarpum*, may be more appropriately grouped among other species including *N. jamaicense*, *N. bartletti*, *N. marshii*, *N. propinquum* and *N. palmeri* rather than on its own. The plant is generally short, soft, silky, and hairy (Bacon 1993). The stem of this hirsute annual is prostrate to ascending, freely branched and 8 to 40 centimeters tall (Munz 1974; Bacon 1993). The funnel-shaped corolla is white to cream or pale violet and 4 to 7 millimeters long (Munz 1974; Bacon 1993).

Habitat Affinities

This species occurs within muddy embankments of marshes and swamps and within lake margins and riverbanks at elevations between 5 and 500 meters (CNPS 2001; Rieser 1994).

Life History

Reproduction studies for this species have not been conducted. The mud nama blooms from January to July (CNPS 2001).

Status and Distribution

Mud nama is known to occur in Orange, Riverside, and San Diego counties; San Clemente Island; Arizona; southern Texas; and Baja California (CNPS 2001; Bacon 1993). The species is thought to be extirpated from Imperial and Los Angeles counties (CNPS 2001). In San Diego County, the species is known from Sweetwater Reservoir and down stream of the reservoir, and older reports include Ricky Dam near Bonita and the San Luis Rey (Reiser 1994). In Orange County, mud nama is recorded from Anaheim Creek, the mesa north of Newport Beach, east of the Peters Canyon channel, Lambert Reservoir, Laguna Canyon, and Emerald Canyon (CNDDDB 2003), though the status of these occurrences is unknown.

In western Riverside County, mud nama is known to occur at Mystic Lake. Specifically, this species is found in a few locations on the edges of the lake, both within the San Jacinto Wildlife Area and just outside the Wildlife Area along Gilman Springs Road.

Threats

This species is threatened by flood control projects, development, and localized changes in hydrology where it occurs. In the Plan Area, proposed improvements to Gilman Springs Road, a plan by the Eastern Municipal Water District to develop 320 acres of permanent wetlands on the eastern edge of the lake using reclaimed and storm water (EMWD 1994; Joe Lewis, EMWD, pers. comm., 2003), and the San Jacinto River Project could potentially threaten the known population.

Conservation Needs

The conservation needs of mud nama include protection and management of occurrences with long-term conservation value in a manner that provides for their long-term viability. Newly discovered populations with long-term conservation value should be conserved in the same manner. Maintenance of hydrological conditions supporting occurrences is essential to this species' long-term persistence.

In the Plan Area, protection and management of the known occurrences are essential to the persistence of this species in western Riverside County. Management of hunting and recreation activities on the San Jacinto Wildlife Area should take into account the needs and distribution of this species in the Wildlife Area. Actions that would modify the hydrology supporting the species habitat or increase the likelihood of deleterious effects from any identified threat should be avoided.

Environmental Baseline

According to our dataset, there are 3 records of mud nama in the Plan Area. One of these records is a population that covers a large area at the receding edge of Mystic Lake along Gilman Springs Road between Jack Rabbit Trail and Eden Hot Springs Road. The population is characterized by large carpet-like patches and additional smaller patches of the plant (CNDDDB 2003; A. Sanders, UCR, pers comm., 2003a). The plants occur on the periphery of the San Jacinto Wildlife Area, which is mapped as PQP Lands, but actually extends onto private lands along Gilman Springs Road. The other two records occur at Mystic Lake within the San Jacinto Wildlife Area (PQP Lands). It is likely that this species is often overlooked, and therefore, future focused surveys may find additional occurrences.

Modeled habitat for this species includes playas/vernal pools, meadows/marshes, and all undeveloped and undisturbed habitat/vegetation within 328 feet (100 meters) of open water below an elevation of 1,608 feet (490 meters) within the Riverside Lowlands Bioregion. Based on this analysis, the Plan Area supports approximately 12,136 acres of modeled habitat for the mud nama. Approximately 5,654 acres (47 percent) of this modeled habitat occurs within PQP Lands.

Effects of the Action

Direct Effects

The Plan Area includes 12,136 acres of modeled habitat for the mud nama. There are 2,272 acres (19 percent) of modeled habitat and one known mud nama occurrence outside the MSHCP Conservation Area; of that, 657 acres (5 percent of total modeled habitat) occur within the Criteria Area Species Survey Areas (CASSA) 3 and 3a (Figure 6.2, pp. 6-64). The mud nama is considered an Additional Survey Needs and Procedures species. Until such time that the Additional Reserve Lands are assembled and conservation objectives for this species are met, surveys will be conducted as part of the project review process for public and private projects where suitable habitat for mud nama is present within CASSA 3 and 3a. Populations detected as a result of survey efforts will be avoided according to the procedures outlined in the Additional Survey Needs and Procedures (section 6.3.2 of the Plan; *i.e.*, 90 percent of portions of property with long-term conservation value will be avoided until the species conservation objectives are met). For those locations found to contain large numbers of individuals or otherwise determined to be important to the overall conservation of the species, the Plan allows flexibility to acquire these locations for inclusion into the Additional Reserve Lands (pp. 6-70).

Within the 657 acres of modeled habitat outside of the MSHCP Conservation Area, but within the CASSA for mud nama (5 percent of total modeled habitat), we anticipate that up to 10 percent of the area with long-term conservation value for this species (as discussed above) will be lost to individual projects.

All individual mud nama plants and populations outside of the MSHCP Conservation Area and outside the CASSA for mud nama are anticipated to be impacted over the 75-year permit term as a result of the proposed Covered Activities. One current record of mud nama in our dataset and

1,614 acres (13 percent) of modeled habitat are outside of the MSHCP Conservation Area and outside of the CASSA for mud nama.

Of the 1,614 acres of modeled habitat for mud nama that are outside of the MSHCP Conservation Area and outside of the CASSA for mud nama, 110 acres of modeled habitat occur within CASSA 1, 2, and 4. Mud nama, however, is not considered a survey species within CASSA 1,2, or 4 and will, therefore, be subject to development impacts within this area.

Because the mud nama is not widely distributed within the Plan Area, specific conservation objectives are provided in the MSHCP (Section 9, pp. 9-125) to ensure that suitable habitat and known populations of the mud nama will persist. The species' conservation objectives for the mud nama include the preservation of floodplain processes and hydrology in the San Jacinto River to provide for the distribution of the species to shift over time as hydrologic conditions and seed bank sources change; inclusion of at least two known occurrences of mud nama along the San Jacinto River near Gilman Springs Road; and inclusion of at least 7,050 acres of suitable habitat within the Riverside Lowlands Bioregion. Although this species is not listed under the Riparian/Riverine Area and Vernal Pools policy, implementation of this policy will help minimize the effects of Covered Activities on mud nama habitat and populations.

Based on our analysis, approximately 4,211 acres (35 percent) of modeled mud nama habitat will be conserved within the Additional Reserve Lands. Another 5,654 acres (47 percent) of modeled mud nama habitat will remain within PQP Lands. In total, 9,865 acres or 81 percent of the modeled habitat for mud nama will be conserved or remain in the Plan Area, including 2 of the 3 records for the species in our dataset.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands including surveys for mud nama. Cooperative management and monitoring are anticipated on PQP Lands. Surveys for mud nama will be conducted at least every eight years to verify occupancy of 75 percent of known locations. If a decline in the distribution of mud nama is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP. Other management actions described in Section 5, Table 5.2 of the MSHCP, such as maintenance and management of wetland habitat within the MSHCP Conservation Area (General Management Measure #4), will help maintain habitat and potential occurrences of the mud nama. Implementation of these management actions will help to avoid and minimize adverse effects to mud nama.

Indirect Effects

Mud nama could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These generally include the indirect effects discussed in the "General Effects" section of this biological opinion. Implementation of the Guidelines Pertaining to the Urban/Wildlands Interface policy and the Riparian/Riverine Area and Vernal Pools policy and the management provisions listed above will help to reduce the indirect effects to this species.

Conclusion

We anticipate the proposed action will directly and indirectly affect mud nama as described in the analyses above, including total loss of 19 percent of its modeled habitat. An additional 5 percent of mud nama modeled habitat outside the MSHCP Conservation Area will be subject to surveys within CASSA 3 and 3a. Once the conservation objectives for mud nama have been met, avoided areas, which have not been otherwise conserved, may be impacted. We anticipate that occurrences determined to be important to the overall conservation of the species will be considered for inclusion in the Additional Reserve Lands and that at least some of the avoided areas may be maintained as open space habitat. Implementation of the avoidance, minimization, and mitigation measures identified in the Plan will further reduce the impacts to mud nama. This species is anticipated to persist within the remaining 81 percent of its modeled habitat within both the PQP Lands and the Additional Reserve Lands. We anticipate that these areas will be monitored and managed cooperatively to benefit this species.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the mud nama. We reached this conclusion because 81 percent of mud nama habitat and 2 of the 3 known occurrences for the species in the Plan Area will be protected or will remain within the MSHCP Conservation Area. In addition, CASSA surveys for the mud nama may result in newly discovered occurrences being included in the MSHCP Conservation Area. Thus, impacts to this species and its habitat, when viewed in conjunction with the protection and management of the MSHCP Conservation Area, are not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of mud nama throughout its range.

Munz's mariposa lily (*Calochortus palmeri* var. *munzii*)

Listing Status

Munz's mariposa lily is not a State or federally listed species. This taxon is on the California Native Plant Society List 1B (RED 3-2-3).

Species Description

Munz's mariposa lily is a perennial herb in the Liliaceae (Lily) family. It is one of two varieties of *C. palmeri*. *C. palmeri* var. *palmeri* has a much wider distribution and a different habitat (wet meadows). The base of the stem of *C. palmeri* var. *palmeri* is bulblet-bearing while Munz's mariposa lily has no bulblets. The leaves are basal and vary in length from 10 to 20 centimeters. The stem is straight and ranges from 30 to 60 centimeters (Fiedler and Ness 1993).

Habitat Affinities

Munz's mariposa lily occurs at elevations from 2,953 to 7,218 feet (900 to 2,200 meters) on seasonally-moist, fine granitic loam on exposed knolls in the shade of lower montane coniferous

forest (yellow pine woodland) and on moist, sandy clay in chaparral and meadows (Fiedler and Ness 1993; CNDDDB 2000; CNPS 2001).

Life History

Munz's mariposa lily flowers from May through July (Munz 1974). The inflorescence consists of one to six bell-shaped flowers. The white or lavender petals are sometimes brown-spotted above the nectary. This round gland is either glabrous or purple-hairy. The erect capsules are 3 to 5.5 cm long. Munz's mariposa lily does not reproduce vegetatively (Munz 1974; Fiedler and Ness 1993). Species-specific studies for Munz's mariposa lily have not been located regarding reproduction, pollinators, germination, and dispersal.

Status and Distribution

Munz's mariposa lily is endemic to the San Jacinto Mountains of western Riverside County. The CNPS (2001) considers this plant fairly endangered in California, although it might occur in such low numbers that it is rarely reported. The CNDDDB (2000) includes four historic records from the San Jacinto Mountains in the general areas of Idyllwild (1967), south of Alvin Meadow (1966), Hurkey Creek (1940), and west of Ribbonwood (1940).

Threats

Munz's mariposa lily is vulnerable to overgrazing, trampling, road maintenance, development projects, and invasion of exotic species (Stephenson and Calcarone 1999).

Conservation Needs

The conservation needs of the Munz's mariposa lily include protection and management of the known occurrences in Riverside County in a manner that provides for their long-term viability. Ecological processes necessary to maintain suitable habitat also need to be protected. Specific threats to the Munz's mariposa lily should be clearly identified and addressed. Actions that would increase the likelihood of deleterious effects from any identified threat should be avoided. Fencing may be necessary in some areas to prevent trampling by livestock. Newly discovered occurrences with long-term conservation value should be conserved in the same manner.

Environmental Baseline

The Munz's mariposa lily is endemic to the San Jacinto Mountains of western Riverside County. No species-specific distribution surveys have been done for the Munz's mariposa lily throughout the Plan Area. Our dataset includes four recent occurrences in the San Jacinto Mountains, and an additional location on the western slope of Mount Edna, south of Beaumont. Stephenson and Calcarone (1999) report the Munz's mariposa lily is known from seven occurrences in the San Jacinto Mountains of Riverside County, at least four of which are located on the San Bernardino National Forest.

The Munz's mariposa lily occurs at elevations from 2,953 to 7,218 feet (900 to 2,200 meters) in chaparral, meadows, and lower montane coniferous forest habitats (CNDDDB 2000; CNPS 2001). We used these criteria within the Narrow Endemic Survey Area of the San Jacinto Mountain Bioregion to model habitat for the Munz's mariposa lily. Based on this analysis, the Plan Area supports approximately 58,105 acres of modeled habitat for the Munz's mariposa lily. Approximately 45,952 acres (79 percent) of modeled habitat occur within PQP Lands. Because the Munz's mariposa lily tends to occur in specific micro-habitats, such as in mesic areas, within chaparral and conifer forest (Stephenson and Calcarone 1999) as described above, the modeled habitat likely overestimates the extent of suitable habitat for this species within the Plan Area.

Effects of the Action

Direct Effects

The Plan Area includes 58,105 acres of modeled habitat for Munz's mariposa lily. There are 12,163 acres (21 percent) of modeled habitat for Munz's mariposa lily outside the MSHCP Conservation Area, though all of this modeled habitat is included within the Narrow Endemic Plant Species Survey Area (NEPSSA) 6 (Figure 6-1, pp. 6-30). Munz's mariposa lily is considered a Narrow Endemic Plant Species. Until such time that the Additional Reserve Lands are assembled and conservation objectives for this species are met, surveys will be conducted as part of the project review process for public and private projects where suitable habitat for the Munz's mariposa lily is present within NEPSSA 6. Populations detected as a result of survey efforts shall be avoided according to the procedures outlined in the Narrow Endemic Plant Species policy (section 6.1.3 of the Plan; *i.e.*, 90 percent of portions of property with long-term conservation value shall be avoided until the species conservation objectives are met). For those locations found to contain large numbers of individuals or otherwise determined to be important to the overall conservation of the species, the Plan allows flexibility to acquire these locations for inclusion into the Additional Reserve Lands (pp. 6-40).

Within the 12,163 acres of modeled habitat outside of the Conservation Area but within the NEPSSA for Munz's mariposa lily (21 percent of total modeled habitat), we anticipate that up to 10 percent of the area with long-term conservation value for this species (as discussed above) will be lost to individual projects. One of two records from our dataset occurs outside of the MSHCP Conservation Area and within NEPSSA 6. If this Munz's mariposa lily occurrence is confirmed to contain large numbers of individuals or otherwise determined to be important to the overall conservation of the species, the Plan allows flexibility to acquire this location for inclusion into the Additional Reserve Lands (pp. 6-40).

Because the Munz's mariposa lily is not widely distributed within the Plan Area, specific conservation objectives are provided in the MSHCP (pp. 9-126) to ensure that suitable habitat and known populations of the Munz's mariposa lily will persist. The Plan states that 10 of the 14 known locations of Munz's mariposa lily within the San Jacinto Mountains, including Garner Valley, will be included within the MSHCP Conservation Area. In addition, at least 33,470 acres of chaparral, meadow, and montane coniferous forest between 2,950 ft (900 m) and 5,380 ft (1,640 m) and within the Narrow Endemic Plant Species Survey Area of the San Jacinto Mountains Bioregion (NEPSSA 6) will be included within the MSHCP Conservation Area on

PQP Lands only. According to the MSHCP, no suitable habitat for the Munz's mariposa lily occurs with the Additional Reserve Lands. The Plan states that of the 33,470 acres of potential habitat for the Munz's mariposa lily, 1,938 acres are designated as Wilderness Area and 17,202 acres are designated as Roadless Areas that do not include Range Allotments.

Based on our dataset, it appears that more than the 33,470 acres of chaparral, meadow, and montane coniferous forest habitat proposed for inclusion in the MSHCP Conservation Area will remain in the Plan Area. Approximately 45,942 acres (79 percent) of the modeled Munz's mariposa lily habitat occur within PQP Lands, but no modeled habitat occurs within the Additional Reserve Lands. Four of five records from our dataset occurs within PQP Lands.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands if occurrences of Munz's mariposa lily are detected within the NEPPSA 6 and are acquired into the Additional Reserve Lands. Cooperative management and monitoring is anticipated on PQP Lands. Surveys for Munz's mariposa lily will be conducted at least every 8 years to verify occupancy of 75 percent of known locations. If a decline in the distribution Munz's mariposa lily is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP. As stated in Section 5, Table 5.2 of the MSHCP, Reserve Managers will avoid or minimize adverse effects to the Munz's mariposa lily, with particular management emphasis on competition with non-native species, sheep and cattle grazing, off-road vehicle use, fire and fire suppression activities, and hydrology altering activities.

Indirect Effects

Munz's mariposa lily could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These generally include the indirect effects discussed in the "General Effects" section of this biological opinion. Implementation of the Guidelines Pertaining to the Urban/Wildlands Interface policy and the management provisions listed above will help to reduce the indirect effects to this species.

Conclusion

We anticipate the proposed action will directly and indirectly affect the Munz's mariposa lily as described in the analyses above. Twenty-one percent of Munz's mariposa lily modeled habitat outside the MSHCP Conservation Area will be subject to surveys within NEPPSA 6. Once the conservation objectives for Munz's mariposa lily have been met, avoided areas, which have not been otherwise conserved, may be impacted. We anticipate that occurrences determined to be important to the overall conservation of the species will be considered for inclusion in the Additional Reserve Lands and that at least some of the avoided areas may be maintained as open space habitat. Implementation of the avoidance, minimization, and mitigation measures identified in the Plan will further reduce impacts to Munz's mariposa lily. This species is anticipated to persist within the remaining 79 percent of its modeled habitat within PQP Lands. We anticipate that the PQP Lands and Additional Reserve Lands will be monitored and managed cooperatively to benefit the Munz's mariposa lily.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the Munz's mariposa lily. We reached this conclusion because 79 percent of Munz's mariposa lily modeled habitat and most of the reported occurrences will remain within PQP Lands. In addition, required surveys for this species may result in newly discovered occurrences being included in the MSHCP Conservation Area. Thus, the impacts to this species and its modeled habitat, when viewed in conjunction with the protection and management of the MSHCP Conservation Area, are not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of the Munz's mariposa lily throughout its range.

Ocellated Humboldt lily (*Lilium humboldtii* ssp. *ocellatum*)

Status of the Species

Listing Status

Ocellated Humboldt lily is not a State or federally listed species. Ocellated Humboldt lily is on the California Native Plant Society's List 4 (RED 1-2-3).

Species Description

Ocellated Humboldt lily is a perennial herb in the Liliaceae (lily) family. It is the southern subspecies of *Lilium humboldtii* (*L. humboldtii* ssp. *humboldtii* occurs in the central valley of California.) and is closely related to *L. pardalinum* (Skinner 1988, 1993). Synonyms include *L. humboldtii* var. *bloomerianum* and *L. fairchildii* (CNPS 2001). The species has a rhizomatous bulb and (usually) a single stem with one to many nodding flowers borne at the top of the stem (Munz 1974). It grows to a height of four meters (Boyd and Banks 1995).

Habitat Affinities

Ocellated Humboldt lily is associated with openings in chaparral, cismontane woodland, coastal scrub, lower montane coniferous forest, and riparian woodland from elevations of 30 to 1,800 meters (CNPS 2001). Within the Agua Tibia Wilderness Area, Boyd and Banks (1995) reported this species occurring regularly in mesic canyons, and populations were best developed in riparian woodland, usually on lower stream benches. They also reported scattered occurrences in drier areas in the understory of oak woodland.

Life History

The large, orange, showy flowers of ocellated Humboldt lily are marked with brownish or maroon spots and bloom from March through July (Boyd and Banks 1995; CNPS 2001). The species is primarily functionally self-incompatible, but limited self-pollination may be possible in the absence of pollinators. The unscented flowers open in the late afternoon and evening. Flowers are open the following morning to coincide with the feeding time of the butterfly

pollinators. The flowers remain open for 6 to 11 days and are primarily pollinated by large Papilionidea butterflies.

The nectar tubes of ocellated Humboldt lily are 20 millimeters (0.79 inches) long and are thought to have evolved in response to the proboscis length of the pollinators such as *Papilio rutulus* and *P. eurymedon*. *Papilio zelicaon* and *Danaus plexippus* are also important pollinators of this lily species. In the absence of butterfly pollinators, several species of hummingbirds have been observed to be frequent visitors but poor pollinators. The feeding angle of the hummingbirds precludes extensive contact with the flower's reproductive structures. In years when there is low or no large butterfly visitation, populations of ocellated Humboldt lily have had a significantly lower than normal seed set (Skinner 1988).

The three capsules of the ovary split open upon maturity. The capsules are approximately 35 millimeters (1.38 inches) long and 23 millimeters (0.90 inches) wide. Each ovary contains 140 to 160 seeds. This species has the heaviest seeds of the western lilies (Skinner 1988), and no seed dispersal mechanism other than gravity dispersal is known.

Status and Distribution

Ocellated Humboldt lily occurs in San Luis Obispo, Santa Barbara, Ventura, Los Angeles, San Bernardino, Orange, Riverside, and San Diego counties and on the Anacapa, Santa Rosa and Santa Cruz islands (Reiser 1996; CNPS 2001). The MSHCP states that, within western Riverside County, the ocellated Humboldt lily primarily occurs in canyons along the eastern slope of the Santa Ana Mountains and on the northern slope of the Palomar Mountains.

Threats

Threats to Ocellated Humboldt lily include collection by recreational hikers (Boyd and Banks 1995), habitat loss, and urban development (CNPS 2001). On Santa Cruz and Santa Rosa islands, the species is threatened by feral herbivores (CPNS 2001).

Conservation Needs

The conservation needs of the ocellated Humboldt lily include protection and management of populations with long-term conservation value in San Luis Obispo, Santa Barbara, Ventura, Los Angeles, San Bernardino, Orange, Riverside, and San Diego counties. This protection and management should address the ecological processes necessary to maintain suitable habitat, such as protection of the natural hydrology that supports the species' habitat and ensuring the viability of its pollinators in occupied habitat. In addition, known threats should be ameliorated where possible. For example, fencing to prevent trampling and grazing by livestock or collection by hikers may be appropriate in certain areas. Future roads and trails should be placed away from ocellated Humboldt lily populations to prevent direct (*i.e.*, removal, collection, or trampling) and indirect impacts (*i.e.*, erosion) to the species.

Environmental Baseline

Our database includes three records of ocellated Humboldt lily within the Plan Area along the eastern slope of the Santa Ana Mountains and the northern slope of the Palomar Mountains. Of these, one occurrence exists within PQP Lands. No species-specific distribution surveys have been conducted for the ocellated Humboldt lily throughout western Riverside County. The ocellated Humboldt lily is also recently known from scattered canyons throughout the Agua Tibia Wilderness Area (Boyd and Banks 1995) and from the San Mateo Canyon Wilderness Area (Boyd *et al.* 1995), both in the Cleveland National Forest.

We attempted to model habitat for the ocellated Humboldt lily using identified vegetation communities in which the species is known to occur (*i.e.*, montane coniferous forest, woodlands/forests, chaparral, coastal scrub, and riparian scrub/woodland/forests) within the Santa Ana Mountains and Agua Tibia Mountains bioregions of the Plan Area. However, the ocellated Humboldt lily requires specific microhabitat features, such as openings within suitable habitat types. We did not have access to digital overlays mapping the extent of certain habitat features in the Plan Area (*i.e.*, openings within various vegetation types), and modeled habitat did not correspond well to the documented distribution of the species. Thus, due to its extremely limited range in the Plan Area and the difficulty in capturing appropriate habitat types in a model for this species, we did not use a habitat model in our analysis of effects to the ocellated Humboldt lily.

Effects of the Action

Direct Effects

The ocellated Humboldt lily will not be considered a Covered Species Adequately Conserved by the MSHCP unless the Forest Service agrees through an MOU to manage populations of this species on their lands cooperatively with the Permittees as “Conserved Habitat” as defined by the MSHCP. If the MOU with the Forest Service is signed, additional monitoring and management would occur on habitat for the ocellated Humboldt lily within Forest Service lands included in the MSHCP Conservation Area. If the MOU with the Forest Service is executed, the MSHCP will authorize impacts associated with development and other proposed Covered Activities over the 75-year permit term outside the MSHCP Conservation Area, which encompasses 1 of the 3 ocellated Humboldt lily observations in our dataset. Thus, any individual ocellated Humboldt lily plants and populations persisting in these areas could be impacted over the 75-year permit term as a result of the proposed development or other Covered Activities.

According to the Plan, at least four known occurrences of ocellated Humboldt lily at Arroyo Seco Canyon in the Agua Tibia Wilderness Area and at Fisherman’s Camp in Tenaja Canyon will be included in the MSHCP Conservation Area (Section 9, pp. 9-128). The Plan also states that historically occupied locations from Castro and Horsethief canyons, the Elsinore Mountains, and Corona between Tin Mine Canyon and Santiago Peak will also be included within the MSHCP Conservation Area. Based on our analysis, 2 of the 3 (67 percent) known occurrences of ocellated Humboldt lily within the Plan Area will be included in the MSHCP Conservation

Area; one will remain in PQP Lands and the other will be conserved in Additional Reserve Lands.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands, including surveys for the ocellated Humboldt lily. Following development of the MOU with the Forest Service, cooperative management and monitoring are anticipated on PQP Lands. Surveys for the ocellated Humboldt lily will be conducted at least every eight years to verify occupancy at a minimum of 75 percent of the known locations. If a decline in the distribution of the ocellated Humboldt lily is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP. Other management actions described in Section 5, Table 5.2 of the MSHCP will help maintain ocellated Humboldt lily habitat by protecting known and future occurrences detected during surveys from collecting and managing existing and future trails systems so that they avoid locations of this species. Implementation of these management actions will help to avoid and minimize adverse effects to the ocellated Humboldt lily.

Indirect Effects

The ocellated Humboldt lily could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These include the indirect effects described in the “General Effects” section of this biological opinion. The management provisions listed above and implementation of the Riparian/Riverine and Vernal Pools policy will help to reduce the indirect effects to this species.

Conclusion

We anticipate the proposed action will directly and indirectly affect the ocellated Humboldt lily as described in the analyses above, including the loss of 1 of the 3 known occurrences in the Plan Area. Implementation of the avoidance, minimization, and mitigation measures identified in the Plan will reduce the impacts to this species. We anticipate that the 2 remaining known occurrences will persist within the MSHCP Conservation Area. We anticipate that the MSHCP Conservation Area will be monitored and managed cooperatively with the Forest Service to benefit the ocellated Humboldt lily.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service’s biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the ocellated Humboldt lily. We reached this conclusion because 2 of the 3 known occurrences and habitat likely supporting additional occurrences of this species will be protected or remain in the MSHCP Conservation Area. Thus, the impacts to the ocellated Humboldt lily and its habitat, when viewed in conjunction with the protection and management of the MSHCP Conservation Area, are not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Orcutt's brodiaea (*Brodiaea orcuttii*)Status of the Species*Listing Status*

Orcutt's brodiaea is not a State or federally listed species. This species is on the California Native Plant Society's List 1B (RED 1-3-2).

Species Description

Orcutt's brodiaea is an herb in the Liliaceae (Lily) family. This species belongs to the subgenus *Filifoliae*, a small group of three species (Niehaus 1971) and is one of 13 species in the genus *Brodiaea* (Keator 1993). It is known to hybridize with *B. filifolia* (thread-leaved brodiaea; CNPS 2001). The small perennial geophyte has dark brown fibrous coated corms, bell-shaped violet flowers and cylindric leaves that are widely channeled in cross-section (Keator 1993).

Habitat Affinities

Orcutt's brodiaea occurs from 30 to 1,615 meters in mesic clay or sometime serpentine sites within vernal pools, valley and foothill grassland, closed-cone coniferous forest, chaparral, cismontane woodland, and meadows (CNDDB 2000; CNPS 2001).

Life History

Orcutt's brodiaea blooms from May through July (CNPS 2001). The bell-shaped flowers are violet in color (Munz 1974). While corms are the principal means of perpetuation from one growing season to another (Niehaus 1971), the species also sets seeds. *Brodiaea* are self-incompatible, and pollination between individuals must take place in order to produce seed (Niehaus 1971). Niehaus (1971) found that a broad spectrum of insects visit *Brodiaea* flowers, but only tumbling flower beetles (Mordellidae) and sweat bees (Helictidae) were found to transport pollen between flowers. Upon maturity, the three lobes of the ovaries split, revealing many tiny black seeds. The seeds are then dispersed as wind rattles the capsules, shaking them free (Smith 1997).

The annual growth cycle of this species begins with the above-ground appearance of a few grass-like leaves from each corm. The corms function similarly to bulbs in storing water and nutrients during the dormant season (Smith 1997). Individuals of the genus *Brodiaea* require several years to mature, and frequently, only a fraction of the mature individuals flower in a given year. An experimental burn study conducted by Cox and Austin (1990) at San Diego vernal pools indicates that Orcutt's brodiaea responds well to periodic fires. Orcutt's brodiaea in burned vernal pools showed population increases when compared to control sites.

Status and Distribution

Orcutt's brodiaea is distributed from southwestern Riverside County south through coastal and interior San Diego County into northwestern Baja California (Munz 1974; Keator 1993; Reiser 1996). Historic records need to be verified to clarify the current distribution (CNPS 2001). The CNPS (2001) considers this plant seriously endangered in California and rare outside of California. Within western Riverside County, the CNDDDB (2000) includes 5 historic occurrences of Orcutt's brodiaea from the Rainbow Valley area (1938), 4 miles west of the Tenaja Guard Station (1960), and the Santa Rosa plateau, specifically, Mesa de Colorado (1982), Mesa de la Punta (1982), and Mesa de Burro (1982).

Threats

General threats to Orcutt's brodiaea include urban development, agricultural conversion, road construction, dumping, and alteration of vernal pool watershed hydrology, and competition with non-native plants (CNDDDB 2000; CNPS 2001). Boyd *et al.* (1992) reported that the principal potential threats to hybrids of *Brodiaea filifolia* and *B. orcuttii* at Miller Mountain are cattle grazing, small-scale mining, and road maintenance activities. The Orcutt's brodiaea occurrences at the Santa Rosa Plateau may be affected by alteration of vernal pool watershed hydrology. Houses have been constructed across the road from the Santa Rosa Plateau and within the watershed of Mesa de Colorado vernal pools. Runoff from the residential property can flow into the vernal pools through culverts or over the road (Carol Bell, The Nature Conservancy, pers. comm. to S. Brown, U.S. Fish and Wildlife Service, August 20, 2003).

Conservation Needs

The conservation needs of Orcutt's brodiaea include protection and management of the occurrences in San Diego and Riverside counties in a manner that provides for long-term viability of the species at these locations. This will require maintenance of hydrology that supports the species habitat and management of known threats. Actions that would modify the hydrology of the species habitat or increase the likelihood of deleterious effects from any identified threat should be avoided. Newly discovered occurrences with long term conservation value should be conserved in the same manner.

Environmental Baseline

No species-specific distribution surveys have been conducted for the Orcutt's brodiaea throughout western Riverside County. Our dataset includes two recent records from the Santa Rosa Plateau area, specifically Mesa de Colorado (1990) and between Mesa de Colorado and Mesa de Burro (1988). Our dataset includes an additional location near the Perris Valley airport; however, this occurrence is mislabeled and actually represents *B. filifolia*. This species was also recently documented in the southern end of the Santa Ana Mountains at Miller Mountain within the San Mateo Wilderness Area, where it overlaps and hybridizes with *B. filifolia* (Boyd *et al.* 1992, 1995).

Orcutt's brodiaea occurs from elevations of 98 to 5,299 feet (30 to 1,615 meters) in mesic clay or sometimes serpentine sites within vernal pools, valley and foothill grassland, closed-cone coniferous forest, chaparral, cismontane woodland, and meadows (CNDDDB 2000; CNPS 2001). Our habitat model for this species includes all vegetation types on Southern Interior Basalt Flow soils and playas/vernal pools, regardless of soil type, within the Santa Ana Mountain Bioregion. Based on these habitats, the Plan Area supports approximately 2,418 acres of modeled habitat for Orcutt's brodiaea. Approximately 1,281 acres (53 percent) of modeled habitat occur within PQP Lands. Because Orcutt's brodiaea occurs in specific microhabitats, such as in mesic sites, within the general habitat types (CNPS 2001) described above, modeled habitat likely overestimates the extent of suitable habitat for this species within the Plan Area. Also, our model may not capture all vernal pools that are occupied or that are considered suitable habitat because not all vernal pools in the Santa Ana Mountain Bioregion have been mapped. Also, we were unable to include additional soil types that harbor vernal pools, such as Murrieta stony clay loam, in our model because we do not have access to digital overlays that map the extent of these soil types in the Plan area.

Effects of the Action

Direct Effects

The Plan Area includes approximately 2,418 acres of modeled habitat for Orcutt's brodiaea. The species will be subject to impacts associated with development and other proposed Covered Activities within 259 acres (11 percent) of this modeled habitat that is outside of the MSHCP Conservation Area. Thus, all individual Orcutt's brodiaea and populations persisting in these areas are anticipated to be lost over the 75-year permit term as a result of the proposed development. No records from our dataset occur within this impact area.

Because Orcutt's brodiaea is not widely distributed within the Plan Area, specific conservation objectives are provided in the MSHCP (pp. 9-128) to ensure that suitable habitat and known populations of Orcutt's brodiaea will persist. The Plan states that at least six of the known occurrences of Orcutt's brodiaea will be included within the MSHCP Conservation Area, including one occurrence at Miller Mountain within San Mateo Wilderness Area; a complex of about 5 occurrences on the Mesa de Burro, Mesa de Colorado, and Mesa de la Punta on the Santa Rosa Plateau within the Santa Rosa Plateau Preserve; and one occurrence along the San Jacinto River. In addition, the watershed of the vernal pool complexes at the Santa Rosa Plateau, at Miller Mountain, and along the San Jacinto River will be included in the MSHCP Conservation Area in order to maintain hydrologic conditions.

Based on our analysis, approximately 1,281 acres (53 percent) of the modeled Orcutt's brodiaea habitat occur within PQP Lands and 878 acres (36 percent) occur within the Additional Reserve Lands. Thus, the MSHCP Conservation Area will include 2,159 acres (89 percent) of the modeled Orcutt's brodiaea habitat in the Plan Area. Two recent records from our dataset will be included within the MSHCP Conservation Area. One of these occurs within the Additional Reserve Lands on the Santa Rosa Plateau and the other occurs within PQP Lands on the Santa

Rosa Plateau. We anticipate this species will benefit from the implementation of the Riparian/Riverine and Vernal Pool Area policy.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands including surveys for the Orcutt's brodiaea. Cooperative management and monitoring is anticipated on PQP Lands. Surveys for the Orcutt's brodiaea will be conducted at least every eight years to verify occupancy at a minimum of 75 percent of the known locations. If a decline in the distribution of Orcutt's brodiaea is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP. As stated in Section 5 of the MSHCP, Reserve Managers will maintain the hydrological processes of the watersheds supporting the occupied vernal pools at the Santa Rosa Plateau, the San Jacinto River, and the San Mateo Wilderness Area.

Indirect Effects

Orcutt's brodiaea could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These generally include the indirect effects discussed in the "General Effects" section of this biological opinion. Implementation of the Guidelines Pertaining to the Urban/Wildlands Interface policy, Riparian/Riverine Areas and Vernal Pools policy, and the management provisions listed above will help to reduce the indirect effects to this species.

Conclusion

We anticipate the proposed action will directly and indirectly affect Orcutt's brodiaea as described in the analysis above, including the loss of 11 percent of its modeled habitat in the Plan Area. Implementation of the avoidance, minimization and mitigation measures identified in the Plan will reduce impacts to this species. This species is anticipated to persist within the remaining 89 percent of its modeled habitat within both the PQP Lands and the Additional Reserve Lands. We anticipate that these areas will be monitored and managed cooperatively to benefit this species

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of Orcutt's brodiaea. We reached this conclusion because 89 percent of the Orcutt's brodiaea habitat will remain within the MSHCP Conservation Area, and no known Orcutt's brodiaea populations will be lost in the Plan Area. Furthermore, the impacts associated with loss of this species' modeled habitat, when viewed in conjunction with the protection and management of the MSHCP Conservation Area, are not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of Orcutt's brodiaea throughout its range.

Palmer's grapplinghook (*Harpagonella palmeri*)Status of the Species*Listing Status*

Palmer's grapplinghook is not a State or federally listed species. This species is on the California Native Plant Society's List 4 (RED 1-2-1).

Species Description

Palmer's grapplinghook (*Harpagonella palmeri*) is an annual herb in the Boraginaceae (Borage) family. *Harpagonella* is a monotypic genus (Munz 1974) originally included in *Pectocarya*, but it is differentiated from this genus by the growth of the calyx to form a bur-like structure around the nutlets (Boyd and Banks 1995). The small white flowers of Palmer's grapplinghook bloom from March through May (CNPS 2001). This species is inconspicuous and can be easily overlooked (CNPS 2001). As the fruit matures, the calyx expands to form a bur-like structure with 5-10 stout spines and hooked bristles around one of the two developing nutlets (Boyd and Banks 1995; Messick 1993). However, before the bur develops, this species has the similar appearance of *Pectocarya* (Boyd and Banks 1995). The disarticulating stems range in height from 3-30 centimeters (1 to 12 inches) (Messick 1993).

Habitat Affinities

Palmer's grapplinghook is associated with clay soils in dry open coastal sage scrub, chaparral, valley and foothill grasslands below 450 meters (1,476 feet) in elevation (Hickman 1983). This species was also found on highly weathered gabbro soils in the Agua Tibia Wilderness Area in the vicinity of Dorland Mountain (Boyd and Banks 1995). According to the Plan, in Riverside County Palmer's grapplinghook is commonly associated with Munz's onion, many-stemmed dudleya, and occasionally with Nevin's barberry. Additionally, this species is associated with the chocolate lily, knot-weed spineflower, purple sanicle, snakeroot, lomatium, lace parsnip, Cleveland's shooting star, goldenstar, soaproot, and red-skinned onion (Boyd 1988).

Life History

Palmer's grapplinghook blooms from March through May (CNPS 2001). As the fruit matures, the calyx expands to form a bur-like structure that could enable the species to be dispersed by animals (Boyd and Banks 1995). Other than the limited information above, nothing is known about the reproduction, dispersal, or recruitment of this species.

Status and Distribution

Palmer's grapplinghook occurs in the cismontane regions of Los Angeles, Orange, Riverside, and San Diego counties; Santa Catalina Island; Arizona; Baja California, Mexico; and Sonora, Mexico (CNPS 2001). The California Native Plant Society (2001) considers the species fairly endangered in California, but widespread outside of California.

Within the Plan Area Palmer's grapplinghook is known from the following localities: Vail Lake, the Lake Skinner/Bachelor Mountain area, Antelope Valley near SR-79, the vicinity of Lake Elsinore, the Santa Ana Mountains in the vicinity of Elsinore Peak, south Corona, Gavilan Peak/Plateau near Harford Springs Park, and the Agua Tibia Wilderness Area near Dorland Mountain. There are also reported localities within the Plan Area at Temescal Wash, Alberhill, Murrieta, Romoland, Steele Peak, and Skunk Hollow found before 1988 (CNDDDB archives), but these have not been recently surveyed to confirm localities.

Threats

This species is threatened by urban development and agricultural conversion (Reiser 2001). Approximately 59 percent of the coastal sage scrub in Riverside County was eliminated between 1945 and 1990 (58 FR16741), and 60 percent of the coastal sage scrub stands in the Riverside-Perris Plain that were mapped around 1930 were either heavily degraded by exotic annual grasses or entirely replaced by them by 1990 (Minnich and Dezzani 1998). According to the Plan, additional threats to Palmer's grapplinghook include clay mining, fire-suppression activities (*i.e.*, discing), grazing, and competition with invasive non-native species.

Conservation Needs

The conservation needs of Palmer's grapplinghook in the United States include the protection and management of occurrences with long-term conservation value in Los Angeles, Orange, Riverside, and San Diego counties, Santa Catalina Island, and Arizona. Newly discovered populations should be conserved in the same manner.

Environmental Baseline

Our dataset includes 39 records of Palmer's grapplinghook in the Plan Area. Based on our records, Palmer's grapplinghook occurs in the vicinity of Vail Lake, the Lake Skinner/Bachelor Mountain area, Antelope Valley near SR-79, the vicinity of Lake Elsinore, the Santa Ana Mountains in the vicinity of Elsinore Peak, south Corona, Gavilan Peak/Plateau near Harford Springs Park, and the Agua Tibia Wilderness Area near Dorland Mountain.

This species occurs in chaparral, coastal sage scrub and grassland habitats that occur on clay soils (Altamont, Auld, Bosanko, Claypit and Porterville) below 3,800 feet (1,158 meters) in elevation within all of the bioregions of the Plan Area, except the San Bernardino Mountains Bioregion. We attempted to model habitat for Palmer's grapplinghook based upon these vegetation and soil characteristics. However, because Palmer's grapplinghook requires specific microhabitat features, such as areas with low vegetation cover in clay soil habitats, modeled habitat significantly overestimated the extent of suitable habitat available for this species in the Plan Area. We did not have access to digital overlays mapping the extent of certain soil types within the Plan Area; therefore, available mapping of clay substrates was incomplete, and modeled habitat did not correspond well to the documented distribution of the species. Thus, we did not use a habitat model in our analysis of effects to the Palmer's grapplinghook.

Effects of the Action

Direct Effects

The species will be subject to impacts associated with proposed residential, commercial, urban, and agricultural development within suitable habitat that is outside of the MSHCP Conservation Area. Any individual Palmer's grapplinghook plants and populations persisting in these areas are anticipated to be impacted over the 75-year permit term as a result of the proposed development, including 14 (36 percent) of the known records for this species.

According to the Plan, at least 24 known locations of Palmer's grapplinghook, within the Plan Area, will be included within the MSHCP Conservation Area (Section 9, pp. 9-129). These locations include Temescal Wash, Alberhill, Lake Elsinore, Antelope Valley, Bachelor Mountain, Vail Lake, Lake Matthews, Harford Springs Park, Cleveland National Forest, Skunk Hollow and Lake Skinner. Additionally, the Plan also states that at least 90,490 acres of suitable habitat will be included within the MSHCP Conservation Area. Suitable habitat is defined as chaparral, coastal sage scrub, and grassland below 1,640 feet (500 meters) in elevation in the Riverside Lowlands, Santa Ana Mountains, and San Jacinto Foothills Bioregions. Based on our analysis, 11 records of Palmer's grapplinghook will remain in PQP Lands and 14 records will be conserved in Additional Reserve Lands. In total, 25 of the 39 (64 percent) occurrences of Palmer's grapplinghook will be conserved or will remain in the MSHCP Conservation Area.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands, including surveys for the Palmer's grapplinghook. Cooperative management and monitoring are anticipated on PQP Lands. Surveys for the Palmer's grapplinghook will be conducted at least every eight years to verify occupancy at a minimum of 75 percent of the known occurrences listed above. If a decline in the distribution of Palmer's grapplinghook is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP. Other management actions described in Section 5, Table 5.2 of the MSHCP will help maintain Palmer's grapplinghook habitat by managing competition by non-native species (*i.e.*, exotic annual grasses), farming, grazing, clay mining, fire and fire suppression activities. Implementation of these management actions will help to avoid and minimize adverse effects to Palmer's grapplinghook.

Indirect Effects

The Palmer's grapplinghook could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These generally include the indirect effects mentioned in the "General Effects" section of this biological opinion. The management provisions listed above will help to reduce the indirect effects to this species.

Conclusion

We anticipate the proposed action will directly and indirectly affect Palmer's grapplinghook as described in the analyses above, including the loss of 36 percent of the known occurrences in the Plan Area. Implementation of the avoidance, minimization, and mitigation measures identified in the Plan will reduce the impacts to this species. We anticipate that the remaining 64 percent of the known occurrences will persist within both the PQP Lands and Additional Reserve Lands of the MSHCP Conservation Area. We anticipate that these areas will be monitored and managed cooperatively to benefit the Palmer's grapplinghook.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the Palmer's grapplinghook. We reached this conclusion because 64 percent of the known occurrences of Palmer's grapplinghook and habitat likely supporting additional occurrences of this species will be protected or remain in the MSHCP Conservation Area. Thus, the impacts to the Palmer's grapplinghook and its habitat, when viewed in conjunction with the protection and management of the MSHCP Conservation Area, are not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Palomar monkeyflower (*Mimulus diffusus*)

Status of the Species

Listing Status

Palomar monkeyflower is not a State or federally listed species. This species is on the California Native Plant Society's List 4 (RED 1-1-1).

Species Description

Palomar monkeyflower is an annual herb in the Scrophulariaceae (Figwort) family. It is one of more than 100 species in the genus *Mimulus*. Thompson (1993) treated this species as a synonym under an expanded concept of *Mimulus palmeri*. This species intergrades with *M. montioides*. The stem is generally round and erect and grows to a maximum height of 28 centimeters. The leaves are linear to ovate and 3 to 28 millimeters in length (Thompson 1993). The many-seeded, ovoid fruits are 3.5 to 9 millimeters in length (Thompson 1993).

Habitat Affinities

Palomar monkeyflower is a foothill and mountain species that is known to be found between elevations of 1220 and 1830 meters (4,002 and 6,003 feet) (CNPS 2001). However, there are records for this species at elevations as low as 1,200 feet (Rancho Santa Ana Botanic Garden, Claremont, California [RSA], data from herbarium specimens). Palomar monkeyflower grows in sandy or gravelly soil in chaparral and lower montane coniferous forest, particularly yellow pine

forest (CNPS 2001; Munz 1974) and may be found in sandy washes and disturbed areas near roads and trails (Thompson 1993).

Life History

Palomar monkeyflower has showy yellow and purple flowers that bloom in the spring from April to June (CNPS 2001). No information regarding reproduction, pollination, or dispersal is available for this species.

Status and Distribution

This species is found in the mountains and foothills of southern California and extreme northern Baja California, Mexico (Grant 1924; Munz 1974). This species is found from the Santa Ana and San Jacinto Mountains of Orange and Riverside counties south through the Peninsular Ranges of San Diego County and down into northern Baja California, Mexico (CNPS 2001). According to Reiser (2001), Palomar monkeyflower is slowly declining in southern California. Currently, this species is not considered very rare in California and is fairly widespread outside of California (CNPS 2001).

Threats

Populations along trails are susceptible to trampling and trail maintenance activities (Boyd and Banks 1995). Increased recreational activity (*i.e.*, camping, hiking) in the mountains is likely to further impact specific known populations of Palomar monkeyflower, as well as other *Mimulus* species (Reiser 2001).

Conservation Needs

The conservation needs of Palomar monkeyflower in the United States include protection and management of known occurrences in San Diego, Orange and Riverside counties in a manner that provides for their long-term viability. Any newly discovered occurrences with long-term conservation value should be treated in the same manner. Actions that would modify the hydrology that supports the species' habitat or increase the likelihood of deleterious effects from any identified threat should be avoided. The determination of more specific conservation needs will require more studies regarding the species' status, distribution, life history (reproductive biology, pollinators, germination, dispersal, etc.), population genetics or biology, habitat requirements, and threats.

Environmental Baseline

In the Plan Area, Palomar monkeyflower is known from the Santa Ana Mountains (Boyd *et al.* 1992; Boyd *et al.* 1995), the Agua Tibia Mountains (Boyd and Banks 1995; Banks 1999) and the San Jacinto Foothills and Mountains. According to our dataset, there are 11 recent records for Palomar monkeyflower within the Plan Area. Six of the eleven records are within the Santa Ana Mountains, two records are in the vicinity of Lake Skinner and three records are in the Agua Tibia Mountains (all except one record are within PQP Lands). However, we determined that 3

of the 6 records in the Santa Ana Mountains were duplicate records. Therefore, there are only 3 records in the Santa Ana Mountains (one in the vicinity of Elsinore Peak, one in San Mateo Canyon and another between Bedford and McBribe Canyons) and a total of 8 records in our dataset. The two records near Elsinore Peak, including the duplicate record, are not entirely within PQP Lands. The records are in close proximity to each other, but one is just within the boundaries of PQP Lands and the other is within a private land inholding.

According to herbarium records, additional recent records of Palomar monkeyflower occur east of Lake Skinner (junction of maintenance road and Tualota Creek on south-facing slope), and throughout the San Jacinto Mountains (RSA, data from herbarium specimens). The Plan identifies additional known locations for Palomar monkeyflower, including Santa Rosa Plateau (no records found), vicinity of Sage (three historic RSA records) and French Valley (no records found).

Chaparral and lower montane coniferous forest in the Santa Ana Mountains, Agua Tibia Mountains, San Jacinto Mountains and San Jacinto Foothills Bioregions at elevations between 1,200 and 6,000 feet (366 and 1829 meters) were used to model habitat for Palomar monkeyflower within the Plan Area. Based on these criteria, the Plan Area includes approximately 270,758 acres of modeled habitat for Palomar monkeyflower. Approximately 172,009 acres (64 percent) of the modeled habitat for Palomar monkeyflower exists within PQP Lands. However, due to Palomar monkeyflower's need for specific microhabitat features, such as sandy soils and disturbed areas, modeled habitat likely overestimates the extent of suitable habitat available for this species in the Plan Area.

Effects of the Action

Direct Effects

The Plan Area includes approximately 270,758 acres of modeled habitat for Palomar monkeyflower. The species will be subject to impacts associated with proposed residential, commercial, urban, and agricultural development within 65,069 acres (24 percent) of this modeled habitat that is outside of the MSHCP Conservation Area. Thus, all individual Palomar monkeyflower plants and populations persisting in these areas are anticipated to be impacted over the 75-year permit term as a result of the proposed development; however, some plants may survive in rural mountainous areas where development impacts are anticipated to occur at a slower rate and at lower densities. Approximately 33,973 acres (52 percent) of the non-conserved modeled habitat for the Palomar monkeyflower are designated as rural/mountainous land.

According to the Plan, at least 18 of the known occurrences of Palomar monkeyflower on the Santa Rosa Plateau, vicinity of Sage, French Valley, east of Lake Skinner, and in the San Jacinto Mountains, Agua Tibia Mountains and Santa Ana Mountains will either remain on PQP Lands or be conserved within the Additional Reserve Lands (Section 9, pp. 9-129). Our modeled habitat for this species did not encompass the Riverside lowlands, including French Valley. In addition, our dataset does not include any of the above localities of Palomar monkeyflower, identified in the Plan, except the Santa Ana Mountains and Agua Tibia Mountains. However, according to

recent herbarium records, known localities for Palomar monkeyflower include the area east of Lake Skinner and throughout the San Jacinto Mountains (RSA, data from herbarium specimens). The Plan also states that at least 23,800 acres of suitable habitat (chaparral and montane coniferous forest at appropriate elevations) within the Agua Tibia, San Jacinto, and Santa Ana Mountains Bioregions will be included within the MSHCP Conservation Area.

Based on our analysis, conserved habitat within the Additional Reserve Lands will include 33,680 acres (12 percent) of modeled habitat for Palomar monkeyflower (chaparral and lower montane coniferous forest). Another 172,009 acres (64 percent) of modeled Palomar monkeyflower habitat will remain within PQP Lands. In total, 205,689 acres or 76 percent of the modeled habitat for Palomar monkeyflower will be conserved or remain in the Plan Area. These measures should help offset the direct impacts to the species.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands including surveys for the Palomar monkeyflower. Cooperative management and monitoring are anticipated on PQP Lands. Surveys for the Palomar monkeyflower will be conducted at least every eight years to verify occupancy at a minimum of 75 percent of the known occurrences listed above. If a decline in the distribution of Palomar monkeyflower is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP. Other management actions described in Section 5, Table 5.2 of the MSHCP will help maintain habitat and populations of Palomar monkeyflower within core areas, such as the prevention of destruction/degradation of this species by trampling, trail maintenance activities, off-road vehicle use, and competition from non-native plants. Implementation of these management actions will help to avoid and minimize adverse effects to Palomar monkeyflower.

Indirect effects

The Palomar monkeyflower could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These generally include the indirect effects mentioned in the “General Effects” section of this biological opinion. The management provisions listed above will help to reduce the indirect effects to this species.

Conclusion

We anticipate the proposed action will affect the Palomar monkeyflower as described in the analysis above, including the loss of 24 percent of its modeled habitat in the Plan Area. Implementation of the avoidance, minimization, and mitigation measures identified in the Plan will reduce the impacts to this species. We anticipate that this species will persist in the remaining 76 percent of its modeled habitat within both the PQP Lands and the Additional Reserve Lands. These lands include large, contiguous habitat blocks where Palomar monkeyflower is likely to occur. We anticipate that these areas will be monitored and managed cooperatively to benefit this species.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service’s biological

opinion that the action, as proposed, is not likely to jeopardize the continued existence of the Palomar monkeyflower. We reached this conclusion because most of the modeled habitat for the Palomar monkeyflower is within PQP Lands and will not be impacted by the Plan. In addition, the impacts associated with loss of this species' habitat, when viewed in conjunction with the protection and management of the MSHCP Conservation Area, it is not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Parish's brittle scale (*Atriplex parishii*)Status of the Species*Listing Status*

Parish's brittle scale is not a State or federally listed species. It is a Forest Service Sensitive Species, and it is on the California Native Plant Society's List 1B (RED 3-3-2).

Species Description

Parish's brittle scale, a member of the Goosefoot family (Chenopodiaceae), is a monoecious annual with mostly opposite leaves and branches. The stems are prostrate, less than 20 centimeters long, and generally woolly at the tips. Leaves are ovate to cordate, 4-8 millimeters long, and densely white-scaly. This species is small and easily overlooked.

Parish's brittle scale is distinguished from the closely related, but more northern species, *A. depressa* and *A. minuscula* by its prostrate growth habit and woolly stem tips. Stems of *A. minuscula* are generally erect, and those of *A. depressa* are glabrous to densely scaly near the tips (Taylor and Wilken 1993).

Habitat Affinities

Parish's brittle scale is restricted to alkaline or clay soils below elevations of 1,900 meters (Taylor and Wilken 1993). Suitable habitat includes seasonal wetlands (floodplains) dominated by chenopod scrub, alkali playas, vernal pools, and alkali grasslands. Known occurrences are associated with sea blite, woolly marbles, alkali weed, wire-stem popcorn flower, California goldfields, hairgrass, Mojave silver scale, bracted saltbush, sharp-tooth peppergrass, dwarf peppergrass, alkali plantain, and toad rush (Bramlet 1993c, 1993a). Parish's brittle scale is associated with other MSHCP Covered Species, including San Jacinto Valley crownscale, Davidson's saltscale, spreading navarretia, vernal barley, smooth tarplant, and thread-leaved brodiaea (Bramlet 1993a; Ogden 1996).

Life History

Parish's brittle scale usually flowers from June to October (CNPS 2001). The flower is obscure and small. Parish's brittle scale produces male flowers mostly in the upper leaf axils and female flowers mostly in the lower leaf axils (Munz 1974). The seeds are about 1.2 millimeters long

(Munz 1974). No information regarding seed dispersal was found. Population size varies considerably from year to year.

Status and Distribution

Historically, Parish's brittle scale was distributed sporadically in cismontane southern California from the Los Angeles Basin (Los Angeles and Orange counties) and Riverside County (Munz 1974; Taylor and Wilken 1993). Parish's brittle scale was known from Cushenbury Springs in the Mojave Desert of San Bernardino County and Vanderwieder Flat in eastern Riverside County. Parish's brittle scale was reported in northwestern Baja California, Mexico, by Wiggins (1980) from Tijuana south to the eastern Sierra Juarez.

Parish's brittle scale was considered extinct by Taylor and Wilken (1993), as it had not been observed since 1974. The species was rediscovered in western Riverside County in 1993 (CNDDDB 2003). The CNPS (2001) considers the species extirpated from Los Angeles, Orange, San Bernardino, and San Diego counties, but it is probably still extant in Baja California. A recent report suggested that Parish's brittle scale may be found in Ventura County, but the author has not observed it in the area (Magney 2002; David Bramlet, pers. comm., 2003). There is also an unconfirmed report of Parish's brittle scale near Ramona in San Diego County.

Threats

Parish's brittle scale is threatened by development, agricultural conversion, and grazing (CNPS 2001). Most occurrences of Parish's brittle scale in the Plan Area were probably destroyed by the agricultural conversion of much of the low-lying habitat in the region. The population reported by Reiser (2001) may have been extirpated by deep agricultural discing. The population conserved west of the Hemet-Ryan Airport is threatened by encroaching exotic plant species.

Conservation Needs

The conservation needs of Parish's brittle scale in the United States include protection and management of the known occurrence in Riverside County in a manner that provides for the species' long-term viability. Any newly discovered occurrences should be conserved in the same manner. Preservation of appropriate habitat (alkali playa) within its historic range is necessary for long-term survival. Surveys in appropriate habitat are needed to identify remaining extant occurrences. Habitat restoration may be needed to allow Parish's brittle scale to recolonize or to be reintroduced into currently unoccupied areas.

Environmental Baseline

In the Plan Area, our dataset includes nine records for Parish's brittle scale. However, this species is currently known only from the upper Salt Creek drainage west of Hemet. The only confirmed extant occurrence is west of the Hemet-Ryan Airport, where 306 plants were found in 1993 (CNDDDB 2003). Subsequent sampling of this population from 1996-2001 resulted in population estimates of 2,400, 3,110, 1,875, and 241 plants (AMEC 2001). This population is conserved within the Upper Salt Creek Wetland Preserve purchased by the Metropolitan Water

District as mitigation for the eastside pipeline project. This Preserve is currently not included in the PQP Lands database for the Plan Area. A population numbering in the thousands was reported in 1996 in Winchester Valley, south of Simpson Road and west of Farnsworth Street, but it was probably extirpated by deep agricultural discing (Reiser 2001).

Appropriate habitat remains on the San Jacinto River floodplain south of the Bernasconi Hills, where a population was reported in 1974 (Bramlet 1993a; Reiser 2001; CNDDDB 2003). Although no current populations are known from the San Jacinto River, Mystic Lake, or the San Jacinto Wildlife Area, these areas provide suitable habitat. A recent survey along the San Jacinto River floodplain from the Ramona Expressway to Railroad Canyon did not identify any Parish's brittlescale populations (Glen Lukos and Associates, Inc. 2000). Nearly the entire 1,600 acres of the Hemet vernal pool area in the upper Salt Creek drainage and most of the San Jacinto River corridor area contain suitable habitat for this species.

The vernal pool model was used to capture potential habitats supporting Parish's brittlescale. The vernal pool model included these parameters within the Riverside Lowlands and the Santa Ana Mountains bioregions: 1) vernal pools and playas and 2) clayey soils (Altamont, Auld, Bosanko, Claypit, and Porterville), alkali soils (Willows, Traver, and Domino), and Santa Rosa Plateau basalt flow soils. Based on our analysis, 42,349 acres of modeled habitat, with the potential to harbor vernal pools suitable for the species, occur within the Plan Area. Approximately 8,831 acres (21 percent) of modeled habitat occur within PQP Lands. We were unable to include additional soil types that harbor vernal pools, such as Murrieta stony clay loam, in our model because we do not have access to digital overlays mapping the extent of these soil types in the Plan Area.

Effects of the Action

Direct Effects

The Plan Area includes 42,349 acres of modeled habitat for Parish's brittlescale. There are 25,831 acres (61 percent) of modeled habitat outside of the MSHCP Conservation Area; of that 9,869 acres (23 percent of total modeled habitat) occur within the Criteria Area Species Survey Areas (CASSA) 1, 2, 3, 3a, 4, and 7 (Figure 6-2, pp. 6-64). Parish's brittlescale is considered an Additional Survey Needs and Procedures species. Until such time that the Additional Reserve Lands can be assembled and species conservation objectives for this species are met, surveys will be conducted as part of the project review process within CASSA 1, 2, 3, 3a, 4, and 7. Populations detected as a result of survey efforts will be avoided according to the procedures outlined in the Additional Survey Needs and Procedures policy (Section 6.3.2 of the Plan; *i.e.*, 90 percent of portions of property with long-term conservation value will be avoided until the species conservation objectives are met). For those locations found to contain large numbers of individuals or otherwise determined to be important to the overall conservation of the species, the Plan allows flexibility to acquire these locations for inclusion into the Additional Reserve Lands (pp. 6-70).

Within the 9,869 acres of the modeled habitat for Parish's brittlescale outside of the MSHCP Conservation Area but within the CASSA for Parish's brittlescale (23 percent of total modeled

habitat), we anticipate that up to 10 percent of the area with long-term conservation value for this species (as discussed above) will be lost to individual projects, including all individual plants within project footprints.

Parish's brittlescale will be subject to impacts associated with proposed residential, commercial, urban, and agricultural development within 15,962 acres (38 percent of total modeled habitat) that are outside of both the MSHCP Conservation Area and the CASSA for this species. Thus, any individual Parish's brittlescale plants and populations outside of the MSHCP Conservation Area and outside the CASSA for Parish's brittlescale are anticipated to be impacted over the 75-year permit term as a result of proposed Covered Activities.

Any populations in the lower San Jacinto River may be at risk from the San Jacinto River Flood Control Project. We assume that a population will not be impacted by this proposed Covered Activity unless criteria in Section 7.3.7 of the Plan are met. The criteria includes conservation of land (called "mitigation lands") and providing hydrology for the continued survival of several species found in alluvial systems. We anticipate that any reduction in the population size will be minimized through adherence to these criteria, such that the distribution of this species will be maintained in the Plan Area.

Because Parish's brittlescale is not widely distributed within the Plan Area, specific conservation objectives are provided in the MSHCP (Section 9, pp. 9-129) to ensure that suitable habitat and known populations of Parish's brittlescale persist. The Plan states that three known locations of Parish's brittlescale will be included within the MSHCP Conservation Area. However, as indicated above, we know of only one extant record of Parish's brittlescale within the Plan Area at the Upper Salt Creek Wetland Preserve. In addition, at least 6,900 acres of grassland and playas and vernal pools within the San Jacinto River, Mystic Lake and Salt Creek Areas will be included within the MSHCP Conservation Area. Floodplain areas along the San Jacinto River will be included in this acreage total to preserve floodplain processes important to the survival of Parish's brittlescale. The Salt Creek floodplain in its existing condition will be included within the MSHCP Conservation Area and floodplain processes will be maintained to provide for persistence of the species.

Based on our analysis, to offset the loss of Parish's brittlescale modeled habitat within the Plan Area, the MSHCP will conserve and manage approximately 7,686 acres (18 percent) of modeled habitat for the Parish's brittlescale within the Additional Reserve Lands. Approximately 8,831 acres (21 percent) of the modeled Parish's brittlescale habitat will remain within PQP Lands, including the only verified occurrence of the species in the Plan Area, that resides within the Upper Salt Creek Wetland Preserve. In total, the MSHCP Conservation Area will include 16,517 acres (39 percent) of the modeled Parish's brittlescale habitat in the Plan Area.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands including surveys for Parish's brittlescale. Cooperative management and monitoring are anticipated on PQP Lands. Surveys will be conducted at least every eight years to ensure a minimum level of occupancy of 75 percent of known populations. If a decline in the distribution of Parish's brittlescale is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9,

Table 9.2 of the MSHCP. Other management actions described in Section 5, Table 5.2 of the MSHCP will help maintain Parish's brittlescale habitat, such as preventing alteration of hydrology and floodplain dynamics, off-road vehicle use, grazing, competition from non-native plants, fire and fire-suppression activities, and farming. Reserve managers will also ensure habitat support functions within the MSHCP Conservation Area by maintaining and enhancing the floodplain processes of the San Jacinto River and upper Salt Creek, including intermittent flooding and periodic pooling. Implementation of these management actions will help to avoid and minimize adverse effects to Parish's brittlescale. We anticipate the Parish's brittlescale will also benefit from the implementation of the Riparian/Riverine Area and Vernal Pools policy.

Indirect Effects

Parish's brittlescale could be subjected to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These generally include the indirect effects mentioned in the "General Effects" section of this biological opinion. Implementation of the Guidelines Pertaining to the Urban/Wildlands Interface policy, Riparian/Riverine Area and Vernal Pools policy, and the management provisions listed above will help to reduce the indirect effects to this species.

Conclusion

We anticipate the proposed action will directly and indirectly affect Parish's brittlescale as described in the analyses above, including total loss of 38 percent of its modeled habitat. An additional 23 percent of Parish's brittlescale modeled habitat outside the MSHCP Conservation Area will be subject to surveys within CASSA 1, 2, 3, 3a, 4, and 7. Once the conservation objectives for Parish's brittlescale have been met, avoided areas, which have not been otherwise conserved, may be impacted. We anticipate that occurrences determined to be important to the overall conservation of the species will be considered for inclusion in the Additional Reserve Lands and that at least some of the avoided areas may be maintained as open space habitat. Implementation of the avoidance, minimization, and mitigation measures identified in the Plan will further reduce the impacts to this species. This species is anticipated to persist within the remaining 39 percent of its modeled habitat within both the PQP Lands and the Additional Reserve Lands. We anticipate that these areas will be monitored and managed cooperatively to benefit this species.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the Parish's brittlescale. We reached this conclusion because 39 percent of the Parish's brittlescale modeled habitat, including the only known location of Parish's brittlescale within the Plan Area, will be protected or remain in the MSHCP Conservation Area. In addition, required surveys for Parish's brittlescale may result in newly discovered occurrences being included in the MSHCP Conservation Area. Thus, impacts to this species and its modeled habitat, when viewed in conjunction with the protection and management of the MSHCP Conservation Area, are not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of Parish's brittlescale throughout its range.

Parish's meadowfoam (*Limnanthes gracillis* spp. *parishii*)Status of the Species*Listing Status*

Parish's meadowfoam was listed as endangered by the State of California in 1979. The U.S. Fish and Wildlife Service proposed to list Parish's meadowfoam as threatened under the Federal Endangered Species Act on August 4, 1994 (59 Federal Register 39879), but withdrew the proposal on February 6, 1997 (62 Federal Register 5560), because various local, State, and Federal agencies developed and approved an agreement entitled: Conservation Agreement for the Preservation of Cuyamaca Lake Downingia (*Downingia concolor* var. *brevior*) and Parish's Meadowfoam. The Service concluded that implementation of the measures in this conservation agreement significantly reduced the risks to Parish's meadowfoam, and therefore, the species did not warrant listing. Parish's meadowfoam was removed from Federal candidate status on September 19, 1997 (62 Federal Register 49397).

Species Description

Parish's meadowfoam is a member of the meadowfoam family (Limnanthaceae), a small family of wetland species found primarily along the Pacific coast of North America. The plant is a low, widely branching annual with glabrous stems 10 to 20 centimeters long (Munz 1974). The leaves are 2 to 6 centimeters long and divided. The flowers are bowl-shaped and the petals are 8 to 10 millimeters long with a white or occasionally with a cream-colored base that becomes pink (Ornduff 1993b). The fruit has a rough texture.

The range of Parish's meadowfoam is separated by over 480 kilometers from any other species of *Limnanthes*. Parish's meadowfoam is distinguished morphologically from *L. g.* ssp. *gracilis* by its smaller flowers, broader sepals, and smooth nutlets (Abrams 1951; Mason 1952).

Habitat Affinities

Parish's meadowfoam is limited to ephemeral wetlands in the mountains of southern California between 600 and 1,700 meters in elevation (CNPS 2001). It occurs on gentle slopes or in swales, in forest glades, among mima mounds and in areas likely to be seasonally inundated (Bauder 1992). Parish's meadowfoam is thought to occur mostly in sandy loam soils with a pH of 6.4 to 7.2 (Gentry and Miller 1965). On the Santa Rosa Plateau, the soils may be clay. Sproul and Beauchamp (1979) considered California buttercup to be a good indicator species for Parish's meadowfoam. Other commonly associated species include checkerbloom, southern mule's ears, and yarrow (Winter 1991).

Life History

Parish's meadowfoam blooms from April through May, setting seed in the late spring and early summer. Germination requires saturated soils or inundation (Munz 1974; Bauder 1992). Parish's meadowfoam is a showy annual that is pollinated by native solitary bees and honeybees

(Brown and Jain 1977). Bauder (1992) suggests that seasonal inundation of seeds may be necessary to trigger germination, although seedlings have limited or no tolerance for inundation. The above-mentioned pollinators require upland habitat for nesting purposes. No information regarding dispersal is available.

Status and Distribution

Parish's meadowfoam is endemic to San Diego and Riverside counties, southern California. Distribution of Parish's meadowfoam is limited to scattered locations in the Cuyamaca and Laguna mountains and on Palomar Mountain within San Diego County, and the Santa Rosa Plateau in southwestern Riverside County (CNDDDB 2003). Fewer than 20 populations of this taxon are known, with the largest population (70 percent of the known individuals) occurring in Cuyamaca Valley, of the Cuyamaca Mountains (62 Federal Register 5560). Much of the population in the Cuyamaca Valley burned in October 2003, but the severity of the fire impacts are still unknown at this time. It is assumed that large populations of Parish's meadowfoam were also lost with the establishment of the Cuyamaca Dam in 1886 and subsequent conversion of the Cuyamaca Valley to agriculture (62 Federal Register 5560).

On August 5, 1996, a Memorandum of Understanding (MOU) and Conservation Agreement were signed that provided protection for Parish's meadowfoam within the Cuyamaca Valley. Signatories to the agreement include: the Helix Water District, Lake Cuyamaca Recreation and Park District, State Parks, CDFG, the Service, and the Forest Service. The Conservation Agreement significantly reduced the threat to Parish's meadowfoam (62 Federal Register 5560) by addressing over 80 percent of the remaining locations and about 70 percent of the populations.

Threats

The major threats to Parish's meadowfoam are habitat loss and excessive disturbance of natural conditions, including alteration of hydrology and removal of pollinators (Winter 1991). Bauder (1992) reported that excessive trampling by unauthorized horseback riding and the discharge of fuels and herbicides into the water table have also impacted the Parish's meadowfoam. The Santa Rosa Plateau population is within an ecological reserve but could be threatened by hydrological alterations and adjacent development. Houses have been constructed across the road from the Santa Rosa Plateau Ecological Reserve and within the watershed of Mesa de Colorado vernal pools, where Parish's meadowfoam is known to occur. Runoff from the residential property can flow into the vernal pools through culverts or over the road (C. Bell, The Nature Conservancy, pers. comm, 2003). Urban runoff can result in the degradation of water quality and changes in the availability of nutrients.

Conservation needs

Due to the rarity of this species, known occurrences with long-term conservation value should be protected from human disturbance and development activities. This protection includes eliminating urban runoff in areas where this species occurs.

Environmental baseline

In the Plan Area, modeled habitat for Parish's meadowfoam occurs in basalt flow soils in and around the Santa Rosa Plateau. The primary vegetation categories captured in the model for Parish's meadowfoam includes: chaparral, coastal sage scrub, grassland, playas and vernal pools, and woodlands and forests in within Santa Ana Mountains Bioregion of the Plan Area. Based on our analysis, the Plan Area supports approximately 2,365 acres of modeled habitat for Parish's meadowfoam. Approximately 1,277 acres (54 percent) of this modeled habitat are within PQP Lands.

There are no recorded locations for Parish's meadowfoam in our dataset. According to the MSHCP, distribution of Parish's meadowfoam is limited to the Santa Rosa Plateau in southwestern Riverside County within the Nature Conservancy Preserve (CNDDDB 2003). The only known locality in the Plan Area is located within the Santa Rosa Plateau Ecological Reserve. It is located on the Mesa de Colorado, 0.25 to 0.50 miles east of pool C-2, the largest vernal pool (CNDDDB 2003). The population is located on basalt-clay in grassland, in an ephemeral stream bed and adjacent ephemeral meadow. The population was found in association with California buttercup (Bauder 1992). Houses have been constructed across the road from the Mesa de Colorado. Culverts have been constructed that route runoff from the developed property into the vernal pool (C. Bell, The Nature Conservancy, personal communication to S. Brown, U.S. Fish and Wildlife Service August 20, 2003). Although, Parish's meadowfoam is located 0.25 to 0.50 miles east of the pool, it could be impacted by changes in the hydrology of the pool and surrounding areas.

Effects of the Action

Direct effects

The Plan Area includes approximately 2,365 acres of modeled habitat for Parish's meadowfoam. Approximately 1,277 acres (54 percent) of Parish's meadowfoam modeled habitat occur within PQP Lands and 865 acres (37 percent) occur within the Additional Reserve Lands. Thus, the MSHCP Conservation Area will include 2,142 acres (91 percent) of the modeled Parish's meadowfoam habitat in the Plan Area. The species will be subject to impacts associated with proposed residential, commercial, urban, and agricultural development within 223 acres (9 percent) of the modeled habitat that is outside of the MSHCP Conservation Area. Thus, any Parish's meadowfoam and populations persisting in these areas are anticipated to be impacted over the 75-year permit term as result of the proposed development; however, some plants may survive in rural mountainous areas where development impacts are anticipated to occur at a slower rate and at lower densities. Approximately 212 acres (95 percent) of the non-conserved modeled habitat for Parish's meadowfoam are designated as rural/mountainous land.

Vernal pools in and around the Santa Rosa Plateau have not been thoroughly surveyed for vernal pool endemic species. There are five mesas with basalt flow soils suitable for vernal pools in and around the Santa Rosa Plateau Ecological Reserve. Mesa de Burro and Mesa de la Punta are both entirely within the Santa Rosa Plateau Ecological Reserve. Mesa de Colorado is located on the southwest edge of the Reserve and extends beyond the reserve boundary. Redonda Mesa and

Avenaloca Mesa are both outside of the Reserve. Vernal pools suitable for the species may occur on the mesas outside of the Santa Rosa Plateau Ecological Reserve. These areas have not been surveyed for vernal pools or vernal pool associated species.

Because the Parish's meadowfoam is not widely distributed within the Plan Area, specific conservation objectives are provided in the MSHCP (Section 9, Table 9.2) to ensure that suitable habitat and known populations of the Parish's meadowfoam will persist. The Plan states that within the MSHCP Conservation Area, at least one known location on the Santa Rosa Plateau will either remain on PQP Lands or be conserved within the Additional Reserve Lands. In addition, the watershed of the vernal pool complex on the Santa Rosa Plateau will be included within the MSHCP Conservation Area. According to the MSHCP (Section 5, Table 5.2), Reserve Managers will ensure habitat support functions within the MSHCP Conservation Area by maintaining the watershed and hydrologic conditions of the known vernal pool complexes on the Santa Rosa Plateau. Implementation of the Riparian/Riverine Areas and Vernal Pools policy may provide additional protection to this species by avoiding and/or minimizing direct impacts to riparian, riverine, and vernal pool habitats.

The Santa Rosa Plateau Ecological Reserve is managed for education and preservation of the unique ecology of the Plateau. The Vernal Pool Trail is the only trail that traverses the shoreline of Mesa de Colorado, where Parish's meadowfoam is located. Based on a map of the area, it is likely that the locality of Parish's meadowfoam is in the Research Area, just east of the vernal pool. This area is closed to public access. Thus, based on the location of the plant within the Reserve, it is not likely that parish's meadow foam plants will be trampled or threatened by changes of hydrology or introductions of non-native plants.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands including surveys for the Parish's meadowfoam. Cooperative management and monitoring is anticipated on PQP Lands. Surveys for the Parish's meadowfoam will be conducted at least every 8 years to verify occupancy at a minimum of 75 percent of the known locations. If a decline in the distribution of Parish's meadowfoam is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP. Implementation of these management actions will help to avoid and minimize adverse effects to Parish's meadowfoam.

Indirect Effects

Parish's meadowfoam could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These generally include the indirect effects discussed in the "General Effects" section of this biological opinion. Implementation of the Guidelines Pertaining to the Urban/Wildlands Interface, Riparian/Riverine Areas and Vernal Pools policy, and the management provisions listed above will help to reduce the indirect effects to this species.

Conclusion

We anticipate the proposed action will affect the Parish's meadowfoam as described in the analysis above, including the loss of 9 percent of its modeled habitat in the Plan Area. Implementation of the avoidance, minimization and mitigation measures identified in the Plan will reduce impacts to the Parish's meadowfoam. This species is anticipated to persist within the remaining 91 percent of its modeled habitat within both the PQP Lands and the Additional Reserve Lands. Together these lands form a system of large, contiguous habitat blocks that likely contain suitable habitat for the Parish's meadowfoam and support the one documented occurrence of this species within the Plan Area. We anticipate that these areas will be monitored and managed cooperatively to benefit this species.

After reviewing the current status of this species, the environmental baseline for the Plan Area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the Parish's meadowfoam. We reached this conclusion because no known occurrences of Parish's meadowfoam will be impacted and most of the modeled habitat that may support populations of Parish's meadowfoam occurs within the MSHCP Conservation Area. Thus, the impacts associated with loss of this species' modeled habitat, when viewed in conjunction with the protection and management of the MSHCP Conservation Area, are not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Parry's spine flower (*Chorizanthe parri* var. *parryi*)

Status of the Species

Listing Status

Parry's spine flower is not a State or federally listed species. This species is on the California Native Plant Society's List 3 (RED ?-2-3).

Species Description

Parry's spine flower is an herb in the Polygonaceae (buckwheat) family (CNPS 2001). It comprises the *Parryanae* subsection of *Chorizanthe* (Reveal and Hardham 1989b) and may be confused with other species of spine flowers, particularly *Chorizanthe procumbens* (CNPS 2001). This prostrate to ascending plant is an annual with a strigose (having stiff straight hairs that lay flat) stem of 2-30 centimeters and oblanceolate to oblong leaves (Hickman 1993d). The brown achenes (seeds) are 2.5-3 millimeters long (Reveal and Hardham 1989b).

Habitat Affinities

Parry's spine flower occurs at elevations typically between 300-2,500 feet, but has been reported as high as 4,000 feet (Reveal and Hardham 1989b) in sandy or rocky openings within chaparral and coastal scrub (CNPS 2001).

Life History

Parry's spine flower has white flowers and blooms from April through June (Munz 1974). Species-specific studies for this species are not available regarding reproduction, dispersal, germination, population ecology and genetics.

Status and Distribution

This species is known from the flats and foothills of the San Gabriel Mountains, San Bernardino Mountains and San Jacinto Mountains within Los Angeles, San Bernardino and Riverside counties (Reveal and Hardham 1989b). The CNPS (2001) reports it as possibly extirpated from Los Angeles County. However, Boyd (1999) notes that this species occurs in the Liebre Mountains, Los Angeles County. Parry's spine flower is endemic to California and considered fairly rare, but more information is needed to clarify current status and distribution (CNPS 2001).

Threats

Parry's spine flower is threatened by habitat loss as a result of urbanization (Reveal and Hardham 1989b, CNPS 2001). Approximately 59 percent of the coastal sage scrub in Riverside County was eliminated between 1945 and 1990 (see 58 Federal Register 16741), and 60 percent of the coastal sage scrub stands in the Riverside-Perris Plain that were mapped in about 1930 were either heavily degraded by exotic annual grasses or entirely replaced by them by 1990 (Minnich and Dezzani 1998).

Conservation Needs

The conservation needs of Parry's spine flower include protection and management of known populations in the San Gabriel Mountains, San Bernardino Mountains and San Jacinto Mountains in a manner that provides for their long term viability. This will require maintenance of the ecological processes that sustain the species' habitat. Newly discovered populations with long term conservation value should be treated in the same manner. Actions that increase the likelihood of deleterious effects from any identified threat should be avoided. Additional information on Parry's spine flower is needed to determine its current status and understand its habitat requirements and essential ecological processes.

Environmental Baseline

Parry's spine flower is sparsely distributed throughout the Plan Area within sandy or rocky openings of chaparral and coastal sage scrub habitats. According to our dataset, there are 25 recent (post 1988) records for Parry's spine flower within the Plan Area. These records occur within the areas of Diamond Valley Reservoir/Rawson Canyon, Aguanga, Wilson Valley/Sage, Vail Lake, Lake Matthews/Gavilan Plateau, Cactus Valley, Quail Valley, March Air Force Base, Cherry Valley and south Corona in the vicinity of Joseph wash. However, there are a few records that appear to be duplicate records, and in one case, a triplicate record. One duplicate record and the triplicate record are located in the vicinity of Diamond Valley Reservoir within

PQP Lands. The other duplicate record is located in the Wilson Valley/Sage area within the MSHCP Conservation Area but appears to lie within a roadway. Therefore, for the purposes of our analysis, we considered 21 records for Parry's spine flower in our dataset.

Chaparral and coastal sage scrub at elevations ranging from 300 to 4,000 feet within the San Bernardino Mountains, San Jacinto Mountains, San Jacinto Foothills and Riverside Lowlands Bioregions were used to model habitat for Parry's spine flower within the Plan Area. Based on these criteria, the Plan Area provides approximately 327,961 acres of habitat for Parry's spine flower. Because Parry's spine flower needs specific microhabitat features, such as sandy or rocky openings, the modeled habitat likely overestimates the extent of suitable habitat for this species in the Plan Area. Twenty-seven percent (88,699 acres) of the modeled habitat for Parry's spine flower occurs on PQP Lands.

Effects of the Action

Direct Effects

According to the Plan, 20 Parry's spineflower known locations will be included in the MSHCP Conservation Area. However, Parry's spine flower will not be considered a Covered Species Adequately Conserved by the MSHCP until occupation of Parry's spine flower in at least 10 localities, (a locality can not be smaller than one quarter section (160 acres)) containing at least 1,000 individuals each, is confirmed within "Conserved Habitat" as defined by the MSHCP. Smaller populations (less than 1,000 individuals) may be considered to meet this objective if it can be demonstrated that the population is self-sustaining.

The Plan Area includes 327,961 acres of modeled habitat for Parry's spine flower. Parry's spine flower will be subject to impacts associated with development and other proposed Covered Activities over the 75-year permit term within 142,131 acres (43 percent) of this modeled habitat, which encompasses 14 of the 21 (67 percent) known locations in our dataset. It is anticipated that most individuals and populations of Parry's spine flower within the impacted areas will be lost as a result of habitat loss and activities such as grading and construction. However, since approximately 60,276 acres (42 percent) of the non-conserved modeled habitat for Parry's spine flower occurs within Rural Mountainous areas, where development impacts are anticipated to occur at a slower rate and at lower densities, it is possible that at least some individuals or populations may survive within these areas.

To offset the loss of Parry's spine flower habitat within the Plan Area, implementation of the MSHCP will provide for the protection of approximately 97,132 acres (30 percent) of modeled Parry's spine flower habitat within the Additional Reserve Lands. Another 88,699 acres (27 percent) of modeled habitat will remain within PQP Lands. A total of 185,831 acres (57 percent) of modeled Parry's spine flower habitat, encompassing 7 of the 21 (33 percent) known locations for Parry's spine flower, will either be conserved on Additional Reserve Lands or remain within PQP Lands within the Plan Area.

Twenty Parry's spine flower known locations will be included in the MSHCP Conservation Area. According to the Plan, these occurrences include locations throughout the Vail Lake area,

in the vicinity of Lake Matthews, Gavilan Hills, Antelope Valley, Rawson Canyon, Santa Rosa Hills, Reche Canyon, Wilson Valley, Juniper Flats, Gilman Hot Springs Road and Diamond Valley Lake. Based on our dataset, only Vail Lake, Lake Matthews, Gavilan Hills, Rawson Canyon, Diamond Valley Lake, Santa Rosa Hills and Wilson Valley areas have recent (post 1988) known locations for Parry's spine flower. The Gavilan Hills occurrence within our dataset is outside the MSHCP Conservation Area. However, the Plan may be referring to another Gavilan Hills record in the same area, such as the locality reported by Boyd and Banks (1995). In addition, the majority of Santa Rosa Hills is not in the MSHCP Conservation Area. There is only one small PQP Land parcel in the northwestern portion of the Santa Rosa Hills area. The only Parry's spine flower record in our dataset for that area is outside of the MSHCP Conservation Area. However, there is a record for this species in the adjacent Cactus Valley within the MSHCP Conservation Area. If the Cactus Valley record is the same as what the Plan identifies as the Santa Rosa Hills occurrence, then the species objective to include this locality in the MSHCP Conservation Area can be met. The remaining locations (Antelope Valley, Reche Canyon, Juniper Flats, Gilman Hot Springs Road) have modeled habitat for Parry's spine flower, but we did not find a recent record within those areas.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands and may also implement these activities on PQP Lands, including surveys for the Parry's spine flower. Surveys will be conducted at least every 8 years to ensure a minimum level of occupancy of 75 percent of known locations of Parry's spine flower. If a decline in the distribution of the Parry's spine flower is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP. Parry's spine flower may require a different sampling strategy due to its rarity of occurrence or other restriction, as described in Section 5.3.3 (pgs 5-53 to 5-73). In addition, Reserve Managers will avoid or minimize adverse effects to Parry's spine flower to the maximum extent practicable. Particular management emphasis will be given to potential flood control and mining activities (Section 5, Table 5-2).

Indirect Effects

The Parry's spine flower could be subject to indirect effects from Covered Activities both inside and outside of the Conservation Area. These generally include the indirect effects mentioned in the "General Effects" section of this biological opinion. The management provisions listed above will help to reduce the indirect effects to this species. Implementation of the Urban/Wildlands Interface policy will also assist in avoiding or minimizing any adverse indirect effects to Parry's spine flower.

Conclusion

We anticipate the proposed action will directly and indirectly affect Parry's spine flower as described in the analyses above, including the loss of 43 percent of its modeled habitat and 14 known occurrences in the Plan Area. Implementation of the avoidance, minimization, and mitigation measures identified in the Plan will reduce the impacts to this species. We anticipate that this species will persist in the remaining 57 percent of its modeled habitat within both the

PQP Lands and conserved by the Additional Reserve Lands. We anticipate that these areas will be monitored and managed cooperatively to benefit the Parry's spine flower.

After reviewing the current status of this species, the environmental baseline for the Plan Area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the Parry's spine flower. We reached this conclusion because the impacts to this species and its modeled habitat, when viewed in conjunction with the protection and management of the MSHCP Conservation Area, are not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Payson's jewelflower (*Caulanthus simulans*)

Status of the Species

Listing Status

Payson's jewelflower is not a State or federally listed species. This species is on the California Native Plant Society's List 4 (RED 1-2-3).

Species Description

Payson's jewelflower is an herb in the Brassicaceae (mustard) family (CNPS 2001). This annual (particularly the pale-flowered form) is easily confused with *Caulanthus heterophyllus* var. *pseudosimulans* (CNPS 2001) but is distinguished by leaf and floral characters (Buck 1993). The fruit consists of silique, 2-8 cm in length (Buck 1993). Individual plants which are bristly and conspicuously spreading below and generally branched above, vary in height from 3-4 dm (Munz 1974, Buck 1993).

Habitat Affinities

Payson's jewelflower occurs in sandy-granitic soils (CNPS 2001) within pinyon-juniper woodland, chaparral and coastal sage scrub, typically on north-facing slopes and ridgelines (Munz 1974; Buck 1993; Ogden 1993a; Reiser 1994). This species is frequently found on rocky steep slopes, in burned areas or in disturbed sites such as streambeds (CNDDDB 2000; Steve Boyd, Rancho Santa Ana Botanical Garden, pers. comm. 2003).

Life History

The small (8-10 mm), white flowers bloom from April to June (Munz 1974). No information regarding reproduction or seed dispersal is available for this species.

Status and Distribution

The range of Payson's jewelflower may extend from the Santa Rosa Mountains through central Riverside County to interior San Diego County, primarily along the desert edge between 400

meters and 2,200 meters in elevation (Munz 1974; Buck 1993). It is endemic to California and considered fairly rare (CNPS 2001).

Threats

Populations of Payson's jewelflower are threatened by grazing, urbanization and road construction (CNPS 2001).

Conservation Needs

The conservation needs of Payson's jewelflower include the protection and management of confirmed occurrences with long term conservation value in San Diego and Riverside counties in a manner that provides for their long-term viability. Any new discoveries with long term conservation value should be conserved in the same manner. Actions that would increase the likelihood of deleterious effects from any identified threat should be avoided. Additional conservation needs for Payson's jewelflower include the need to collect data pertaining to local population source/sink dynamics, habitat requirements, reproduction, pollinators, germination, dispersal, and effects of fragmentation on this species.

Environmental Baseline

According to our dataset, there are 20 recent (post 1988) records for Payson's jewelflower within the Plan Area. However, all occurrences west of Radec (vicinity of Sage Road and Hwy 79) are believed to represent *Caulanthus heterophyllus* ssp. *pseudosimulans* (CNDDDB 2003; Steve Boyd, Rancho Santa Ana Botanical Garden, pers. comm. 2003). Payson's jewelflower (particularly the pale-flowered form) is easily confused with *Caulanthus heterophyllus* var. *pseudosimulans* (CNPS 2001). Therefore, within western Riverside County, the Payson's jewelflower is only known to occur in the southeastern portion of the Plan Area. Only 4 out of the 20 recent records for Payson's jewelflower are located within this portion of the Plan Area. These records occur in the vicinity of Sage/Aguanga Valley.

Peninsular juniper woodland and scrub, chaparral and coastal sage scrub between 1,312 and 7,218 feet (400-2,200 meters) in elevation within the Desert Transition, Agua-Tibia Mountains and San Jacinto foothills Bioregions were used to model habitat for Payson's jewelflower within the Plan Area. Based on these vegetation communities, Bioregions, and elevations, the Plan Area supports approximately 138,820 acres of modeled habitat for Payson's jewelflower. Because Payson's jewelflower needs specific microhabitat features, such as sandy-granitic soils, north-facing slopes and ridgelines, modeled habitat likely overestimates the extent of suitable habitat for this species. Thirty-five percent of the modeled habitat for Payson's jewelflower occurs on PQP Lands.

Effects of the Action

Direct Effects

The Plan Area includes 138,820 acres of modeled habitat for Payson's jewelflower. Payson's jewelflower will be subject to impacts associated with development and other proposed Covered Activities over the 75-year permit term within 46,873 acres (34 percent) of this modeled habitat, which encompasses 1 of the 4 known locations of this species in our dataset. We anticipate that this population and any other individuals and populations of Payson's jewelflower persisting outside the MSHCP Conservation Area will be impacted as a result of habitat loss and activities such as grading and construction; however, some plants may survive in rural mountainous areas where development impacts are anticipated to occur at a slower rate and at lower densities. Approximately 12,166 acres (26 percent) of the non-conserved modeled habitat for Payson's jewelflower are designated as rural/mountainous land.

To offset the loss of Payson's jewelflower habitat within the Plan Area, implementation of the MSHCP will provide for the conservation and management of approximately 42,694 acres (31 percent) of modeled Payson's jewelflower habitat within the Additional Reserved Lands, which encompasses the remaining three known locations of Payson's jewelflower in our dataset. Two of these three known locations captured within the Additional Reserve Lands by our interpretation of the cell criteria could be impacted by widening of the SR-79. However, this activity will be subject to the Criteria Refinement Process (Section 6.5). In order to proceed as a Covered Activity under the Plan, the proposed project, incorporating Criteria Refinements and in consideration of effects on Covered Species (*i.e.*, Payson's jewelflower), must be determined to be biologically equivalent or superior to a project on the same site not deviating from the MSHCP Criteria.

Another 49,253 acres (35 percent) of modeled habitat will remain on PQP Lands. A total of 91,946 acres (66 percent) of modeled habitat for Payson's jewelflower will either be conserved as Additional Reserve Lands or remain as PQP Lands within the Plan Area.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands, including surveys for the Payson's jewelflower. Cooperative management and monitoring is anticipated on PQP Lands. Surveys will be conducted at least every 8 years to ensure a minimum level of occupancy of 75 percent of known locations of Payson's jewelflower. Management measures will be triggered if a decline in the distribution of Payson's jewelflower is documented below this threshold. In addition, reserve managers will control access to the MSHCP Conservation Area to avoid trampling and other destructive activities that would potentially impact Payson's jewelflower (Section 5, Table 5-2).

Indirect Effects

The Payson's jewelflower could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These generally include the indirect effects mentioned in the "General Effects" section of this biological opinion. The management

provisions listed above will help to reduce the indirect effects to this species. As a result of the measures incorporated into the MSHCP, we anticipate few indirect impacts to this species.

Conclusion

We anticipate the proposed action will directly and indirectly affect Payson's jewelflower as described in the analyses above, including the loss of 34 percent of its modeled habitat in the Plan Area. Implementation of the avoidance, minimization, and mitigation measures identified in the Plan will reduce the impacts to this species. We anticipate that this species will persist in the remaining 66 percent of its modeled habitat within both the PQP Lands and conserved by the Additional Reserve Lands. We anticipate that these areas will be monitored and managed cooperatively to benefit the Payson's jewelflower.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the Payson's jewelflower. We reached this conclusion because most of the known locations for Payson's jewelflower and much of its modeled habitat will be included in the MSHCP Conservation Area. Thus, the impacts to this species and its modeled habitat, when viewed in conjunction with the protection and management of the MSHCP Conservation Area, is not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Peninsular spine flower (*Chorizanthe leptotheca*)

Status of the Species

Listing Status

Peninsular spine flower is not a State or federally listed species. This species is on the California Native Plant Society's List 4 (RED 1-2-2).

Species Description

Peninsular spine flower is an annual herb in the Polygonaceae (buckwheat) family. This species is in subsection *Staticoideae* and is closely related to and difficult to distinguish from *C. staticoides* (Reveal and Hardham 1989b; CNPS 2001). It has reddish, thinly hairy stems, 5 to 35 centimeters in length and oblong to narrowly ovate leaves 5 to 30 millimeters in length (Hickman 1993d).

Habitat Affinities

Peninsular spine flower is found in open habitats, typically on granitic-derived or alluvial surfaces. At higher elevations, this species is associated with chaparral, sage scrub, and coniferous forest openings, and at lower elevations, it is typically associated with old formation

alluvial benches (Reveal and Hardham 1989b). It occurs in sandy and gravelly places at elevations between 300 and 1,900 meters (Reveal and Hardham 1989b; Hickman 1993d).

Life History

The peninsular spine flower blooms from May through August and has white, pink, or red flowers. The flowers produce narrow, brown achenes that are 3 to 4 millimeters long (Reveal and Hardham 1989b). No studies have been conducted for this species regarding reproduction. Specific data regarding pollinators, seed viability, and dispersal are lacking.

Status and Distribution

The range of peninsular spine flower extends from the foothills at the southern base of the San Bernardino Mountains in San Bernardino County, southward along the eastern edge of the Santa Ana Mountains, continuing through the San Jacinto Mountains of Riverside County and the mountains of central San Diego County to the Tecate Mountains of northern Baja California (Reveal and Hardham 1989b). It is considered fairly rare in California and rare outside of California (CNPS 2001).

Threats

This species is threatened by habitat loss and competitive exclusion from exotic annual grasses (CNPS 2001).

Conservation Needs

Protection of the peninsular spine flower will require control of invasive plant competitors, maintenance of fluvial processes in lower elevations and current information regarding the distribution and density of the species.

Environmental Baseline

We have two records in our database from Butterfield Valley and east of Hemet. In addition, this species has been collected from several locations within the Plan Area. Recent collections are known from near Kolb Creek, Arroyo Seca Creek, and Temescal Canyon (Steven Boyd, Rancho Santa Ana Botanic Gardens, pers. comm., 2003). Reveal and Hardham (1989b) also report records from Garner Valley, Aguanga Valley, Valle Vista, and southwest of Cahuilla.

The vegetation communities used to model habitat for the peninsular spine flower include chaparral, coastal sage scrub, montane coniferous forest, and Riversidian alluvial fan sage scrub between elevations of 985 and 6,230 feet (300 and 1,900 meters) within the Narrow Endemic Plant Species Survey Area (NEPSSA) 9 (*i.e.*, Vail), Agua Tibia Mountains, San Bernardino Mountains, San Jacinto Mountains, and Santa Ana Mountains bioregions. Based on these criteria, there are 277,145 acres of peninsular spine flower modeled habitat within the Plan Area. Approximately 182,440 acres (66 percent) of the modeled habitat are within PQP Lands. Because the peninsular spine flower is generally limited to open areas within granitic soils and

alluvial benches (Steven Boyd, Rancho Santa Ana Botanic Gardens, pers. comm., 2003), the modeled habitat likely overestimates the extent of suitable habitat in the Plan Area.

Effects of the Action

Direct Effects

The peninsular spine flower will not be considered a Covered Species Adequately Conserved by the MSHCP until occupation is confirmed for at least 10 localities (Section 9, Table 9.3) within “Conserved Habitat” as defined in the MSHCP. A locality can not be smaller than one quarter section (160 acres) and must contain at least 1,000 individuals. Smaller populations may contribute to the locality count if they are demonstrably self-sustaining. The Plan Area includes 277,145 acres of modeled habitat for the peninsular spine flower. The peninsular spine flower will be subject to impacts associated with residential, commercial, urban, and agricultural development within 69,988 acres (25 percent) of modeled peninsular spine flower habitat outside the MSHCP Conservation Area. Thus, any individual plants or populations in these areas are anticipated to be impacted over the 75-year permit term as a result of proposed development or other Covered Activities; however, some plants may survive in rural mountainous areas where development impacts are anticipated to occur at a slower rate and at lower densities. Approximately 34,463 acres (49 percent) of the non-conserved modeled habitat for the peninsular spine flower are designated as rural/mountainous land.

Based on our analysis, the MSHCP will conserve and manage approximately 24,717 acres (9 percent) of modeled peninsular spine flower habitat within the Additional Reserved Lands, including one known occurrence of the species. Approximately 182,440 acres (66 percent) of modeled habitat will remain in PQP Lands. In total, 75 percent of the modeled habitat for the peninsular spine flower will be conserved or remain in the Plan Area. Implementation of these conservation measures should help reduce direct impacts to this species within the Plan Area.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands, including surveys for the peninsular spine flower. Cooperative management and monitoring are anticipated on PQP Lands. Surveys for the peninsular spine flower will be conducted at least every eight years to verify occupancy at a minimum of 75 percent of known locations. If a decline in the distribution of the peninsular spine flower is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP. Other management actions described in Section 5 of the MSHCP will help maintain peninsular spine flower habitat, such as emphasizing management of competition from non-native plant species (Section 5, Table 5.2). Implementation of these management actions will help to avoid and minimize adverse effects to peninsular spine flower.

Indirect Effects

The peninsular spine flower could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These generally include the indirect effects mentioned in the “General Effects” section of this biological opinion. Implementation of

the Guidelines Pertaining to the Urban/Wildlands Interface policy and the management provisions listed above will help to reduce the indirect effects to this species.

Conclusion

We anticipate the proposed action will directly and indirectly affect the peninsular spine flower as described in the analysis above, including the loss of 25 percent of the modeled habitat within the Plan Area. Implementation of the avoidance, minimization, and/or mitigation measures included in the Plan will reduce the impacts to this species. We anticipate that this species will persist in the remaining 75 percent of modeled habitat within both the existing PQP Lands and Additional Reserve Lands and that these areas will be monitored and managed cooperatively to benefit the peninsular spine flower.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of this species. We reached this conclusion because impacts associated with loss of this species' modeled habitat, when viewed in conjunction with the protection and management of the MSHCP Conservation Area, are not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Plummer's mariposa lily (*Calochortus plummerae*)

Status of the Species

Listing Status

Plummer's mariposa lily is not a State or federally listed species. It is a Forest Service Sensitive Species and is on the California Native Plant Society's List 1B (RED 2-2-3).

Species Description

Plummer's mariposa lily is an herb in the Liliaceae (Lily) family (CNPS 2001). It is a member of subsection *Weediani*. It hybridizes with intermediate mariposa lily, also a member of this subsection, where the two are sympatric in the San Jose Hills and Puente Hills (Ness 1989; CNPS 2001). This perennial bulb has a fibrous coat, basal leaves that vary in length from 20-40 centimeters and stems 30-90 centimeters high (Fiedler and Ness 1993).

Habitat Affinities

Plummer's mariposa lily occurs on rocky and sandy sites, typically of alluvial or granitic material, in coastal scrub, chaparral, cismontane woodland, lower montane coniferous forest and valley and foothill grasslands at elevations from 100 to 1,700 meters (CNDDDB 2003; CNPS 2001). It is absent from areas of dense shrub cover (CNDDDB 2003) and is less common at the higher end of its elevation range (CNPS 2001).

Life History

This species flowers from May through July (CNPS 2001). The inflorescence consists of two to six bell-shaped flowers. The pale pink or rose colored petals have a wide central band of long yellow hairs on the inner face. Each petal also has a round gland; the gland is either glabrous or bordered with a ring of dense orange hairs. The erect capsules are 4-8 centimeters long (Munz 1974; Fiedler and Ness 1993). Species-specific studies on reproduction, pollinators, germination, and dispersal for this species are not available.

Status and Distribution

Plummer's mariposa lily is endemic to California. It has been significantly reduced by development and continues to decline (CNPS 2001). This species is known from Ventura, Orange, Los Angeles, San Bernardino, and Riverside counties. The CNPS (2001) considers it fairly endangered in California. (Note: the CNPS's estimation of endangerment is not related to the Federal designation of endangered).

Threats

The Plummer's mariposa lily is threatened by urban development (CNPS 2001; CNDDDB 1997) and trail and road maintenance (CNDDDB 1997) throughout its range. Within the Plan Area, the population of Plummer's mariposa lily near Banning is thought to have been extirpated by development. The population near the Oak Glen Conservation Camp is thought to be threatened by trail cutting practices of the Conservation Camp fire crew (CNDDDB 1997).

Conservation Needs

The conservation needs of Plummer's mariposa lily include protection and management of known populations with long-term conservation value in Ventura, Orange, Los Angeles, San Bernardino, and Riverside counties in a manner that provides for their long-term viability. This will require maintenance of the ecological processes that sustain the species' habitat. Newly discovered populations with long-term conservation value should be treated in the same manner. Actions that increase the likelihood of deleterious effects from any identified threat should be avoided. Additional information on Plummer's mariposa lily is needed to provide more specific conservation recommendations.

Environmental Baseline

According to our dataset, there are seven records of Plummer's mariposa lily in the Plan Area. Two records are within PQP Lands; one of the records is in the San Bernardino Mountains (San Bernardino National Forest) near the San Bernardino and Riverside County line and Oak Glen Conservation Camp; and one record is located east of Lake Skinner. In addition, two records extend into both PQP Lands and Additional Reserve Lands, along SR-74, on the eastern side of the San Jacinto River, near the confluences of the North Fork of the San Jacinto River and the San Jacinto River. Two records are located in the Jurupa Mountains area near the Riverside and San Bernardino County line, and one record is in the Box Springs Mountains area. The Plan

identifies additional recent occurrences including Reche Canyon, the Badlands, and near Lake Hemet in Garner Valley. In addition, Plummer's mariposa lily is known to occur in the Santa Ana Mountains within Orange County and is expected to occur within the northern end of the Santa Ana Mountains in the Plan Area (Steve Boyd, Rancho Santa Ana Botanic Garden, pers. comm. 2003).

Chaparral, coastal sage scrub, native grasslands, montane coniferous forest, and woodland/forests habitats between elevations of 394 and 5,282 feet (120 and 1,610 meters) within the San Jacinto Mountains, San Jacinto Foothills, San Bernardino Mountains, and Riverside Lowlands bioregions were used to model habitat for the Plummer's mariposa lily within the Plan Area. However, no native grasslands occurred within the habitat model parameters for this species. The modeled habitat was limited to the eastern most portion of the Plan Area. Habitats were captured east of I-15 and I-215, north to I-91 and to the Riverside County line. Based on our habitat model, the Plan Area includes 333,876 acres of modeled Plummer's mariposa lily habitat. Approximately 135,707 acres (41 percent) of the modeled habitat for this species occurs on PQP Lands. Because Plummer's mariposa lily needs specific microhabitat features, such as sandy or rocky-granitic open areas, modeled habitat likely overestimates the extent of suitable habitat for this species in the Plan Area.

Effects of the Action

Direct Effects

The Plummer's mariposa lily will not be considered a Covered Species Adequately Conserved by the MSHCP until occupation is confirmed for at least six localities (Section 9, Table 9.3) within "Conserved Habitat" as defined in the MSHCP. A locality can not be smaller than one quarter section (160 acres) and must contain at least 500 individuals. Smaller populations may contribute to the locality count if they are demonstrably self-sustaining. The Plan includes 333,876 acres of modeled habitat for the Plummer's mariposa lily. If the species-specific conservation objective above is met, Plummer's mariposa lily will be subject to impacts associated with residential, commercial, urban and agricultural development within 118,443 acres (35 percent) of modeled habitat that are outside of the MSHCP Conservation Area. Thus, any individual Plummer's mariposa lily plants or populations persisting in these areas are anticipated to be impacted over the 75-year permit term as a result of proposed development and other Covered Activities; however, some plants may survive in rural mountainous areas where development impacts are anticipated to occur at a slower rate and at lower densities. Approximately 51,468 acres (43 percent) of the non-conserved modeled habitat for Plummer's mariposa lily are designated as rural/mountainous land.

Because the Plummer's mariposa lily is not widely distributed within the Plan Area, specific conservation objectives are provided in the MSHCP (Section 9, pp. 9-132) to ensure that suitable habitat and known populations of the Plummer's mariposa lily will persist. The Plan considered at least eight known locations for Plummer's mariposa lily within the San Bernardino Mountains close to the county line and Oak Glen Conservation Camp, Jurupa Hills, Reche Canyon, along SR-74 in the San Jacinto Mountains, and near Hemet Lake within Garner Valley to be included in the MSHCP Conservation Area. However, according to our dataset, there are only seven

known records within the Plan Area. In addition, the occurrences reported for Reche Canyon and Hemet Lake in the Plan could not be verified, and much of the area in the vicinity of Hemet Lake is outside of the MSHCP Conservation Area. Therefore, the Reche Canyon and the Hemet Lake occurrences need to be confirmed as Plummer's mariposa lily localities, as described in species-specific Objective 3.

The Plan states that the localities along SR-74 (two locations identified in our dataset) will be included within the MSHCP Conservation Area. However, road widening, grading shoulders and weed control of SR-74 (Covered Activity of Maintenance of Public Roads Section 7.2 and 7.3) could affect these known locations along the SR-74, which are situated very close to the roadway.

Based on our analysis, to offset the loss of Plummer's mariposa lily habitat within the Plan Area, implementation of the MSHCP will provide for the conservation and management of 79,725 acres (24 percent) of modeled Plummer's mariposa lily habitat within the Additional Reserve Lands. Approximately 135,707 acres (41 percent) of modeled habitat will remain in PQP Lands. A total of 215,432 acres (65 percent) of modeled Plummer's mariposa lily habitat will be included in the MSHCP Conservation Area, including 4 of the 7 records in our dataset for this species in the Plan Area.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands including surveys for Plummer's mariposa lily. Cooperative management and monitoring are anticipated on PQP Lands. Surveys will be conducted at least every eight years to ensure a minimum level of occupancy at 75 percent of the known locations of Plummer's mariposa lily. If a decline in the distribution of the Plummer's mariposa lily is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP. Other management actions described in Section 5 of the MSHCP will help maintain Plummer's mariposa lily habitat in the Plan Area. Implementation of these management actions will help to avoid and minimize adverse effects to Plummer's mariposa lily to the maximum extent practicable (Section 5, Table 5.2).

Indirect Effects

The Plummer's mariposa lily could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These generally include the effects mentioned in the "General Effects" section of this biological opinion. The management provisions listed above and implementation of the Urban Wildlands/Interface policy will help to reduce the indirect effects to this species.

Conclusion

We anticipate the proposed action will directly and indirectly affect Plummer's mariposa lily as described in the analyses above, including the loss of 35 percent of its modeled habitat in the Plan Area. Implementation of the avoidance, minimization, and mitigation measures identified in the Plan will reduce the impacts to this species. We anticipate that this species will persist in

the remaining 65 percent of its modeled habitat within both the PQP Lands and Additional Reserve Lands. We anticipate that these lands will be monitored and managed cooperatively to benefit the Plummer's mariposa lily.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the Plummer's mariposa lily. We reached this conclusion because implementation of the species conservation objectives will provide for Plummer's mariposa lily persistence within the Plan Area. Thus, impacts to this species and its modeled habitat, when viewed in conjunction with the protection and management of the MSHCP Conservation Area, are not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Prostrate navarretia (*Navarretia prostrata*)Status of the Species*Listing Status*

Prostrate navarretia is not a State or federally listed species. This species is on the California Native Plant Society's List 1B (RED 2-3-3).

Species Description

Prostrate navarretia is an annual herb in the Polemoniaceae (phlox) family (CNPS 2001). It is one of approximately 27 species in the genus *Navarretia* (Day 1993) and was originally described as *Gilia prostrata* (Munz 1974). The species is prostrate with a central head and radiating leaves and stems bearing heads (Day 1993). The branches are generally 4 to 10 centimeters long (Munz 1974). This species can be difficult to distinguish from spreading navarretia (*Navarretia fossalis*), which also grows in vernal pools. Spreading navarretia has white flowers while prostrate navarretia generally has bluish flowers (Reiser 2001). Spreading navarretia is not prostrate and the inflorescence is not buried in the center of the basal leaves; but instead the flowers sit above the leaves in a cyme (Reiser 2001).

Habitat Affinities

Prostrate navarretia occurs in vernal pools, in coastal sage scrub and valley and foothill grassland (alkaline) habitats between 15 and 700 meters (CNPS 2001; CNDDDB 1994). It can occur in similar habitats to spreading navarretia (U.S. Fish and Wildlife Service 1998). All of the records in the CNDDDB that include habitat descriptions locate this species in vernal pool or vernal marsh areas.

Life History

Prostrate navarretia blooms from April to July (CNPS 2001). It has small (7 to 9 millimeters), blue to white flowers (Day 1993). The flowers are funnellform in shape (Munz 1974). The seeds remain attached to the fruit until wet (Day 1993).

Status and Distribution

Prostrate navarretia is endemic to California. It is known to occur in Los Angeles, Merced, Monterey, Orange, Riverside, and San Diego counties and is thought to be extirpated from Alameda and San Bernardino counties (CNPS 2001). The CNPS (2001) considers it seriously endangered throughout its range. (Note: the CNPS's estimation of endangerment is not related to the Federal designation of endangered).

Threats

Threats to prostrate navarretia within the Plan Area are assumed to be similar to those affecting spreading navarretia and other vernal pool endemic species. In particular, the Mesa de Colorado vernal pools on the Santa Rosa Plateau Ecological Reserve are threatened by adjacent urban development and by the invasion of non-native grasses. Run-off from residential property within the watershed of the Mesa de Colorado pools can flow into the vernal pools through culverts or over the road (Carol Bell, Santa Rosa Plateau Ecological Reserve, pers. comm., 2003). Such run-off can result in the degradation of water quality and changes in the availability of nutrients.

Conservation Needs

The conservation needs of prostrate navarretia include protection and management of known occurrences in Los Angeles, Merced, Monterey, Orange, Riverside and San Diego counties in a manner that provides for their long-term viability. This includes preservation and maintenance of the hydrological and ecological processes that support the species' habitat. Newly discovered populations should be conserved in the same manner. Actions that would affect the hydrology that supports the species' habitat or increase the likelihood of deleterious effects from any identified threat should be avoided.

Environmental Baseline

There are no recent (post 1988) records of prostrate navarretia in our dataset. However, according to CNDDB (1997), there are two presumably extant records of prostrate navarretia on the Santa Rosa Plateau on Mesa de Burro (in large vernal marsh) and Mesa de Colorado (south end of Mesa, northwest of large vernal marsh, in small vernal pool). This species is considered "locally common in the larger vernal pools on Mesa de Colorado" (Reiser 2001). Prostrate navarretia has also been reported within two vernal pools on Mesa de Colorado, on the east side of Via Volcano Road, within the Santa Rosa Plateau Ecological Reserve (Zachary Principe, Santa Rosa Plateau Ecological Reserve, pers. comm., 2003), on PQP Lands. The CNDDB record on Mesa de Colorado may be the same occurrence reported by Principe .

Reiser (2001) states that prostrate navarretia is reported from several locales in low-lying areas along the San Jacinto River floodplain between Lakeview and Perris. However, it is probable that those records have been reannotated to spreading navarretia. Spreading navarretia was not described until the mid 1970's. After spreading navarretia was described, all of the prostrate navarretia specimens from the San Jacinto River in the UCR herbarium were reannotated to spreading navarretia (Andrew Sanders, UCR herbarium, pers. comm., 2003). The only Riverside County prostrate navarretia specimen in the Rancho Santa Ana Botanic Gardens herbariums was reannotated to spreading navarretia; therefore, we do not think the prostrate navarretia occurs on the San Jacinto River flood plain.

We used the following parameters to model habitat for prostrate navarretia within the Plan Area: vernal pools and playas and any other habitat that occurs on clay soils (Claypit, Porterville, Altamont, Auld, Bosanko) and Santa Rosa Plateau basalt flow soils within the Santa Ana Mountains Bioregion. The Plan Area supports 2,573 acres of modeled habitat for the prostrate navarretia. Approximately 1,330 acres (52 percent) of the modeled habitat occurs within PQP Lands. We were unable to include additional soil types that harbor vernal pools (such as Murrieta stony clay loam) in our model, because we do not have access to digital overlays mapping the extent of these soil types in the Plan Area. This habitat model captures areas that may harbor undocumented vernal pools or other appropriate areas that may provide suitable habitat for the species. Although prostrate navarretia is a vernal pool-associated species, we did not use the vernal pool model in our analysis of this species. Since prostrate navarretia is only known to occur on the Santa Rosa Plateau within the Santa Ana Mountains Bioregion, using the vernal pool model would represent a gross overestimate of this species' potential habitat in the Plan Area.

No species-specific distribution surveys have been done for prostrate navarretia throughout the Plan Area. However, it is possible that this species is present in vernal pools (or other suitable habitat) at locations other than those listed above. The "Generalized Baseline for Vernal Pools Within the Plan Area" discussion included in this biological opinion provides information on the status and distribution of vernal pools in the Plan Area, including the Santa Rosa Plateau, where this species is reported to occur.

Effects of the Action

Direct Effects

The Plan Area includes 2,573 acres of modeled habitat for prostrate navarretia. There are 342 acres (13 percent) of modeled habitat outside the MSHCP Conservation Area; of that 158 acres (6 percent of total modeled habitat) occur within the Criteria Area Species Survey Areas (CASSA) 7 (Figure 6.2, pp. 6-64). The prostrate navarretia is considered an Additional Survey Needs and Procedures species. Until such time that the Additional Reserve Lands are assembled and conservation objectives for this species are met, surveys will be conducted as part of the project review process for public and private projects where suitable habitat for prostrate navarretia is present within CASSA 7. Populations detected as a result of survey efforts will be avoided according to the procedures outlined in the Additional Survey Needs and Procedures (section 6.3.2 of the Plan; *i.e.*, 90 percent of portions of property with long-term conservation

value will be avoided until the species conservation objectives are met). For those locations found to contain large numbers of individuals or otherwise determined to be important to the overall conservation of the species, the Plan allows flexibility to acquire these locations for inclusion into the Additional Reserve Lands (pp. 6-70).

Within the 158 acres of modeled habitat outside of the MSHCP Conservation Area, but within the CASSA for prostrate navarretia (6 percent of total modeled habitat), we anticipate that up to 10 percent of the area with long-term conservation value for this species (as discussed above) will be lost to individual projects, including all individual plants within the project footprint.

Prostrate navarretia will be subject to impacts associated with development and other proposed Covered Activities within 184 acres of modeled habitat that is outside of the MSHCP Conservation Area and outside of the CASSA for prostrate navarretia (7 percent of total modeled habitat). Thus, any individual prostrate navarretia plants and populations outside of the MSHCP Conservation Area and outside the CASSA for prostrate navarretia are anticipated to be impacted over the 75-year permit term as a result of the proposed Covered Activities.

Of the 184 acres of modeled habitat for prostrate navarretia that are outside of the MSHCP Conservation Area and outside of the CASSA for prostrate navarretia, 72 acres of modeled habitat occur within CASSA 1. Prostrate navarretia is not considered a survey species within CASSA 1 and will, therefore, be subject to development impacts within these areas. However, it should be noted that the modeled habitat for this species captured in CASSA 1 is not located within the Santa Rosa Plateau where all of the known occurrences are found.

Because prostrate navarretia has a limited geographical distribution and specialized habitat requirements within the Plan Area, specific conservation objectives are provided in the MSHCP (pp. 9-133) to ensure that known populations of prostrate navarretia will persist on the Santa Rosa Plateau. The Plan states that, within the MSHCP Conservation Area, at least the one known occurrence of prostrate navarretia and the watershed of the vernal pool complex on Santa Rosa Plateau will either remain on PQP Lands or be conserved within the Additional Reserve Lands.

Based on our analysis, there are two documented records (CNDDDB 1997) of prostrate navarretia on Santa Rosa Plateau that will be included within the MSHCP Conservation Area. The CNDDDB record within the larger vernal pool on Mesa de Burro will remain within PQP Lands in the Santa Rosa Plateau Ecological Reserve. However, it was not clear from the description if the CNDDDB record whether the population within the small vernal pool on Mesa de Colorado occurs within PQP Lands or Additional Reserve Lands. Portions of Mesa de Colorado, where prostrate navarretia is considered locally common, are located outside the MSHCP Conservation Area, but within the CASSA for this species. If prostrate navarretia is found as a result of CASSA surveys, we expect those populations will be avoided as described above.

The Plan Area supports 2,573 acres of modeled habitat for prostrate navarretia. Approximately 1,330 acres (52 percent) of the modeled habitat lies within PQP Lands and 901 acres (35 percent) will be conserved within the Additional Reserve Lands. Thus, approximately 2,231 acres (87 percent) of modeled prostrate navarretia habitat will be included in the MSHCP

Conservation Area. In addition, implementation of the Riparian/Riverine and Vernal Pool Area policy will assist in providing some protection to this species' habitats by avoiding and/or minimizing direct impacts to vernal pool habitats.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands including surveys for prostrate navarretia. Cooperative management and monitoring are anticipated on PQP Lands. Surveys for prostrate navarretia will be conducted at least every eight years to verify occupancy of 75 percent of known locations. If a decline in the distribution of prostrate navarretia is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP. Wetland habitats within the MSHCP Conservation Area will be maintained and managed to the extent feasible and baseline wetland habitat conditions will be measured at the time lands are conveyed to the MSHCP Conservation Area (Section 5, pp. 5.5). Other management actions described in Section 5 of the MSHCP will help maintain prostrate navarretia habitat, such as managing known and future occurrences for competition with non-native grasses (Section 5, Table 5.2), preventing alteration of hydrology and floodplain dynamics, off-road vehicle use, grazing and competition from non-native plants.

Indirect Effects

Prostrate navarretia could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These generally include the indirect effects discussed in the "General Effects" section of this biological opinion. Implementation of the Guidelines Pertaining to the Urban/Wildlands Interface policy, the Riparian/Riverine Area and Vernal Pools policy, and the management provisions listed above will help to reduce the indirect effects to this species.

Conclusion

We anticipate the proposed action will directly and indirectly affect prostrate navarretia as described in the analyses above, including total loss of up to 13 percent of its modeled habitat. An additional 6 percent of prostrate navarretia modeled habitat outside the MSHCP Conservation Area will be subject to surveys within CASSA 7. Once the conservation objectives for prostrate navarretia have been met, avoided areas, which have not been otherwise conserved, may be impacted. We anticipate that occurrences determined to be important to the overall conservation of the species will be considered for inclusion in the Additional Reserve Lands and that at least some of the avoided areas may be maintained as open space habitat. Implementation of the avoidance, minimization and mitigation measures identified in the Plan will further reduce impacts to prostrate navarretia. This species is anticipated to persist within the known locations (Mesa de Colorado and Mesa de Burro) on the Santa Rosa Plateau and potentially within other areas included in the MSHCP Conservation Area. We anticipate that these areas will be monitored and managed cooperatively to benefit this species.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the

prostrate navarretia. We reached this conclusion because 87 percent of prostrate navarretia modeled habitat and all of the known occurrences of prostrate navarretia on Mesa de Burro and Mesa de Colorado on the Santa Rosa Plateau will be protected or will remain within the MSHCP Conservation Area. In addition, CASSA surveys for the prostrate navarretia may result in newly discovered occurrences being included in the MSHCP Conservation Area. Thus, impacts to this species and its modeled habitat, when viewed in conjunction with the protection and management of the MSHCP Conservation Area, are not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of prostrate navarretia throughout its range.

Prostrate spine flower (*Chorizanthe procumbens*)

Status of the Species

Listing Status

Prostrate spine flower is not a State or federally listed species. This species was considered for inclusion in the California Native Plant Society's Inventory of Rare and Endangered Plants, but it was rejected because it was considered too common.

Species Description

Prostrate spine flower is an herb in the Polygonaceae (buckwheat) family (CNPS 2001). Prostrate spine flower comprises the *Procumbentes* subsection of *Chorizanthe* (Reveal and Hardham 1989b). This subsection has, at various times, contained combinations of three taxonomic units (*Chorizanthe procumbens*, *C. jonesiana*, and *C. uncinata*) based on descriptions by Nuttall and Goodman. Upon further study, Reveal and Hardham (1989b) have determined that within the *Chorizanthe procumbens* complex, the forms that are described as separate species are more appropriately described as one species (*C. procumbens*). Where the forms occur together, a series of intermediate forms is also present. The intermediate forms do not represent hybrids; they represent different stages of development (Reveal and Hardham 1989b). This prostrate to spreading plant is an annual species and is of small stature (2 to 8 centimeters high and 5 to 50 centimeters across) (Reveal and Hardham 1989b).

Habitat Affinities

Prostrate spine flower is found in sandy soil, often in association with sandy barrens and sandy openings in chaparral, coastal sage scrub, and, occasionally, grasslands (Munz 1974; Reiser 1994; Boyd and Banks 1995). This species will tolerate minimal soil disturbance and is frequently found along the margins of dirt roads or brushed chaparral (Reiser 1996). Prostrate spine flower is often associated with long-spined spine flower and Cleveland's bush monkeyflower in the Agua Tibia Mountains (Boyd and Banks 1995).

Life History

The prostrate spine flower blooms from April through June. The flowers vary in color from white to yellow. The brown achenes are 1.5 to 2.5 millimeters long (Reveal and Hardham 1989b). No species-specific studies have been conducted for this species regarding general ecology, reproduction, pollination, dispersal, etc.

Status and Distribution

Prostrate spine flower occurs in coastal southern California and northwestern Baja California, Mexico, in valleys and hillsides below elevations of 800 meters (Munz 1974; Hickman 1993d). In California, it occurs on the mesas and foothills of the Santa Monica, San Gabriel, and San Bernardino mountains within Los Angeles County, San Bernardino County, Riverside County, Orange County, and San Diego County (Reveal and Hardham 1989b). In Mexico, this species ranges as far south as Camalu along the coast of Baja California (Reiser 1996) and has been recorded from at least 18 locations (Reveal and Hardham 1989b). Prostrate spine flower is most common in coastal Orange and San Diego counties, where it has been reported from about 25 localities (Reiser 1994; Roberts 1997).

Threats

This species is threatened by disturbance from urban development (Reiser 1994) and competition from non-native weedy annual grasses (Boyd *et al.* 1992).

Conservation Needs

Conservation needs of prostrate spine flower include managing occurrences with long-term conservation value for the species in a manner that provides for long-term viability of the localities. Because prostrate spine flower occurs in open habitats and is sensitive to competition from weedy annual grasses, consideration should be given to avoiding and reducing activities, such as grazing, that result in surface disturbance and, thus, promote the spread of weedy species (Boyd *et al.* 1992) in and around known occurrences of the prostrate spine flower. Any newly discovered populations with long-term conservation value should be conserved in the same way. Actions that would increase the likelihood of deleterious effects from any identified threat should be avoided.

Environmental Baseline

Within the Plan Area, most occupied areas of the prostrate spine flower are within PQP Lands in the Santa Rosa Plateau, Agua Tibia Wilderness Area, and the San Mateo Canyon Wilderness Area. Most of the known populations for the species are concentrated in the Santa Ana Mountains or along the north slope of the Palomar Mountains (Lathrop and Thorne 1985; Reveal and Hardham 1989b; Boyd *et al.* 1992; Boyd and Banks 1995). Lathrop and Thorne described the prostrate spine flower as a common annual in open areas within the Santa Rosa Plateau. Boyd *et al.* (1995) found at least four populations in the San Mateo Canyon Wilderness Area of the Cleveland National Forest, and there are three records in our dataset from this area. Large

populations were documented near Dorland Mountain in the northwest corner of the Agua Tibia Wilderness Area of the Cleveland National Forest, where it is associated with heavy soils derived from weathered gabbro (Boyd and Banks 1995). There are three records in our dataset from the Agua-Tibia area. Population sizes vary from several hundred individuals to tens of thousands (Boyd and Banks 1995; Banks 1999). There are five additional records in our dataset located east of I-15, south of SR-79, and west of Doral Mountain; however, two of these records are duplicates. Some records for the prostrate spine flower may be mapped incorrectly or represent misidentified specimens of Parry's spine flower (Andrew Sanders, University of California at Riverside, pers. comm., 2003). The Lake Elsinore locality from our dataset is mapped incorrectly and likely represents an occurrence in the Santa Ana Mountains (Reveal and Hardham 1989b) within PQP Lands. According to information supplied by the UC Riverside herbarium, the plant has also been reported in Beaumont, Murrieta, along Temecula Creek, French Valley, Moreno Valley, and Meadowbrook, but these records are not included in our dataset. The Beaumont, French Valley, Moreno Valley, and Meadowbrook records appear to be outside the known range of this species and may be misidentified specimens of Parry's spine flower as well (Andrew Sanders, University of California at Riverside, pers. comm., 2003). Another location was reported from the vicinity of Winchester (Reiser 1996), but this record requires further confirmation and was not included in our dataset. Therefore, for the purposes of our analysis, we considered eight unique and verifiable records for the prostrate spine flower in the Plan Area.

The vegetation communities used to model habitat for the prostrate spine flower include chaparral, coastal sage scrub, and grasslands below 2,625 feet (800 meters) in the Agua Tibia Mountains and Santa Ana Mountains bioregions. Based on this analysis, there are 94,988 acres of modeled prostrate spine flower habitat within the Plan Area. Approximately 58,828 acres (62 percent) of this modeled habitat are within PQP Lands. Due to the prostrate spine flower's microhabitat associations (*i.e.*, sandy openings), the modeled habitat likely overestimates the extent of suitable habitat for this species in the Plan Area.

Effects of the Action

Direct Effects

The prostrate spine flower will be subject to impacts associated with proposed residential, commercial, urban, and agricultural development within 30,688 acres (32 percent) of modeled habitat, including 2 known populations, that are outside of the MSHCP Conservation Area. Thus, any individuals or populations persisting in these areas are anticipated to be impacted over the 75-year permit term as a result of proposed development or other Covered Activities; however, some plants may survive in rural mountainous areas where development impacts are anticipated to occur at a slower rate and at lower densities. Approximately 25,090 acres (82 percent) of the non-conserved modeled habitat for the prostrate spine flower are designated as rural/mountainous land.

Based on our analysis, to offset the loss of prostrate spine flower habitat in the Plan Area, the MSHCP will conserve and manage approximately 5,472 acres (6 percent) of modeled prostrate spine flower habitat within the Additional Reserve Lands, including two records for the species.

Approximately 58,828 acres (62 percent) of modeled habitat will remain in PQP Lands, including four records for the species. In total, 64,300 acres (68 percent) of the modeled habitat and at least 6 (75 percent) of the records in our dataset for the prostrate spine flower will be conserved or remain in the Plan Area.

The Permittees will implement management and monitoring practices within Additional Reserve Lands, including surveys for the prostrate spine flower. Cooperative management and monitoring are anticipated on PQP Lands. Surveys for the prostrate spine flower will be conducted at least every eight years to verify occupancy at a minimum level of 75 percent of the known locations. If a decline in the distribution of the prostrate spine flower is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP. Other management actions described in Section 5, Table 5.2 of the MSHCP will help maintain prostrate spine flower habitat, such as management of competition from non-native plants. Implementation of these management actions will help to avoid and minimize adverse effects to the prostrate spine flower.

Indirect Effects

The prostrate spine flower could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These include the indirect effects described in the “General Effects” section of this biological opinion. Implementation of the management provisions listed above will help to reduce the indirect effects to this species.

Conclusion

We anticipate the proposed action will directly and indirectly affect the prostrate spine flower, as described in the analysis above, including the loss of 32 percent of the modeled habitat within the Plan Area. Implementation of the avoidance, minimization, and mitigation measures included in the Plan will reduce the impacts to this species. This species is anticipated to persist in the remaining 68 percent of modeled habitat within both the existing PQP Lands and Additional Reserve Lands. We anticipate that these areas will be monitored and managed cooperatively to benefit this species.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service’s biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of this species. We reached this conclusion because 68 percent of modeled prostrate spine flower habitat and 75 percent of the known locations will be protected or will remain within the MSHCP Conservation Area. Thus, impacts to the species’ and its modeled habitat, when viewed in conjunction with the protection and management of the MSHCP Conservation Area, are not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Rainbow manzanita (*Arctostaphylos rainbowensis*)Status of the Species*Listing Status*

Rainbow manzanita is not a State or federally listed species. It is considered a Forest Service Sensitive Species and is on the California Native Plant Society's List 1B (RED 3-3-3).

Species Description

Rainbow manzanita is a shrub in the Ericaceae (Heath) family (CNPS 2001). Originally considered to be a hybrid between *A. glauca* and *A. glandulosa* or called *A. peninsularis* ssp. *peninsularis*, it was described as a distinct species by Keely and Massihi (1994). This burl-forming, perennial, evergreen grows 1 to 4 meters in height.

Habitat Affinities

This species is restricted to southern mixed chaparral, principally on gabbro or related soils rich in ferro-magnesian minerals (ultramafic) (Boyd and Banks 1995). Typically, *Adenostoma fasciculatum* is a major constituent of chaparral where this species grows and *Xylococcus bicolor* may also occur nearby (Rieser 1994).

Life History

Reproduction studies for this species have not been conducted. The white, urceolate (hollow and urn shaped) blossoms bloom from January to February (CNPS 2001). Rainbow manzanita is a vigorously resprouting species that produces copious amounts of fruit. This species is able to quickly establish seedlings on sites disturbed by wildfires or land clearing equipment (*i.e.*, bulldozers) (Keeley and Massihi 1994).

Status and Distribution

Rainbow manzanita is endemic to California. It is restricted to southwestern Riverside County, from the San Mateo Wilderness Area south to northwestern San Diego County, north of the San Luis Rey River, between elevations of 300 and 600 meters (Keeley and Massihi 1994). It extends east to the Aqua Tibia range and west to the Santa Margarita Mountains (Keeley and Massihi 1994). CNPS (2001) considers it seriously endangered throughout its range. (Note: the CNPS's estimation of endangerment is not related to the Federal designation of endangered).

Threats

Threats to rainbow manzanita include residential and commercial development, conversion of habitat to avocado groves (CNPS 2001; Keely and Massihi 1994), alteration of natural fire regime, fire fighting and fire clearance activities (Boyd and Banks 1995). In addition, rainbow manzanita flowers and fruits are often heavily infested by boring insects on the eastern edge of

its range (Keeley and Massihi 1994). Further studies are necessary to determine the potential long-term effects of the infestations.

Conservation Needs

The conservation needs of rainbow manzanita include protection and management of the known populations in Riverside and San Diego counties in a manner that provides for their long-term viability. This will require maintenance of the ecological processes that support chaparral. Newly discovered populations with long-term conservation value should be conserved in the same manner. Actions that would increase the likelihood of deleterious effects from any identified threat should be avoided. Additionally, more studies need to be conducted regarding the species' life history, population genetics, dispersal, and reproduction requirements.

Environmental Baseline

In the Plan Area, rainbow manzanita occurs in chaparral vegetation communities primarily in association with gabbro or related soils rich in ferro-magnesian minerals (Boyd and Banks 1995). Our dataset includes 26 records of rainbow manzanita. Four of the records that are located within PQP Lands are duplicate records. Therefore, for the purposes of our analysis, we considered 22 occurrences of rainbow manzanita in the Plan Area. The majority of the records occur within the Santa Ana Mountains Bioregion, within the Cleveland National Forest or on the Santa Rosa Plateau. There are occurrences within PQP Lands in the Santa Rosa Plateau Reserve, the San Mateo Canyon Wilderness Area, the Santa Margarita Ecological Reserve, and the northwest corner of Agua Tibia Wilderness Area. Our dataset also includes records from south and west of the Santa Rosa Plateau Reserve, the confluence of Santa Margarita River with Temecula Creek, Rainbow Creek, the junction of Rancho California Road and Via Santa Rosa, and west of Pala Creek.

The MSHCP identifies additional populations of rainbow manzanita on Gavilan Mountain, near Wildomar, and Margarita Peak areas (Boyd *et al.* 1995; Keeley and Massihi 1994; CNDDDB 1998). However, Margarita Peak is located outside the Plan Area. Within the Agua Tibia Wilderness Area of the Cleveland National Forest, only one location with two plants was observed in southern mixed chaparral (Boyd and Banks 1995). It is suspected that rainbow manzanita may be more common in the chaparral in the western and southwestern portions of the Wilderness Area. The MSHCP identifies the Santa Rosa Plateau as the only core location for this species in the Plan Area.

Modeled habitat for the rainbow manzanita includes chaparral and chamise chaparral at elevations between 984 and 1,969 feet (300 and 600 meters) within the Riverside Lowlands, Santa Ana Mountains, and Agua Tibia Mountains bioregions. Based on these criteria, the Plan Area supports approximately 65,798 acres of modeled habitat for the rainbow manzanita. Approximately 22,717 acres (35 percent) of the modeled habitat are within PQP Lands. Due to the rainbow manzanita's microhabitat associations (*i.e.*, gabbro or related soils), the modeled habitat likely overestimates the extent of suitable habitat in the Plan Area. Additionally, the majority of occurrences for this species are within the Santa Ana Mountains Bioregion. There are some occurrences of rainbow manzanita, however, along the peripheral edge between the

Riverside Lowlands Bioregion and the Santa Ana Mountains Bioregion and Riverside Lowlands Bioregion and Agua Tibia Mountains Bioregion; thus, we captured the Riverside Lowlands Bioregion in the habitat model for this species. The inclusion of the Riverside Lowlands Bioregion in the habitat model for rainbow manzanita increases the overestimation of suitable habitat in the Plan Area.

Effects of the Action

Direct effects

The rainbow manzanita will not be considered a Covered Species Adequately Conserved by the MSHCP until occupation is confirmed for at least 10 localities (Section 9, Table 9.3) within “Conserved Habitat” as defined in the MSHCP. A locality can not be smaller than one quarter section (160 acres) and must contain at least 50 individuals. Smaller populations may contribute to the locality count if they are demonstrably self-sustaining. The Plan includes 65,798 acres of modeled habitat for the rainbow manzanita. If the species-specific conservation objective above is met, rainbow manzanita will be subject to impacts associated with residential, commercial, urban, and agricultural development within 28,688 acres (44 percent) of modeled habitat that are outside of the MSHCP Conservation Area. Thus, any individual rainbow manzanita plants or populations persisting in these areas are anticipated to be impacted over the 75-year permit term as a result of proposed development and other Covered Activities; however, some plants may survive in rural mountainous areas where development impacts are anticipated to occur at a slower rate and at lower densities. Approximately 14,269 acres (50 percent) of the non-conserved modeled habitat for rainbow manzanita are designated as rural/mountainous land.

Based on our analysis, the MSHCP will conserve and manage approximately 14,393 acres of modeled habitat in Additional Reserve Lands, including four known occurrences of the species. Approximately 22,717 acres of modeled habitat will remain in PQP Lands, including five known occurrences of rainbow manzanita. In total, 56 percent of modeled habitat and 41 percent of the known occurrences of rainbow manzanita will either be conserved or remain in the Plan Area.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands, including surveys for the rainbow manzanita. Cooperative management and monitoring are anticipated on PQP Lands. Surveys for the rainbow manzanita will be conducted at least every eight years to verify occupancy at a minimum of 75 percent of the known locations. If a decline in the distribution of the rainbow manzanita is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP. Other management actions described in Section 5, Table 5.2 of the MSHCP will help maintain rainbow manzanita habitat, such as managing known and future occurrences of this species with regard to maintaining the natural fire regime, farming activities, and potential insect infestation. Implementation of these management actions will help to avoid and minimize adverse effects to the rainbow manzanita.

Indirect Effects

Rainbow manzanita could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These impacts generally include the indirect effects discussed in the “General Effects” section of this biological opinion. Many of the known locations within our dataset occur along a border between the Conservation Area and areas of proposed development; therefore, these populations are highly vulnerable to indirect effects. Implementation of the management provisions listed above will help to reduce the indirect effects to this species.

Conclusion

We anticipate the proposed action will affect the rainbow manzanita as described in the analysis above, including the loss of 44 percent of its modeled habitat in the Plan Area. Implementation of the avoidance, minimization, and/or mitigation measures included in the Plan will reduce the impacts to this species. This species is anticipated to persist within the remaining 56 percent of its modeled habitat within both the PQP Lands and the Additional Reserve Lands. We anticipate that these areas will be monitored and managed cooperatively to benefit this species. These lands include large, contiguous habitat blocks that support at least 9 of the 22 (41 percent) occurrences of rainbow manzanita in our dataset.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service’s biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the rainbow manzanita. We reached this conclusion because implementation of the species’ conservation objectives will provide for rainbow manzanita persistence within the Plan Area. Thus, impacts to this species and its modeled habitat, when viewed in conjunction with the protection and management of the MSHCP Conservation Area, are not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Round-leaved filaree (*Erodium macrophyllum*)

Status of the Species

Listing Status

Round-leaved filaree is not a State or federally listed species. This species is on the California Native Plant Society’s List 2 (RED 2-3-1).

Species Description

Round-leaved filaree is an herb in the Geraniaceae (geranium) family (CNPS 2001). It is one of two native species in the genus *Erodium* found in California. This annual/biennial is generally scapose (having a naked flowering stem rising from the ground). Round-leaved filaree is

covered with very short hairs and flowering stems that are 10 to 30 centimeters long (Munz 1974).

Habitat Affinities

This species is restricted to open cismontane woodland and valley and foothill grassland habitats on very friable clay soils between elevations of 15 and 1,200 meters (CNPS 2001). This species can also occur in openings of chaparral and mixed chaparral communities and is typically associated with Bosanko clay soils (Andy Sanders, UCR Herbarium, pers. comm., 2003).

Life History

Round-leaved filaree blooms from March through May (CNPS 2001). The flowers are generally white, tinged red or purple, and 10 to 16 millimeters long (Munz 1974). The body of the fruit is approximately 8 to 10 millimeters long with a truncated tip (Taylor 1993). In general, information regarding this species' reproduction is lacking.

Status and Distribution

Within California, round-leaved filaree occurs in the Sacramento Valley, northern San Joaquin Valley, central western California, South Coast, and Santa Cruz Island. It also occurs from southern Utah to northern Mexico (Taylor 1993). Most occurrence information is historic and needs to be updated with more current distribution data (CNPS 2001).

The UCR database and the Rancho Santa Ana Botanic Gardens contain 10 current and historic records of this species in the Plan Area: five records from the Gavilan Hills, one record at Lake Mathews, one record at Diamond Valley Lake, one record at Temescal Wash near Lee Lake, one record at French Valley, and one record in the foothills of the Agua Tibia Mountains.

Threats

In general, the primary threats to this species are urbanization and the invasion and subsequent competition of non-native plants (CNPS 2001).

Conservation Needs

The conservation needs of round-leaved filaree in the United States include protection and management of known populations with long-term conservation value in central and southern California and southern Utah in a manner that provides for their long-term viability. Newly discovered populations with long-term conservation value should be treated in the same manner. Actions that increase the likelihood of deleterious effects from any identified threat should be avoided. Additional information on round-leaved filaree is needed to provide more specific conservation recommendations.

Environmental Baseline

Our dataset includes eight records of round-leaved filaree in the Plan Area. However, there is one duplicate record near Lake Matthews. Therefore, for the purposes of our analysis, we considered seven records of round-leaved filaree in the Plan Area. Five of these records are in the vicinity of Vail Lake, Lake Skinner, and south of Lake Mathews. One record is in the vicinity of Temescal Wash near Lee Lake, and one record is located near Lake Skinner. The MSHCP does not identify any core locations for this species.

Modeled habitat for round-leaved filaree includes 119,675 acres of grassland and woodland/forests below elevations of 3,937 feet (1,200 meters) in the Riverside Lowlands and Santa Ana Mountains bioregions of the Plan Area. Approximately 24,199 acres (20 percent) of the modeled habitat occur within PQP Lands. Due to the species' microhabitat associations (*i.e.*, friable/Bosanko clay soils), the modeled habitat likely overestimates the extent of suitable habitat for the round-leaved filaree within the Plan Area.

Effects of the Action

Direct effects

The Plan Area includes approximately 119,675 acres of modeled habitat for the round-leaved filaree. There are 81,080 acres (68 percent) of modeled habitat outside the MSHCP Conservation Area; of that, 5,998 acres (5 percent of total modeled habitat) occur within the Criteria Area Species Survey Areas (CASSA) 1, 2, 3, 3a, 4, 5, 6, and 7 (Figure 6-2, pp. 6-64). The round-leaved filaree is considered an Additional Survey Needs and Procedures species. Until such time that the Additional Reserve Lands are assembled and conservation objectives for this species are met, surveys for the round-leaved filaree will be conducted as part of the project review process for public and private projects where suitable habitat is present for the species within CASSA 1, 2, 3, 3a, 4, 5, 6, and 7. Populations detected as a result of survey efforts will be avoided according to the procedures outlined in the Additional Survey Needs and Procedures (Section 6.3.2; *i.e.*, 90 percent of portions of property with long-term conservation value will be avoided until the species conservation objectives are met). For those locations found to contain large numbers of individuals or otherwise determined to be important to the overall conservation of the species, the Plan allows flexibility to acquire these locations for inclusion into the Additional Reserve Lands (pp. 6-70).

Within the 5,998 acres of modeled habitat that occurs outside of the Conservation Area, but within the CASSA for round-leaved filaree, we anticipate that up to 10 percent of the area with long-term conservation value for round-leaved filaree (as discussed above) will be lost to individual projects.

Round-leaved filaree will be subject to impacts associated with development and other proposed Covered Activities within 75,082 acres (63 percent) of modeled habitat that are outside of the MSHCP Conservation Area and outside of CASSA 1, 2, 3, 3a, 4, 5, 6, and 7. Thus, any individual round-leaved filaree plants and populations persisting in these areas are anticipated to

be impacted over the 75-year permit term as a result of the proposed development and other Covered Activities.

Based on our analysis, to offset the loss of round-leaved filaree habitat in the Plan Area, the MSHCP will conserve and manage approximately 14,395 acres (12 percent) of modeled habitat for the round-leaved filaree within Additional Reserve Lands. Approximately 24,199 acres (20 percent) of the modeled habitat for round-leaved filaree will remain in PQP Lands, including five of the known locations in the vicinity of Vail Lake, Lake Skinner, and south of Lake Mathews. Thus, the MSHCP Conservation Area will include 32 percent of the modeled round-leaved filaree habitat and 71 percent of the known locations in the Plan Area.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands including surveys for the round-leaved filaree. Cooperative management and monitoring are anticipated on PQP Lands. Surveys for the round-leaved filaree will be conducted at least every eight years to verify occupancy at a minimum of 75 percent of the known locations. If a decline in the distribution of round-leaved filaree is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP. Other management actions described in Section 5, Table 5.2 of the MSHCP will help maintain round-leaved filaree habitat, such as managing known and future occurrences of this species with regard to non-native plant species invasions. Implementation of these management actions will help to avoid and minimize adverse effects to round-leaved filaree.

Indirect Effects

Round-leaved filaree could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These generally include the indirect effects discussed in the “General Effects” section of this biological opinion. Implementation of the Guidelines Pertaining to the Urban/Wildlands Interface policy and the management provisions listed above will help to reduce the indirect effects to this species.

Conclusion

We anticipate the proposed action will directly and indirectly affect round-leaved filaree as described in the analyses above, including the total loss of 63 percent of its modeled habitat. An additional 5 percent of modeled habitat for the round-leaved filaree outside the MSHCP Conservation Area will be subject to surveys within CASSA 1, 2, 3, 3a, 4, 5, 6, and 7. Once the conservation objectives for round-leaved filaree have been met, avoided areas, which have not been otherwise conserved, may be impacted. We anticipate that occurrences determined to be important to the overall conservation of the species will be considered for inclusion in the Additional Reserve Lands and that at least some of the avoided areas may be maintained as open space habitat. Implementation of the avoidance, minimization, and mitigation measures identified in the Plan will further reduce the impacts to round-leaved filaree. This species is anticipated to persist within the remaining 32 percent of its modeled habitat within both the PQP Lands and the Additional Reserve Lands. We anticipate that these areas will be monitored and managed cooperatively to benefit this species.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the round-leaved filaree. We reached this conclusion because 71 percent of the documented occurrences will be protected or will remain within the MSHCP Conservation Area. In addition, CASSA surveys for the round-leaved filaree may result in newly discovered occurrences being included in the MSHCP Conservation Area. Thus, the impacts to this species and its modeled habitat, when viewed in conjunction with the protection and management of the MSHCP Conservation Area, are not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of round-leaved filaree throughout its range.

San Jacinto Mountains bedstraw (*Galium angustifolium* ssp. *jacinticum*)Status of the Species*Listing Status*

San Jacinto Mountains bedstraw is not a State or federally listed species. It is a U.S. Forest Service sensitive species. The California Native Plant Society categorizes this plant as a List 1B species (R-E-D code 3-1-3).

Species Description

San Jacinto Mountains bedstraw, a perennial herb in the madder family (Rubiaceae), has a relatively low habit and is lacking woody stems (Dempster and Stebbins 1971; Munz 1974). Nutlets are densely covered by long, straight, and spreading hairs (Dempster 1993b).

Habitat Affinities

San Jacinto Mountains bedstraw occurs at elevations from 4,200 ft (1,280 m) to 6,496 ft (1,980 m) in partially shady, open mixed forest and lower montane coniferous forest (Dempster and Stebbins 1971; CNPS 2001).

Life History

The San Jacinto Mountains bedstraw blooms from June through August (CNPS 2001). Fertilized San Jacinto Mountains bedstraw flowers produce two nutlets (Dempster 1993b).

Status and Distribution

The distribution of this subspecies is limited to elevations between 4,200 ft (1,280 m) and 6,496 ft (1,980 m) on the western side of the San Jacinto Mountains in western Riverside County (Dempster and Stebbins 1971). The CNDDDB (2003) includes three historic (1960's) records of the San Jacinto Mountains bedstraw in the San Jacinto Mountains. One occurrence is located along Black Mountain Road about 0.9 miles above the junction to Pine Wood, one is in Lake Fulmor, and one is in Alandale Pines.

Threats

This plant is vulnerable to trampling, tree harvesting, road maintenance, and high levels of recreation use, particularly from off-road vehicles (Stephenson and Calcarone 1999).

Conservation Needs

The conservation needs of the San Jacinto Mountains bedstraw include protection and management of the occurrences in Riverside County in a manner that provides for long-term viability at these locations. Ecological processes necessary to maintain suitable habitat also need to be protected. Specific threats to the San Jacinto Mountains bedstraw should be clearly identified and addressed. Actions that would increase the likelihood of deleterious effects from any identified threat should be avoided. Newly discovered occurrences with long term conservation value should be conserved in the same manner.

Environmental Baseline

No species-specific distribution surveys have been done for San Jacinto Mountains bedstraw throughout the Plan Area. Our dataset includes one recent (1989) occurrence from the UCR GIS database located approximately 3.5 miles west of the junction of I-15 and SR-74 (Riverside Avenue). This record is likely incorrectly mapped, as this species is only known from the San Jacinto Mountains area (Dempster and Stebbins 1971; CNPS 2001; CNDDDB 2003).

The Forest Service reports this species occurs in the Black Mountain area of the San Jacinto Mountains. Some occur near campgrounds on the San Bernardino National Forest and possibly in the Hall Canyon Research Natural Area (Stephenson and Calcarone 1999).

The vegetation type used to model habitat for this species was montane coniferous forest between 4,200 ft and 6,500 ft within the Narrow Endemic Plant Species Survey Area of the San Jacinto Mountains Bioregion. Based on this analysis, the Plan Area supports approximately 17,818 acres of modeled habitat for San Jacinto Mountains bedstraw. Approximately 12,044 acres of modeled habitat occur within PQP Lands.

Effects of the Action

Direct Effects

The Plan Area includes 17,818 acres of modeled habitat for San Jacinto Mountains bedstraw. There are 5,774 acres (32 percent) of modeled habitat for San Jacinto Mountains bedstraw outside the MSHCP Conservation Area, though all of this modeled habitat is included within the Narrow Endemic Plant Species Survey Area (NEPSSA) 6 (Figure 6-1, pp. 6-30). The San Jacinto Mountains bedstraw is considered a Narrow Endemic Plant Species. Until such time that the Additional Reserve Lands are assembled and conservation objectives for this species are met, surveys will be conducted as part of the project review process for public and private projects where suitable habitat for San Jacinto Mountains bedstraw is present within NEPSSA 6. Populations detected as a result of survey efforts will be avoided according to the procedures

outlined in the Narrow Endemic Plant Species policy (section 6.1.3 of the Plan; *i.e.*, 90 percent of portions of property with long-term conservation value will be avoided until the species conservation objectives are met). For those locations found to contain large numbers of individuals or otherwise determined to be important to the overall conservation of the species, the Plan allows flexibility to acquire these locations for inclusion into the Additional Reserve Lands (pp. 6-40).

Within the 5,774 acres of modeled habitat that is outside of the MSHCP Conservation Area but within NEPSSA 6 (32 percent of total modeled habitat), we anticipate that up to 10 percent of the area with long-term conservation value for this species (as discussed above) will be lost to individual projects.

Because San Jacinto Mountains bedstraw is not widely distributed within the Plan Area, specific conservation objectives are provided in the MSHCP (pp. 9-136) to ensure that suitable habitat and known populations of the San Jacinto Mountains bedstraw will persist. The Plan states that at least eight of the known locations of this species will be included within the MSHCP Conservation Area, including Lake Fulmor, Dark Canyon, and the Black Mountain area. In addition, at least 12,125 acres of montane coniferous forest between 4,200 ft and 6,500 ft within the NEPSSA 6 of the San Jacinto Mountains Bioregion will be included within the Conservation Area on PQP Lands only.

Based on our dataset, it appears that slightly less than the 12,125 acres of montane coniferous forest habitat proposed for inclusion in the MSHCP Conservation Area will remain in the Plan Area. Approximately 12,044 acres (68 percent) of the modeled San Jacinto Mountains bedstraw habitat occur within PQP Lands, but no modeled habitat occurs within the Additional Reserve Lands.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands if occurrences of the San Jacinto Mountains bedstraw are detected within the NEPSSA 6 and are acquired into the Additional Reserve Lands. Cooperative management and monitoring is anticipated on PQP Lands. Surveys for the San Jacinto Mountains bedstraw will be conducted at least every 8 years to verify occupancy of 75 percent of known locations. If a decline in the distribution San Jacinto Mountains bedstraw is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP. As stated in Section 5, Table 5.2 of the MSHCP, Reserve Managers will avoid or minimize adverse effects to San Jacinto Mountains bedstraw to the maximum extent practicable.

Indirect Effects

San Jacinto Mountains bedstraw could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These generally include the indirect effects described in the “General Effects” section of this biological opinion. Implementation of the Guidelines Pertaining to the Urban/Wildlands Interface policy and the management provisions listed above will help to reduce the indirect effects to this species.

Conclusion

We anticipate the proposed action will directly and indirectly affect San Jacinto Mountains bedstraw as described in the analyses above. Thirty-two percent of San Jacinto Mountains bedstraw modeled habitat outside the MSHCP Conservation Area will be subject to surveys within NEPSSA 6. Once the conservation objectives for San Jacinto Mountains bedstraw have been met, avoided areas, which have not been otherwise conserved, may be impacted. We anticipate that occurrences determined to be important to the overall conservation of the species will be considered for inclusion in the Additional Reserve Lands and that at least some of the avoided areas may be maintained as open space habitat. Implementation of the avoidance and minimization measures identified in the Plan will further reduce the impacts to San Jacinto Mountains bedstraw. This species is anticipated to persist within the remaining 68 percent of its modeled habitat within the PQP Lands. We anticipate that the PQP Lands will be monitored and managed cooperatively to benefit the San Jacinto Mountains bedstraw.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the the San Jacinto Mountains bedstraw. We reached this conclusion because 68 percent of San Jacinto Mountains bedstraw modeled habitat will remain within the MSHCP Conservation Area and no known San Jacinto Mountains bedstraw populations will be lost in the Plan Area. In addition, required surveys for this species may result in newly discovered occurrences being included in the MSHCP Conservation Area. Thus, impacts to this species and its modeled habitat, when viewed in conjunction with the protection and management of the MSHCP Conservation Area, are not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of the San Jacinto Mountains bedstraw throughout its range.

San Miguel savory (*Satureja* [= *Calamintha*] *chandleri*)

Status of the Species

Listing Status

San Miguel savory is not a State or federally listed species. It is a Forest Service Sensitive Species and is on the California Native Plant Society's List 1B (RED 2-2-2).

Species Description

San Miguel savory belongs to the mint family (Lamiaceae). This perennial shrub is branched and the upper parts are pubescent. San Miguel savory ranges in height from 20 to 50 centimeters (Munz 1974). The flowers arise in the leaf axils in clusters of one to six and range in color from white to lavender. The two-lipped corollas are 4 to 7 millimeters long. The fruit nutlets are shiny, dark brown, and 1.5 millimeters in diameter. There are three *Satureja* species that are differentiated by geographic range and morphological characters including habit, pubescence, calyx length, and leaf length (Averett 1993).

Habitat Affinities

San Miguel savory is primarily restricted to rocky, gabbroic, and metavolcanic substrates in coastal sage scrub, chaparral, cismontane woodland, riparian woodland, and valley and foothill grasslands between 120 and 1,005 meters in elevation (CNDDDB 2003). In San Diego County and northern Baja California, it occurs in open chamise dominated slopes, while in the Santa Ana Mountains, it is reported in more mesic situations (Reiser 1994).

Life History

This species flowers from March through May (Munz 1974; CNPS 2001). Information regarding pollinators of this species was not available. Information regarding dispersal of this species has not been reviewed.

Status and Distribution

San Miguel savory is an extremely rare shrub with very few recent records. It occurs in Orange County, Riverside County, San Diego County, and Baja California, Mexico, at elevations between 120 and 1,005 meters (CNDDDB 2003; Reiser 1994; CNPS 2001).

Threats

In general, San Miguel savory is threatened by agricultural conversion, urban development, and recreational activities (CNPS 2001).

Conservation Needs

The conservation needs of San Miguel savory include protection and management of the known populations in Orange, Riverside, and San Diego counties in a manner that provides for their long-term viability. Newly discovered populations should be conserved in the same manner. Actions that would increase the likelihood of deleterious effects from any identified threat should be avoided. Moreover, since most of the literature on this species is limited to its taxonomic treatments, the determination of more specific conservation needs will require more studies regarding the species' status, distribution, life history (reproductive biology, pollinators, germination, dispersal, etc.), population genetics or biology, habitat requirements, and threats.

Environmental Baseline

Our dataset includes seven records of San Miguel savory on the Santa Rosa Plateau. One record is a duplicate record. Therefore, for the purposes of our analysis, we considered six records for San Miguel savory in the Plan Area. Five records are from within the Santa Rosa Plateau Ecological Reserve. One record is located three miles southwest of Murrieta near Warner's Ranch (CNDDDB 2003). The MSHCP does not identify any core locations for this species.

In the Plan Area, San Miguel savory typically occurs in areas that receive coastal breezes and fog (Andy Sanders, UCR Herbarium, pers. comm., 2003b) with rocky, gabbroic and

metavolcanic substrates in coastal sage scrub (diegan), chaparral, and woodland/forests at elevations between 394 and 3,297 feet (120 and 1,005 meters). Modeled habitat for San Miguel savory includes these vegetation types in the Santa Ana Mountains Bioregion (While riparian woodland is listed as a habit association for this species, we could not verify occurrences of San Miguel savory in this vegetation type). Based on this analysis, the Plan Area supports approximately 102,737 acres of modeled habitat for the San Miguel savory. Approximately 68,538 acres (67 percent) of the modeled habitat are within PQP Lands. Due to San Miguel savory's microhabitat associations (*i.e.*, gabbroic and metavolcanic substrates), the modeled habitat likely overestimates the amount of suitable habitat within the Plan Area.

Effects of the Action

Direct effects

The Plan Area includes approximately 102,737 acres of modeled habitat for San Miguel savory. There are 29,486 acres (29 percent) of modeled habitat outside the MSHCP Conservation Area; of that, approximately 19,094 acres (19 percent of total modeled habitat) occur within Narrow Endemic Plant Species Survey Areas (NEPSSA) 1, 7, and 9 (Section 6.1.3, Figure 6.1). This species is considered a Narrow Endemic Plant Species (Section 6.1.3, Table 6.1). There is a discrepancy between Table 6.1 and Figure 6.1 (pp.6-32 and 6-30 respectively). Table 6.1 designates NEPSSA 10 for this species. NEPSSA 9 is listed for this species in Figure 6.1, and there is no NEPSSA 10; therefore, we assumed NEPSSA 9 to be the correct survey area for San Miguel savory based on the habitat, species occurrences, and Figure 6.1.

Until such time that the Additional Reserve Lands can be assembled and conservation objectives for San Miguel savory are met, surveys will be conducted for public and private projects within NEPSSA 1, 7, and 9, where suitable habitat for the San Miguel savory is present. Populations detected as a result of survey efforts will be avoided according to the procedures outlined in the Narrow Endemic Plant Species Policy (Section 6.1.3 of the Plan; *i.e.*, 90 percent of portions of property with long-term conservation value shall be avoided until the species conservation goals are met). We anticipate that new locations of San Miguel savory may be confirmed through these survey efforts. For those locations found to contain large numbers of individuals or otherwise determined to be important to the overall conservation of the species, the Plan allows flexibility to acquire these locations for inclusion into the Additional Reserve Lands (pp. 6-70).

Within the 19,094 acres (19 percent) of modeled habitat that occur outside of the Conservation Area but within the NEPSSA for San Miguel savory, we anticipate that up to 10 percent of the area with long-term conservation value for San Miguel savory (as discussed above) will be lost to individual projects.

San Miguel savory will be subject to impacts associated with development and other proposed Covered Activities within 10,392 acres (10 percent) of modeled habitat that are outside of the MSHCP Conservation Area and outside of the NEPSSA for San Miguel savory. Thus, any individual San Miguel savory plants and populations persisting in these areas are anticipated to be impacted over the 75-year permit term as a result of the proposed development and other Covered Activities; however, some plants may survive in rural mountainous areas where

development impacts are anticipated to occur at a slower rate and at lower densities. Approximately 25,301 acres (86 percent) of the non-conserved modeled habitat for the San Miguel savory are designated as rural/mountainous land.

Based on our analysis, to offset the loss of San Miguel savory modeled habitat in the Plan Area, the MSHCP will conserve and manage approximately 4,713 acres (5 percent) of the modeled habitat for San Miguel savory in the Additional Reserve Lands. Approximately 68,538 acres (67 percent) of the modeled San Miguel savory habitat will remain within PQP Lands, including five of the known locations from the Santa Rosa Plateau Ecological Reserve. Thus, the MSHCP Conservation Area will include 73,251 acres (71 percent) of the modeled habitat and five (83 percent) of the records for San Miguel savory in the Plan Area.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands including surveys for San Miguel savory. Cooperative management and monitoring are anticipated on PQP Lands. Surveys for San Miguel savory will be conducted at least every eight years to verify occupancy at a minimum of 75 percent of the known locations. If a decline in the distribution of San Miguel savory is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP. As stated in the MSHCP (Section 5, Table 5.2), Reserve Managers will avoid or minimize adverse effects to San Miguel savory to the maximum extent practicable. In addition, Reserve Managers will manage the known and future occurrences of this species for recreational activities.

Indirect Effects

San Miguel savory could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These generally include the indirect effects discussed in the “General Effects” section of this biological opinion. Implementation of the Guidelines Pertaining to the Urban/Wildlands Interface policy and the management provisions listed above will help to reduce the indirect effects to this species.

Conclusion

We anticipate the proposed action will directly and indirectly affect San Miguel savory as described in the analyses above, including the total loss of 10 percent of its modeled habitat. An additional 19 percent of San Miguel savory modeled habitat outside the MSHCP Conservation Area will be subject to surveys within NEPSSA 1, 7, and 9. Once the conservation objectives for San Miguel savory have been met, avoided areas, which have not been otherwise conserved, may be impacted. We anticipate that occurrences determined to be important to the overall conservation of the species will be considered for inclusion in the Additional Reserve Lands and that at least some of the avoided areas may be maintained as open space habitat. Implementation of the avoidance, minimization, and mitigation measures identified in the Plan will further reduce the impacts to San Miguel savory. This species is anticipated to persist within the remaining 71 percent of its modeled habitat within both the PQP Lands and the Additional Reserve Lands. We anticipate that these areas will be monitored and managed cooperatively to benefit this species.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the San Miguel savory. We reached this conclusion because 71 percent of San Miguel savory habitat and 83 percent of the documented occurrences will be protected or will remain within the MSHCP Conservation Area. In addition, required surveys for the San Miguel savory may result in newly discovered occurrences being included in the MSHCP Conservation Area. Thus, impacts to this species and its modeled habitat, when viewed in conjunction with the protection and management of the MSHCP Conservation Area, are not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of the San Miguel savory throughout its range.

Shaggy-haired alumroot (*Heuchera hirsutissima*)

Status of the Species

Listing Status

Shaggy-haired alumroot is not a State or federally listed species. It is a Forest Service Sensitive Species. This species is on the California Native Plant Society's List 1B (RED 3-1-3).

Species Description

Shaggy-haired alumroot is a member of the saxifrage family (Saxifragaceae). Shaggy-haired alumroot is one of 13 species of the genus *Heuchera*, and it forms a complex with *H. abramsii*, *H. brevistaminea*, *H. elegans*, and *H. cespitosa* (Elvander 1993). This herbaceous perennial is rhizomatous and consists of a basal rosette and a raceme-like inflorescence on a scape that ranges in height from 10 to 36 centimeters. The fruits are partially enclosed by the hypanthium and contain numerous small seeds (Elvander 1993).

Habitat Affinities

Shaggy-haired alumroot occurs in rocky areas in subalpine coniferous forests and upper-montane coniferous forests from elevations of 1,830 to 3,500 meters (CNPS 2001).

Life History

This perennial species blooms from May through July (CNPS 2001). The fruits contain numerous small seeds (Elvander 1993). No information regarding pollinators, seed dispersal, or longevity was identified.

Status and Distribution

Shaggy-haired alumroot is restricted to the San Jacinto Mountains and Santa Rosa Mountains in Riverside County (CNPS 2001; Munz 1974). It occurs just outside the Plan Area on San Jacinto Peak, Miller Peak, Jean Peak, Cornell Peak, Hidden Lake Divide/Long Valley Creek, the eastern

edge of Fuller Ridge, and in the vicinity of Tower 2 of the Palm Springs aerial tramway (CNDDDB 2003).

Threats

The primary threats to shaggy-haired alumroot in the Plan Area are trampling by foot traffic and rock climbing in the San Jacinto Mountains (CNDDDB 2003, Stephenson and Calcarone 1999).

Conservation Needs

Conservation needs of shaggy-haired alumroot include protection and management of known occurrences in the San Jacinto Mountains and Santa Rosa Mountains in a manner that provides for their long-term viability. Specific management needs include protection from impacts due to recreational activities (*e.g.*, climbing)

Environmental Baseline

There is only one recent occurrence of shaggy-haired alumroot in the Plan Area, along the Pacific Crest Trail, north-northwest of Little Round Valley in San Jacinto State Park. This occurrence is outside the modeled habitat for shaggy-haired alumroot due to the coarse scale of vegetation mapping. The occurrence is described within montane coniferous forest habitat (CNDDDB 2003). It was also reported from a gully behind Tahquitz Rock in 1981 (CNDDDB 2003).

Modeled habitat for shaggy-haired alumroot includes montane coniferous forests between elevations of 5,955 and 11,484 feet (1,815 and 3,500 meters) within the San Jacinto Mountains Bioregion of the Plan Area. There are 9,251 acres of modeled habitat for shaggy-haired alumroot within the Plan Area. Approximately 7,711 acres (83 percent) of this modeled habitat occurs within PQP Lands.

Effects of the Action

Direct Effects

The shaggy-haired alumroot will not be considered a Covered Species Adequately Conserved by the MSHCP unless the Forest Service agrees through an MOU to manage populations of this species on their lands cooperatively with the Permittees as “Conserved Habitat” as defined by the MSHCP. The Plan Area includes approximately 9,251 acres of modeled habitat for shaggy-haired alumroot. If the MOU with the Forest Service is executed, shaggy-haired alumroot will be subject to impacts associated with proposed development and other Covered Activities within 1,540 acres (17 percent) of modeled habitat that are outside of the MSHCP Conservation Area. Thus, any individual shaggy-haired alumroot plants or populations persisting in these areas are anticipated to be impacted over the 75-year permit term as a result of proposed development and other Covered Activities. The only recent occurrence of shaggy-haired alumroot from the Plan Area occurs outside of the modeled habitat but within PQP Lands.

If the MOU with the Forest Service is signed, additional monitoring and management will occur within suitable habitat for the shaggy-haired alumroot within Forest Service lands included in the MSHCP Conservation Area. No shaggy-haired alumroot modeled habitat occurs within Additional Reserve Lands, but 7,711 acres (83 percent) of modeled habitat for the species will remain within PQP Lands. In total, 83 percent of the modeled habitat for the shaggy-haired alumroot will remain in the Plan Area.

At least one Core Area can support the shaggy-haired alumroot within the MSHCP Conservation Area, in the San Jacinto Mountains. Following development of the MOU with the Forest Service, cooperative management and monitoring are anticipated on PQP Lands. Surveys for the shaggy-haired alumroot will be conducted at least every eight years to verify occupancy at a minimum of 75 percent of the Core Areas identified above. If a decline in the distribution of the shaggy-haired alumroot is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP. Reserve managers will avoid or minimize impacts to this species to the maximum extent practicable (Section 5, Table 5.2). Other management actions described in Section 5 of the MSHCP, such as control of unauthorized public access, maintenance of existing habitat, including control of invasive weeds, and management of specific threats to the species will help maintain habitat and populations of the shaggy-haired alumroot.

Indirect Effects

The shaggy-haired alumroot could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These include the indirect effects described in the “General Effects” section of this biological opinion. The management provisions listed above will help to reduce the indirect effects to this species.

Conclusion

We anticipate the proposed action will directly and indirectly affect the shaggy-haired alumroot as described in the analyses above, including the loss of 17 percent of its modeled habitat in the Plan Area. We anticipate that this species will persist in the remaining 83 percent of the modeled habitat within the existing PQP Lands.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service’s biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the shaggy-haired alumroot. We reached this conclusion because most of the modeled habitat and the only known occurrence of shaggy-haired alumroot within the Plan Area are within PQP Lands that will not be impacted by the Plan. Thus, the impacts to this species and its modeled habitat, when viewed in conjunction with the protection and management of the MSHCP Conservation Area, are not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Small-flowered microseris (*Microseris douglasii* ssp. *platycarpha*)Status of the Species*Listing Status*

Small-flowered microseris is not a State or federally listed species. This species is on the California Native Plant Society's List 4 (RED 1-2-2).

Species Description

Small-flowered microseris is an annual in the sunflower family (Asteraceae) and occurs as a low-growing rosette. The scape ranges in height from 6 to 40 centimeters, and the small florets expand as the achenes mature. This obscure annual is extremely difficult to census, except during its short flowering season in early and mid-spring.

Morphologically intermediate biotypes are observed where *Microseris douglasii* ssp. *platycarpha* overlaps in range with *M. d.* ssp. *douglasii* and *M. d.* ssp. *tenella*, suggesting intergrading among the subspecies (Chambers 1955).

Habitat Affinities

Small-flowered microseris is found in clay soils and occurs on plains, hillsides, and foothill slopes in association with native grasslands or vernal pools (Munz 1974; Chambers 1955, 1993; Reiser 2001). It is often found near vernal pools or serpentine outcrops (Chambers 1993). It is typically found in areas of native bunchgrasses, and it does well on cracked clay lenses where competition from shrubs is poor (Reiser 2001). It may also occur on clay soils in broad openings of cismontane woodland and coastal scrub (CNPS 2001).

Life History

This self-fertilizing, yellow-flowered plant blooms from March to April (Munz 1974, Bachmann and Battjes 1994). The flower heads open in the morning only, except on overcast and cool days. As the stigmas emerge from the anther tubes, the stigmas appear to be free of pollen, but as the florets close toward midday, self-pollination is almost automatic. Self-fertility has been observed to be high: an almost perfect fruit set is achieved (Chambers 1955). Fruits of this species are readily dispersed downslope by wind and surface run-off after rains (Price *et al.* 1986).

Status and Distribution

Small-flowered microseris is known from cismontane southern California and northwestern Baja California, Mexico below elevations of 1,000 meters (Munz 1974; Chambers 1993). In the United States, it has been reported from Los Angeles County, Riverside County, Orange County, San Diego County, San Clemente Island, and Santa Catalina Island (CNPS 2001). In Baja

California, it has been reported as far south as Las Escobas (Reiser 2001). It is considered by the California Native Plant Society to be fairly rare in California (CNPS 2001).

Threats

Habitat loss due to urbanization and agricultural conversion are the primary threats throughout this species' range (Chambers 1955). According to the CNPS (2001), small-flowered microseris is severely declining due to urban development.

Conservation Needs

The conservation needs of small-flowered microseris include protection and management of known occurrences in a manner that provides for their long-term viability. Any new discoveries with long-term conservation value should be conserved in the same manner. Actions that would modify the hydrology that supports the species' habitat or increase the likelihood of deleterious effects from any identified threat should be avoided.

Environmental Baseline

Our dataset includes 25 records of small-flowered microseris in the Plan Area; however, ten of these records are duplicates. Therefore, for the purposes of our analysis, we considered 15 occurrences of small-flowered microseris to occur in the Plan Area. Based on our dataset, small-flowered microseris is found on PQP Lands in Lake Mathews Estelle Mountain Reserve, on BLM property north of Vail Lake, and along San Juan Creek in Cleveland National Forest. Our dataset also includes records near Bedford Wash in Temescal Canyon, an in-holding within Cleveland National Forest near Elsinore Peak, north of Vail Lake, Indian Creek, Alberhill, Cottonwood Canyon, Warm Springs Creek, Lake Skinner, Temecula Creek, and in French Valley east of the San Diego Canal. Just outside of the Plan Area, it is found in the San Mateo Canyon Wilderness near Miller Mountain (Rancho Santa Ana Botanic Garden, Claremont California, data from herbarium specimens). It has been observed infrequently on the Santa Rosa Plateau (Lathrop and Thorne 1985), but no recent surveys have confirmed this information. Boyd and Banks (1995) report this species from Oak Mountain north of Vail Lake and in the hills west of Vail Lake above Pauba Valley.

The primary vegetation types used to model habitat for this species were grasslands and playas/vernal pools below 3,281 feet (1,000 meters) in elevation within the Riverside Lowlands, Santa Ana Mountains, and San Jacinto Foothills Bioregions. Based on this analysis, there are approximately 125,562 acres of modeled habitat for the small-flowered microseris in the Plan Area. Approximately 22,137 acres (18 percent) of the modeled habitat occur within PQP Lands. Due to the microhabitat associations (*e.g.*, Altamont, Auld, Bosanko, Claypit, and Porterville soils) of the small-flowered microseris, the modeled habitat likely overestimates the extent of suitable habitat for the species within the Plan Area.

Effects of the Action

Direct Effects

The small-flowered microseris will not be considered a Covered Species Adequately Conserved by the MSHCP until occupation is confirmed for at least 10 localities (Section 9, Table 9.3) within “Conserved Habitat” as defined in the MSHCP. A locality can not be smaller than one quarter section (160 acres) and must contain at least 1,000 individuals. Smaller populations may contribute to the locality count if they are demonstrably self-sustaining. The Plan Area includes 125,562 acres of modeled habitat for small-flowered microseris. If the species-specific conservation objective above is met for the small-flowered microseris, the species will be subject to impacts associated with development and other proposed Covered Activities within 82,679 acres (66 percent) of modeled habitat that are outside of the MSHCP Conservation Area. It is anticipated that populations of small-flowered microseris at Indian Creek, Alberhill, Cottonwood Canyon, Temecula Creek, Bedford Wash, the in-holding within Cleveland National Forest, French Valley and any other individuals and populations persisting outside of the MSHCP Conservation Area will be impacted over the 75-year permit term as a result of the proposed development and other Covered Activities.

The Plan states that at least eight of the known localities at Lake Matthews, in the Cleveland National Forest, at Lake Skinner, and at Vail Lake will be included within the MSHCP Conservation Area. Based on our analysis, the MSHCP will conserve and manage approximately 20,747 acres (17 percent) of modeled habitat within the Additional Reserve Lands. Approximately 22,137 acres (18 percent) of modeled habitat will remain within PQP Lands. In total, approximately 42,884 acres or 34 percent of the modeled habitat for small-flowered microseris will be conserved or remain in the Plan Area, including 8 of the 15 (53 percent) unique records for the species in our dataset.

The Permittees will implement management and monitoring practices within Additional Reserve Lands, including surveys for small-flowered microseris. Cooperative management and monitoring are anticipated on PQP Lands. Surveys for the small-flowered microseris will be conducted at least every eight years to verify occupancy at a minimum level of 75 percent of the known locations. If a decline in the distribution of the small-flowered microseris is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP. The small-flowered microseris will benefit from the General Management Measures described in Section 5 of the MSHCP, such as control of unauthorized public access and off-roading, prevention of grazing and competition from non-native plants, and management of specific threats to the species.

Indirect Effects

Small-flowered microseris could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These generally include the indirect effects mentioned in the “General Effects” section of this biological opinion. Implementation of the Riparian/Riverine Area and Vernal Pools policy and the management provisions listed above will help to reduce the indirect effects to this species.

Conclusion

We anticipate the proposed action will directly and indirectly effect the small-flowered microseris as described in the analyses above, including the loss of 66 percent of its modeled habitat in the Plan Area. Implementation of the avoidance, minimization, and/or mitigation measures identified in the Plan will help reduce the impacts to this species. This species is anticipated to persist in the remaining 34 percent of the modeled habitat within both the existing PQP Lands and the Additional Reserve Lands. We anticipate that these areas will be monitored and managed cooperatively to benefit the small-flowered microseris.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the small-flowered microseris. We reached this conclusion because 34 percent of the modeled habitat and 53 percent of the documented occurrences for small-flowered microseris will be protected or will remain in the MSHCP Conservation Area. Thus, the impacts associated with loss of this species' modeled habitat, when viewed in conjunction with the protection and management of the MSHCP Conservation Area, are not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Small-flowered morning-glory (*Convolvulus simulans*)

Status of the Species

Listing Status

Small-flowered morning-glory is not a State or federally listed species. This species is on the California Native Plant Society's List 4 (RED 1-2-2).

Species Description

Small-flowered morning-glory is an herbaceous annual in the morning-glory family (Convolvulaceae) and reaches heights of 1 to 3 decimeters (Munz 1974; Dempster 1993c). The bell-shaped flowers are small (0.6 centimeters) and pink or blue. The capsular fruits are dry, dehiscent and spheric; the two chambers each contain two seeds for a total of four seeds per fruit (Dempster 1993c).

Habitat Affinities

Small-flowered morning-glory is restricted to wet clay soils and serpentine seeps and ridges, below elevations of 700 meters in southern valley needlegrass grassland, mixed native and non-native grasslands, sage scrub, and openings in chaparral (Munz 1974; Dempster 1993c; CNPS 2001). Possible associate species include *Acanthomintha ilicifolia*, *Microseris* species and *Plantago rhodosperma* (Reiser 2001).

Life History

Small-flowered morning-glory blooms from March through June (CNPS 2001). Generally, members of *Convolvulus* are pollinated by bees and flies (Proctor *et al.* 1996). No published information for the dispersal of this species is available.

Status and Distribution

The geographic range of small-flowered morning-glory extends from Contra Costa County through Kern County, San Benito County, Stanislaus County, San Joaquin County, San Luis Obispo County, Santa Barbara County, San Clemente Island, Santa Catalina Island, Santa Cruz Island, Los Angeles County, Riverside County, San Diego County and down into Baja California (CNPS 2001; Munz 1974). The wide range of this species and the limited number of collections may indicate that it was once much more common and is currently declining throughout its range (Reiser 2001).

Threats

The small-flowered morning-glory is primarily threatened by habitat loss due to urbanization and agricultural conversion. Historic heavy grazing could be a factor in the decline of this species, as the clay lenses they occupy seem to occur most often in non-native grasslands where cattle are/were grazing (Reiser 2001).

Conservation Needs

The conservation needs of small-flowered morning-glory include protection and management of known occurrences in a manner that provides for their long-term viability. Any new discoveries with long-term conservation value should be conserved in the same manner. Actions that interfere with the ecological processes that support the species habitat or increase the likelihood of deleterious effects from any identified threat should be avoided.

Environmental Baseline

Our database includes 30 records of small-flowered morning-glory in the Plan Area; however 10 records are duplicates. Based on our dataset, small-flowered morning-glory is found on PQP Lands in Lake Mathews Estelle Mountain Reserve, BLM property north of Vail Lake, Lake Skinner Recreation Area, and the Santa Rosa Plateau Ecological Preserve. Our dataset also includes records from east of Lake Street in Alberhill, the junction of SR-74 and Juniper Flats Road, Temescal Canyon near the Indian Truck Trail, Horsethief Canyon, Avery Canyon, Warm Springs Creek, and Skunk Hollow. The species also occurs in Paloma Valley near the junction of Briggs Road and Scott Road (Santa Barbara Botanical Garden, Santa Barbara, California, data from herbarium specimens, 1991).

The primary vegetation types used to model habitat for this species were grasslands and coastal sage scrub below 2,297 feet (700 meters) in elevation. Based on this analysis, the Riverside Lowlands, Santa Ana Mountains and San Jacinto Foothills Bioregions support approximately

228,119 acres of modeled habitat for the small-flowered morning-glory. Approximately 44,640 acres (20 percent) of the modeled habitat occurs within PQP Lands. Due to the microhabitat associations (*e.g.*, Altamont, Auld, Bosanko, Claypit, and Porterville soils) of the small-flowered morning glory, it is likely that the modeled habitat overestimates the extent of suitable habitat within the Plan Area.

Effects of the Action

Direct Effects

The Plan Area includes 228,119 acres of modeled habitat for the small-flowered morning-glory. Small-flowered morning-glory will be subject to impacts associated with proposed residential, commercial, urban, and agricultural development over the 75-year permit term within 131,975 acres (58 percent) of this habitat. It is anticipated that populations of small-flowered morning-glory in Paloma Valley near the junction of Briggs Road and Scott Road, the junction of State Highway 74 and Juniper Flats Road, Avery Canyon, Warm Springs Creek, and any other individuals and populations persisting outside of the MSHCP Conservation Area will be impacted over the 75-year permit term as a result of the planned development. However, some plants may survive in rural mountainous areas where development impacts are anticipated to occur at a slower rate and at lower densities. Approximately 30,361 acres (23 percent) of the non-conserved modeled habitat for the small-flowered morning-glory are designated as rural/mountainous land.

To offset the loss of small-flowered morning-glory habitat within the Plan Area, the MSHCP will conserve and manage 51,503 acres (23 percent) of modeled habitat within the Additional Reserve Lands. Another 44,640 acres of modeled habitat (20 percent) will remain within PQP Lands. In total, 42 percent of the modeled habitat for small-flowered morning-glory will be conserved or remain in the Plan Area, including 14 of the 20 (70 percent) unique records for the small-flowered morning-glory. Eight of the records are located within PQP Lands in Lake Mathews Estelle Mountain Reserve, BLM property north of Vail Lake, Lake Skinner Recreation Area, and the Santa Rosa Plateau Ecological Preserve. The remaining 6 records are proposed for conservation within Additional Reserve Lands in Horsethief Canyon, Skunk Hollow, Alberhill, north of Vail Lake, and Temescal Wash.

The Permittees will implement management and monitoring practices within Additional Reserve Lands, including surveys for small-flowered morning-glory. Cooperative management and monitoring are anticipated on PQP Lands. Surveys for the small-flowered morning-glory will be conducted at least every eight years to verify occupancy at a minimum level of 75 percent of the known locations. If a decline in the distribution of the small-flowered morning-glory is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP. The small-flowered morning-glory will also benefit from the General Management Measures described in Section 5 of the MSHCP, such as control of unauthorized public access, off-road vehicles, and exotic species.

Indirect Effects

Small-flowered morning-glory could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These generally include the indirect effects mentioned in the “General Effects” section of this biological opinion. The management provisions listed above will help to reduce the indirect effects to this species.

Conclusion

We anticipate the proposed action will directly and indirectly affect small-flowered morning-glory as described in the analyses above, including the loss of 58 percent of its modeled habitat in the Plan Area. Implementation of the avoidance, minimization, and mitigation measures identified in the Plan will reduce the impacts to this species. We anticipate that this species will persist in the remaining 42 percent of its modeled habitat within both the existing PQP Lands and the Additional Reserve Lands. We anticipate that these areas will be monitored and managed cooperatively to benefit the small-flowered morning-glory.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service’s biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the small-flowered morning-glory. We reached this conclusion because 42 percent of small-flowered morning-glory modeled habitat and 70 percent of the known occurrences will remain within the MSHCP Conservation Area. Thus, impacts to this species and its modeled habitat, when viewed in conjunction with the protection and management of the MSHCP Conservation Area, are not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Smooth tarplant (*Centromadia* [= *Hemizonia*] *pungens* ssp. *laevis*)

Status of the Species

Listing Status

Smooth tarplant is not a State or federally listed species. This species is on the California Native Plant Society’s List 1B (RED 2-3-3).

Species Description

Smooth tarplant is an annual composite in the sunflower family (Asteraceae), with rigid, bristly, freely branching stems reaching 10 to 120 centimeters in height. Stems are rough to the touch with both long and short spreading hairs that may have tiny glands that exude a strong-scented resin. On bolted plants, leaves are rigidly spine-tipped; lower leaves are 5 to 15 centimeters long, linear-lanceolate and deeply pinnatifid; upper leaves are 1 to 2 centimeters long, linear to awl-like and spine-tipped with stiff margins and, generally, with axillary leaf clusters. Leaves and bracts are not scabrous; upper leaves and bracts are sparsely setose-ciliate, otherwise very glabrous (Randal 1995; Keil 1993; Munz 1974; Abrams 1960).

The flowering heads are terminal on short lateral stems, which are axillary along the main branches and have condensed internodes and crowded leaves. The heads are small (4 to 6 millimeters), scattered, or approximate in loose glomerules, and contain both disk and ray flowers. The leaves appear to be whorled or involucrate beneath some flowerheads, each of which has a single series of 25 to 40 true phyllaries. Each phyllary partly encloses a single pale yellow disk flower at its base. The ray flowers are 3 to 5 millimeters long and double-lobed. Achenes are about 2 millimeters long and beaked with a smooth or minutely roughened surface and without a pappus. The disk flowers are darker yellow. The receptacle is flat with obtuse or slightly acute chaff scales that are not spine-tipped (Keil 1993; Abrams 1960).

In the spring, the juvenile form of smooth tarplant is difficult to distinguish from *Hemizonia paniculata*. Smooth tarplant is also frequently confused with other *Centromadia* species, such as *C. parryi* ssp. *australis* and *C. pungens* ssp. *pungens* (CNPS 2001). Subspecies of *C. pungens* differ from one another in the shape of their receptacle bracts, roughness of leaves and bracts, and size of flower heads. Chaff scales are generally spine-tipped in *C. pungens*, except in *C. p. ssp. laevis*. The nomenclature was recently revised by Baldwin (1999).

Habitat Affinities

Smooth tarplant occurs at elevations up to 480 meters in heavy, alkaline soils, in a variety of habitats including chenopod scrub, meadows and seeps, playas, valley/foothill grasslands, and riparian woodlands (CNPS 2001). The species prefers valley and foothill grasslands, particularly near alkaline locales, and generally grows at sites with minimal shrub cover (Reiser 2001). It also grows in disturbed areas including agriculture fields, graded areas, drainage ditches, dirt berms, and roadsides (CNDDDB 2003). Smooth tarplant is frequently associated with other sensitive species, including the San Jacinto Valley crownscale, Davidson's saltscale, Parish's brittlescale, vernal barley, Coulter's goldfields, and thread-leaved brodiaea (Bramlet 1993a).

Life History

Smooth tarplant flowers from April to September (CNPS 2001). Ray flowers produce fertile seeds (achenes). The disk flowers are usually staminate (male only) and do not produce fertile seeds. Following germination (in autumn - late spring depending on rains) the plants grow into small rosettes with distinctive pinnatifid leaves. Rosettes bolt in late spring and early summer (Randall 1995). No literature regarding seed dispersal was available.

Status and Distribution

Smooth tarplant is found in southwestern California and northwestern Baja California, Mexico. It occurs in San Bernardino, Riverside, and San Diego counties (Keil 1993). Western Riverside County accounts for 89 percent of the reported occurrences in the CNDDDB (2003). It is considered by the California Native Plant Society to be seriously endangered in California (CNPS 2001).

Outside of the Plan Area, the species may occur in Orange and Los Angeles counties (Reiser 2001) or the occurrences in these counties may be *Centromadia parryi* ssp. *australis* (CNPS

2001). There are also seven collections of *Centromadia pungens* in the herbarium at the San Diego Natural History Museum for Baja California, which may or may not be *C. pungens* ssp. *laevis* (Reiser 2001). The species was historically known from two locations in San Diego County. A major population in Santee was severely affected, and possibly extirpated, by the development of a shopping center at Santee Square Trolley Station. The status of this population is unknown. One small population remains east of Lake Hodges (CNDDDB 2003). In San Bernardino County, the species has been recently confirmed from Lytle Creek (1993) and may also occur in Ontario (1987), Loma Linda (1987), and the City of San Bernardino (1987) (Rancho Santa Ana Botanic Garden, Claremont California, data from herbarium specimens).

Threats

The CNPS Inventory (2001) indicates that smooth tarplant is threatened by agriculture, urbanization, and flood control projects. While smooth tarplant has been documented to grow in disturbed soils (CNDDDB 2003), agricultural discing throughout western Riverside County's farmlands, particularly within drainages, has resulted in the loss of many historical populations of this species (Reiser 2001). Additional threats to smooth tarplant within the Plan Area include: habitat destruction and fragmentation from urban development, alteration of hydrology and flood plain dynamics, creek channel maintenance, trampling by cattle and sheep, fire-suppression practices (including discing and plowing), roadside maintenance (mowing or grading), and off-road vehicle activity (CNDDDB 2003). No studies have been conducted regarding the tolerance of smooth tarplant to various levels of disturbance; however, it is likely that the frequency, timing, and method of disturbance would influence population levels over the long term.

The populations of smooth tarplant along the San Jacinto River may be impacted by the proposed San Jacinto River Flood Control project. Depending on the alignment, extent of channelization, and resulting alteration of the hydrologic regime that supports the species, occurrences along this river could be lost. Similarly, the populations along Murrieta Creek may be impacted by the Corps' Murrieta Creek Flood Control Project. The proposed realignment of SR-79 could eliminate habitat, remove occurrences, and further alter the hydrologic regime that supports the species in the upper Salt Creek drainage. The proposed East Lake Specific Plan would remove populations of smooth tarplant within the project footprint, southeast of Lake Elsinore.

Conservation Needs

The conservation needs of smooth tarplant include the protection and management of known occurrences in San Diego, San Bernardino, and Riverside counties in a manner that provides for their long-term viability. Due to the extremely limited distribution of this species and the importance of the action area to its long-term survival, all known populations of smooth tarplant with long-term conservation value in the Plan Area should be managed and protected. Any newly discovered occurrences should be conserved in the same manner. In order to conserve this species, hydrological and other ecological processes necessary to maintain suitable habitat should be protected. Actions that would modify the hydrology that supports the species' habitat or increase the likelihood of deleterious effects from any identified threat should be avoided.

Environmental Baseline

Smooth tarplant is found at scattered, low elevation locations throughout much of the Riverside Lowlands Bioregion. Our dataset includes 102 records of smooth tarplant from the Plan Area; however, fifteen of these records are duplicates. Six unique records are from the Domenigoni Valley (PQP Lands) and have been inundated by the Diamond Valley Reservoir. Therefore, for the purposes of our analysis, we considered 81 records for this species in the Plan Area. These records represent 98 percent of the known extant records for the smooth tarplant.

Our dataset includes populations on PQP Lands in the San Jacinto Wildlife Area, Alberhill Creek, and Murrieta Creek. The majority of occurrences outside PQP Lands are located in the San Jacinto River, Murrieta Creek, San Diego and Colorado River Aqueducts (Hemet and San Jacinto), and Salt Creek/Domenigoni Valley. Additional locations include: Cole Canyon, Mead Valley, Lakeview Hotsprings, Auld Creek (west of Lake Skinner), southeast of Lake Elsinore, San Timeteo Canyon, Morrison Park (Moreno Valley), Temescal Wash, along the Perris Valley Storm Drain, east of Perris near Sherman Road, Perris Valley Airport, Potrero Creek near Beaumont, southeast of the junction of SR-79 and SR-74, east of I-215 in Menifee, the junction of SR-74 and Juniper Flats Road, Simpson Avenue in Winchester, Avery Canyon, south of Diamond Valley lake along the San Diego Canal, south of Cottonwood Avenue in San Jacinto, March Air Reserve Base, Warm Springs Creek, French Valley, west of Lake Skinner, and east of Canyon Lake.

No species-specific distribution surveys have been conducted for smooth tarplant throughout the Plan Area. It is possible that this species persists adjacent to vernal pools in localities other than the ones listed above. The “Generalized Baseline for Vernal Pools Within the Plan Area” discussion included in this biological opinion provides information on the status and distribution of vernal pools in the Plan Area. Smooth tarplant may occur in the vicinity of vernal pools identified in this discussion.

Recent surveys conducted along the San Jacinto River between the Ramona Expressway and Goetz Road identified 14 occurrences of smooth tarplant (approximately 43,650 individuals) on 104.9 acres (Glen Lukos Associates 2000). Recent surveys conducted within the Metropolitan Water District Upper Salt Creek Wetland Preserve Mitigation Parcel estimated just under seven million smooth tarplant individuals on 10.56 acres of the parcel (AMEC 2001). Southeast of Lake Elsinore, 15 populations (approximately 1,750 individuals) of smooth tarplant were recently identified (Glen Lukos Associates 2003 as cited in HDR Engineering 2003). One individual of this species was found on PQP Lands in the Santa Ana River floodplain north of the 60 freeway bridge (Dave Bramlet, pers. comm., 2003).

The MSHCP identifies three smooth tarplant locations (Gavilan Hills, Sycamore Canyon Park, Lakeview Mountains) that could not be verified. A population that previously existed near Lake Mathews was extirpated by the construction of Cajalco Creek Dam (Dave Bramlet, pers. comm., 2003), and a population near Diamond Valley Lake has been inundated.

The vernal pool model was used to capture potential habitats supporting the smooth tarplant. The vernal pool model included these parameters within the Riverside Lowlands and the Santa

Ana Mountains bioregions: 1) vernal pools and playas and 2) clayey soils (Altamont, Auld, Bosanko, Claypit, and Porterville), alkali soils (Willows, Traver, and Domino), and Santa Rosa Plateau basalt flow soils. Based on our analysis, 42,349 acres of modeled habitat, with the potential to harbor vernal pools suitable for the species, occur within the Plan Area.

Approximately 8,831 acres (21 percent) of modeled habitat occur within PQP Lands. We were unable to include additional soil types that harbor vernal pools, such as Murrieta stony clay loam, in our model because we do not have access to digital overlays mapping the extent of these soil types in the Plan Area. Because the smooth tarplant requires the presence of specific hydrological processes and is only known to occur within the Riverside Lowlands Bioregion, the modeled habitat likely overestimates the extent of suitable habitat within the Plan Area.

However, because 54 percent of the records in our dataset for smooth tarplant fall outside of modeled habitat, it is likely that there are additional types of alkali soils that provide suitable habitat for the species, but these were not captured by our modeled habitat. For example, Chino silt loam and Grangeville sandy loam are two alkali soils found along Murrieta Creek in areas where populations of smooth tarplant have been recorded (Knecht 1971).

Effects of the Action

Direct Effects

The Plan Area includes 42,349 acres of modeled habitat for smooth tarplant. There are 25,831 acres (61 percent) of modeled habitat outside the MSHCP Conservation Area; of that 9,711 acres (23 percent of total modeled habitat) occur within the Criteria Area Species Survey Areas (CASSA) 1, 2, 3, 3a, 4, and 6 (Figure 6-2, pp. 6-64). The smooth tarplant is considered an Additional Survey Needs and Procedures species. Surveys will be conducted in these areas as part of the project review process for public and private projects where suitable habitat is present. Until such time that the Additional Reserve Lands are assembled and conservation objectives for this species are met, surveys for the smooth tarplant will be conducted where suitable habitat is present for the species within CASSA 1, 2, 3, 3a, 4, and 6. Populations detected as a result of survey efforts will be avoided according to the procedures outlined in the Additional Survey Needs and Procedures (Section 6.3.2 of the Plan; *i.e.*, 90 percent of portions of property with long-term conservation value will be avoided until the species conservation objectives are met). For those locations found to contain large numbers of individuals or otherwise determined to be important to the overall conservation of the species, the Plan allows flexibility to acquire these locations for inclusion into the Additional Reserve Lands (pp. 6-70).

Within the 9,711 acres of modeled habitat outside of the MSHCP Conservation Area, but within the CASSA for smooth tarplant (23 percent of total modeled habitat), we anticipate that up to 10 percent of the area with long-term conservation value for this species (as discussed above) will be lost to individual projects. Eleven of the 81 records from our dataset occur outside of the MSHCP Conservation Area, but within the CASSA for smooth tarplant. If these occurrences of smooth tarplant are confirmed to contain large numbers of individuals or otherwise determined to be important to the overall conservation of the species, the Plan allows flexibility to acquire these locations for inclusion into the Additional Reserve Lands (pp. 6-70).

Smooth tarplant will be subject to impacts associated with development and other proposed Covered Activities within 16,121 acres of modeled habitat that are outside of the MSHCP Conservation Area and outside of the CASSA for smooth tarplant (38 percent of total modeled habitat). Thus, any populations outside of the MSHCP Conservation Area and outside the CASSA for smooth tarplant, including 58 percent of the known occurrences in the Plan Area, are anticipated to be impacted over the 75-year permit term as a result of the proposed Covered Activities.

Because the majority (98 percent) of the existing smooth tarplant populations occur within the Plan Area, specific conservation objectives are provided in the MSHCP (Section 9, pp. 9-142) to ensure that suitable habitat and substantial known populations of the species will persist. The Plan states that at least 27 of the known locations of smooth tarplant will be included within the MSHCP Conservation Area, and three core areas: San Jacinto Wildlife Area, the middle segment of the San Jacinto River, and upper Salt Creek. In addition, the Plan states that at least 6,900 acres of grassland and playas and vernal pools within the San Jacinto River, Mystic Lake and Salt Creek Areas will be included within the MSHCP Conservation Area, including 3,990 acres within Additional Reserve Lands and 2,910 acres within PQP Lands. Floodplain areas along the San Jacinto River will be included in this acreage total to preserve floodplain processes important to the survival of smooth tarplant. Salt Creek floodplain, in its existing condition (from Warren Road to Newport Road), and vernal pools in Upper Salt Creek will be included within the MSHCP Conservation Area. Floodplain processes will be maintained to provide for persistence of the species. We anticipate this species will also benefit from the implementation of the Riparian/Riverine Area and Vernal Pools policy.

The 27 known smooth tarplant occurrences considered by the MSHCP to be included in the MSHCP Conservation Area encompass populations in 12 locations: Antelope Valley, Temescal Canyon, Lake Elsinore, Murrieta Creek, French Valley, Lakeview Mountains, Lake Skinner, Diamond Valley Lake, Sycamore Canyon Park, Alberhill Creek, Lake Mathews and the Santa Ana River. Eight of these locations are tenuous due to a variety of factors. The populations at Diamond Lake and Lake Mathews are likely extirpated. The population west of Lake Skinner is outside of the Criteria Area. The populations in Sycamore Canyon Park and the Lakeview Mountains were not included in our dataset due to the age or precision level of the records; thus, these populations need to be confirmed. Populations designated to be conserved in Additional Reserve Lands along Murrieta Creek are likely to be impacted by the Murrieta Creek Flood Control Project. The Temescal Canyon population falls outside of the Additional Reserve Lands, although it could be captured by an adjustment to Cell Group I of the Temescal Canyon Area Plan (Section 3.3.16). The occurrence near the Santa Ana River consisted of only one plant in 1992; thus, this location also needs to be reassessed and confirmed.

Covered Activities that may impact populations of smooth tarplant include the realignment of SR-79 and the San Jacinto River Flood Control Project. The Core Area on upper Salt Creek and occurrences along Warren Road (Section 3.2.3 - Noncontiguous Habitat Blocks 6 and 7) are within the footprint of the proposed SR-79 realignment project. Smooth tarplant is not included on the list of species to be analyzed for this project (Section 7.3.5); therefore, no mitigation measures will cover the potential loss of these populations. However, the smooth tarplant may

benefit from association with other sensitive species on the list, including San Jacinto Valley crownscale and thread-leaved brodiaea.

Any populations in the lower San Jacinto River may be at risk from the San Jacinto River Flood Control Project. We assume that a population will not be impacted by this proposed Covered Activity unless criteria in Section 7.3.7 of the Plan are met. The criteria includes conservation of land (called “mitigation lands”) and providing hydrology for the continued survival of the smooth tarplant (among other species). We anticipate that any reduction in the population size will be minimized through adherence to these criteria and the distribution of this species will be maintained in the Plan Area.

Based on our analysis, to offset the loss of smooth tarplant modeled habitat in the Plan Area, the MSHCP will conserve and manage approximately 7,686 acres (18 percent) of modeled habitat for the smooth tarplant within the Additional Reserve Lands, including 15 records for the species from our dataset. Approximately 8,831 acres (21 percent) of the modeled habitat for smooth tarplant will remain within PQP Lands, including 9 records for the species from our dataset. In total, 16,517 acres (39 percent) of the modeled habitat and 24 (30 percent) of the records in our dataset for smooth tarplant will be conserved or will remain in the Plan Area. The 24 occurrences that will be included in the MSHCP Conservation Area will represent 92 percent of the remaining range wide occurrences for the smooth tarplant.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands including surveys for smooth tarplant. Cooperative management and monitoring are anticipated on PQP Lands. Surveys for smooth tarplant will be conducted at least every eight years to verify occupancy at a minimum of 75 percent of the known locations. If a decline in the distribution of smooth tarplant is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP. Reserve Managers will ensure habitat support functions within the MSHCP Conservation Area by maintaining and enhancing the floodplain processes of the San Jacinto River, Mystic Lake, and upper Salt Creek, including intermittent flooding and periodic pooling (Section 5, Table 5.2). Other management actions described in Section 5 of the MSHCP will help maintain smooth tarplant habitat, such as preventing alteration of hydrology and floodplain dynamics, off-road vehicle use, farming, fire and fire suppression activities, grazing, and competition from non-native plants species. Implementation of these management actions will help to avoid and minimize adverse effects to smooth the tarplant.

Indirect Effects

Smooth tarplant could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These generally include the indirect effects discussed in the “General Effects” section of this biological opinion. Implementation of the Guidelines Pertaining to the Urban/Wildlands Interface policy, Riparian/Riverine Area and Vernal Pools policy, and the management provisions listed above will help to reduce the indirect effects to this species.

Conclusion

We anticipate the proposed action will directly and indirectly affect smooth tarplant as described in the analyses above, including total loss of 38 percent of its modeled habitat. An additional 23 percent of smooth tarplant modeled habitat outside the MSHCP Conservation Area will be subject to surveys within CASSA 1, 2, 3, 3a, 4, and 6. Once the conservation objectives for smooth tarplant have been met, avoided areas, which have not been otherwise conserved, may be impacted. We anticipate that occurrences determined to be important to the overall conservation of the species will be considered for inclusion in the Additional Reserve Lands and that at least some of the avoided areas may be maintained as open space habitat. Implementation of the avoidance, minimization, and mitigation measures identified in the Plan will further reduce the impacts to smooth tarplant. This species is anticipated to persist within the remaining 39 percent of its modeled habitat within both the PQP Lands and the Additional Reserve Lands. We anticipate that these areas will be monitored and managed cooperatively to benefit this species.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the smooth tarplant. We reached this conclusion because 39 percent of the modeled habitat and 30 percent of the records for smooth tarplant in the Plan Area will be protected or will remain within the MSHCP Conservation Area. In addition, CASSA surveys for the smooth tarplant may result in newly discovered occurrences being included in the MSHCP Conservation Area. Thus, impacts to this species and its habitat, when viewed in conjunction with the protection and management of the MSHCP Conservation Area, are not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of smooth tarplant throughout its range.

Sticky-leaved dudleya (*Dudleya viscida*)

Status of the Species

Listing Status

Sticky-leaved dudleya is not a State or federally listed species. This species was removed from Federal category 1 candidate status on February 28, 1996, because it was more abundant than previously thought (61 Federal Register 7457, U.S. Fish and Wildlife Service 1996d). It is a Forest Service Sensitive Species. The species is on the California Native Plant Society's List 1B species (RED 2-2-3).

Species Description

Sticky-leaved dudleya is a succulent, rosette-forming perennial in the Stonecrop family (Crassulaceae). The species has a short stem, which forms clumps up to 5 decimeters or more wide. Sticky-leaved dudleya possesses evergreen rosettes with 15 to 40 leaves per rosette. These leaves are tapering from base, somewhat flattened, 6 to 15 centimeters long, 1 to 2 centimeters wide at the base, dark green, viscid, with an odor similar to pine resin; floral stems

are 2 to 4 decimeters tall; petals are white or pink and wide-spreading from the middle (Moran 1979).

Sticky-leaved dudleya is readily distinguished from all other species of *Dudleya* in California by its strongly viscid and odorous leaves (Moran 1979). Only one other species, *D. anomala* of Baja California, shares the sticky nature of the foliage (Moran 1960). Other species of *Dudleya* occurring in the general area of sticky-leaved dudleya differ also as follows: Blochman's dudleya (*Dudleya blochmaniae*) and variegated dudleya (*Dudleya variegata*) are much smaller (5-8 rosette leaves, 2-7 centimeters long) and have underground stems and vernal rosettes; southern California dudleya (*Dudleya lanceolata*) and chalk lettuce (*Dudleya pulverulenta*) have erect petals forming a tube; fingertips (*Dudleya edulis*) has terete, pale green leaves.

Habitat Affinities

Sticky-leaved dudleya is found on mesic, mostly north-facing, and often steep, rocky canyon slopes. Sticky-leaved dudleya is known to occur in chaparral, sage scrub, and coastal bluff scrub, at elevations from 10 to 550 meters (CNPS 2001). In the San Mateo Wilderness, this species is most common on meta-sedimentary and intrusive volcanic substrates (Boyd *et al.* 1992).

Life History

No studies have been published regarding the reproductive biology of sticky-leaved dudleya. It blooms from May through June, is pollinated by bees and bee flies (Wyatt 1983), and produces capsules of 5 carpels 7 to 9 millimeters long, containing many minute, narrow, pointed, caudate seeds 1.2 to 1.4 millimeters long (Munz 1974). No studies are available regarding seed dispersal in sticky-leaved dudleya. Seeds are presumably self-dispersed.

Status and Distribution

Sticky-leaved dudleya is endemic to southwestern California. It is known from fewer than 20 occurrences in southeastern Orange, northern San Diego, and southwestern Riverside counties (Munz 1974; Bartel 1993; CNPS 2001; CNDDDB 2003). The majority of the populations are concentrated within the southern Santa Ana Mountains, but scattered populations are found as far south as Oceanside and Lake Hodges in San Diego County (CNDDDB 2003). In their assessment of flora in the San Mateo Canyon Wilderness Area, Boyd *et al.* (1995) reported scattered populations of sticky-leaved dudleya occurring from Lucas Canyon (immediately adjacent to Riverside County within Orange County) south to Devil Canyon (immediately adjacent to Riverside County within San Diego County), but most occurrences were concentrated in the lower half of San Mateo Canyon within Riverside County. The species appears to be stable and is estimated to number between 100,000 and 250,000 individuals.

Threats

Sticky-leaved dudleya is threatened by development and road construction (CNPS 2001).

Conservation Needs

The conservation needs of sticky-leaved dudleya include protection and management of the known populations in Orange, Riverside, and San Diego counties in a manner that provides for their long-term viability. Newly discovered populations with long-term conservation value should be conserved in the same manner. Actions that would increase the likelihood of deleterious effects from any identified threat should be avoided.

Environmental Baseline

Within the Plan Area, sticky-leaved dudleya is known to occur in the southern Santa Ana Mountains (CNDDDB 2000). No species-specific distribution surveys have been conducted for the sticky-leaved dudleya throughout western Riverside County, though our dataset includes three occurrences from San Mateo Canyon in the Santa Ana Mountains. All three occurrences are from the CNDDDB, two of which were taken from Boyd *et al.* 1992. Boyd *et al.* (1995) reported that the most extensive known populations of sticky-leaved dudleya occur within the San Mateo Canyon Wilderness Area and are associated with rock outcrops and cliffs of granitic, metavolcanic, and metasedimentary origin and typically occur on mesic exposures (east, northeast, and north).

Sticky-leaved dudleya generally occurs on cliffs and banks within coastal bluff scrub, chaparral, and coastal scrub from elevations of 32 to 1,805 feet (10 to 550 meters) (CNDDDB 2000; CNPS 2001). The vegetation types used to model habitat for this species were chaparral and coastal sage scrub below 1,805 feet (550 meters) in the Santa Ana Mountain Bioregion. Based on these criteria, the Plan Area supports approximately 30,072 acres of modeled habitat for sticky-leaved dudleya. Approximately 14,546 acres (48 percent) of modeled habitat exists within PQP Lands. However, due to sticky-leaved dudleya's specific microhabitat associations (*i.e.*, cliffs and banks with mesic exposures), the modeled habitat likely overestimates the amount of suitable habitat within the Plan Area (Boyd *et al.* 1995; CNPS 2001; CNDDDB 2003).

Effects of the Action

Direct Effects

The sticky-leaved dudleya will not be considered a Covered Species Adequately Conserved by the MSHCP unless the Forest Service agrees through an MOU to manage populations of this species on their lands cooperatively with the Permittees as "Conserved Habitat" as defined by the MSHCP. The Plan Area includes approximately 30,072 acres of modeled habitat for the sticky-leaved dudleya. If the MOU with the Forest Service is executed, the sticky-leaved dudleya will be subject to impacts associated with proposed residential, commercial, urban and agricultural development within 12,927 acres (43 percent) of the modeled habitat that are outside of the MSHCP Conservation Area. Thus, any individual sticky-leaved dudleya plants or populations persisting in these areas are anticipated to be impacted over the 75-year permit term as a result of proposed development. It is anticipated that most sticky-leaved dudleya in these areas will be lost, as a result of habitat loss and activities such as grading and construction; however, some plants may survive in rural mountainous areas where development impacts are

anticipated to occur at a slower rate and at lower densities. Approximately 10,509 acres (81 percent) of the non-conserved modeled habitat for the sticky-leaved dudleya are designated as rural/mountainous land.

If the MOU with the Forest Service is signed, additional monitoring and management would occur on habitat for the sticky-leaved dudleya within Forest Service lands included in the MSHCP Conservation Area. To offset the loss of sticky-leaved dudleya habitat within the Plan Area, the MSHCP will conserve and manage 2,599 acres (9 percent) of sticky-leaved dudleya modeled habitat within Additional Reserve Lands. Approximately 14,546 acres (48 percent) of modeled habitat will remain within PQP Lands, including the three occurrences of sticky-leaved dudleya in our dataset. In total, 57 percent of the modeled habitat for the sticky-leaved dudleya and 100 percent of the known occurrences will be conserved or remain in the Plan Area.

At least one Core Area will support the sticky-leaved dudleya within the MSHCP Conservation Area in the Santa Ana Mountains. Following development of the MOU with the Forest Service, cooperative management and monitoring are anticipated on PQP Lands. Surveys for the sticky-leaved dudleya will be conducted at least every eight years to verify occupancy at a minimum of 75 percent of the Core Areas identified above. If a decline in the distribution of the sticky-leaved dudleya is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP. Other management actions described in Section 5, Table 5.2 of the MSHCP, such as control of unauthorized public access, maintenance of existing habitat, control of invasive weeds, and management of specific threats to the species will help maintain habitat and populations of the sticky-leaved dudleya within the Plan Area.

Indirect Effects

The sticky-leaved dudleya could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These include the indirect effects described in the “General Effects” section of this biological opinion.

Conclusion

We anticipate the proposed action will directly and indirectly affect the sticky-leaved dudleya as described in the analyses above, including the loss of 43 percent of its modeled habitat in the Plan Area. Implementation of the avoidance, minimization, and mitigation measures identified in the Plan will reduce the impacts to this species. We anticipate that this species will persist in the remaining 57 percent of its modeled habitat within both the existing PQP Lands and the Additional Reserve Lands. We anticipate that these areas will be monitored and managed cooperatively to benefit the sticky-leaved dudleya.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service’s biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the sticky-leaved dudleya. We reached this conclusion because 57 percent of the modeled habitat for the sticky-leaved dudleya and all of the known occurrences will be included in the MSHCP

Conservation Area. In addition, the impacts associated with loss of this species' modeled habitat, when viewed in conjunction with the protection and management of the MSHCP Conservation Area, is not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Vernal barley (*Hordeum intercedens*)

Status of the Species

Listing Status

Vernal barley is not a State or federally listed species. This species is on the California Native Plant Society's List 3 (RED ?-2-2).

Species Description

Vernal barley is an annual herb in the Poaceae (grass) family (CNPS 2001). It is one of about 30 species of *Hordeum* (Barkworth 1993). This species is short, obscure, and difficult to distinguish from other barley species. It is closely allied to, and often confused with, *Hordeum depressum*, another alkali favoring species, and *H. pusillum* (Braum and Bailey 1987).

Habitat Affinities

Vernal barley occurs at elevations from 16 to 3,280 feet (5 to 1,000 meters) in coastal dunes, coastal scrub, mesic grasslands, vernal pools, and large saline flats or depressions (Braum and Bailey 1987; CNPS 2001). In Riverside County, vernal barley is found in the Domino, Willows and Traver soils series and is associated with alkali flats and flood plains within the alkali vernal plains community (Ferren and Fiedler 1993). Associated species include: seablite, alkali weed, wire-stem popcorn flower, sand spurry, California goldfields, Mojave silver scale, San Jacinto Valley crownscale, bracted saltbush, five-hook bassia, sharp-tooth peppergrass, dwarf peppergrass, little mousetail, alkali heath, smooth tarplant, and toad rush (Bramlet 1993a). AMEC (2001) reports vernal barley may tolerate some soil disturbance.

Life History

This species blooms from March to June (CNPS 2001). Population size varies considerably from year to year depending upon rainfall, local flooding, and disturbance. No studies are available regarding the reproductive biology or seed dispersal of vernal barley.

Status and Distribution

Vernal barley occurs below 3,280 feet (1,000 meters) in scattered locations bordering the Central Valley of central California, southwestern California, and northwestern Baja California, Mexico (Barkworth 1993). In southern California it has been reported from Orange, Riverside, and San Diego counties. It also occurs on the islands of Anacapa, Santa Barbara, San Benito, San Clemente, Santa Catalina, Santa Cruz, San Miguel, San Nicolas and Santa Rosa (CNPS 2001).

In Mexico, it has been reported as far south as Punta Blanca about 130 km south of El Rosario (Reiser 1996).

The CNPS considers vernal barley fairly rare in California and rare outside of California, but more information on locations within Los Angeles, Mono, and San Mateo counties is needed to clarify the current status (CNPS 2001). CNPS (2001) reports most mainland occurrences have been extirpated by development and others are threatened.

Threats

Vernal barley is threatened by development (CNPS 2001). In Riverside County, vernal barley occurs in similar habitat as the federally listed San Jacinto Valley crownscale. Threats to San Jacinto Valley crownscale, which include habitat degradation and destruction due to widespread urbanization and development, agricultural practices, off-road vehicles, and flood control (63 Federal Register 54975), would also likely threaten vernal barley.

The vernal barley populations on the San Jacinto River are threatened by the proposed San Jacinto River flood control project. That project proposes channelization of all or a portion of the River. Depending on the alignment, extent of channelization, and resulting alteration of the hydrologic regime that supports the species, some or all of the occurrences along the River could be lost. Glen Lukos Associates, Inc. (2000) estimated that construction of the Ramona Expressway and the improved river channel will result in the loss of 50,000 individuals of vernal barley covering approximately 10.0 acres. Indirect impacts associated with subsequent development could result in the loss of 28,000 individuals on approximately 18.0 acres (Glen Lukos Associates, Inc. 2000).

During the last several years, nearly continuous disturbances (*i.e.*, discing and other agricultural activities; flood control activities, including the creation of ditches and other drainage structures, etc.) have disrupted the hydrology of the vernal pools and playa at upper Salt Creek in the Plan Area (Recon 1995). These factors have resulted in a decrease in the water available to portions of the upper Salt Creek drainage area (Recon 1995) and a loss of suitable habitat for vernal barley. The proposed realignment of SR-79 could eliminate habitat, remove occurrences, and further alter the hydrologic regime that supports vernal barley in the upper Salt Creek drainage.

Conservation Needs

Conservation of vernal barley will require the protection and management of known and future occurrences with long term conservation value. This will require maintenance of hydrology that supports the species habitat and management of known threats. Actions that would modify the hydrology of the species habitat or increase the likelihood of deleterious effects from any identified threat should be avoided. Newly discovered occurrences with long term conservation value should be conserved in the same manner.

Environmental Baseline

The distribution and status of vernal barley in western Riverside is poorly understood. Our dataset includes 39 recent records from the Lake Elsinore area, the San Jacinto Wildlife Area, and the Salt Creek area. Nine records are duplicates or triplicates; thus, for the purposes of our analysis, we considered 30 known occurrences of the vernal barley in the Plan Area. Four of the records from 1993 are mapped incorrectly in our dataset. They were mapped northeast of Salt Creek; however, according to herbarium labels, they are located near the upper Salt Creek/Hemet area.

Surveys for vernal barley were conducted in 1998 and 2001 on the MWD Upper Salt Creek wetland mitigation parcel located on the west side of the San Diego Canal near California Avenue and Stetson Avenue (AMEC 2001). Individual plants were not counted because vernal barley occurs in extremely large numbers at this site and it is difficult to count; however, its areal extent was mapped. In both survey years, its extent was a little more than 30 acres.

Surveys for vernal barley were also conducted in 2000 along a 10.5-mile stretch of the San Jacinto River between the Ramona Expressway southwest to the Railroad Canyon reservoir (Glen Lukos Associates, Inc. 2000). The total area occupied by vernal barley was 300 acres and approximately 525,000 individuals of vernal barley were counted.

Vernal barley has also been reported from the Santa Rosa Plateau; however, because it is easily confused with *H. depressum*, it is not certain whether the record is accurate (Fred Roberts, pers. comm., 2003).

The habitat association of vernal barley is difficult to characterize (Fred Roberts, pers. comm. 2003). However, within western Riverside County, it appears to be associated with vernal pools and playas, alkali playa, and alkali grasslands (AMEC 2001), as well as mesic grasslands on clay soils (Fred Roberts, pers. comm., 2003).

The vernal pool model was used to capture potential habitats supporting vernal barley. The vernal pool model included these parameters within the Riverside Lowlands and the Santa Ana Mountains bioregions: 1) vernal pools and playas and 2) clayey soils (Altamont, Auld, Bosanko, Claypit, and Porterville), alkali soils (Willows, Traver, and Domino), and Santa Rosa Plateau basalt flow soils. Based on our analysis, 42,349 acres of modeled habitat, with the potential to harbor vernal pools suitable for the species, occur within the Plan Area. Approximately 8,831 acres (21 percent) of modeled habitat occur within PQP Lands. We were unable to include additional soil types that harbor vernal pools, such as Murrieta stony clay loam, in our model because we do not have access to digital overlays mapping the extent of these soil types in the Plan Area.

Effects of the Action

Direct Effects

The Plan Area includes approximately 42,349 acres of modeled habitat for the vernal barley. The species will be subject to impacts associated with development and other proposed Covered Activities within up to 25,831 acres (61 percent) of modeled habitat that is outside of the MSHCP Conservation Area. Thus, any individual vernal barley plants and populations persisting in these areas are anticipated to be lost over the 75-year permit term as a result of the proposed Covered Activities. Eight vernal barley records from our dataset occur outside the MSHCP Conservation Area. Two of these records, however, occur within the Criteria Area though they were not captured by our interpretation of the conservation criteria for the Cell Group. The criteria for that Cell Group (San Jacinto Valley Plan, subunit 4, Cell Group D') indicates that 70 to 80 percent of the cell group would be conserved, focusing in the central portion of the Cell Group. The vernal barley occurrences are located in the northern part of this cell group, just outside of that interpretation. The Plan has sufficient flexibility to allow the criteria for that Cell Group to be adjusted. Thus, we anticipate that these occurrences will be included in the Additional Reserve Lands in order to meet the conservation objectives for this species.

Because vernal barley is not widely distributed within the Plan Area, specific conservation objectives are provided in the MSHCP (Section 9, pp. 9-145) to ensure that suitable habitat and known populations of vernal barley will persist. The Plan states that at least four locations will be included with the MSHCP Conservation Area, including the occurrence near Nichols Road at Alberhill, and three core locations in the San Jacinto Wildlife Area, the middle segment of the San Jacinto River from Ramona Expressway south to Railroad Canyon, and the upper Salt Creek drainage west of Hemet. In addition, at least 6,900 acres of grassland and playa and vernal pool habitat within the San Jacinto River, Mystic Lake and Salt Creek areas will be included within the MSHCP Conservation Area. Floodplain areas along the San Jacinto River will be included in this total acreage to preserve floodplain processes important to the survival of vernal barley. Salt Creek floodplain in its existing condition (from Warren Road to Newport Road) and vernal pools in Upper Salt Creek will be included within the MSHCP Conservation Area, and floodplain processes will be maintained to provide for persistence of the species. We anticipate this species will also benefit from the implementation of the Riparian/Riverine Areas and Vernal Pools policy.

Based on our analysis, it appears that more than the 6,900 acres of alkali playa and vernal pool habitat proposed for inclusion in the MSHCP Conservation Area will remain in the Plan Area. Approximately 8,831 acres (21 percent) of modeled habitat for vernal barley will remain in PQP Lands, including 11 records (37 percent) from the San Jacinto Wildlife Area. Approximately 7,686 acres (18 percent) of modeled habitat will be conserved within Additional Reserve Lands, including 13 records (43 percent) in the upper Salt Creek Area. Thus, 39 percent of the modeled vernal barley habitat and 80 percent of the records from our dataset will be conserved or remain in the MSHCP Conservation Area.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands including surveys for vernal barley. Cooperative management and monitoring are anticipated on PQP Lands. Surveys for the vernal barley will be conducted at least every eight years to verify occupancy at a minimum of 75 percent of the known locations. If a decline in the distribution of vernal barley is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP. Other management actions described in Section 5, Table 5.2 of the MSHCP will help maintain habitat and populations of vernal barley, such as preventing alteration of hydrology and floodplain dynamics, off-road vehicle use, grazing and competition from non-native plants. Implementation of these management actions will help to avoid and minimize adverse effects to vernal barley.

Indirect Effects

Vernal barley could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These generally include the indirect effects discussed in the “General Effects” section of this biological opinion. Implementation of the Guidelines Pertaining to the Urban/Wildlands Interface policy, Riparian/Riverine Areas and Vernal Pools policy, and the management provisions listed above will help to reduce the indirect effects to this species.

Conclusion

We anticipate the proposed action will affect vernal barley as described in the analysis above, including the loss of 61 percent of its modeled habitat in the Plan Area. Implementation of the avoidance, minimization and mitigation measures identified in the Plan will reduce impacts to this species. This species is anticipated to persist within the remaining 39 percent of its modeled habitat within both the PQP Lands and the Additional Reserve Lands. We anticipate that these areas will be monitored and managed cooperatively to benefit this species.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service’s biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of vernal barley. We reached this conclusion because most of known occurrences in the Plan Area will be protected or will remain within the MSHCP Conservation Area. In addition, other large areas containing modeled habitat, some of which may support vernal barley populations, will be included within the MSHCP Conservation Area. Thus, the impacts associated with loss of this species’ modeled habitat, when viewed in conjunction with the protection and management of the MSHCP Conservation Area, are not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of vernal barley throughout its range.

Wright's trichocoronis (*Trichocoronis wrightii* var. *wrightii*)Status of the Species*Listing Status*

Wright's trichocoronis is not a State or federally listed species. This species is on the California Native Plant Society's List 2 (RED 3-3-1).

Species Description

Wright's trichocoronis is an annual herb in the Asteraceae (sunflower) family (CNPS 2001). It is one of two species in the genus *Trichocoronis* in southern California (King and Robinson 1987). It is a low, slightly succulent subaquatic annual that is less than 30 centimeters tall (Powell 1993). *Trichocoronis* is a member of the tribe Eupatorieae, a largely tropical group of asters that is poorly represented in California (Keil 1993).

Habitat Affinities

In Western Riverside County, Wright's trichocoronis is found in the alkali vernal plains and is associated with alkali playa, alkali annual grassland, and alkali vernal pool habitats (Bramlet 1993a; Ferren and Fiedler 1993). This species occupies the more mesic portions of these habitats (Bramlet 1993b). Wright's trichocoronis is associated with other sensitive species, including San Jacinto Valley crowscale, little mousetail, smooth tarplant, and spreading navarretia (Bramlet 1993a).

Life History

Wright's trichocoronis blooms from May to September and produces 75 to 125 flowers per flower head (Powell 1993). The achenes are one millimeter long (Munz 1974). No literature is available regarding pollination, germination, or seed dispersal. This species may rely on flooding to distribute seeds.

Status and Distribution

The historic range of Wright's trichocoronis includes the Great Valley of central California, western Riverside County, and the Edwards Plateau of central Texas and adjacent Mexico (Munz 1974; Powell 1993). In California there are reported occurrences for Wright's trichocoronis from Merced (1948; CNDDDB 2000), San Joaquin (1914; CNDDDB 2000), Colusa (1953; CNDDDB 2000), Riverside (1937-1993; CNDDDB 2000; UCR Herbarium), and Sutter (CalFlora 2001) counties. Wright's trichocoronis appears to be extirpated from central California. It is currently extremely rare in California, rare in Texas, and possibly more common in northern Mexico (Bramlet 1993a; CNPS 2001).

Threats

Threats to Wright's trichocoronis include habitat loss due to agriculture and urbanization (CNPS 2001). Wright's trichocoronis is dependent on alkaline soils that are saturated for extended periods of time. Much of the remaining suitable habitat for this species has been affected by discing for fuel modification, alteration in hydrology, trampling by livestock, incorporation of cow manure into the soil, and dry land farming activities (Glen Lukos Associates, Inc. 2000). In Riverside County, Wright's trichocoronis occurs in similar habitat as the federally listed San Jacinto Valley crowscale and spreading navarretia. Threats to these species and their habitat, which include habitat destruction from urban development, alteration of floodplain dynamics, off-road vehicle activity, and competition from non-native plant species (63 Federal Register 54975), also threaten Wright's trichocoronis.

Wright's trichocoronis' populations on the San Jacinto River are threatened by the proposed San Jacinto River flood Control Project. That project proposes channelization of all or a portion of the River. Depending on the alignment, extent of channelization, and resulting alteration of the hydrologic regime that supports the species, some or all of the occurrences along the River could be lost. The occurrence of Wright's trichocoronis located southwest of Lakeview Hot Springs is threatened by sheep grazing (CNDDDB 2000).

Conservation Needs

The conservation needs of Wright's trichocoronis include protection and management of known occurrences in California and Texas in a manner that provides for their long-term viability. This will require maintenance of hydrology that supports the species habitat and management of known threats. Actions that would modify hydrology or increase the likelihood of deleterious effects from any identified threat should be avoided. Newly discovered occurrences with long term conservation value should be conserved in the same manner.

Environmental Baseline

No species-specific distribution surveys have been conducted for Wright's trichocoronis in western Riverside County. Our dataset includes 10 recent records from the San Jacinto River area; three records are duplicates; therefore, for the purposes of our analysis, we considered only seven known occurrences of Wright's trichocoronis in the Plan Area. In 1991, 315 Wright's trichocoronis plants were observed at one location, southwest of Lakeview Hot Springs.

The vernal pool model was used to capture potential habitats supporting Wright's trichocoronis . The vernal pool model included these parameters within the Riverside Lowlands and the Santa Ana Mountains Bioregions: 1) vernal pools and playas and 2) clayey soils (Altamont, Auld, Bosanko, Claypit, and Porterville), alkali soils (Willows, Traver, and Domino), and Santa Rosa Plateau basalt flow soils. Based on our analysis, 42,349 acres of modeled habitat, with the potential to harbor vernal pools suitable for the species, occur within the Plan Area. We were unable to include additional soil types that harbor vernal pools, such as Murrieta stony clay loam, in our model because we do not have access to digital overlays mapping the extent of these soil types in the Plan Area.

Effects of the Action

Direct Effects

The Plan Area includes 42,349 acres of modeled habitat for Wright's trichocoronis. There are 25,831 acres (61 percent) of modeled habitat for Wright's trichocoronis outside the MSHCP Conservation Area; of that 24,046 acres (57 percent of total modeled habitat) occur within the Narrow Endemic Plant Species Survey Areas (NEPSSA) 1, 2, 3, 3a, 4, and 9 (Figure 6-1, pp. 6-30). Wright's trichocoronis is considered a Narrow Endemic Plant Species. Until such time that the Additional Reserve Lands are assembled and conservation objectives for this species are met, surveys will be conducted as part of the project review process for public and private projects where suitable habitat for Wright's trichocoronis is present within NEPSSA 1, 2, 3, 3a, 4, and 9. Populations detected as a result of survey efforts shall be avoided according to the procedures outlined in the Narrow Endemic Plant Species policy (Section 6.1.3 of the Plan; *i.e.*, 90 percent of portions of property with long-term conservation value shall be avoided until the species conservation objectives are met). For those locations found to contain large numbers of individuals or otherwise determined to be important to the overall conservation of the species, the Plan allows flexibility to acquire these locations for inclusion into the Additional Reserve Lands (pp. 6-40).

Within the 24,046 acres of modeled habitat outside of the MSHCP Conservation Area, but within the NEPSSA for Wright's trichocoronis (57 percent of total modeled habitat), we anticipate that up to 10 percent of the area with long-term conservation value for this species (as discussed above) will be lost to individual projects.

Wright's trichocoronis will be subject to impacts associated with development and other proposed Covered Activities within 1,785 acres of modeled habitat that is outside of the MSHCP Conservation Area and outside of the NEPSSA for Wright's trichocoronis (4 percent of total modeled habitat). Thus, all individual plants and populations outside of the MSHCP Conservation Area and outside of the NEPSSA for Wright's trichocoronis are anticipated to be lost over the 75-year permit term as a result of the proposed Covered Activities. One of the records of Wright's trichocoronis in our dataset occurs outside of the MSHCP Conservation Area and outside of NEPSSA 1, 2, 3, 3a, 4, and 9. However, it occurs within the Criteria Area, though it was not captured by our interpretation of the conservation criteria for the Cell Group. The criteria for that Cell Group (Lakeview/Nuevo Area Plan, subunit 1, Cell Group I) indicates that 60 to 70 percent of the Cell Group would be conserved, focusing in the eastern portion of the Cell Group. The Wright's trichocoronis occurrence is located in the southwest corner of this Cell Group, just outside of that interpretation. The Plan has sufficient flexibility to allow the criteria for that Cell Group to be adjusted. Thus, we anticipate that this occurrence will be included in the Additional Reserve Lands in order to meet the conservation objectives for the species.

Because the Wright's trichocoronis is not widely distributed within the Plan Area, specific conservation objectives are provided in the MSHCP (pp. 9-146) to ensure that suitable habitat and known populations of Wright's trichocoronis will persist. The Plan states that at least four of the known locations of Wright's trichocoronis will be included within the MSHCP

Conservation Area, including the locations along the San Jacinto River from the vicinity of the Ramona Expressway and San Jacinto Wildlife Area and along the northern Shore of Mystic Lake. In addition, at least 6,900 acres of grasslands and playas and vernal pools including Willow, Domino, and Traver soils, along the San Jacinto River, at Mystic Lake, and at Salt Creek, will be included within the Conservation Area, including 3,990 acres within Additional Reserve Lands and 2,910 within PQP Lands. Floodplain areas along the San Jacinto River will be included in this acreage total to preserve floodplain processes important to the survival of Wright's trichocoronis. The Plan also states that the Salt Creek floodplain, in its existing condition (from Warren Road to Newport Road), and vernal pools in Upper Salt Creek will be included within the MSHCP Conservation Area and floodplain processes maintained to provide for persistence of the species. We anticipate this species will also benefit from the implementation of the Riparian/Riverine Areas and Vernal Pools policy.

Based on our analysis, it appears that more than the 6,900 acres of grasslands and playas and vernal pool habitat proposed for inclusion in the MSHCP Conservation Area will remain in the Plan Area. Approximately 8,831 acres (21 percent) of the modeled habitat for Wright's trichocoronis will remain within PQP Lands, including six records (67 percent) in the San Jacinto Wildlife Area. Approximately 7,686 acres (18 percent) of modeled habitat will be conserved within the Additional Reserve Lands, including two records (22 percent) located along the San Jacinto River. Thus, the MSHCP Conservation Area will include 39 percent of the modeled habitat for Wright's trichocoronis and 89 percent of the records from our dataset.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands including surveys for Wright's trichocoronis. Cooperative management and monitoring are anticipated on PQP Lands. Surveys for Wright's trichocoronis will be conducted at least every eight years to verify occupancy at a minimum of 75 percent of known locations. If a decline in the distribution Wright's trichocoronis is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP. Other management actions described in Section 5, Table 5.2 of the MSHCP will help maintain habitat and populations of Wright's trichocoronis by maintaining and enhancing the floodplain processes of the San Jacinto River, Mystic Lake, and upper Salt Creek, including intermittent flooding and periodic pooling. Management will emphasize preventing alteration of hydrology and floodplain dynamics and addressing threats such as off-road vehicle use, grazing and competition from non-native plants. Implementation of these management actions will help to avoid and minimize adverse effects to Wright's trichocoronis.

Indirect Effects

Wright's trichocoronis could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These generally include the indirect effects discussed in the "General Effects" section of this biological opinion. Implementation of the Guidelines Pertaining to the Urban/Wildlands Interface policy, Riparian/Riverine Areas and Vernal Pools policy, and the management provisions listed above will help to reduce the indirect effects to this species.

Conclusion

We anticipate the proposed action will directly and indirectly affect Wright's trichocoronis as described in the analyses above, including the total loss of 4 percent of its modeled habitat. An additional 57 percent of Wright's trichocoronis modeled habitat outside the MSHCP Conservation Area will be subject to surveys within NEPSSA 1, 2, 3, 3a, 4, and 9. Once the conservation objectives for Wright's trichocoronis have been met, avoided areas, which have not been otherwise conserved, may be impacted. We anticipate that occurrences determined to be important to the overall conservation of the species will be considered for inclusion in the Additional Reserve Lands and that at least some of the avoided areas may be maintained as open space habitat. Implementation of the avoidance, minimization, and mitigation measures identified in the Plan will further reduce impacts to this species. This species is anticipated to persist within the remaining 39 percent of its modeled habitat within both the PQP Lands and Additional Reserve Lands. We anticipate that these areas will be monitored and managed cooperatively to benefit this species.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of Wright's trichocoronis. We reached this conclusion because 39 percent of Wright's trichocoronis modeled habitat and most of the known occurrences will remain within the MSHCP Conservation Area. In addition, required surveys for this species may result in newly discovered occurrences being included in the MSHCP Conservation Area. Thus, the impacts to this species and its modeled habitat, when viewed in conjunction with the protection and management of the MSHCP Conservation Area, are not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of Wright's trichocoronis throughout its range.

Yucaipa onion (*Allium marvinii*)

Status of the Species

Listing Status

Yucaipa onion is not a State or federally listed species. This species is on the California Native Plant Society's List 1B (RED 3-3-3).

Species Description

Yucaipa onion is a perennial herb in the Liliaceae (Lily) family (CNPS 2001). It has a long, dull white perianth (5 mm long) with a brown stripe fading to lavender (Davidson 1921). The ovary contains distinct wing-like crests (Davidson 1921). Yucaipa onion has a tall, slender habit similar to red skinned onion, (*Allium haematochiton*), but it lacks the numerous blood-red bulb coats of that species. This perennial geophyte is grows to two to three decimeters high (Davidson 1921).

Habitat Affinities

This species occurs at elevations from 2,943 to 3,494 feet (760 to 1,065 meters) in clay openings in chaparral habitat (CNPS 2001).

Life History

This perennial herb blooms from April through May. No studies have been conducted for this species regarding reproduction. Specific data regarding pollinators and seed viability and dispersal are lacking.

Status and Distribution

The Yucaipa onion is known from the Yucaipa area of the southern San Bernardino Mountains in San Bernardino County and the Beaumont and Calimesa areas in western Riverside County (CNDDDB 2000; CNPS 2001; A. Sanders, UCR, pers. comm., October 2003). The Yucaipa record is from 1993, and the Beaumont record is from 1921 (CNDDDB 2000). The Yucaipa onion was recently rediscovered in western Riverside County (Calimesa) by Steven Hill in 2001 (A. Sanders, UCR, pers. comm., October 2003).

Threats

The primary threat to this species is urbanization (CNPS 2001). Like other bulb-bearing perennials, this species is presumably susceptible to damage from ground disturbance activities such as discing and cultivation.

Conservation Needs

The conservation needs of Yucaipa onion include conservation and management of the known occurrences in Riverside and San Bernardino counties in a manner that provides for long-term viability of the species at these locations. Ecological processes necessary to maintain suitable habitat should be identified and maintained. Any new discoveries should be conserved in the same manner. Actions that would increase the likelihood of deleterious effects from any identified threat should be avoided.

Environmental Baseline

No focused species distribution surveys have been done for the Yucaipa onion in western Riverside County, and our database does not contain any records of this species. However, the Yucaipa onion was recorded in 1921 in the Beaumont area of the southern San Bernardino Mountains in western Riverside County (CNDDDB 2000) and recently rediscovered by Steven Hill in April 2001 in the Calimesa area on the south side of the I-10 right-of-way, approximately 0.2 mile west of the Desert Lawn Road exit, reportedly on private property (A. Sanders, UCR, pers. comm., October 2003). This occurrence is located in the vicinity of the proposed improvements to I-10 as described in the MSHCP (Section 7, pp. 7-36).

This species occurs at elevations from 2,943 to 3,494 feet (760 to 1,065 meters) in clay openings in chaparral habitat (CNPS 2001). The vegetation community used to model habitat for this species was chaparral between 2,500 and 3,500 feet within the Narrow Endemic Plant Species Survey Area of the San Bernardino Mountains area (Northeast survey area). Based on these criteria, the Plan Area includes approximately 8,335 acres of habitat for the Yucaipa onion. Approximately 1,095 acres (13 percent) of the modeled habitat occur within PQP Lands. Because the Yucaipa onion occurs in specific micro-habitats, such as on clay openings within chaparral as described above, the modeled habitat likely overestimates the extent of suitable habitat for this species within the Plan Area.

Effects of the Action

Direct Effects

The Plan Area includes 8,335 acres of modeled habitat for the Yucaipa onion; of this, 6,591 acres (79 percent) of modeled habitat occur outside the MSHCP Conservation Area, though all of this modeled habitat occurs within the Narrow Endemic Plant Species Survey Area (NEPSSA) 8 (Figure 6.1, pp. 6-30). The Yucaipa onion is considered a Narrow Endemic Plant Species. Until such time that the Additional Reserve Lands are assembled and conservation objectives for this species are met, surveys will be conducted as part of the project review process for public and private projects where suitable habitat for the Yucaipa onion is present within NEPSSA 8. Populations detected as a result of survey efforts will be avoided according to the procedures outlined in the Narrow Endemic Plant Species policy (Section 6.1.3 of the Plan; *i.e.*, 90 percent of portions of property with long-term conservation value will be avoided until the species conservation objectives are met). For those locations found to contain large numbers of individuals or otherwise determined to be important to the overall conservation of the species, the Plan allows flexibility to acquire these locations for inclusion into the Additional Reserve Lands (pp. 6-40).

Within the 6,591 acres of modeled habitat that is outside of the MSHCP Conservation Area, but within the NEPSSA for Yucaipa onion (79 percent of total modeled habitat), we anticipate that 10 percent of the area with long-term conservation value for this species (as discussed above) will be lost to individual projects. The only recently documented occurrence of the Yucaipa onion (Calimesa, as described above in *Status*) is located outside of the MSHCP Conservation Area and within NEPSSA 8. This occurrence is located in the vicinity of the proposed improvements to I-10 as described in the MSHCP (Section 7, pp. 7-36). We anticipate that this occurrence will be documented and that, at a minimum, 90 percent of the area with long-term conservation value will be avoided by any activity related to the I-10 improvements. If the 90 percent threshold cannot be met, a Determination of Biologically Equivalent or Superior Preservation will be made. If this Yucaipa onion occurrence is confirmed to contain significant numbers of individuals or otherwise determined to be important to the overall conservation of the species, the Plan allows flexibility to acquire this location for inclusion into the Additional Reserve Lands (pp. 6-40).

Because the Yucaipa onion is not widely distributed within the Plan Area, specific conservation objectives are provided in the MSHCP (Section 9, pp. 9-147) to ensure that suitable habitat for

the Yucaipa onion will persist. No conservation of any specific occurrences or populations is proposed; however, the Plan that proposes at least 1,200 acres of chaparral between elevations of 2,943 and 3,494 feet within the San Bernardino Mountains Bioregion will be included within the MSHCP Conservation Area, including 330 acres within Additional Reserve Lands and 870 within PQP Lands.

Based on our analysis, it appears that more than 1,200 acres of chaparral habitat between 760 and 1,065 feet in elevation proposed for inclusion in the MSHCP Conservation Area will remain in the Plan Area. Approximately 1,095 acres (13 percent) of the modeled Yucaipa onion habitat occur within PQP Lands, and 650 acres (8 percent) occur within the Additional Reserve Lands. Thus, the MSHCP Conservation Area will include up to approximately 1,744 acres (21 percent) of the modeled Yucaipa onion habitat in the Plan Area.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands if occurrences of Yucaipa onion are detected within the NEPSSA 8 and are acquired into the Additional Reserve Lands. Cooperative management and monitoring are anticipated on PQP Lands. Surveys for Yucaipa onion will be conducted at least every eight years to verify occupancy of 75 percent of known locations. If a decline in the distribution Yucaipa onion is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP.

Indirect Effects

The Yucaipa onion could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These generally include the indirect effects discussed in the “General Effects” section of this biological opinion. Implementation of the Guidelines Pertaining to the Urban/Wildlands Interface policy and the management provisions listed above will help to reduce the indirect effects to this species.

Conclusion

We anticipate the proposed action will directly and indirectly affect Yucaipa onion as described in the analyses above. Seventy-nine percent of Yucaipa onion modeled habitat outside of the MSHCP Conservation Area will be subject to surveys within NEPSSA 8. Once the conservation objectives for the Yucaipa onion have been met, avoided areas, which have not been otherwise conserved, may be impacted. We anticipate that occurrences determined to be important to the overall conservation of the species will be considered for inclusion in the Additional Reserve Lands and that at least some of the avoided areas may be maintained as open space habitat. Implementation of the avoidance, minimization, and mitigation measures identified in the Plan will further reduce impacts to the Yucaipa onion. This species is anticipated to persist within the remaining 21 percent of its modeled habitat within both the PQP Lands and Additional Reserve Lands. We anticipate that these areas will be monitored and managed cooperatively to benefit the Yucaipa onion.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the Yucaipa onion. We reached this conclusion because 21 percent of Yucaipa onion modeled habitat will be protected or will remain within the MSHCP Conservation Area. In addition, required surveys for this species may result in newly discovered occurrences being included in the MSHCP Conservation Area, and the one known location if confirmed, will be subject to the avoidance measures described above. Thus, the impacts to this species and its modeled habitat, when viewed in conjunction with the protection and management of the MSHCP Conservation Area, are not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of Yucaipa onion throughout its range.

REPTILES

Belding's orange-throated whiptail (*Cnemidophorus hyperythrus beldingi*)

Status of the Species

Listing Status

The Belding's orange-throated whiptail (*Cnemidophorus hyperythrus beldingi*) is a California Department of Fish and Game Species of Special Concern. This species is not federally listed.

Species Description

The Belding's orange-throated whiptail is a moderate-sized gray, reddish brown, dark brown, or black lizard with five to seven pale yellow or tan stripes (Walker and Taylor 1968; Stebbins 1985; Rowland 1992). Adults have varying degrees of red-orange wash (Stebbins 1985) that may occur on all undersurfaces (Rowland 1992). The orange wash is especially prominent on the throat and chest in breeding males. In hatchlings and juveniles, the tail is a highly visible bright blue (Rowland 1992).

Habitat Affinities

Information on habitat requirements for the Belding's orange-throated whiptail is limited and not fully understood. Belding's orange-throated whiptails occur primarily in open coastal sage scrub habitat with approximately 50percent cover but may also occur in open chaparral, non-native grassland and oak woodland habitats as well as alluvial fan scrub and riparian areas (Brattstrom 2000). According to McGurty (1980), most of the Belding's orange-throated whiptail populations were historically known to occur on the floodplains or stream terraces adjacent to other suitable habitat such as coastal sage scrub.

California buckwheat is known to commonly occur in coastal sage scrub habitat, the whiptails primary habitat. The presence of California buckwheat generally indicates a particular amount of inter-shrub spacing (10 to 40 percent bare ground cover) apparently required for foraging and thermoregulatory behavior of this species (McGurty 1981; Rowland 1992). In addition,

shrubland perennials, in particular California buckwheat, provide a substantial amount of leaf litter, which is a food source for the western subterranean termites (*Reticulitermes hesperus*), the Belding's orange-throated whiptails primary food item, and may be part of the requirement for optimal whiptail habitat (Rowland and Brattstrom 2001). Roland and Brattstrom (2001) also suggest that the heterogeneity provided by microhabitats, such as *Eriogonum* species or grasses and annuals, within a predominately Riversidian sage scrub community is required for optimal habitat for the species.

Vegetation alone is not always a good predictor of whiptail presence. Other habitat characteristics such as cover, soil, and slope are also important for whiptails (Brattstrom 2000). In earlier studies, Brattstrom (1989) found that soil grain size preference data clearly suggested that whiptails chose only the two finest grain sizes in which to bury. However, the whiptail may choose to bury in loose soil aprons brought up from the sub-surface by rodents, in an otherwise large grain exposure (Brattstrom 1989). Brattstrom (2000) later found that whiptails occurred more frequently on medium to coarse soil, where the coarse soil is important in holding the whiptail burrows open and medium sized soil may be easier for the whiptail to escape into for cover. Suitable hibernation, and likely oviposition sites, may occur on well isolated, south facing slopes with open bare ground (Jennings and Hayes 1994).

Belding's orange-throated whiptail are known to occur in areas with light disturbance including dirt roads and trails within suitable habitat (Brattstrom 2000). The construction of dirt roads and trails break up the hard ground and forms loose, coarse soil for the Belding's orange-throated whiptail to burrow.

Belding's orange-throated whiptail range and habitat occasionally overlap with that of the federally listed Stephens' kangaroo rat (Brattstrom 2000). These two species share similar habitat parameters, except that the Stephens' kangaroo rat prefers areas with hard but fine grained soil and a more restricted vegetation preference of California buckwheat, Filaree and similar annuals (Brattstrom 2000).

Life History

Information on the life history of the Belding's orange-throated whiptail is limited and not well known. Bostic (1966a) found that Belding's orange-throated whiptails feed primarily on prey of a secretive nature and low activity (e.g., ants), depending primarily on chemo-reception when hunting such prey. When hunting prey of intermediate or high activity (e.g., Lepidopterans), vision is most often employed. Bostic's (1966a) data indicates that termites comprised 72 percent - 92 percent of the whiptail diet, with peak consumption occurring simultaneously with the swarming of reproductives in April. In late summer, when termites migrate deep into the soil to avoid high surface temperatures, alternate prey items dominate the whiptail's diet. The most important alternate prey item for the orange-throated whiptail is the spider (Aranedia), which was found by Bostic (1966a) to be the next most abundant prey item after termites. No significant differences in diet between the sexes or between adults and juveniles were found (Bostic 1966a).

Whiptails are diurnal, but they are also bimodal, spending the warmest portion of the day in shade or an underground retreat (*e.g.*, shade beneath bushes, or excavate shallow retreats in the substrate) (Milstead 1957). As stated in Brattstrom (2000), Belding's orange-throated whiptails are known to dig their own burrows and seldom use rodent burrows except for extreme emergencies.

Unlike several species in the genus *Cnemidophorus*, Belding's orange-throated whiptails do not reproduce parthenogenetically. Bostic (1966b) estimated average clutch size to be 2.3 eggs. It appears that adult females (2 years of age or older) deposit one clutch of eggs in June and another in mid-July (Bostic 1966b). In contrast, one clutch per season is probably the rule for yearlings, which deposit their eggs in late June through mid-July (Bostic 1966b). Adult whiptails usually enter into hibernation in late July through most of September, while immatures enter into hibernation in December (Bostic 1966a).

Limited information on Belding's orange-throated whiptail predators is available. However, according to Brattstrom (1993), known predators of Belding's orange-throated whiptail include the coachwhip snake, striped racer snake and the house cat. Suspected predators of the Belding's orange-throated whiptail include rattlesnakes, the western whiptail lizard, domestic dog, roadrunner, American kestrel, scrub jay, shrike and mockingbird.

Little is known about the home range for the Belding's orange-throated whiptail. Limited information on home range is partially due to the fact that these lizards tend not to be sedentary enough to provide a substantial amount of recapture data to calculate defined home ranges. However, Bostic (1965) recorded an average home range of 0.11 acre for adult Belding's orange-throated whiptails, which is considerably smaller than the average home ranges of larger species of *Cnemidophorus* (Dudek and Associates 2000b). According to Bostic (1965), females have significantly larger home ranges than males. The mean home range size for females was approximately 2.1 times larger than the mean home range for males. Consequently, female home ranges extensively overlap and superimpose with each other as well as overlap male ranges. "Overlap, but not superimposition, of male home ranges was also recorded" (Bostic 1965). In addition, according to Rowland (1992) and Bostic (1965), Belding's orange-throated whiptail home ranges are often elongate and much smaller than the California gnatcatcher, another coastal sage scrub associated species.

Very little information is known or available on the dispersal of Belding's orange-throated whiptail. As stated in Brattstrom (1993), the data from Rowland and Bostic's studies clearly indicates that Belding's orange-throated whiptail populations are not sedentary or stable populations. The majority of the population continues to move, presumably in search of prey (Brattstrom 1993). Brattstrom (2000) states that whiptails can move in and out of its preferred habitat by direct movements and by dispersal, especially as related to its r-selected reproduction. In addition, while coastal sage scrub is the preferred habitat for Belding's orange-throated whiptail, they disperse widely and are found in many other habitat types and in disturbed areas (Brattstrom 2000).

Status and Distribution

Historical distribution for the Belding's orange-throated whiptail is not well known, but according to limited historical museum and wildlife agency records verified by Brattstrom (2000), this species was recorded to occur in Riverside, San Diego, Orange and San Bernardino counties in southern California and throughout Baja California (California Academy of Sciences). The current range also includes southwestern California and Baja California, Mexico. Currently, Belding's orange-throated whiptails, range from the coast to the foothills of Orange County (from Corona del Mar) and southern San Bernardino County (near Colton), southward to Loreto, Baja California, Mexico (Jennings and Hayes 1994). In California, they are located on the coastal slope of the Peninsular Ranges and extend from near sea level to 1,040 meters (northeast of Aguanga, Riverside County) (Jennings and Hayes 1994) according to historic and current records. However, Rowland and Brattstrom (2001) state of all known localities, 99 percent occur below 854 meters.

The distribution of the western subterranean termite, the Belding's orange-throated whiptail's primary prey item, curiously delimits certain boundaries of the distribution of the whiptail, where apparently suitable habitat continues. For example, the Peninsular Mountain Range in Riverside and San Diego counties where the termite is limited to its slopes, possibly restricts eastward and altitudinal expansion of the whiptail populations. McGurty's (1980) data suggested that Belding's orange-throated whiptail had been extirpated from 60 percent of its historic range at the time of his survey (*i.e.*, 1980). Jennings and Hayes (1994) compared McGurty's data to aerial photographs in 1990 and estimated that 75 percent of the historic range of Belding's orange-throated whiptail no longer supported this subspecies.

Threats

Information on the threats to Belding's orange-throated whiptail populations is limited. However, habitat destruction is a major threat to the Belding's orange-throated whiptail (Brattstrom 2000). Approximately 59 percent of the coastal sage scrub in Riverside County was eliminated between 1945 and 1990 (see 58 Federal Register 16741), and 60 percent of the coastal sage scrub stands in the Riverside-Perris Plain that were mapped ca. 1930 were either heavily degraded by exotic annual grasses or entirely replaced by them by 1990 (Minnich and Dezzani 1998). Urban and agricultural development may also serve as effective dispersal barriers (Bostic 1966a). In addition, due to the Belding's orange-throated whiptail's affinity toward open disturbed areas, it is susceptible to being run over or trampled on roads and trails within suitable habitat.

Habitat fragmentation and associated edge effects, including the invasion of exotic species, also threaten the Belding's orange-throated whiptail. Argentine ants, an invasive exotic ant species known to displace many native insects, may influence the food base of orange-throated whiptails (Jennings and Hayes 1994). In addition, domestic cats from homes adjacent to open space are known to be Belding's orange-throated whiptail predators (Brattstrom 1993).

Fire suppression activities including excessive prescribed burning can lead to increased exposure to predation due to modification of the canopy profile, and can ultimately lead to type conversion

from coastal sage scrub and chaparral to non-native grassland (McGurty 1981). In addition, increased fire frequency can adversely affect the Belding's orange-throated whiptail by eliminating the leaf litter within suitable habitat which provides cover for the whiptail and a food source for the western subterranean termite. In fact, according to Brattstrom (2000), Belding's orange-throated whiptails were usually found in areas that had not been burned within the last five years.

Further threats include irreversible habitat destruction resulting from land-filling or artificial channelization of natural drainage bottoms, which likely serve as foraging and dispersal areas for this species (Jennings and Hayes 1994). In addition, the over use of insecticides can kill off potential Belding's orange-throated whiptail insect prey base.

Conservation Needs

Conservation of the Belding's orange-throated whiptail within the Plan Area will require the preservation of open coastal sage scrub habitat, as well as a variety of other adjacent suitable habitats with approximately 50percent vegetation cover and medium to coarse soils for the whiptail to burrow. These suitable habitats must also support the whiptails primary prey source, the western subterranean termite.

Little to no information is available or known about the dispersal and home range for the Belding's orange-throated whiptail. Therefore, the optimum size for viable core areas and appropriate lengths and widths of functioning linkages for the Belding's orange-throated whiptail is unknown at this time. However, it is clear that smaller habitat fragments are more susceptible to non-native ant invasions than larger fragments or substantial core areas (Suarez *et al* 1998). Non-native ants may indirectly adversely affect Belding's orange-throated whiptail populations. Therefore, it is important for the Belding's orange-throated whiptail to conserve contiguous large tracts of suitable habitat to avoid or minimize edge effects. In addition, functioning linkages between these core areas need to be conserved and properly managed to preserve genetic variability for this species within the region. In addition, management measures should be implemented to address such issues as non-native species control and fire suppression activities within the Plan Area to benefit and preserve Belding's orange-throated whiptail populations in western Riverside county over the long-term.

Environmental Baseline

The Belding's orange-throated whiptail populations are reportedly widespread throughout the Plan Area. However, no focused surveys for the Belding's orange-throated whiptail within the Plan Area were conducted to verify the current status. According to our dataset, we have 141 known locations (post 1988) for the Belding's orange-throated whiptail throughout the Plan Area. These known locations occur mostly within the following areas: between Santa Rosa Plateau and Santa Margarita Ecological Reserve, Lake Skinner/Diamond Valley Lake, Hogbacks, Lake Matthews/Estelle Mountain, Alberhill, Lake Elsinore/Canyon Lake, Lake Perris/San Jacinto Wildlife Area, Badlands, Sage/Vail Lake, Aguanga Valley, Motte-Rimrock Reserve and Cactus Valley.

In addition to the locations identified in our dataset, the Belding's orange-throated whiptail is also likely to occur in Bautista Canyon in the San Jacinto Mountains (Stephenson and Calcarone 1999). Reportedly, Brattstrom (1989) found Belding's orange-throated whiptail in parts of Cahuilla Indian Reservation and Terwilliger Valley, and northwest along the western foothills of the San Jacinto Mountains of Riverside County. This species can also be found in the Santa Margarita Ecological Reserve (Fisher and Case 2000a). Furthermore, Brattstrom (2000) conducted a study that verified Belding's orange-throated whiptail presence within its preferred habitats in parts of all known designated Stephens' kangaroo rat reserves.

Chaparral, coastal sage scrub, desert scrub, Riversidean alluvial fan scrub, riparian scrub, woodland and forest habitats up to 3,400 feet (1,036 meters) within San Jacinto foothills, Santa Ana mountains, Desert transition and Riverside lowlands Bioregions were used to model habitat for the Belding's orange-throated whiptail within the Plan Area. We found that the Plan Area supports approximately 380,334 acres of modeled habitat for the Belding's orange-throated whiptail. Thirty-three percent (123,632 acres) of the modeled habitat occurs on existing PQP Lands. Because Belding's orange-throated whiptails need specific microhabitat features, such as open areas with leaf litter and medium to coarse soils, modeled habitat likely overestimates the extent of suitable habitat for this subspecies.

Effects of the Action

Direct Effects

The Plan Area includes 380,334 acres of modeled habitat for the Belding's orange-throated whiptail. The Belding's orange-throated whiptail will be subject to impacts associated with development and other proposed Covered Activities over the 75-year permit term within 155,863 (41 percent) of this modeled habitat, which encompasses 74 of the 117 (63 percent) Belding's orange-throated whiptail observations in our dataset. It is anticipated that most Belding's orange-throated whiptail in these areas will be injured or killed, as a result of habitat loss and activities such as grading and construction, although a small number may be able to escape to adjacent habitats, and some will likely survive in rural/mountainous areas with appropriate habitat. Approximately 72,613 acres (47 percent) of the non-conserved modeled habitat for the Belding's orange-throated whiptail are designated as rural/mountainous land where development impacts are expected to occur at a slower rate and at lower densities.

To offset the loss of Belding's orange-throated whiptails within the Plan Area, implementation of the MSHCP will conserve and manage large areas containing suitable habitat for this species and linkages among these areas. Additional Reserve Lands will include 100,839 acres (27 percent) of Belding's orange-throated whiptail modeled habitat within the Plan Area. Conserved habitat within Additional Reserve Lands encompasses 38 out of 141 (27 percent) Belding's orange-throated whiptail observations in our dataset. Another 123,632 acres (33 percent) of Belding's orange-throated whiptail modeled habitat will remain within PQP Lands. PQP Lands encompass 29 of the 141 (20 percent) Belding's orange-throated whiptail observations in our dataset. In total, 224,471 acres (59 percent) of the modeled habitat for Belding's orange-throated whiptail will be conserved or remain in the Plan Area. This total amount of modeled habitat includes 48 percent of Belding's orange-throated whiptail observations in our dataset.

The MSHCP Conservation Area will include at least nine Core Areas of native habitat that are known to support the Belding's orange-throated whiptail. These Core Areas will include Santa Rosa Plateau, Lake Skinner/Diamond Valley Lake, Lake Matthews/Estelle Mountain, Lake Perris/San Jacinto Wildlife Area, Badlands, Potrero Valley, Banning Bench, Sage/Vail Lake, and numerous smaller proposed and existing non-contiguous habitat blocks. The MSHCP also identifies the Anza Valley as a Core Area with suitable habitat for the Belding's orange-throated whiptail. Our modeled habitat for the Belding's orange-throated whiptail did not capture any areas within the Anza Valley for this subspecies, and our dataset does not include any Belding's orange-throated whiptail observations in this part of the Plan Area. However, our modeled habitat and occurrence dataset suggests that the following additional Core Areas support this subspecies: Santa Margarita Ecological Reserve, Alberhill, Canyon Lake, Motte-Rimrock Reserve and Cactus Valley. In addition, while the Plan does not identify any potential linkages to be included in the MSHCP Conservation Area for the Belding's orange-throated whiptail, several functional linkages are identified for the coastal western whiptail. Many of these same linkages, particularly Wilson Creek, Tucalota Creek, Temecula Creek, Gavilan Hills and Kolb Creek/Arroyo Seco, will likely provide appropriate connectivity between Core Areas for the Belding's orange-throated whiptail.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands including surveys for the Belding's orange-throated whiptail. Cooperative management and monitoring are anticipated on PQP Lands. Surveys for the Belding's orange-throated whiptail will be conducted at least every eight years to verify occupancy at a minimum of 75 percent of the Core Areas identified above. If a decline in the distribution of the Belding's orange-throated whiptail is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP.

Other management actions described in Section 5 of the MSHCP, such as control of unauthorized public access, restricting off-road vehicle use, maintenance and management of existing upland and wetland habitats, including control of invasive weeds, and management of specific threats to the species will help maintain habitat and populations of the Belding's orange-throated whiptail within Core Areas.

Management activities, such as non-native plant mechanical control methods (*i.e.*, mowing) and prescribed burning could result in a low level of death and injury for the Belding's orange-throated whiptail. It is anticipated that any impacts to Belding's orange-throated whiptails from management actions will be minimized by adherence to appropriate survey protocols and other guidelines described in Section 7.4 of the MSHCP.

Indirect Effects

The Belding's orange-throated whiptail could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These include the indirect effects described in the "General Effects" of this biological opinion. Specifically, the Belding's orange-throated whiptail is susceptible to road mortality and habitat fragmentation due to roads and likely to be vulnerable to indirect effects (*e.g.*, increased vehicle strikes) associated

with roads. The Wildlife Crossings Guidelines will help minimize the impact of roads on lizard mortality. In addition, the Belding's orange-throated whiptail is susceptible to any significant impacts to its primary prey source, the western subterranean termite. The western subterranean termite may be adversely affected within the Plan Area by the invasion of non-native Argentine ant populations, the over use of insecticides in suitable Belding's orange-throated whiptail habitat, and fire suppression activities that reduce the abundance of woody fuels available to the termites. Implementation of the Urban/Wildlands Interface Policy and Fuels Management Guidelines will help minimize these indirect effects.

Conclusion

We anticipate the proposed action will directly and indirectly affect the Belding's orange-throated whiptail as described in the analyses above, including the loss of 41 percent of its modeled habitat in the Plan Area. Implementation of the avoidance, minimization, and mitigation measures identified in the Plan will reduce the impacts to this species. We anticipate that this species will persist in the remaining 59 percent of its modeled habitat within both the existing PQP Lands and the Additional Reserve Lands. Together these lands form a system of large, contiguous habitat blocks that are inter-connected within the Plan Area. We anticipate that these areas will be monitored and managed cooperatively to benefit this species.

After reviewing the current status of this species, the environmental baseline for the Plan Area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the Belding's orange-throated whiptail. We reached this conclusion based on the widespread distribution of the Belding's orange-throated whiptail in the Plan Area and because the impacts associated with loss of this species' habitat, when viewed in conjunction with the protection and management of the MSHCP Conservation Area, is not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Amount or Extent of Take

We anticipate the take of all Belding's orange-throated whiptails within up to 155,863 acres of modeled habitat outside of the MSHCP Conservation Area. A small, but undeterminable, number of Belding's orange-throated whiptails are anticipated to be taken as a result of management actions. Take will be in the form of harm, death, and injury. This level of anticipated take is not likely to result in jeopardy to the Belding's orange-throated whiptail.

Coastal western whiptail (*Cnemidophorus tigris multiscutatus*)

Status of the Species

Listing Status

The coastal western whiptail is a Species of Special Concern designated by the California Department of Fish and Game. This species is not federally listed.

Species Description

The coastal western whiptail is a large (2.4-4.6 inches) lizard that appears checkered or spotted on the dorsum. Coastal western whiptail is one of six subspecies of *Cnemidophorus tigris* that range throughout western United States, Baja California and portions of northern mainland Mexico. Very little information is known or available for the subspecies, *C. t. multiscutatus*. Therefore, the information presented below will refer to the species, the western whiptail (*Cnemidophorus tigris*).

Habitat Affinities

The western whiptail occurs in a wide variety of habitats from sandy, gravelly, or rocky areas in desert flats, along bases of mountains and well up into mountain ranges throughout its extensive range. However, this species is primarily found in desert flats (Pianka 1970). According to Benes (1969) the western whiptail can be found in open, often rocky areas with little vegetation or sunny micro habitats within shrub and native grassland associations. In California, the western whiptail is also found in digger pine-oak associations (Pianka 1970). Schoenherr (1976) indicates that the western whiptail may also occur in oak woodland. Studies conducted by Fisher and Case (2000a) commonly located the species in chaparral. The habitat requirements for the coastal western whiptail, specifically, are not well known.

Life History

Prey items of the western whiptail include termites, scorpions, solfugids, cockroaches, antlion larvae, and various insect eggs, larvae, and pupae (Anderson 1993). In general, foraging individuals are usually on the move, foraging in discrete patches and capturing sedentary, hidden prey that were often detected by chemoreception. The prime foraging location of the whiptail lizard is under perennials where a host of invertebrate prey can be found.

The daily activity period of western whiptail individuals consists of nearly continuous movement associated with the search for prey with activity peaks in the morning and afternoon. They can be characterized as terrestrial, fusiform, diurnal, and actively foraging lizards (Anderson 1993). Predators of western whiptails include the greater roadrunner, leopard lizard, collared lizard, various raptors and shrikes, various *Crotalus* species, and other large snakes that co-occur in the same area as the coastal western whiptail (Pianka 1970).

Thermoregulatory needs dominate the daily life cycle of whiptails in general. To compensate for extreme temperature changes in their environment, whiptails maintain their body temperatures within a rather narrow range by behavioral thermoregulation. Bostic (1966c) found that substrate temperature appears to play a more important role in regulating body temperature than does that of air. A larger whiptail, like western whiptail, behaviorally compensates for its relatively greater heat retention relative to smaller species by occupying cooler portions of the thermal mosaic for a greater percentage of time abroad than does a smaller *Cnemidophorus*. Activity becomes increasingly concentrated in the shade as the day becomes increasingly hotter and is eventually restricted to the coolest shade before the animal retreats to a burrow to escape the midday peak in temperature. Field and laboratory studies by Asplund (1974) show that

larger lizards bask less and spend more time in the shade than do smaller lizards with the same thermal preference and tolerance limits.

Data on seasonal activity varies with location. Pequegnat (1951) states that the most active periods for this lizard in the Santa Ana Mountains occur during early and late summer and that they are seldom detected during late June, July and early August. Schoenherr (1976) reports that whiptail lizards first appear in the San Gabriels during April and May, increasing their activity until June, and remaining abundant and active all summer. The number of active individuals tapers off in September and activity ceases altogether in October (Schoenherr 1976).

Little to no information is available on the dispersal and home range for the coastal western whiptail. Anderson (1993) found that the home range for the western whiptail was quite large (1.0 hectare for males; 0.32 hectare for females).

In temperate zone populations, the reproductive season generally begins in May (earlier at Desert Center, Riverside County, California (Anderson and Karazov 1988). Mean clutch size of *C. tigris* varies from 2.1 to 4.0 (Garland 1993). Length of reproductive season appears to influence clutch frequency. Length of reproductive season is likely influenced by rainfall, temperature, resources for reproduction, potential micro-environmental conditions for egg development, and adequate resources for hatchlings. Female body size is the major factor determining clutch and egg size.

Adult and immature whiptails usually enter into hibernation in late July; adults hibernate through most of September while immature whiptails hibernate through December (Bostic 1966c).

Status and Distribution

Information on the historical distribution is very limited. According to museum specimen records (Museum of Vertebrate Zoology, California Academy of Sciences-Department of Herpetology) and the U.S. Geological Survey herpetology database, historical distribution for the species appears to be comparable to the current known range for coastal western whiptail.

The coastal western whiptail occurs on the coastal side of the Transverse and Peninsular Ranges from Santa Barbara County to Baja California, Mexico. The coastal western whiptail is widely distributed, but uncommon, over much of its range in California.

Threats

Threats to the coastal western whiptail within the Plan Area probably include those similar to the Belding's orange-throated whiptail. These include habitat destruction and fragmentation, widespread use of insecticides, and off road-vehicle use. Approximately 59 percent of the coastal sage scrub in Riverside County was eliminated between 1945 and 1990 (see 58 Federal Register 16741), and 60 percent of the coastal sage scrub stands in the Riverside-Perris Plain that were mapped ca. 1930 were either heavily degraded by exotic annual grasses or entirely replaced by them by 1990 (Minnich and Dezzani 1998).

Conservation Needs

Much of the information provided in the status of the species refers to the species, the western whiptail. The western whiptail occurs in a wide variety of habitats and its current distribution ranges throughout the southwest United States and Mexico. Identifying and subsequently protecting potential habitat for the subspecies, the coastal western whiptail, as a conservation need is difficult due to the lack of information on habitat requirements for the subspecies. However, it is reasonable to assume that conservation of western whiptail potential habitat (desert flats, shrubland, grassland, oak woodland) within the Plan Area, including its preferred micro habitat of open, often rocky sunny areas, would serve as a conservation need for the subspecies, coastal western whiptail. In addition, hydrological and other ecological processes necessary to maintain potential habitat should be preserved. It is presumed that functioning linkages between conserved core areas are also required for the persistence of this subspecies within the Plan Area. However, defining additional or more specific conservation needs for the coastal western whiptail would require a greater understanding of the subspecies life history, important ecological processes and threats than what is provided by the available literature.

Environmental Baseline

Coastal western whiptail occurrences have reportedly been documented throughout western Riverside County. However, no focused surveys for the coastal western whiptail within the Plan Area were conducted to verify the current status. According to our dataset, there are 64 known localities (post 1988) for the coastal western whiptail within the Plan Area. The majority of these localities are concentrated in the following areas: the vicinity of Lake Skinner/Diamond Valley Reservoir, Lake Mathews/Dawson Canyon, Crown Valley, Lake Elsinore/Canyon Lake, Alberhill, Motte-Rimrock Reserve, Santa Rosa Plateau, Vail Lake/Sage, Aguanga Valley, Badlands and Banning/Beaumont area. Coastal western whiptail records have also been reported in the vicinity of Lake Perris, James Reserve, Tenaja Canyon and Santa Margarita Ecological Reserve (Fisher and Case 2000a).

Coastal sage scrub, chaparral (Holland and Goodman 1998a; Fisher and Case 2000a; Chris Brown, U.S. Geological Survey, pers. comm., 2004), desert scrub, Riversidean alluvial fan scrub, playas/ vernal pools, and Peninsular juniper woodland/scrub habitats throughout the Plan Area were used to model habitat for the coastal western whiptail within the Plan Area. The Plan Area supports 712,331 acres of modeled habitat for the coastal western whiptail. Approximately 267,996 acres (38 percent) of the modeled habitat occurs on existing PQP Lands. This species is a habitat generalist and is found in open areas, but it is widespread throughout intact habitats in a variety of vegetation types (Chris Brown, U.S. Geological Survey, pers. comm., 2004). The coastal western whiptail was commonly found in chaparral in surveys conducted by Fisher and Case (2000a). However, because the coastal western whiptail needs specific microhabitat features, such as sandy or rocky sunny openings, modeled habitat likely overestimates the extent of suitable habitat available for this species in the Plan Area.

Effects of the Action

Direct Effects

The Plan Area includes 712,331 acres of modeled habitat for the coastal western whiptail. Coastal western whiptails will be subject to impacts associated with development and other proposed Covered Activities over the 75-year permit term within 306,492 acres of this modeled habitat outside the MSHCP Conservation Area, which encompasses 37 out of 64 (57 percent) coastal western whiptail observations within our dataset. It is anticipated that most coastal western whiptails in these areas will be injured or killed, as a result of habitat loss and activities such as grading and construction, although a small number may be able to escape to adjacent habitats, and some will likely survive in rural/mountainous areas with appropriate habitat. Approximately 95,932 acres (31 percent) of the non-conserved modeled habitat for the coastal western whiptail are designated as rural/mountainous land where development impacts are expected to occur at a slower rate and at lower densities.

To offset the loss of coastal western whiptail habitat within the Plan Area, implementation of the MSHCP will conserve and manage large areas containing suitable habitat for this subspecies and linkages among these areas. Additional Reserve Lands will include 137,843 acres (19 percent) of modeled coastal western whiptail habitat in the Plan Area. Another 267,996 acres (38 percent) of the modeled coastal western whiptail habitat will remain within PQP Lands. PQP Lands encompass 11 of the 64 (17 percent) coastal western whiptail observations in our dataset. In total, 57 percent of the modeled habitat for coastal western whiptail will be conserved or remain in the Plan Area. This modeled habitat includes 38 percent of the coastal western whiptail observations in our dataset.

The MSHCP Conservation Area will include at least 13 Core Areas of native habitat that are known to support the coastal western whiptail: Santa Rosa Plateau, Lake Skinner-Diamond Valley Lake, Lake Matthews-Estelle Mountain, San Jacinto Wildlife Area-Lake Perris, the Badlands, Potrero Valley, the Banning Bench, Sage/Vail Lake, Anza Valley, Agua Tibia Wilderness, Santa Ana Mountain foothills, Santa Ana River, and Paloma Valley/Hogbacks. Our dataset suggests that additional Core Areas including Alberhill, Motte-Rimrock Reserve and Santa Margarita Ecological Reserve also support the coastal western whiptail within the Plan Area.

In addition, the MSHCP Conservation Area will include functional linkages (upland and riparian corridors) between large tracts of suitable habitat. Potential functional linkages for this subspecies include San Jacinto River, from Estelle Mountain to Wildomar, Kolb Creek/Arroyo Seco, Temecula Creek, Wilson Creek, Tule Creek, San Gorgonio Wash, Gavilan Hills and Tualota Creek.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands and may also implement these activities on PQP Lands, including surveys for the coastal western whiptail. Surveys for the coastal western whiptail will be conducted at least every eight years to ensure a minimum level of occupancy of 75 percent of the Core Areas. If a decline in the distribution of the coastal western whiptail is documented below this threshold,

management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP. Other management actions described in Section 5 of the MSHCP, such as control of unauthorized public access, restricting off-road vehicle use, maintenance of existing habitat, including control of invasive weeds, and management of specific threats to the species will help maintain habitat and populations of the coastal western whiptail within Core Areas and habitat linkages.

Management activities, such as prescribed burning, could result in a low level of death and injury to coastal western whiptails. It is anticipated that any impacts to coastal western whiptails from management actions will be minimized by adherence to appropriate survey protocols and other guidelines described in Section 7.4 of the MSHCP.

Indirect Effects

The coastal western whiptail could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These include the indirect effects described in the “General Effects” section of this biological opinion. Specifically, the coastal western whiptail is vulnerable to domestic cat predation, widespread use of pesticides and Argentine ant invasions. Implementation of the Urban/Wildlands Interface Policy will help minimize these indirect effects.

Conclusion

We anticipate the proposed action will directly and indirectly affect the coastal western whiptail as described in the analyses above, including the loss of 43 percent of its modeled habitat in the Plan Area. Implementation of the avoidance, minimization, and mitigation measures identified in the Plan will reduce the impacts to this species. We anticipate that this species will persist in the remaining 57 percent of its modeled habitat within both the existing PQP Lands and the Additional Reserve Lands. Together these lands form a system of large, contiguous habitat blocks that are inter-connected within the Plan Area. We anticipate that these areas will be monitored and managed cooperatively to benefit this species.

After reviewing the current status of this species, the environmental baseline for the Plan Area, the effects of the proposed action, and the cumulative effects, it is the Service’s biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the coastal western whiptail. We reached this conclusion based on the widespread distribution of the coastal western whiptail in the Plan Area and because the impacts associated with loss of this species habitat, when viewed in conjunction with the protection and management of the MSHCP Conservation Area, is not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Amount or Extent of Take

We anticipate the take of all coastal western whiptails within up to 306,492 acres of modeled habitat outside of the MSHCP Conservation Area. A small, but undeterminable, number of coastal western whiptails are anticipated to be taken as a result of management actions. Take

will be in the form of harm, death, and injury. This level of anticipated take is not likely to result in jeopardy to the coastal western whiptail.

Granite night lizard (*Xantusia henshawi henshawi*)Status of the Species*Listing Status*

The granite night lizard is a Species of Special Concern designated by the California Department of Fish and Game. This species is not federally listed.

Species Description

The granite night lizard is a smooth, flat-bodied lizard (1.4-2.75 inches) with round dark dorsal spots and large eyes with vertical pupils (Fisher and Case 1997c).

Habitat Affinities

The granite night lizard is restricted to narrow microenvironment conditions (Bezy 1972) where it is rarely found far from rock outcrop crevices (Lee 1975). The locally common, but patchily distributed lizard (Lee 1976; Holland and Goodman 1998a), is found exclusively in areas of massive rocks, rock outcrops, and flaking granite, in a variety of desert, chaparral, and woodland habitats (Zeiner *et al.* 1988). It takes cover in cracks and crevices and can be found under flakes and slabs of exfoliating granite (Lee 1974; Zeiner *et al.* 1988). It is almost completely confined to granodiorite or metavolcanic rocky areas within suitable habitats (Lee 1973a; Grisner and Galvan 1986; Bezy 1988). However, Fisher and Case (1997c) found granite night lizards to utilize coastal sage scrub and chaparral habitat away from rock outcrops. Lee (1973b, 1975) found that most of the suitable rock outcrop habitat type used by the lizard is primarily within chaparral habitats, with chaparral-coastal sage scrub and chaparral-creosote bush ecotonal areas occupied to a lesser degree (Lee 1973b, 1975). They may also utilize grasslands and other habitats between suitable outcrops for movement (Holland and Goodman 1998a).

Life History

The granite night lizard is known to prey on spiders, ants, bees, beetles, true bugs, moths, flies, and other invertebrates (Brattstrom 1952; Stebbins 1954). In addition, they also eat their shed skin (Holland and Goodman 1998a), and the female eat the fetal membranes and ingest the amniotic fluid (Holland and Goodman 1998a). Grisner and Galvan (1996) found that *X. h. gracilis* will eat lizard eggs; however, the granite night lizard did not even notice the eggs or recognize their value as a food resource. The granite night lizard forages in the cracks and crevices of their rock outcrop or lie in wait (Lee 1974, Zeiner *et al.* 1988).

The granite night lizard becomes active in early to mid-spring and remains active until late summer or early fall (Zeiner *et al.* 1988). The common name of the granite night lizard suggests that it is strictly nocturnal; however, it is not (Maultz and Case 1974; Bezy 1988). Holland and

Goodman (1998a) propose that their cryptic coloration and microhabitat usage of crevices and fissures within rocks probably makes diurnal activity difficult to observe.

In the sexually dimorphic, viviparous granite night lizard, females become sexually mature at approximately 56 mm, which is usually around the third or fourth year, while males are sexually mature at the end of their second year or the beginning of their third year at a snout-vent length of 50 millimeters (Lee 1975; Zeiner *et al.* 1988; Holland and Goodman 1998a). All reproductive activities take place within the confines of the rock crevices and fissures (Zeiner *et al.* 1988). Copulation usually occurs in May and June (Zeiner *et al.* 1988), following which between 1 and 2 eggs are laid (Lee 1973b; Zeiner *et al.* 1988; Holland and Goodman 1998a). Broods are born between mid-September and mid-October (Lee 1973b; Zeiner *et al.* 1988; Holland and Goodman 1998a). Egg development takes three months (Lee 1973b; Zeiner *et al.* 1988).

There is little information regarding survivorship, longevity, seasonal movements and home range size. However, a number of authors including Heimlich and Heimlich (1947), Lowe (1948), Brattstrom (1952), Zweifel and Lowe (1966), and Lee (1975) all reported direct and indirect evidence that the night lizard engages in aggressive behavior.

Diurnal birds such as scrub jays, common raven, red-tailed hawk, greater roadrunner, American kestrel and nocturnal birds such as owls, may be potential predators, but they are generally excluded by microhabitat features (Lee 1975). Some rodents such as woodrats may also be potential predators (Lee 1975). A number of sympatric snakes and some lizards have been noted to eat night lizards in captivity (Lee 1975). In addition, a number of reptile species may compete for food resources and possibly cover resources (Lee 1975).

Status and Distribution

Literature on the historical distribution for *Xantusia henshawi* and this subspecies is not readily available. In addition, museum records of the historical distribution for the granite night lizard are very limited.

The granite night lizard ranges from southern California (South Cabazon, Riverside County [Glaser 1970]) south into northern Baja California, Mexico (Arroyo Encanto, Baja California Mexico [Lee 1976]). The lizard can be found in arid and semi-arid habitats on the coastal and desert slopes of the Peninsular Ranges, occupying the San Jacinto Mountains and Santa Rosa Mountains (Riverside County), Laguna Mountains (San Diego County), and the San Pedro Martir Mountains (Baja California Del Norte, Mexico). There is also an isolated granite night lizard population near Pedricena, Durango, Mexico (Stebbins 1985). Its elevational range is from 130 to 1200 meters in California (Zeiner *et al.* 1988), though Lee (1976) indicates that it reaches 2,250 meters, presumably in Mexico.

A recent genetic study on the granite night lizard by Lovich (2001) shows that the species is divided into three haploclades with high degrees of sequence divergence. The three haploclades are separated geographically by the San Jacinto and Elsinore fault zones and their associated geophysical features (*e.g.*, canyons and valley floors).

Threats

Threats to this species include collecting and destruction of occupied rock outcrops from development and agriculture.

Conservation Needs

The species needs granodiorite or metavolcanic rocky areas containing massive rocks, rock outcrops, and flaking granite, where it can use cracks and crevices under flakes and slabs of exfoliating granite. Additionally, efforts should be made to maintain the genetic diversity of this subspecies by conserving populations within the two haploclades in the Plan Area.

Environmental Baseline

The granite night lizard is known primarily from the eastern portion of the Plan Area between 426 to 7,612 feet (130 to 2,320 meters) in elevation where massive rocks, rock outcrops, and flaking granite are present. For purposes of our analysis, modeled habitat includes all chaparral, coastal sage scrub, desert scrub, montane coniferous forest, Riversidean alluvial fan sage scrub, and woodlands and forest habitats, between 426 to 7,612 feet (130 to 2,320 meters) elevation (Stebbins 2003), within all Bioregions except the Santa Ana Mountains and San Bernardino Mountains (Rob Lovich, Camp Pendleton, pers. comm. 2003; Chris Brown, USGS, pers. comm. 2003). Based on this analysis, the Plan Area supports approximately 504,115 acres of modeled habitat for the granite night lizard. Approximately 199,397 acres (40 percent) of this modeled habitat occurs within PQP Lands. Because the granite night lizard is limited to areas of boulders, rock outcrops, and flaking granite within the above vegetation communities, modeled habitat greatly overestimates the extent of suitable habitat for this subspecies.

The MSHCP database includes 47 records of the granite night lizard from 1933-1997. The majority (42) of these records are pre-1990 or do not have a date associated with them. Our dataset only includes five records, and only one of these records is within PQP Lands.

Historic populations of granite night lizards were known to occur in southern Banning (Bezy 1972) and within a band that appears to wrap around the Banning area south along the base of San Jacinto Mountain, through the Pine Meadow area, to the west around the Wilson Creek/Vail Lake/Aguanga area, and also south into the Cleveland National Forest (Lee 1975, 1976). Information from the MSHCP also shows populations occurring in San Jacinto, southwest of the San Jacinto River and north of Hemet, around the Cactus Valley area, in the vicinity of Sage, and in Winchester.

A genetic study (Lovich 2001) found the species within the United States to be divided into three haplotypes separated by the San Jacinto and Elsinore fault zones and their associated geophysical features. Two of the three haploclades occur in the Plan Area and are separated by the San Jacinto fault zone.

Effects Of The Action

Direct Effects

The Plan Area includes 504,115 acres of modeled habitat for the granite night lizard. Granite night lizards will be subject to impacts associated with development and other proposed Covered Activities over the 75-year permit term within 192,854 acres (38 percent) of this modeled habitat, which encompasses 4 of the 5 (80 percent) granite night lizard observations in our dataset. It is anticipated that most granite night lizards in these areas will be injured or killed, as a result of habitat loss and activities such as grading and construction, although it is likely that some will survive in rural mountainous areas and in areas where rocky outcrops are left intact due to development constraints. Approximately 60,726 acres (31 percent) of the non-conserved modeled habitat for the granite night lizard are designated as rural/mountainous land where development impacts are expected to occur at a slower rate and at lower densities.

To offset the loss of granite night lizard habitat within the Plan Area, implementation of the MSHCP will conserve and manage large areas containing modeled habitat for the granite night lizard. Conserved habitat within the Additional Reserve Lands will include 111,864 acres (22 percent) of modeled granite night lizard habitat. Another 199,397 acres (40 percent) of modeled granite night lizard habitat will remain within PQP Lands. In total, 62 percent of the modeled habitat for the granite night lizard will be conserved or remain in the Plan Area, and the majority of modeled habitat within each Bioregion will be conserved or remain within PQP Lands. The MSHCP Conservation Area will include at least nine core areas: Lake Skinner-Diamond Valley Lake, San Jacinto Wildlife Area-Lake Perris, the Badlands, Potrero Valley, the Banning Bench, Sage/Vail Lake/Wilson Valley, Agua Tibia Mountains, San Jacinto Mountains, and Anza Valley.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands including surveys for the granite night lizard. Cooperative management and monitoring are anticipated on PQP Lands. Surveys for the granite night lizard will be conducted at least every eight years to verify occupancy at a minimum of 75 percent of the Core Areas identified above. If a decline in the distribution of the granite night lizard is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP.

Other management actions described in Section 5, Table 5.2 of the MSHCP, such as control of unauthorized public access, maintenance of existing habitat and suitable microhabitat sites (*i.e.*, granite rocky outcrops), and management of specific threats to the species (*e.g.*, destruction of habitat, agriculture, predation by domestic cats, brush management, and human collection) will help maintain habitat and populations of the granite night lizard within Core Areas.

Management activities, such as non-native plant mechanical control methods (*i.e.*, mowing), prescribed burning, and pitfall trapping could result in a low level of death and injury for the granite night lizard. It is anticipated that any impacts to granite night lizards from management actions will be minimized by adherence to appropriate trapping and survey protocols and other guidelines described in Section 7.4 of the MSHCP.

Indirect Effects

The granite night lizard could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These include the indirect effects described in the “General Effects” section of this biological opinion. Because of their susceptibility to road mortality, the granite night lizard is likely to be vulnerable to increased vehicle strikes associated with new roads. The guidelines and recommendations described in Section 7 for wildlife undercrossings associated with new and expanded roadways will help minimize the impact of roads on lizard mortality. The granite night lizard is also vulnerable to predation by domestic cats and human collectors that gain access by roads/trails. The guidelines and recommendations, under the Urban/Wildlands Interface policy (Section 6.1.4), for incorporating barriers adjacent to the MSHCP Conservation Area will minimize these impacts.

Conclusion

We anticipate the proposed action will directly and indirectly affect the granite night lizard as described in the analyses above, including the loss of 38 percent of modeled habitat in the Plan Area. We anticipate that this species will persist in the remaining 62 percent of the modeled habitat within both the existing PQP Lands and the Additional Reserve Lands. Implementation of the avoidance, minimization, and mitigation measures identified in the Plan will reduce the impacts to this subspecies. Together these lands form a system of large, contiguous habitat blocks that are inter-connected within the Plan Area. We anticipate that these areas will be monitored and managed cooperatively to benefit this subspecies.

After reviewing the current status of this subspecies, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service’s biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the granite night lizard. We reached this conclusion because the majority of modeled habitat within the Plan Area (62 percent) and within each Bioregion will be conserved or remain within PQP Lands and will not be impacted by the Plan. In addition, the impacts associated with loss of this subspecies’ modeled habitat, when viewed in conjunction with the protection and management of the MSHCP Conservation Area, is not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this subspecies throughout its range.

Amount or Extent of Take

We anticipate the take of all granite night lizards within up to 192,854 acres of modeled habitat outside of the MSHCP Conservation Area. A small, but undeterminable, number of granite night lizards are anticipated to be taken as a result of management actions. Take will be in the form of harm, death, and injury. This level of anticipated take is not likely to result in jeopardy to the granite night lizard.

Granite spiny lizard (*Sceloporus orcutti*)Status of the Species*Listing Status*

The granite spiny lizard is not a federally or State-listed species.

Species Description

The granite spiny lizard is a large, robust lizard (3.0-4.25 inches) with strongly keeled scales and a wide purplish ventral stripe (Fisher and Case 1997c). Males have distinct deep blue ventral patches on chest, throat and femoral pores. The granite spiny lizard was initially described by Stejeger in 1893, based on specimens captured by Charles Orcutt in 1890.

Habitat Affinities

Mayhew (1963a) and Holland and Goodman (1998a) state that the granite spiny lizard is found in chaparral, coastal sage scrub, and riparian areas, but closely tied to fractured granodiorite rock outcrops. Mayhew (1963b) added yellow pine forest and pinyon-juniper woodlands to the known habitats. Stebbins (1985) went into greater detail describing the specific regions where certain habitats were used. Essentially, the granite spiny lizard frequents granite outcrops in areas of oak and chaparral, ranging into yellow pine habitat on the coastal side of the mountains, while on the desert side of the mountains, it is found in rocky canyons and on the rocky upper portions of alluvial fans, where there is sufficient moisture for the growth of chaparral, palms, or mesquite. In Baja California, Mexico, it is found in pinon-juniper woodlands and subtropical thornforest.

Boulders are the key character (Mayhew 1963) within a variety of chaparral and forest habitats (Zeiner *et al.* 1988). Klauber (1939) observed that granite spiny lizards were often present under granite flakes on boulders, being the most abundant lizard on rock outcrops in Riverside County. Zeiner *et al.* (1988) stated that the species occurs in areas dominated by massive rock formations, spends most of its time foraging or basking on rocks and seeking shelter in rock crevices and under rocks (Mayhew 1963; Zeiner *et al.* 1988). Shaw (1950) and Weintraub (1980) observed the granite spiny lizard to occur on granite outcroppings and on palm trees.

Life History

The primarily insectivorous granite spiny lizard, forages on ants, beetles, bees, butterfly larvae, grasshoppers, sowbugs, and cicadas; however, it has also been observed to eat leaf and flower buds and fleshy fruits (Mayhew 1963b; Stebbins 1985; Zeiner *et al.* 1988; Holland and Goodman 1998a). It is known to cannibalize smaller individuals (Stebbins 1954; Mayhew 1963b). Granite spiny lizards primarily forage on rock outcroppings (Zeiner *et al.* 1988).

The granite spiny lizard is diurnal (Zeiner *et al.* 1988). It basks on rock outcrops all day during mild weather and normally restricts basking activity to the early and late portions of the day

when temperatures are high (Zeiner *et al.* 1988; Holland and Goodman 1998a). The species is normally active from between March through September, but if conditions are warm, it may be periodically active through January (Zeiner *et al.* 1988; Holland and Goodman 1998a). In Riverside, they may emerge from hibernation in January but are not normally numerous until March (Mayhew 1963b) and go into hibernation by November.

Mayhew's (1963b) study of the temperature preferences of granite spiny lizards found that daily emergence varies with age and weather conditions; younger animals were active earlier than adults and stayed active longer than adults, and all individuals retreated when in high winds and cloudy conditions. The species was active within the 14.4° to 37.9° Celcius thermal range. Mayhew (1963b) also found that they enter hibernation at varying times depending on location and weather. He found that once they enter into hibernation, they are roused by some other trigger than temperature or weather mechanism.

The females become sexually mature at about three years of age or at a minimum snout-vent length of 85 mm, while the male becomes sexually mature at about 90 millimeters snout-vent length (Mayhew 1963c; Holland and Goodman 1998a). Copulation usually occurs in March or April, following which between 8 and 15 eggs are laid, usually between the months of May to early June (Zeiner *et al.* 1988) or July and August (Mayhew 1963c). Only one clutch is laid per year (Mayhew 1963c). The young hatch between July and September (Holland and Goodman 1998a).

There is no information regarding survivorship or longevity in the literature, the only source being a few sentences from Mayhew (1963b). Mayhew states that during his studies between 1958 and 1961, there was no measurable difference in relative abundance during a single year until that year's cohort hatched. He attributed the lack of change, during a year, to relatively long life expectancy of the species. He found that while the maximum life expectancy is unknown, males have lived at least six years, and females have lived at least five years in the field.

The only literature source regarding granite spiny lizard movements is from Mayhew (1963b). Daily movements were found to vary extensively, ranging from minor one meter ectothermic adjustments to 44 meters travels across a number of outcrops and a steep ravine. These movements may be made at once, or over a period of hours, and the number of stops per movement is unrelated to sex or distance. Within a year, granite spiny lizards apparently move less during the early spring months as opposed to summer and fall. Mayhew (1963b) found that the distances traveled between years did not differ significantly from the distances traveled during a single year. The largest home range was 17 meters in diameter; however, these territories were not defended. Individuals usually have a center of activity, within the home range, that they return to after foraging. Adults are adept at homing (experiments have shown them to home at least 128 meters), while juveniles are not. This may be a result of strong site attachment in adults and lack of site attachment in juveniles.

Zeiner *et al.* (1988) states that males are territorial; however, Mayhew (1963b) indicates that in none of the studies described by him has he ever witnessed a territory defensive event. Though not social, animals are not solitary, and many can occur together in the same area within suitable

habitat. The granite spiny lizard may overwinter communally, with the younger age classes in the least desirable, or more exposed crevices (Weintraub 1968; Holland and Goodman 1998a).

The only known predation on granite spiny lizards, within the literature, is known from cannibalism (Mayhew 1963b). Other species which may prey on granite spiny lizards may include woodrats, ringtail cats, black-tailed weasel, raptors, road-runners, larger lizards, and various snakes including rattlesnakes. However, Mayhew (1963b) states that on a couple of occasions granite spiny lizards were observed within a couple of feet from red-diamond rattlesnakes and neither had interest in the other.

Status and Distribution

Literature on the historical distribution of the granite spiny lizard is not readily available. However, museum records of the historical distribution of the granite spiny lizard include localities in Riverside (*i.e.*, San Jacinto, Hemet Valley, Perris Valley, Snow Creek), San Diego and San Bernardino counties, and Baja California (*i.e.*, San Pedro Martir region, San Ignacio) (CAS, CAS-SUR).

Generally speaking, the granite spiny lizard ranges from southern California, through northern and southern Baja California, Mexico. More precisely, it occurs on the lower slopes of the Peninsular Ranges from approximately the northern side of San Gorgonio Pass to the tip of Baja California, from sea level to around 1,680 meters (Stebbins 1985).

Threats

Threats to this species include collecting and destruction of occupied rock outcrops from development and agriculture.

Conservation needs

The species needs rocky areas containing massive rock formations, rock outcrops, and flaking granite, where it can use cracks and crevices.

Environmental Baseline

The granite spiny lizard occurs throughout the Plan Area from about 0 to 7,000 feet (0 to 2,130 meters) in elevation where fractured rock outcrops are present. For purposes of our analysis, modeled habitat includes all chaparral, coastal sage scrub, desert scrub, montane coniferous forest, Peninsula juniper woodland and scrub, Riversidean alluvial fan sage scrub, and woodlands and forest habitats between 0 and 7,000 feet (0 to 2,130 meters) in elevation, within all Bioregions. Based on this analysis, the Plan Area supports approximately 631,401 acres of modeled habitat for the granite spiny lizard. Approximately 117,860 acres (19 percent) of this modeled habitat occurs within PQP Lands. Because the granite spiny lizard is limited to areas of boulders, rock outcrops, and flaking granite within the above vegetation communities, modeled habitat greatly overestimates the extent of suitable habitat for this subspecies.

The MSHCP database includes 166 records since 1907 for the granite spiny lizard. A large number (78) of the more precise records are since 1990. Our dataset only includes 96 records. Clusters of MSHCP records occur in the Santa Rosa Plateau area, Canyon Lake area, Sage area, Winchester area, Gavilan Hills area, and Riverside area. Mayhew (1963) collected granite spiny lizards at the University of Riverside Campus, Box Springs Mountains just east of UCR, granite outcrops between 2-9 miles south of UCR, Mount Rubidoux in the City of Riverside, and in the San Jacinto Mountains. Additional records in the Plan Area include the Santa Ana Mountains, Arlington, Mockingbird Canyon, Reche Canyon, Moreno, Val Verde, Woodcrest, Gavilan, Temescal, Perris, Elsinore, Lake Perris State Park, Domenigoni Valley, Vail Lake area, Potrero Valley, Cactus Valley, Crown Valley, Harford Springs area, Motte Reserve, and the Santa Rosa Plateau.

Effects of the Action

Direct Effects

The Plan Area includes 631,401 acres of modeled habitat for the granite spiny lizard. Granite spiny lizards will be subject to impacts associated with development and other proposed Covered Activities over the 75-year permit term within 229,290 acres (36 percent) of this modeled habitat, which encompasses 59 of the 96 (61 percent) granite spiny lizard observations in our dataset. It is anticipated that most granite spiny lizards in these areas will be injured or killed, as a result of habitat loss and activities such as grading and construction, although it is likely that some will survive in rural mountainous areas and in areas where rocky outcrops are left intact due to development constraints. Approximately 89,292 acres (39 percent) of the non-conserved modeled habitat for the granite spiny lizard are designated as rural/mountainous land where development impacts are expected to occur at a slower rate and at lower densities.

To offset the loss of granite spiny lizard habitat within the Plan Area, implementation of the MSHCP will conserve and manage large areas containing modeled habitat for the granite spiny lizard. Conserved habitat within the Additional Reserve Lands will include 117,860 acres (45 percent) of modeled habitat for granite spiny lizard, which encompasses 19 of the 96 (20 percent) granite spiny lizard observations in our dataset. Another 284,252 acres (19 percent) of modeled granite spiny lizard habitat will remain within PQP Lands. PQP Lands encompass 18 of the 96 (19 percent) granite spiny lizard observations in our dataset. In total, 64 percent of the modeled habitat for the granite spiny lizard will be conserved or remain in the Plan Area. This modeled habitat includes 39 percent of the granite spiny lizard observations in our dataset. The majority (greater than 50 percent) of the modeled habitat within each bioregion would be conserved or remain within PQP Lands, with the exception of the Riverside Lowlands (45 percent).

The MSHCP Conservation Area would include at least 12 Core Areas: Santa Rosa Plateau, Lake Skinner-Diamond Valley Lake, Lake Mathews-Estelle Mountain, San Jacinto Wildlife Area-Lake Perris, the Badlands, Potrero Valley, the Banning Bench, Sage/Vail Lake, Agua Tibia Mountains, San Jacinto Mountains, Santa Ana Mountains and Anza Valley.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands including surveys for the granite spiny lizard. Cooperative management and monitoring are anticipated on PQP Lands. Surveys for the granite spiny lizard will be conducted at least every eight years to verify occupancy at a minimum of 75 percent of the Core Areas identified above. If a decline in the distribution of the granite spiny lizard is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP.

Other management actions described in Section 5.0 of the MSHCP, such as control of unauthorized public access and maintenance of existing habitat (*i.e.*, rocky outcrops) will help maintain habitat and populations of the granite spiny lizard within Core Areas.

Management activities, such as prescribed burning and pitfall trapping, could result in a low level of death and injury for the granite spiny lizard. It is anticipated that any impacts to granite spiny lizards from management actions will be minimized by adherence to appropriate trapping and survey protocols and other guidelines described in Section 7.4 of the MSHCP.

Indirect Effects

The granite spiny lizard could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These include the indirect effects described in the “General Effects” section of this biological opinion. Because of their susceptibility to road mortality, the granite spiny lizard is likely to be vulnerable to increased vehicle strikes associated with new roads. The guidelines and recommendations described in Section 7 for wildlife undercrossings associated with new and expanded roadways will help minimize the impact of roads on lizard mortality. The granite spiny lizard is also vulnerable to predation by domestic cats and human collectors that gain access by roads/trails. The guidelines and recommendations, under the Urban/Wildlands Interface policy (Section 6.1.4), for incorporating barriers adjacent to the MSHCP Conservation Area will minimize these impacts.

Conclusion

We anticipate the proposed action will directly and indirectly affect the granite spiny lizard as described in the analyses above, including the loss of 36 percent of modeled habitat in the Plan Area. We anticipate that this species will persist in the remaining 64 percent of the modeled habitat within both the existing PQP Lands and the Additional Reserve Lands. Implementation of the avoidance, minimization, and mitigation measures identified in the Plan will reduce the impacts to this species. Together these lands form a system of large, contiguous habitat blocks that are inter-connected within the Plan Area. We anticipate that these areas will be monitored and managed cooperatively to benefit this species.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service’s biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the granite spiny lizard. We reached this conclusion because the majority of modeled habitat within the Plan Area (64 percent) and within each Bioregion, with one exception, will be conserved or

remain within PQP Lands and will not be impacted by the Plan. In addition, the impacts associated with loss of this species' modeled habitat, when viewed in conjunction with the protection and management of the MSHCP Conservation Area, is not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Amount or Extent of Take

We anticipate the take of all granite spiny lizards within up to 229,290 acres of modeled habitat outside of the MSHCP Conservation Area. A small, but undeterminable, number of granite spiny lizards are anticipated to be taken as a result of management actions. Take will be in the form of harm, death, and injury. This level of anticipated take is not likely to result in jeopardy to the granite spiny lizard.

Northern red diamond rattlesnake (*Crotalus ruber ruber*)

Status of the Species

Listing Status

The northern red diamond rattlesnake is a species of special concern designated by the California Department of Fish and Game. This species is not federally listed.

Species Description

The northern red diamond rattlesnake (29-64 inches) is a stout, tan to brick-red colored snake with diamond-shaped blotches (blotches edged in white) on dorsal side. The tail is encircled in distinct black and white rings near the rattle (Fisher and Case 1997c). The red diamond rattlesnake belongs to the Viperidae family and has five subspecies but the northern red diamond rattlesnake is the only one that occurs in California.

Habitat Associations

The northern red diamond rattlesnake has a wide tolerance for varying environments. Throughout the range of the northern red diamond rattlesnake, rainfall varies from 3 to 30 inches per year. In addition, the northern red diamond rattlesnake has been recorded from a number of vegetation types, although it is most common in dense chaparral in the foothills, cactus or boulder associated coastal sage scrub (Stebbins 1954; 1985, Fitch 1970) and desert slope scrub associations associated with heavy brush and large rocks or boulders (Klauber 1972). Chamise and red shank associations may offer important structural habitat for refuges and food resources for this species (Jennings and Hayes 1994). Prey density likely affects the population dynamics of the northern red diamond rattlesnake; however, availability of suitable dens for both hibernation and gravid females may be a more limiting factor (Keenlyne 1972).

Life History

Principal food resources for adult northern red diamond rattlesnakes include small mammals such as mice, rats, gophers, white-tailed antelope ground squirrels, California ground squirrels, chipmunks, rabbits and tree squirrels (Tevis 1943; Klauber 1971, 1972). Coastal western whiptails are a major food source of northern red diamond rattlesnake juveniles. Many other types of prey are taken opportunistically depending on the local environment such as frogs, toads, lizards, birds and other snakes. Klauber (1972) also reported the remains of a young skunk found in the digestive tract of a rattlesnake.

Rattlesnakes often secure their prey waiting beside heavily traveled game trails and striking as creatures pass by. When a rattlesnake strikes, it rarely retains hold of the creature, allowing the venom to take effect and following the animal by scent. After the prey has succumbed to venom, the rattlesnake devours the prey whole. The use of venom allows the snake to avoid injury and also aids in digestion once the prey is swallowed. Prey sizes vary depending on opportunity and size of the hunting snake. Prey may range from 5 percent to over 100 percent and averages 40 percent of the snake's own body weight (Klauber 1971).

Sixteen years of census data collected in San Diego County (Klauber 1939) suggests that northern red diamond rattlesnakes can be active year around but is most visible during its peak mating period between April and May. May is the most active month for rattlesnakes in the southwestern United States.

Fitch and Shirer (1971) observed average daily movements of radio telemetered northern red diamond rattlesnakes of 45 meters, but on 50 percent of the days there was no movement at all. During 10 percent of the tracking time, travel distances greater than 150 meters were recorded. Rattlesnakes can also climb and swim (Klauber 1972).

The northern red diamond rattlesnake is one of the most docile of the *Crotalus* genera (Gillingham 1987). Aggressive behavior is seldom employed unless the animal is annoyed or injured. Once their privacy is encroached upon, they can defend themselves by hiding, fleeing, striking a defensive posture, or striking.

Reproduction for rattlesnakes are dependent on local climatic conditions, although mating typically occurs in the spring, and live young are born in the autumn. In colder climates, there is a biennial reproductive cycle because of the shortened activity season. Rattlesnakes are oviparous and females do not lay their first clutch until they are three years old. Gravid females are gregarious, possibly due to greater protection offered by a group when females are slow and non-mobile (Fitch 1970). Wright and Wright (1957) reported that developing young are carried by the female for approximately 140-150 days; however, Klauber (1971) indicated that the length of gestation for the annual cycle is probably four months and suggested that this duration is speculative because females have a mechanism for sperm storage that can produce an irregularity between dates of mating and birth. Gravid rattlesnakes require a quiet and safe place for birth, probably in burrows or under substantial cover objects such as large rocks (Stebbins 1954; Klauber 1972). Three to 20 young are born typically between late July and September

(Klauber 1937; Wright and Wright 1957). Once born, the young fend for themselves, receiving no protective interest from the mother.

When hibernating in temperate or cooler environs, rattlesnakes are typically gregarious in nature (Fitch 1970; Gillingham 1987; Seigel and Ford 1987). Usually, a den is used by all the rattlesnakes within range. Once a den is found to be safe, successive generations of rattlesnakes will follow elders into the same refuge (Klauber 1971). Topography and climate regulate the number of rattlesnakes sharing a den. Where adequate sites are plentiful, the number of individuals in a den will generally be less, and conversely, the number of rattlesnakes will be large if dens are sparse. However, Klauber (1972) indicates that when good sites are close together, the gregarious nature of the snakes will lead to the selection of particular sites so that the concentrations are fairly large. In the more southern portion of its range, where the hibernation season is relatively short, refuge selection becomes a choice of the individual than the group (Klauber 1972). In southern California's mild climate, dens are impromptu refuges, such as rock crevices, mammal dens or piles of leaves. Often, rattlesnakes will take advantage of warm weather during the winter by leaving their refuges for a few hours to sun themselves.

Little to no information is known about maturation rates, growth rates, or longevity of this species. It is presumed that they occasionally attain an age of 12 to 14 years (Klauber 1971). In captivity, several species of rattlesnakes have been kept alive for 18 to 20 years at the San Diego Zoo (Klauber 1971). Bowler (1977) reported a captive northern red diamond rattlesnake living 14 years.

Status and Distribution

Literature on the historical distribution of the red diamond rattlesnake and subspecies, the northern red diamond rattlesnake, is not readily available. In addition, historical museum records for this species and in particular the subspecies is limited.

The known range of the northern red diamond rattlesnake extends from Pioneertown and Morongo Valley in San Bernardino County southward on both coastal and desert sides of the Peninsular Ranges and the Santa Ana Mountains, to Loreto, Baja California (Peguegnat 1951; Stebbins 1985). The elevation range of the species is from near sea level to 1,520 meters (Palomar Mountain), though it is most frequently encountered below 1,200 meters (Klauber 1972). Rattlesnakes inhabiting high altitudes are characteristically smaller than lowland forms (Klauber 1971).

Threats

Development of chaparral, coastal sage scrub, Riversidean alluvial fan sage scrub, and desert scrub associations and the increasing use of steeper, rock slopes for drip agriculture, such as avocado orchards, has significantly intruded into northern red diamond rattlesnake habitat (Jennings and Hayes 1994). In addition, the type conversion of sage scrub association to non-native grasslands through changed fire cycles and agricultural practices (Minnich and

Dezzani 1998) have also destroyed suitable habitat for the northern red diamond rattlesnake in southern California.

Wild and domestic animals that have been found to prey on rattlesnakes for food include birds of prey, cats, dogs, badgers, coyotes, foxes, opossum, wildcats, racoons, hogs, skunks and other species of snake (Klauber 1997). Ungulates such as deer, horses, antelope, sheep, goats, and cattle may directly kill rattlesnakes by trampling them (Klauber 1997) or reduce their populations indirectly by removing the food source of the rattlesnakes prey by grazing (Klauber 1997). Mortality due to vehicular interactions has also proved to be detrimental to the large snake populations (Rudolph *et al.* 1999).

Significant threats to the species result from habitat fragmentation and isolation and the associated indirect effects of decreased genetic exchange and direct effects of increased vehicular interactions. Furthermore, as development continues and human populations expand, rattlesnakes will more often be killed as nuisance animals.

Current threats to the northern red diamond rattlesnake within the action area include degradation, fragmentation, and destruction of habitat. A significant portion of the historically prime habitat of the northern red diamond rattlesnake has been developed or used for agriculture during the last century. For example, approximately 59 percent of the coastal sage scrub in Riverside County was eliminated between 1945 and 1990 (see 58 Federal Register 16741), and 60 percent of the coastal sage scrub stands in the Riverside-Perris Plain that were mapped ca 1930 were either heavily degraded by exotic annual grasses or entirely replaced by them by 1990 (Minnich and Dezzani 1998). These impacts have continuously and cumulatively increased in scope as result of continuing authorized and unauthorized projects and human-induced landscape conversions within the action area. Coastal sage scrub is considered to be one of the most depleted habitat types in the United States (Kirkpatrick and Hutchinson 1977; Axelrod 1978; Klopatek *et al.* 1979; Westman 1987; O'Leary 1990). Since the northern red diamond rattlesnake prefers densely vegetated chaparral, coastal sage scrub and desert scrub, the conversion of these habitats to non-native grasslands pose a significant threat to this species as non-native grasslands do not generally provide them refugia and prey species.

Predators include red-tailed hawks (Jennings and Hayes 1994) and other birds of prey. In addition to wild predators, humans pose a significant threat due to the lack of environmental education regarding rattlesnakes, and this threat has likely increased as urban to habitat ratio has increased (Jennings and Hayes 1994).

Vehicular mortality is a significant threat to the northern red diamond rattlesnake as roads fragment habitat, and this species is forced to cross roads in search of food, mates, and refugia. Rudolph *et al.* (1999) found that large snake abundance was significantly reduced within 450 meters of roads. In 1931, Klauber estimated northern red diamond rattlesnake traffic casualties at 10,000 per year in San Diego County and increased that estimate to 15,000 per year in 1956. Due to the slow movement of rattlesnakes (Klauber 1997) and the use of the roads for thermoregulation (Klauber 1997; Stebbins 1954), roads present a significant risk of mortality to the northern red diamond rattlesnake.

Conservation Needs

Conservation of large blocks of contiguous potential habitat for the northern red diamond rattlesnake is greatly needed to ensure that the existing population remains viable in the action area. Conserved habitats should include chaparral and coastal sage scrub association that have dense shrubs, rock outcroppings, and other habitat features that provide cover for gravid females, and an intact ecosystem that includes a variety of prey (*e.g.*, squirrels, rabbits, lizards) and their appropriate habitats. Within conserved habitats, activities that destroy or degrade habitat such as off-road vehicle use, brush collecting, agriculture, and human recreational use should be eliminated or modified to reduce impacts to the northern red diamond rattlesnake.

Another conservation need to ensure that the population of northern red diamond rattlesnakes remain viable is to maintain movement corridors. Addition of wildlife crossings, including culverts, overpasses, and underpasses, should be considered for existing roads that fragment suitable habitat for the northern red diamond rattlesnake. Since vehicular mortality is a significant but avoidable cause of rattlesnake decline, it is important that future roads be designed to avoid suitable habitat for northern red diamond rattlesnakes and, where necessary, to include wildlife crossings for this species.

In addition to preserving contiguous potential habitat, a public education program regarding the habitat preferences and dangers of the northern red diamond rattlesnake should be developed. Public education could reduce the number of anthropogenic induced mortalities as humans learn to avoid disturbing potential habitat and antagonizing individual rattlesnakes.

Environmental Baseline

The northern red diamond rattlesnake is distributed throughout undisturbed old growth chaparral and coastal sage scrub in the lower elevations of the Plan Area. The primary vegetation types used to model habitat for this species were chaparral, desert scrub, Riversidean alluvial fan sage scrub, and coastal sage scrub up to 4,987 feet (1,520 meters) in elevation. Based on this analysis, the Plan Area supports approximately 547,945 acres of modeled habitat for the northern red diamond rattlesnake. Approximately 222,235 acres of this modeled habitat occurs within PQP Lands. Because northern red diamond rattlesnakes need specific microhabitat features such as heavy brush and large rocks or boulders, modeled habitat likely overestimates the extent of suitable habitat for this species. Twelve of the 44 known occurrences (27 percent) in our dataset were located within PQP Lands.

Glaser (1970) reported that the northern red diamond rattlesnake was detected in the vicinity of Mockingbird Canyon, Gavilan Hills, Reche Canyon, Moreno, Perris, Elsinore, Aguanga, Beaumont, Hemet, Banning, San Jacinto, Riverside, and Box Springs Mountain, among various other localities. Van Denburgh (1922a) reported that this rattlesnake was collected from San Jacinto, Reche Canyon, the San Jacinto Mountains.

Effects of the Action

Direct Effects

The Plan Area includes 547,945 acres of modeled habitat for the northern red diamond rattlesnake. Northern red diamond rattlesnakes will be subject to impacts associated with development and other proposed Covered Activities over the 75-year permit term within 210,699 acres (38 percent) of this modeled habitat, which encompasses 25 of the 44 (57 percent) northern red diamond rattlesnake observations in our dataset. It is anticipated that most northern red diamond rattlesnakes in these areas will be injured or killed, as a result of habitat loss and activities such as grading and construction. However, a small number may be able to escape to adjacent habitats, and some will survive within suitable habitat of rural/mountainous areas where development impacts are expected to occur at a slower rate and at lower densities. Approximately 84,458 acres (40 percent) of the non-conserved modeled habitat for the northern red diamond rattlesnake are designated as rural/mountainous land.

To offset the loss of northern red diamond rattlesnake habitat within the Plan Area, implementation of the MSHCP will conserve and manage large areas containing modeled habitat for the rattlesnake and linkages among these areas. Conserved habitat within the Additional Reserve Lands will include 115,012 acres (21 percent) of modeled northern red diamond rattlesnake habitat (chaparral and sage scrub below 1,520 meters), which encompasses 7 of the 44 (16 percent) northern red diamond rattlesnake observations in our dataset. Another 222,235 acres (41 percent) of modeled northern red diamond rattlesnake habitat will remain within PQP Lands. PQP Lands encompass 12 of the 44 (27 percent) northern red diamond rattlesnake observations in our dataset. In total, 62 percent of the modeled habitat for northern red diamond rattlesnake will be conserved or remain in the Plan Area. This modeled habitat includes 43 percent of the northern red diamond rattlesnake observations in our dataset.

At least 10 Core Areas will support the northern red diamond rattlesnake within the MSHCP Conservation Area at the Santa Ana Mountains, Agua Tibia Mountains, San Jacinto Mountains, Lake Skinner-Diamond Valley lake, Lake Mathews-Estelle Mountain, San Jacinto Wildlife Area-Lake Perris, the Badlands, Potrero Valley, the Banning Bench, Sage/Vail Lake, and Anza Valley.

These Core Areas will be connected by appropriate habitat linkages (including hibernacula for this species). Identified linkages include upland and riparian connections from Estelle Mountain to Wildomar, Gavilan Hills, San Jacinto River, Koib Creek/Arroyo Seco, Temecula Creek, Tocalota Creek, Wilson Creek, Tule Creek, and San Gorgonio Wash.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands including surveys for the northern red diamond rattlesnake. Cooperative management and monitoring are anticipated on PQP Lands. Surveys for the northern red diamond rattlesnake will be conducted at least every eight years to verify occupancy at a minimum of 75 percent of the Core Areas identified above. If a decline in the distribution of the northern red diamond rattlesnake is documented below this threshold, management measures

will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP.

Other management actions described in Section 5.0 and Table 5.2 of the MSHCP, such as control of unauthorized public access and off-road vehicles, maintenance of existing habitat, including control of invasive weeds, and management of specific threats to the species will help maintain habitat and populations of the northern red diamond rattlesnake within Core Areas and habitat linkages.

Management activities, such as prescribed burning and pitfall trapping, could result in a low level of death or injury to northern red diamond rattlesnakes. It is anticipated that any impacts to northern red diamond rattlesnakes from management actions will be minimized by adherence to appropriate survey protocols and other guidelines described in Section 7.4 of the MSHCP.

Indirect Effects

The northern red diamond rattlesnake could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These include the indirect effects described in the “General Effects” section of this biological opinion. Because of their susceptibility to road mortality and fragmentation due to roads, the northern red diamond rattlesnake is likely to be vulnerable to indirect effects (e.g., increased vehicle strikes) associated with roads. The guidelines and recommendations described in Section 7 for wildlife undercrossings associated with new and expanded roadways will help minimize the impact of roads on habitat connectivity and snake mortality.

Conclusion

We anticipate the proposed action will directly and indirectly affect the northern red diamond rattlesnake as described in the analyses above, including the loss of 38 percent of its modeled habitat in the Plan Area. Implementation of the avoidance, minimization, and mitigation measures identified in the Plan will reduce the impacts to this species. We anticipate that this species will persist in the remaining 62 percent of the modeled habitat within both the existing PQP Lands and the Additional Reserve Lands. Together these lands form a system of large, contiguous habitat blocks that are inter-connected within the Plan Area. We anticipate that these areas will be monitored and managed cooperatively to benefit this species.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service’s biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the northern red diamond rattlesnake. We reached this conclusion based on the widespread distribution of the northern red diamond rattlesnake in the Plan Area and because the impacts associated with loss of this species’ modeled habitat, when viewed in conjunction with the protection and management of the MSHCP Conservation Area, is not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Amount or Extent of Take

We anticipate the take of all northern red diamond rattlesnakes within up to 210,699 acres of modeled habitat outside of the MSHCP Conservation Area. A small, but undeterminable, number of northern red diamond rattlesnakes are anticipated to be taken as a result of management actions. Take will be in the form of harm, death, and injury. This level of anticipated take is not likely to result in jeopardy to the northern red diamond rattlesnake.

San Bernardino mountain kingsnake (*Lampropeltis zonata parvirubra*)

Status of the Species

Listing Status

The San Bernardino mountain kingsnake is a Species of Special Concern designated by the California Department of Fish and Game and is also a U.S. Forest Service Sensitive Species. This species is not a federally endangered or threatened species.

Species Description

The San Bernardino mountain kingsnake is one of seven subspecies of the California mountain kingsnake (*Lampropeltis zonata*). The California mountain kingsnake (20-40 inches) is a smooth and shiny snake with black, white and red rings around its body and tail. The San Bernardino mountain kingsnake differs from the other subspecies by the number of tricolored rings or triads it has around the body. This subspecies has 37 or more triads (Behler and King 1998).

Much of the information provided below is for the species, the California mountain kingsnake, unless otherwise stated specifically for the subspecies, San Bernardino mountain kingsnake.

Habitat Affinities

The California mountain kingsnake occurs in a variety of habitats including valley-foothill hardwood, hardwood-conifer, mixed and montane chaparral, valley-foothill riparian, coniferous forests, and wet meadows (Zeiner *et al.* 1988). Holland and Goodman (1998a) further refine its habitat associations for southern California by characterizing it as a species which is typically found in montane coniferous forests or mixed coniferous forests, occasionally in riparian woodlands at lower elevations. In other areas of California, it may occasionally occur into chaparral communities. Regardless, the California mountain kingsnake is primarily associated with montane coniferous forests and mixed coniferous forests and secondarily associated with riparian woodland, oak woodland, chaparral, and coastal sage scrub (McGurty 1988). Chaparral and scrub habitats are only occupied when woodland habitats are present nearby (Zweifel 1952; McGurty 1988). A key habitat feature in many areas appears to be the presence of downed logs, usually of large conifers (Holland and Goodman 1998a). McGurty (1988) found that California mountain kingsnakes were most commonly found in the following order, (1) under rocks, (2) in rock cracks, under logs or bark of logs and stumps, (3) in the open, and (4) dead on the road.

The San Bernardino mountain kingsnake occurs in well-illuminated canyons with rocky outcrops or rock talus in association with bigcone spruce and various canyon chaparral species at lower elevations, and with black oak, incense cedar, Jeffrey pine, and ponderosa pine at higher elevations (Zweifel 1952; Jennings and Hayes 1994; McGurty 1988). The San Bernardino mountain kingsnake uses crevices and cap rocks, or rocks on soil as refugia, basking sites, hibernation sites, foraging grounds, and suitable oviposition sites (Jennings and Hayes 1994; Holland and Goodman 1998a).

Life History

California mountain kingsnake diet is known to include lizards, lizard eggs, smaller snakes, nestling birds and eggs, and small mammals (Fitch 1936; Cunningham 1959; Zweifel 1974; Zeiner *et al.* 1988). The San Bernardino mountain kingsnake has been documented to consume western fence lizards, skinks, and sagebrush lizards. Newton and Smith (1975) and Jennings and Hayes (1994) both indicate that this subspecies is primarily saurophagous.

The California mountain kingsnake is normally diurnally and crepuscularly active from mid-March to mid-October at lower elevations with a reduced period at higher elevations (Newton and Smith 1975; Zeiner *et al.* 1988; Holland and Goodman 1998a). However, the San Bernardino mountain kingsnake has been found to be active nocturnally during the warmest periods in late spring and summer (Stebbins 1954; Newton and Smith 1975; McGurty 1988).

The time of reproduction is thought to be correlated with winter hibernation and heat (McGurty 1988). McGurty (1988) hypothesized that these factors are synchronized with endogenous circannual rhythms and result in mating behavior and oviposition around the same time each year (Duvall *et al.* 1982). Males are combative upon emergence from hibernation to establish breeding dominance (McGurty 1988). The dominant, usually larger snake, breeds significantly more than the subordinate snakes (McGurty 1988). The breeding males ascertain the females reproductive condition through olfactory cues (McGurty 1988). McGurty (1988) found that females must be at least 600 mm snout-vent length (an estimated four or five years old) to reproduce. Mating occurs from March or April (Newton and Smith 1975) to May (Zeiner *et al.* 1988). The California mountain kingsnake is oviparous (Holland and Goodman 1998a). The female California mountain kingsnake is known to lay a single clutch of 3-8 eggs in July (Newton and Smith 1975; Nussbaum *et al.* 1983; Holland and Goodman 1998a). Eggs are probably laid in loose well-aerated soil under rocks, other surface objects, or decaying logs (Zeiner *et al.* 1988). California mountain kingsnake eggs hatch in about 63 days (Newton and Smith 1975), usually occurring from late June to early October (Zeiner *et al.* 1988). No information on the movement ecology or colonization abilities is available or exists for this taxon (Jennings and Hayes 1994).

McGurty (1988) and Holland and Goodman (1998a) all discuss the subspecies' site tenacity and even microsite tenacity. McGurty (1988) found that some individuals could be found at the same rock outcrops for multiple years and of those, some individuals could be found under the same rock. McGurty proposes that perhaps they do not leave the natal rock outcrop.

Little is known or available in the literature about predators of the San Bernardino mountain kingsnake. However, Zeiner et al. (1988) believe that adults and juveniles are probably preyed upon by hawks, owls, and medium and large-sized mammals and that egg clutches may be taken by medium-sized mammals.

Status and Distribution

Information on the historical distribution for California mountain kingsnake and particularly the subspecies, the San Bernardino mountain kingsnake, is very limited.

The California mountain kingsnake occurs throughout the montane portions of south-central Washington, Oregon, California, and into northern Baja California, Mexico (McGurty 1988) along the Cascade and Sierra Mountains and patchily through the Coast Ranges, Transverse Ranges and patchily down the Peninsular Ranges, effectively circling California's Central Valley. Throughout its range, it may be found from sea level to over 2450 meters (Zeiner *et al.* 1988). However, Klauber (1943) states that the California mountain kingsnake is seldom found below an altitude of 4,000 feet (1,220 meters).

The San Bernardino mountain kingsnake is a California endemic that is generally associated with the Transverse Ranges, where it is restricted to the San Gabriel Mountains (Los Angeles County), San Bernardino Mountains (Los Angeles and San Bernardino Counties), and San Jacinto Mountains (Riverside County). The San Bernardino mountain kingsnake is documented from elevations ranging from 370 to 2,470 meters (Jennings and Hayes 1984). According to Fisher and Case (1997c), this subspecies is known to occur primarily above 1,500 meters within its range. However, recent surveys conducted in the southern slopes of the San Bernardino Mountains have detected this subspecies as low as 800 meters (Adam Backlin, Robert Fisher, unpublished data)

Threats

A number of factors threaten San Bernardino mountain kingsnake populations including poaching by collectors, destruction of habitat and microhabitat by collectors, firewood harvesting, logging, and development (Newton and Smith 1975; McGurty 1988; Zeiner *et al.* 1988; Jennings and Hayes 1994; Holland and Goodman 1998a). McGurty (1988), Jennings and Hayes (1994), and Holland and Goodman (1998a) all discuss the subspecies' site tenacity and even microsite tenacity. Therefore, not only do poachers damage suitable habitat, but they may adversely affect individual San Bernardino mountain kingsnakes that return to and depend on those specific sites.

Conservation Needs

The conservation of large intact tracts of suitable habitat within the Plan Area, including montane coniferous forest at higher elevations, and riparian scrub, woodland and forest and associated chaparral at lower elevations, is essential for the protection of this species. In addition, hydrological and other ecological processes necessary to maintain these suitable habitats need to be protected. Preferred micro habitats including downed logs and rocky

outcroppings or talus within suitable habitats need to be conserved and managed to protect these areas from disturbance and poachers.

Environmental Baseline

The San Bernardino mountain kingsnake occurs in higher elevation forests and riparian areas, which, in the Plan Area, are primarily on Forest Service lands. The vegetation types used to model habitat for this species were woodlands and forests, montane coniferous forests, and riparian vegetation (scrub, woodlands, and forests) above 1,500 m in elevation within the San Bernardino Mountain and San Jacinto Mountain Bioregions. Based on this analysis, the Plan Area supports approximately 26,984 acres of modeled habitat for the San Bernardino mountain kingsnake. Approximately 22,015 acres of this modeled habitat occurs within PQP Lands, consisting primarily of lands owned by the Forest Service. Because San Bernardino mountain kingsnakes need specific microhabitat features, such as downed logs and rocky outcroppings or talus, modeled habitat likely overestimates the extent of suitable habitat for this species. There are no records of San Bernardino mountain kingsnake in our dataset, but according to the MSHCP, known populations for San Bernardino mountain kingsnake within the Plan Area occur in Idyllwild and south of Banning in the San Jacinto Mountains.

Effects of the Action

Direct Effects

The San Bernardino mountain kingsnake will not be considered a Covered Species Adequately Conserved by the MSHCP unless the Forest Service agrees through an MOU to manage their lands cooperatively with the Permittees for the benefit of the San Bernardino mountain kingsnake. The Plan Area includes 26,984 acres of modeled habitat for the San Bernardino mountain kingsnake. If the MOU with the Forest Service is executed, the incidental take permit for the MSHCP will authorize impacts associated with development and other proposed Covered Activities over the 75-year permit term within 4,969 acres (18 percent) of the modeled habitat for the San Bernardino mountain kingsnake. It is anticipated that most San Bernardino mountain kingsnakes in these areas will be injured or killed as a result of habitat loss and activities such as grading and construction, although a small number may be able to escape to adjacent habitats.

Habitat for the San Bernardino mountain kingsnake will not be conserved through the MSHCP as Additional Reserve Lands. However, if the MOU with the Forest Service is signed, additional monitoring and management would occur on habitat for the San Bernardino mountain kingsnake within Forest Service lands included in the MSHCP Conservation Area. At least two Core Areas in the San Jacinto Mountains and San Bernardino Mountains will support the San Bernardino mountain kingsnake within the MSHCP Conservation Area.

Following development of the MOU with the Forest Service, cooperative management and monitoring are anticipated on PQP Lands. Surveys for the San Bernardino mountain kingsnake will be conducted at least every eight years to verify occupancy at a minimum of 75 percent of the Core Areas identified above. If a decline in the distribution of the San Bernardino mountain kingsnake is documented below this threshold, management measures will be triggered, as

appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP. Other management actions described in Section 5 of the MSHCP, such as control of unauthorized public access, maintenance of existing habitat, including control of invasive weeds, and management of specific threats to the species, such as human collection, logging and firewood harvesting, and removal of rock outcrops, will help maintain habitat and populations of the San Bernardino mountain kingsnake within Core Areas and habitat linkages.

Management activities, such as prescribed burning and pitfall trapping, could result in a low level of death or injury to San Bernardino mountain kingsnakes. It is anticipated that any impacts to San Bernardino mountain kingsnakes from management actions will be minimized by adherence to appropriate survey protocols and other guidelines described in Section 7.4 of the MSHCP.

Indirect Effects

The San Bernardino mountain kingsnake could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These include the indirect effects described in the “General Effects” section of this biological opinion.

Conclusion

We anticipate the proposed action will directly and indirectly affect the San Bernardino mountain kingsnake as described in the analyses above, including the loss of 18 percent of its modeled habitat in the Plan Area. Implementation of the avoidance, minimization, and mitigation measures identified in the Plan will reduce the impacts to this species. We anticipate that this species will persist in the remaining 82 percent of the modeled habitat in existing PQP Lands. The PQP Lands include large, habitat blocks that will be monitored and managed to benefit the San Bernardino mountain kingsnake consistent with the goals of the MSHCP.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service’s biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the San Bernardino mountain kingsnake. We reached this conclusion because most of the modeled habitat for the San Bernardino mountain kingsnake is within PQP Lands that will not be impacted by the Plan. In addition, the impacts associated with loss of this species’ modeled habitat, when viewed in conjunction with the protection and management of the MSHCP Conservation Area, is not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Amount or Extent of Take¹

We anticipate the take of all San Bernardino mountain kingsnakes within up to 4,969 acres of modeled habitat outside of the MSHCP Conservation Area. A small, but undeterminable, number of San Bernardino mountain kingsnakes are anticipated to be taken as a result of management actions. Take will be in the form of harm, death, and injury. This level of anticipated take is not likely to result in jeopardy to the San Bernardino mountain kingsnake.

San Diego banded gecko (*Coleonyx variegatus abbotii*)

Status of the Species

Listing Status

The San Diego banded gecko is not a State or federally listed species.

Species Description

The San Diego banded gecko is a medium-sized (42-74 millimeters) lizard with dark uniform body bands on a yellow-pink background. This species has soft skin, vertical pupils and a thin yellow band over the collar (Fisher and Case 1997c).

The desert banded gecko (*C. v. variegatus*) and San Diego banded gecko (*C. v. abbotii*) are the two subspecies of western banded gecko (*C. variegatus*) that occur in California. Klauber (1945) distinguished the San Diego banded gecko from other subspecies by the presence of unbroken (uniform in color) dorsal bands of equal width and a narrow light nuchal band in adults, and the absence of head spotting in adults.

Habitat Affinities

Although it is primarily a desert species, the western banded gecko occurs in habitats ranging from cismontane chaparral and desert scrub to open sand dunes and arid tropical forests (Dixon 1970, Grismer 1988). Rocks, boards, fallen yucca stems, cow dung, and other litter serve as diurnal refuge for the banded gecko. Additionally, it may utilize mammal burrows for refuge (Klauber 1945; Parker and Pianka 1974).

The San Diego banded gecko occurs predominantly in shrub habitats in coastal and cismontane southern California. The San Diego banded gecko is typically found in coastal sage scrub and chaparral, preferring granite or rocky outcrops in these habitats (Klauber 1945; Stebbins 1972). This species is difficult to detect and may be considered uncommon due to sampling and survey methods (Holland and Goodman 1998a).

¹This take is not authorized unless the conditions for coverage in Section 9 (Table 9.3, pp. 9-20) are met and concurred with by the Service.

Life History

Insects and other arthropods including termites, beetles, spiders, grasshoppers, sowbugs, and insect larvae comprise the banded gecko's diet (Klauber 1945; Parker and Pianka 1974). Water requirements are fulfilled by moisture in food (Miller and Stebbins 1964). Banded geckos utilize an opportunistic foraging strategy that is an intermediate between active and ambush strategies. Cooper (1998) demonstrated that banded geckos tongue-flick and attack at higher rates in response to prey chemicals than to a pungency and odorless controls. It is hypothesized that both olfaction and vomerolfaction are used by this genera to make adaptively important chemosensory discriminations when pursuing prey items.

Banded geckos are active between April and October and activity peaks in May. Intermittent activity may be displayed by juveniles between November and March (Klauber 1945; Parker 1972). The primary daily activity period is two hours after sunset (Klauber 1945; Miller and Stebbins 1964; Kingsbury 1989), although Brattstrom (1952) reports occasional activity in the afternoon to absorb heat. Kingsbury (1989) found that males were active over a broader range of times and that females were found at lower air temperatures. Huey and Pianka (1983) suggest that the time of activity may be of little importance in reducing dietary overlap and competition between the banded gecko and other sympatric, diurnal lizards such as whiptails.

Male banded geckos emerge in April and attain peak testes size in May after which their testes regress (Parker 1972). The mating period is between April and May, egg-laying occurs between May and September with the highest frequency of gravid females occurring in May and June (Parker 1972). Eggs are probably buried in the ground or under rocks (Mayhew 1968). Clutch size is normally two eggs which are sometimes laid one at a time on different days. Sperm storage occurs in females and can result in two to three clutches per season (Mayhew 1968, Parker 1972). The incubation period is approximately 30-45 days. Hatchlings appear from July through November and reach maturity in one year at 52 millimeters (males) and 56 millimeters (females) (Stebbins 1954; Fitch 1970; Parker 1972; Miller and Stebbins 1964).

Predators of the banded gecko include night snakes, leaf-nosed snakes, western patch-nosed snakes, sidewinders, western diamondback rattlesnakes, coachwhips, and zebra-tailed lizards (Klauber 1945; Funk 1965; and Parker 1972). Tarantulas, large centipedes, solpugids, other rattlesnake species, coyotes, and foxes are other possible predators (Parker 1972). Domestic and feral cats are also potential predators of small lizards and geckos (Punzo 2001).

Under laboratory conditions, Greenberg (1943) observed that geckos tended to aggregate in shelters during the day. This resulted in aggressive interactions between males which suggests the possibility of territoriality in the field, or a means of sex recognition in a non-sexually dimorphic species.

Status and Distribution

Literature on the historical distribution of the San Diego banded gecko is not readily available. In addition, historical museum records are very limited for this subspecies.

The western banded gecko currently ranges from southern Nevada to the tip of Baja California, Mexico and south Sinaloa, Mexico; from coastal southern California east to southwestern New Mexico; and on islands off the western coast of Baja California and in the Gulf of Mexico (Stebbins 1985). The San Diego banded gecko is present in coastal and cismontane southern California from interior Ventura County south (Klauber 1945, Stebbins 1972). The maximum elevation observed for this subspecies was 1,500 meters [*i.e.*, Los Angeles, Santa Ana, and Palomar mountains]. This species begins to integrate with the desert banded gecko in the vicinity of the San Jacinto Mountains (C. Brown, USGS, pers comm. 2001).

Threats

Current threats to the San Diego banded gecko within the action area include degradation, fragmentation, and destruction of habitat; urbanization; and vehicle mortality. A significant portion of the historically prime habitat of the San Diego banded gecko has been developed or farmed during the last century. For example, approximately 59 percent of the coastal sage scrub in Riverside County was eliminated between 1945 and 1990 (see 58 Federal Register 16741) and 60 percent of the coastal sage scrub stands in the Riverside-Perris Plain that were mapped ca 1930 were either heavily degraded by exotic annual grasses or entirely replaced by them by 1990 (Minnich and Dezzani 1998). These impacts have continuously and cumulatively increased in scope as result of continuing authorized and unauthorized projects and human-induced landscape conversions within the action area. Coastal sage scrub is considered to be one of the most depleted habitat types in the United States (Kirkpatrick and Hutchinson 1977; Axelrod 1978; Klopatek *et al.* 1979; Westman 1987; and O'Leary 1990).

Fragmentation and edge effects, particularly those related to lighting, irrigation, domestic pets, and human intrusion are also significant effects. These activities have occurred throughout each of the Bioregions inhabited by the San Diego banded gecko. Fragmentation studies by Soule *et al.* (1988) and Crooks and Soule (1999) concluded that the decline of top predators in fragmented landscapes could lead to the release of smaller predators that, in turn, strongly limit populations of prey species.

Edge effects to the San Diego banded gecko resulting from residential, commercial, industrial, and roadway lighting and irrigation, and the introduction domestic pets have likely had a significant effect on this small, nocturnal species. The introduced Argentine ants, common in areas with irrigated landscapes, can move up to 1,312 feet from urbanized edge (Suarez *et al.* 1988) and can alter the native arthropod community, thereby significantly reducing their diversity and abundance (Bolger *et al.* 2000). Any reduction in the native arthropod community reduces food resources for arthropod predators, including the gecko. Domestic cats have been documented to range up to 3,100 feet from their home (Barratt 1997) and commonly feed on small lizards, including geckos (Punzo 2001). Thus, domestic cats pose a threat to San Diego banded gecko populations that exist within 3,100 feet of residential housing.

Vehicular mortality is likely a significant threat to the San Diego banded gecko as roads fragment habitat, and this species is forced to cross roads in search of food, mates, and refugia. In addition, it appears these geckos are drawn to paved roads (Stebbins 1954) to obtain heat from

the warm pavement during cool periods. Holland and Goodman (1998a) recommended that new roads should be designed to avoid suitable habitat for this species.

Unauthorized collection is also a threat to the San Diego banded gecko. Although the California Department of Fish and Game allows permitted individuals to collect two individuals, collection exceeding this amount or collection without a permit occurs (Hernandez 2003). Unauthorized collection can lead to fragmented populations and introduction of diseases and parasites.

Conservation Needs

Conservation of large blocks of habitat connected by suitable linkages is needed to help conserve the species. Conserved habitats should include desert scrub, chaparral, Riversidean alluvial sage scrub and coastal sage scrub associations that have rock outcroppings, and an intact ecosystem that includes a variety of prey (*e.g.*, insects, spiders) and their appropriate habitats. Within conserved habitat, activities that destroy or degrade habitat such as off-road vehicle use, brush collecting, agriculture, and human recreational use should be eliminated or modified to reduce impacts to the San Diego banded gecko.

In addition to habitat conservation, measures need to be implemented to minimize the edge effects of urbanized lands. Measures establishing minimum setback distances from preserved habitat, appropriate lighting, and the use of native landscaping should be encouraged when constructing residential, commercial, industrial, and transportation projects. In addition, the public should be educated as to the effects of domestic pets, especially cats, in areas adjacent to potential habitat and the effects resulting from unauthorized collection.

Another conservation need to ensure that the population of San Diego banded gecko remain viable is to maintain movement corridors. Addition of wildlife crossings, including culverts, overpasses, and underpasses, should be considered for existing roads that fragment suitable habitat for the San Diego banded gecko. Since vehicular strikes are a significant but avoidable cause of lizard mortality, it is important that future roads be designed to avoid suitable habitat for San Diego banded gecko and, where necessary, to include wildlife crossings for this species.

Environmental Baseline

Modeled habitat for the San Diego banded gecko includes coastal sage scrub, chaparral, desert scrub, and Riversidean alluvial fan scrub below 4,987 feet (1,520 meters) in elevation in the Riverside Lowlands, Santa Ana Mountains, and San Jacinto Foothills Bioregions, where most of the San Diego banded geckos have been observed. Glaser (1970) reported that the San Diego banded gecko was detected in the vicinity of Moreno, San Jacinto, Riverside, and Box Springs Mountain. The action area supports approximately 363,349 acres of modeled habitat for the San Diego banded gecko. Since not all of this modeled habitat includes specific microhabitat features, such as rocky outcroppings, the amount of suitable habitat is likely overestimated. Approximately 118,713 acres of modeled habitat for the San Diego banded gecko occurs within PQP Lands. This modeled habitat within PQP Lands includes eight San Diego banded gecko observations in our dataset.

Effects of the Action

Direct Effects

The Plan Area includes 363,349 acres of modeled habitat for the San Diego banded gecko. San Diego banded geckos will be subject to impacts associated with development and other proposed Covered Activities over the 75-year permit term within 149,898 acres (41 percent) of this modeled habitat, which encompasses 3 of the 13 (23 percent) San Diego banded gecko observations in our dataset. It is anticipated that most San Diego banded geckos in these areas will be injured or killed as a result of habitat loss and activities such as grading and construction, although a small number may be able to escape to adjacent habitats, and some will survive in rural/mountainous areas with appropriate habitat. Approximately 72,347 acres (48 percent) of the non-conserved modeled habitat for the San Diego banded gecko are designated as rural/mountainous land where development impacts are expected to occur at a slower rate and at lower densities.

To offset the loss of San Diego banded gecko habitat within the Plan Area, implementation of the MSHCP will conserve and manage large areas containing suitable habitat for the gecko and linkages among these areas. Conserved habitat within the Additional Reserve Lands will include 94,737 acres (26 percent) of potential San Diego banded gecko habitat (chaparral and sage scrub below 1,520 meters), which encompasses 2 of the 13 (15 percent) San Diego banded gecko observations in our dataset. Another 118,713 acres (33 percent) of modeled San Diego banded gecko habitat will remain within PQP Lands. PQP Lands encompass 8 of the 13 (62 percent) San Diego banded gecko observations in our dataset. In total, 59 percent of the modeled habitat for San Diego banded gecko will be conserved or remain in the Plan Area. This modeled habitat includes 77 percent of the San Diego banded gecko observations in our dataset.

At least seven Core Areas contain modeled habitat and will support the San Diego banded gecko within the MSHCP Conservation Area at the San Jacinto foothills, Lake Skinner-Diamond Valley lake, Lake Mathews-Estelle Mountain, San Jacinto Wildlife Area-Lake Perris, the Badlands, Santa Ana Mountains, and Sage/Vail Lake

These Core Areas will be connected by linkages including upland and riparian connections from Estelle Mountain to Wildomar, Gavilan Hills, San Jacinto River, Temecula Creek, and Tualota Creek. Although little is known about the dispersal capabilities of the San Diego banded gecko, most of the linkages contain modeled habitat for the San Diego banded gecko and should be suitable for dispersal.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands including surveys for the San Diego banded gecko. Cooperative management and monitoring are anticipated on PQP Lands. Surveys for the San Diego banded gecko will be conducted at least every eight years to verify occupancy at a minimum of 75 percent of the Core Areas identified above. If a decline in the distribution of the San Diego banded gecko is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP.

Other management actions described in Section 5 of the MSHCP, such as control of unauthorized public access and off-road vehicle use, maintenance of existing habitat, including control of invasive weeds, and management of specific threats to the species will help maintain habitat and populations of the San Diego banded gecko within Core Areas and habitat linkages.

Management activities, such as prescribed burning and pitfall trapping, could result in a low level of death and injury to San Diego banded geckos. It is anticipated that any impacts to San Diego banded geckos from management actions will be minimized by adherence to appropriate survey protocols and other guidelines described in Section 7.4 of the MSHCP.

Indirect Effects

The San Diego banded gecko could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These include the indirect effects described in the “General Effects” section of this biological opinion. Because of their susceptibility to road mortality and fragmentation due to roads, the San Diego banded gecko is likely to be vulnerable to indirect effects (*e.g.*, increased vehicle strikes) associated with roads. The guidelines and recommendations described in Chapter 7 for wildlife undercrossings associated with new and expanded roadways will help minimize the impact of roads on habitat connectivity and gecko mortality.

Conclusion

We anticipate the proposed action will directly and indirectly affect the San Diego banded gecko as described in the analyses above, including the loss of 38 percent of its modeled habitat in the Plan Area. Implementation of the avoidance, minimization, and mitigation measures identified in the Plan will reduce the impacts to this species. We anticipate that this species will persist in the remaining 62 percent of its modeled habitat within both the existing PQP Lands and the Additional Reserve Lands. Together these lands form a system of large, contiguous habitat blocks that are inter-connected within the Plan Area, which we anticipate will be monitored and managed cooperatively to benefit this species.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service’s biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the San Diego banded gecko. We reached this conclusion based on the relatively widespread distribution of the San Diego banded gecko in appropriate micro habitats in southern California and the western and southern portions of the Plan Area and because the impacts associated with loss of this species’ modeled habitat, when viewed in conjunction with the protection and management of the MSHCP Conservation Area, is not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Amount or Extent of Take

We anticipate the take of all San Diego banded geckos within up to 149,898 acres of modeled habitat outside of the MSHCP Conservation Area. A small, but undeterminable, number of San

Diego banded geckos are anticipated to be taken as a result of management actions. Take will be in the form of harm, death, and injury. This level of take is not likely to result in jeopardy to the San Diego banded gecko.

San Diego horned lizard (*Phrynosoma coronatum blainvillii*)Status of the Species*Listing Status*

The San Diego horned lizard is a species of Special Concern designated by California Department of Fish and Game. This species is not federally listed.

Species Description

The San Diego horned lizard is a medium (65-110 millimeters snout to ventral length), flat-bodied lizard with five backwardly projecting head spines. The dorsal color is highly variable, but typically gray, tan, reddish-brown, or whitish, and usually resembles the prevailing soil color (Jennings 1988). The venter is yellow to white with discrete, dark spots. There has been much debate over the years whether horned lizard of the coronatum-blainvillii complex should be recognized as two species (*Phrynosoma blainvillii* and *Phrynosoma coronatum*) or as a single species (*Phrynosoma coronatum*). Taxonomy of this group was being revised in the mid 1990's (Jennings and Hayes 1994). However, currently this group is recognized as one species (*Phrynosoma coronatum*). The San Diego horned lizard (*Phrynosoma coronatum blainvillii*) is one of two subspecies of the coast horned lizard (*Phrynosoma coronatum*) that occur in California. Much of the information provided below is for the species, unless otherwise stated.

Habitat Associations

The coast horned lizard is found in a wide variety of vegetation types including coastal sage scrub, annual grassland, chaparral, oak woodland, riparian woodland and coniferous forest (Klauber 1939; Stebbins 1954; Jennings and Hayes 1994). However, this species is most common in shrub-dominated communities. Key habitat elements include loose, fine soils with a high sand fraction, an abundance of native ants, open areas with limited overstory for basking, and areas with low, dense shrubs for refuge (Jennings and Hayes 1994). Coast horned lizards are also primarily associated with either cryptogamic soils or sandy soils (Fisher and Case 1997c). In inland areas within dense brush habitats, this species is restricted to areas with pockets of open microhabitat, created by disturbance (e.g., floods, fire, roads, grazed areas, fire breaks) (Jennings and Hayes 1994).

Life History

Horned lizards of the genus *Phrynosoma* are primarily ant-eating reptiles whose dietary habits are well known (Montanucci 1981; Pianka and Parker 1975; Powell and Russell 1984; Rissing 1981; Turner and Medica 1982). Over 95 percent of the diet of the San Diego horned lizard consists primarily of native ants, preferably harvester ants and *Crematogaster californica* ants

(Pianka and Parker 1975; Suarez *et al.* 2002). Other slow moving insects, such as beetles, flies, and caterpillars are consumed opportunistically when encountered (Presch 1969; Pianka and Parker 1975). This species does not appear to eat non-native Argentine ants (Jennings and Hayes 1994). Argentine ants have displaced the native ants that dominate the coastal horned lizard diet in much of coastal southern California (Suarez *et al.* 1998; Suarez *et al.* 2000).

The San Diego horned lizard emerges from hibernation in March and becomes surface active in April through July, after which most adults estivate again (summer hibernation) (Hagar 1992). The adults reappear again briefly in late summer and return to overwintering sites between August and early October depending upon elevation (Klauber 1939; Howard 1974; Hagar 1992).

The daily diurnal activity of the San Diego horned lizard is distinctive. As surface temperatures reach >19° Celsius (almost 15° Celsius below temperatures of normal activity), just prior to sunrise, this taxon emerges from burial sites in the substrate into a position that allows them to bask in the first rays of the sun (Heath 1965; Hagar 1992). The San Diego horned lizard feeding schedule corresponds with the peak activity patterns of harvester ants, between the hours of 0900 and 1100 (Whitford and Ettershank 1975; Whitford *et al.* 1976). As expected, the bulk of thermoregulatory basking occurred in the early morning and late afternoon. Midday temperatures over 40°C are avoided (optimum temperature: 29-39° Celsius) by burying themselves in the substrate only to reemerge later in the afternoon to resume full activities (*e.g.*, feeding, territorial, and reproductive). As the day ends and the temperature cools, this species again burrows into the substrate where it will remain overnight til the next sunrise. High site fidelity is often exhibited by the San Diego horned lizard, as effective thermoregulation requires familiarity with their surroundings (Heath 1965).

Tollestrup's (1981) observations suggest that olfactory cues are important in *Phrynosoma*'s daily activities, including courtship, feeding, sex recognition, and conspecific interactions. In addition, they were observed to apparently mark sites by partially extruding the cloaca and rubbing it back and forth on the substrate.

In southern California, the male reproductive cycle begins during mid to late March and ends in June as testes decrease in size. Female San Diego horned lizards are oviparous, laying a clutch of 6-17 eggs between May and July each year (Stebbins 1954; Howard 1974; Goldberg 1983). Hatchlings appear in late July to early August, and require 2 - 3 years to reach reproductive age (Stebbins 1954; Howard 1974; Pianka and Parker 1975; Goldberg 1983). After reviewing the data (Stebbins 1954; Pianka and Parker 1975; Howard 1974), Goldberg (1983) found the average clutch sizes from various studies ranged from 11 to 12.5 individuals. In addition, Goldberg's (1983) study suggests that coast horned lizards have the potential to produce multiple clutches.

Known predators of the San Diego horned lizard include the southern pacific rattlesnake, striped racer, burrowing owl, greater roadrunner, loggerhead shrike, American kestrel, prairie falcon, badger and gray fox; however, a variety of other predators most likely prey upon this species (Jennings and Hayes 1994). The San Diego horned lizard may use an array of defensive methods against predators. However, this species relies mostly on its cryptic appearance and behavior to simply lie motionless (Jennings and Hayes 1994) to avoid predators. Klauber (1939) documented change in body coloration to match the soil or sand on which they were found.

Other defensive methods used include hissing, inflating lungs to increase apparent size (Pianka and Parker 1975; Sherbrooke 1981), raising their horns by lowering their snout (Pianka and Parker 1975; Sherbrooke 1981), and squirting blood from the corner of the eye (which seems to repel or distract coyotes, dogs and cats) (Presch 1969; Pianka and Parker 1975). An additional defense mechanism may be based on learned avoidance by predators suggested by reports, which are well documented in the literature (Klauber 1972; Milne and Milne 1950; Van Denburgh 1922b; Vorhies 1948; Wright and Wright 1957), of snakes dying while trying to swallow *Phrynosoma* species.

Munger (1984) found that horned lizards utilize limited home ranges, occupying areas much smaller than they would if they moved randomly. His data further suggests that there is a reduction in home range overlap, and contrary to expectation, overlap between sexes tended to be less than overlap between individuals of the same sex (Munger 1984). In addition, Munger found that male home ranges were larger than female home ranges. For the closely related, Texas horned lizard, Munger (1984) calculated the mean adult male and female home ranges to be 24,013 square meters and 13,775 square meters, respectively. In Whitford and Bryant's 1979 study, the Texas horned lizard moved an average of 46.8 meters per day (range = 9-91 meters). They also found that an individual Texas horned lizard moved over a zigzag course during a day but rarely crossed its own trail. As stated in Jennings and Hayes (1994), Hagar (1992) presented limited information on the home range and movement ecology for the San Diego horned lizard in San Bernardino and Riverside counties, but home ranges were likely severely overestimated and importance of movement patterns was unclear. However, in Fisher, Suarez and Case (2002), results of a study that radiotracked San Diego horned lizards suggest that home range sizes are approximately 0.1 square kilometer. Nonetheless, further studies on home range and movement ecology for the San Diego horned lizard are needed due to the limited amount of existing information.

Status and Distribution

Historically, the San Diego horned lizard was distributed from the Transverse Ranges in Kern, Los Angeles, Santa Barbara, and Ventura counties southward through the Peninsular Ranges of southern California to Baja California (Jennings 1988). The San Diego horned lizard seems to have disappeared from about 45 percent of its former range in southern California, in particular on the coastal plain where it was once common (Hayes and Guyer 1981) and in riparian and coastal sage scrub habitats on the old alluvial fans of the southern California coastal plain (Bryant 1911; Van Denburgh 1922b).

Most surviving populations inhabit upland sites with limited optimal habitat. Many of these sites are on marginally suitable Forest Service land (Jennings and Hayes 1994). In California, the San Diego horned lizard currently ranges from the Transverse Ranges south to the Mexican border west of the deserts, although the taxon occurs on scattered sites along the extreme western desert slope of the Peninsular Ranges (Jennings 1988). The known elevation range of this species is from 10 meters at the El Segundo dunes (Los Angeles County) to approximately 2,130 meters at Tahquitz Meadow, on San Jacinto Mountain, in Riverside County (Jennings and Hayes 1994). The San Diego horned lizard is thought to intergrade with the California horned lizard in

extreme southern Kern county and northern Santa Barbara, Ventura, and Los Angeles counties (Reeve 1952; Montanucci 1968; Jennings 1988).

Threats

Habitat loss due to agriculture and urbanization is the primary threat to this species. The specialized diet, habitat requirements, and site fidelity make the San Diego horned lizard vulnerable to habitat destruction and disturbance. In addition to the direct loss of habitat, agriculture and urbanization lead to a variety of edge-associated effects, including an altered fire regime, invasion by non-native species, off-road vehicles, accessibility to collectors, use by domesticated animals, and road-associated effects (Soule 1986). The defensive method of remaining immobile rather than fleeing and its affinity for open spaces, such as roads and trails, makes the San Diego horned lizard particularly vulnerable to collectors/poachers, domesticated pets and to being killed by vehicles (Jennings and Hayes 1994).

The continued displacement and elimination of its food base of native ants by the Argentine ant is a major threat to the San Diego horned lizard. Argentine ants colonize around disturbed soils associated with building foundations, roads and landfills and expand into adjacent natural areas, eliminating native ant colonies (Ward 1987). The Argentine ant also appears to be dependent on moisture in arid environments (Hertzer 1930). Moisture associated with adjacent development such as water runoff from residential/commercial irrigation systems that flow into open space may result in favorable conditions for the Argentine ant (Suarez *et al.* 1998). Argentine ants can follow roads deep into native habitat reserves (De Kock and Giliomee 1989) and into the larger fragments (Suarez *et al.* 1998). Suarez *et al.* (1998) suggest that urban reserves are only effective at maintaining natural populations of native ants at distances of 200 meters or greater from an edge.

Within areas where Argentine ants have invaded, the diet of the horned lizard changes significantly to include more of the other arthropod species (Suarez *et al.* 2000). Suarez and Case (2002) fed horned lizard hatchlings a diet of arthropods typical of invaded areas and found the average growth rates near zero. This may have detrimental effects on the San Diego horned lizard since high initial growth from a hatchling to an adult is necessary for lizards to reach reproductive maturity by their second year (Fisher *et al.* 2002). In addition, horned lizards are sit and wait predators that expend little energy waiting at ant colony entrances or foraging trails for ants in exchange for the benefit of capturing a relatively large prey item, preferably the harvester ant in the case of the San Diego horned lizard. This species may not be able to adjust its behavior of a sit and wait predator to capture prey items typical of an Argentine ant invaded area (Suarez and Case 2002).

Habitat conversion from shrub communities to exotic grasslands due to increased fire frequency or other disturbances may impact native populations including the San Diego horned lizard (Holland and Goodman 1998a). Similarly, roads and fire breaks not only result in direct loss of native habitat but also function as corridors for the invasion and establishment of exotic plant species into natural areas (Holland and Goodman 1998a).

In Riverside County, approximately 59 percent of the coastal sage scrub in Riverside County was eliminated between 1945 and 1990 (58 Federal Register 16741), and 60 percent of the coastal sage scrub stands in the Riverside-Perris Plain that were mapped ca. 1930 were either heavily degraded by exotic annual grasses or entirely replaced by them by 1990 (Minnich and Dezzani 1998).

Conservation Needs

Conservation of large blocks of contiguous habitat for the San Diego horned lizard is needed to ensure that the existing population remains viable in the Plan Area. Conserved habitats should include loose, fine soils with a high sand fraction, an abundance of native ants, open areas with limited overstory for basking, and areas with low, dense shrubs for refuge. Within conserved habitats, activities that destroy or degrade habitat such as irrigation, off-road vehicle use, brush collecting, agriculture, and human recreational use should be eliminated or modified to reduce impacts to the San Diego horned lizard.

Another conservation need to ensure that the population of San Diego horned lizard remains viable is to maintain movement corridors. Addition of wildlife crossings, including culverts, overpasses, and underpasses, should be considered for existing roads that fragment suitable habitat for the San Diego horned lizard. Since vehicular mortality is a significant but avoidable cause of horned lizard mortality, it is important that future roads be designed to avoid suitable habitat for the San Diego horned lizard and, where necessary, to include wildlife crossings for this species.

Limited information is available or known about the dispersal, colonization and home range for the San Diego horned lizard. However, it is reported that terrestrial iguanid lizards, including the San Diego horned lizard, do not commonly have circular home ranges (Rose 1982). Due to the limited amount of information, the optimum size or shape for viable core areas and appropriate lengths and widths of functioning linkages to encompass San Diego horned lizard movements are unknown at this time. Further studies of the San Diego horned lizard's movement ecology and colonization abilities (Jennings and Hayes 1994) would assist in reserve design and management of remaining populations.

Environmental Baseline

The San Diego horned lizard is distributed throughout scrub, grassland, and forest habitats of the Plan Area. The primary vegetation types used to identify modeled habitat for this species were chaparral, coastal sage scrub, desert scrub, Riversidean alluvial fan sage scrub, grassland, riparian woodland, oak woodland, and montane coniferous forest. Based on these habitats, the Plan Area supports approximately 771,533 acres of modeled habitat for the San Diego horned lizard. Approximately 308,045 acres (40 percent) of this modeled habitat occurs within PQP Lands. Because not all of this modeled habitat includes specific microhabitat features such as fine soils with a high sand fraction, an abundance of native ants, open areas with limited overstory, and areas with low, dense shrubs, modeled habitat likely overestimated the extent of suitable habitat for this species within the Plan Area. Seven of the 38 observations (27 percent) of San Diego horned lizards in our dataset were located within PQP Lands.

Because the records are generally evenly distributed throughout the Plan Area, there are no definable "key" or "core" populations. However, there are a few lightly clustered areas within the Plan Area. These include the Lake Elsinore area, Highgrove area, Good Hope area, Murrieta Hot Springs area, Aguanga area, Banning area, Lake Hemet area, and Lake Skinner area.

Effects of the Action

Direct Effects

The Plan Area includes 771,533 acres of modeled habitat for the San Diego horned lizard. San Diego horned lizards will be subject to impacts associated with development and other proposed Covered Activities over the 75-year permit term within 323,543 acres (42 percent) of this habitat, which encompasses 55 percent (21 of 38) of the San Diego horned lizard observations in our dataset. It is anticipated that most San Diego horned lizards in these areas will be injured or killed, as a result of habitat loss and activities such as grading and construction, although a small proportion may be able to escape to adjacent habitats, and some will likely survive in rural/mountainous areas with appropriate habitat. Approximately 101,082 acres (31 percent) of the non-conserved modeled habitat for the San Diego horned lizard are designated as rural/mountainous land where development impacts are expected to occur at a slower rate and at lower densities.

To offset the loss of San Diego horned lizard habitat within the Plan Area, implementation of the MSHCP will conserve and manage large areas containing suitable habitat for the lizard and linkages among these areas. Conserved habitat within Additional Reserve Lands will include 139,945 acres (18 percent) of potential San Diego horned lizard habitat (chaparral, coastal sage scrub, desert scrub, grassland, montane coniferous forest, riparian scrub, woodland, and forest, Riversidean alluvial fan scrub, and upland woodlands and forests) in the Plan Area, which encompasses 10 of 38 (26 percent) San Diego horned lizard observations in our dataset. Another 308,045 acres (40 percent) of potential San Diego horned lizard habitat will remain in PQP ownership. PQP Lands encompass 7 of the 38 (18 percent) San Diego horned lizard observations within our dataset. In total, 58 percent of the modeled habitat for the San Diego horned lizard will be conserved or remain in the Plan Area. This modeled habitat includes 45 percent of the San Diego horned lizard observations in our dataset.

At least thirteen Core Areas will support the San Diego horned lizard within the MSHCP Conservation Area at the Santa Rosa Plateau, Lake Skinner-Diamond Valley lake, Lake Mathews-Estelle Mountain, San Jacinto Wildlife Area-Lake Perris, the Badlands, Potrero Valley, the Banning Bench, Sage/Vail Lake, Anza Valley, Agua Tibia Wilderness, Paloma Valley/Hogbacks, Santa Ana Mountains foothills, and Santa Ana River. The MSHCP Conservation Area Linkages will connect these Core areas. Most of the linkages contain modeled habitat for the San Diego horned lizard and should be suitable for dispersal.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands including surveys for the San Diego horned lizard. Cooperative management and monitoring is anticipated on PQP Lands. Surveys for the San Diego horned lizard will be conducted at least every eight years to verify occupancy at a minimum of 75 percent of the Core

Areas identified above. If a decline in the distribution of the San Diego horned lizard is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP.

Other management actions described in Section 5, Table 5.2 of the MSHCP, such as control of unauthorized public access and off-road vehicles, management of specific threats to the species, and maintenance of existing habitat, including control of invasive weeds, will help maintain habitat and populations of the San Diego horned lizard within Core Areas and habitat linkages.

Management activities, such as prescribed burning and pitfall trapping, could result in a low level of death and injury to San Diego horned lizards. It is anticipated that any impacts to San Diego horned lizards from management actions will be minimized by adherence to appropriate survey protocols and other guidelines described in Section 7.4 of the MSHCP.

Indirect Effects

The San Diego horned lizard could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These include the indirect effects described in the “General Effects” section of this biological opinion. Because of their susceptibility to road mortality and fragmentation due to roads, the San Diego horned lizard is likely to be vulnerable to indirect effects (*e.g.*, increased vehicle strikes) associated with roads. In addition, San Diego horned toads are likely to be negatively affected by the displacement of native ants by Argentine ants since horned toads feed almost exclusively on native ants. The invasion of Argentine ants is strongly correlated with human development and is likely to occur more readily in habitat that has a greater urban interface, such as the proposed linkages.

Conclusion

We anticipate the proposed action will directly and indirectly affect the San Diego horned lizard as described in the analyses above, including the loss of 42 percent of its modeled habitat in the Plan Area. Implementation of the avoidance, minimization, and mitigation measures identified in the Plan will reduce the impacts to this species. We anticipate that this species will persist in the remaining 58 percent of its modeled habitat within both the existing PQP Lands and the Additional Reserve Lands. Together these lands form a system of large, contiguous habitat blocks that are inter-connected within the Plan Area. We anticipate that these areas will be monitored and managed cooperatively to benefit this species.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service’s biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the San Diego horned lizard. We reached this conclusion based on the widespread distribution of the San Diego horned lizard in the Plan Area and because the impacts associated with loss of this species’ habitat, when viewed in conjunction with the protection and management of the MSHCP Conservation Area, is not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Amount or Extent of Take

We anticipate the take of all San Diego horned lizards within up to 323,543 acres of modeled habitat outside of the MSHCP Conservation Area. A small, but undeterminable, number of San Diego horned lizard are anticipated to be taken as a result of management actions. Take will be in the form of harm, death, and injury. This level of take is not likely to result in jeopardy to the San Diego horned lizard.

San Diego mountain kingsnake (*Lampropeltis zonata pulchra*)

Status of the Species

Listing Status

The San Diego mountain kingsnake is designated as a Species of Special Concern by the California Department of Fish and Game. This subspecies is also a Forest Service Region 5 sensitive species. The San Diego mountain kingsnake is not a federally endangered or threatened species.

Species Description

The species, California mountain kingsnake (*Lampropeltis zonata*), (20-40 inches) is a smooth and shiny snake with black, white and red rings around its body and tail. There are seven subspecies of California mountain kingsnake, including the San Diego mountain kingsnake. The San Diego mountain kingsnake is similar in appearance to the San Bernardino mountain kingsnake (*Lampropeltis zonata parvirubra*) except that it has 37 or less tricolored rings, or triads, around its body (Behler and King 1998).

Due to lack of information for the San Diego mountain kingsnake, much of the information provided below is for the species, the California mountain kingsnake, unless stated otherwise.

Habitat Affinities

The California mountain kingsnake occurs in a variety of habitats including valley-foothill hardwood, hardwood-conifer, mixed and montane chaparral, valley-foothill riparian, coniferous forests, and wet meadows (Zeiner *et al.* 1988). Holland and Goodman (1998a) further refine its habitat associations for southern California by characterizing it as a species that is typically found in montane coniferous forests or mixed coniferous forests, occasionally in riparian woodlands at lower elevations. In other areas of California, it may occasionally occur in chaparral communities. Regardless, the California mountain kingsnake is primarily associated with montane coniferous forests and mixed coniferous forests and secondarily associated with riparian woodland, oak woodland, chaparral, and coastal sage scrub (McGurty 1988). Chaparral and scrub habitats are only occupied when woodland habitats are present nearby (McGurty 1988). A key habitat feature in many areas appears to be the presence of downed logs, usually of large conifers (Holland and Goodman 1998a).

In the interior mountain ranges, the San Diego mountain kingsnake occurs primarily in associations of ponderosa, Jeffrey, and Coulter pine, and black oak and is infrequently found below the coniferous forest associations (Zweifel 1975, McGurty 1988, Jennings and Hayes 1994). When occurring at lower elevations, and in the coastal ranges, it occurs below the edge of mixed oak-coniferous forest in riparian woodlands, usually in canyon bottoms, that have western sycamore, Fremont's cottonwood, coast live oak, willows, wild rose, poison oak, and blackberries. It may also be found in narrow riparian woodlands in association with chaparral and coastal sage scrub vegetation types (Zweifel 1975; McGurty 1988; Jennings and Hayes 1994). Most of the San Diego mountain kingsnakes found by McGurty (1988) in rock outcrops were associated with open stands of conifers and black oak. Within the rock outcrops, snakes preferred to be under layered rock structures and in rock fractures nearly twice as often as under a rock on the ground. Adults and subadults are more selective than juveniles, choosing rock structures with direct subterranean access while juveniles were mainly found under rocks on ground soils. Rock outcrops within broken shade are preferred; however, shady north-facing rocks and rock fissures, which are wider than the snake body within the rock outcrop, are usually avoided (McGurty 1988).

Life History

The California mountain kingsnake diet is known to include lizards, lizard eggs, smaller snakes, nestling birds and eggs, and small mammals (Fitch 1936, Cunningham 1959, Zweifel 1974, Zeiner *et al.* 1988). The only known naturally caught prey items of the San Diego mountain kingsnake are western fence lizards and western skinks (McGurty 1988; Holland and Goodman 1998a); however, it is likely that other lizards and small mammals are also taken (McGurty 1988; Jennings and Hayes 1994). McGurty (1988) found that captive San Diego mountain kingsnake would feed on fence lizards, skinks, side-blotched lizards, and mice. Newton and Smith (1975) and Jennings and Hayes (1994) both indicate that this subspecies is primarily saurophagous.

The San Diego mountain kingsnake is normally diurnally and crepuscularly active from mid-March to mid-October at lower elevations with a reduced period at higher elevations (Newton and Smith 1975; Zeiner *et al.* 1988; Holland and Goodman 1998a). However, this subspecies has been found to be active nocturnally during the warmest periods in late spring and summer (Stebbins 1954; Newton and Smith 1975; McGurty 1988).

The time of reproduction is thought to be correlated with winter hibernation and heat (McGurty 1988). McGurty (1988) hypothesized that these factors are synchronized with endogenous circannual rhythms and result in mating behavior and oviposition around the same time each year (Duvall *et al.* 1982). Males are combative upon emergence from hibernation to establish the dominant breeding individual (McGurty 1988) whereupon, the dominant, usually larger snake, breeds significantly more than the subordinate snakes (McGurty 1988). The breeding males ascertain the females reproductive condition through olfactory cues (McGurty 1988). McGurty (1988) found that females must be at least 600 mm snout-vent length (an estimated four or five years old) to reproduce. Mating occurs from March or April (Newton and Smith 1975) to May (Zeiner *et al.* 1988). The California mountain kingsnake is oviparous (Holland and Goodman 1998a). The female California mountain kingsnake is known to lay a single

clutch of 3-8 eggs in July (Newton and Smith 1975; Nussbaum *et al.* 1983; Holland and Goodman 1998a). Eggs are probably laid in loose well-aerated soil under rocks, other surface objects, or decaying logs (Zeiner *et al.* 1988). The California mountain kingsnake eggs hatch in about 63 days (Newton and Smith 1975), usually occurring from late June to early October (Zeiner *et al.* 1988).

McGurty (1988) and Holland and Goodman (1998a) all discuss the subspecies' site tenacity and even microsite tenacity. McGurty (1988) found that some individuals could be found at the same rock outcrops for multiple years and, of those, some individuals could be found under the same rock.

Little is known or available in the literature about predators of the San Diego mountain kingsnake. However, Zeiner *et al.* (1988) believe that adults and juveniles are probably preyed upon by hawks, owls, and medium and large-sized mammals and that egg clutches may be taken by medium-sized mammals.

Status and Distribution

The California mountain kingsnake occurs throughout the montane portions of south-central Washington, Oregon, California, northern Baja California, Mexico (McGurty 1988) and along the Cascade and Sierra mountains and patchily through the Coast Ranges, Transverse Ranges, Peninsular Ranges, effectively circling the Central Valley. Throughout its range, it may be found from sea level to 2450+ meters in elevation (Zeiner *et al.* 1988); however, Klauber (1943) states that the California mountain kingsnake is seldom found below an altitude of 4,000 feet (1,220 meters).

Generally speaking, the San Diego mountain kingsnake is a California endemic that is apparently restricted to the Coast Range south of Ventura County and across to the Peninsular Ranges. Specifically, it ranges from the Santa Monica Mountains (Los Angeles County), Santa Ana Mountains (Orange and Riverside counties), Santa Rosa Mountains (Riverside County), and the Corte Madera, Cuyamaca, Hot Springs, Laguna, and Palomar mountains (San Diego County) (Jennings and Hayes 1984; McGurty 1988). The subspecies has been documented from sea level to approximately 1,800 meters (Jennings and Hayes 1994); however, the lower elevational ranges are for coastal situations, which enjoy lower temperatures and fog or abundant cloud cover. The inland locations are more typical and primarily support the subspecies between 1,219 and 1,829 meters (McGurty 1988). However, according to Fisher and Case (1997c), the San Diego mountain kingsnake occurs above 500 meters within its range.

Threats

A number of factors threaten San Diego mountain kingsnake populations including poaching by collectors, destruction of habitat and microhabitat by collectors, firewood harvesting, logging, and development (Newton and Smith 1975; McGurty 1988; Zeiner *et al.* 1988; Jennings and Hayes 1994; Holland and Goodman 1998a). McGurty (1988), Jennings and Hayes (1994), and Holland and Goodman (1998a) all discuss the subspecies' site tenacity and even microsite

tenacity. Therefore, not only do poachers damage suitable habitat, but they may adversely affect individual San Diego mountain kingsnakes that return to and depend on those specific sites.

Conservation Needs

The conservation of large intact tracts of suitable habitat within the Plan Area, including montane coniferous forest at higher elevations and riparian scrub, woodland and forest and associated chaparral at lower elevations, is important for the protection of this species. In addition, ecological processes necessary to maintain these suitable habitats should be protected. Preferred microhabitats including downed logs and rocky outcroppings or talus within suitable habitats

need to be conserved and managed to protect these areas from disturbance and poachers.

Environmental Baseline

The primary vegetation types used to model habitat for this species were montane coniferous forests, riparian scrub, and woodlands and forest above 1,608 feet (490 meters) in elevation within the Santa Ana Mountains, Palomar Mountains, and Santa Rosa Mountains (Santa Ana Mountains, Aqua-Tibia Mountains, and Desert Transition Bioregions). Based on this analysis, the Plan Area supports approximately 10,297 acres of modeled habitat for the San Diego mountain kingsnake. Approximately 6,965 acres (68 percent) of this modeled habitat occurs within PQP Lands, consisting primarily of lands owned by the Forest Service. Because San Diego mountain kingsnakes need specific microhabitat features, such as downed logs and rocky outcroppings or talus, modeled habitat likely overestimates the extent of suitable habitat for this species. There is a single record of a San Diego mountain kingsnake in our database, and it is outside the MSHCP Conservation Area. However, according to the Plan, known populations of San Diego mountain kingsnake occur within the Plan Area in the Santa Ana Mountains.

Effects of the Action

Direct Effects

The San Diego mountain kingsnake will not be considered a Covered Species Adequately Conserved by the MSHCP unless the Forest Service agrees through an MOU to manage their lands cooperatively with the Permittees for the benefit of the San Diego mountain kingsnake. The Plan Area includes approximately 10,297 acres of modeled habitat for San Diego mountain kingsnake. If the MOU with the Forest Service is executed, the MSHCP will authorize impacts associated with development and other proposed Covered Activities over the 75-year permit term within 2,580 acres (25 percent) of the modeled habitat for the San Diego mountain kingsnake. Thus, all individual San Diego mountain kingsnakes persisting in these areas would be impacted over the 75-year permit term as a result of habitat loss and activities such as grading and construction, although a small number may be able to escape to adjacent habitats, and some will survive in rural/mountainous areas with suitable habitat. Approximately 2,123 acres (82 percent) of the non-conserved modeled habitat for the San Diego mountain kingsnake are designated as rural/mountainous land where development impacts are expected to occur at a slower rate and at lower densities.

If the MOU with the Forest Service is signed, additional monitoring and management would occur for San Diego mountain kingsnake habitat within Forest Service lands included in the MSHCP Conservation Area. To offset the loss of San Diego mountain kingsnake habitat within the Plan Area, implementation of the MSHCP will conserve and manage large areas containing modeled habitat. Conserved habitat within the Additional Reserve Lands will include 752 acres (7 percent) of modeled San Diego mountain kingsnake habitat. Another 6,965 acres (68 percent) of modeled San Diego mountain kingsnake habitat will remain within PQP Lands. In total, 75 percent of the modeled habitat for the San Diego mountain kingsnake will be conserved or will remain in the Plan Area.

At least three Core Areas can potentially support the San Diego mountain kingsnake within the MSHCP Conservation Area including in the Santa Ana Mountains, Agua Tibia Mountains, and Santa Rosa Plateau. These Core Areas will be connected by appropriate habitat linkages (including hibernacula for this species). Identified linkages include upland and riparian connections from the Santa Ana Mountains to the Santa Rosa Plateau and portions of Pechanga and Temecula Creek which link to the Agua Tibia Mountains.

Following development of the MOU with the Forest Service, cooperative management and monitoring is anticipated on PQP Lands. Surveys for the San Diego mountain kingsnake will be conducted at least every eight years to verify occupancy at a minimum of 75 percent of the Core Areas identified above. If a decline in the distribution of the San Diego mountain kingsnake is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP.

Other management actions described in Section 5, Table 5.2 of the MSHCP, such as control of unauthorized public access, maintenance of existing habitat, including control of invasive weeds, and management of specific threats to the species will help maintain habitat and populations of the San Diego mountain kingsnake.

Management activities, such as prescribed burning and pitfall trapping, could result in a low level of death or injury to San Diego mountain kingsnakes. It is anticipated that any impacts to San Diego mountain kingsnakes from management actions will be minimized by adherence to appropriate survey protocols and other guidelines described in Section 7.4 of the MSHCP.

Indirect Effects

The San Diego mountain kingsnake could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These include the indirect effects described in the “General Effects” section of this biological opinion. Because of their susceptibility to road mortality and fragmentation due to roads, the San Diego mountain kingsnake is likely to be vulnerable to indirect effects (*e.g.*, increased vehicle strikes) associated with roads. The guidelines and recommendations described in Section 7 for wildlife undercrossings associated with new and expanded roadways will help minimize the impact of roads on habitat connectivity and snake mortality.

Conclusion

We anticipate the proposed action will directly and indirectly affect the San Diego mountain kingsnake as described in the analyses above, including the loss of 25 percent of its modeled habitat in the Plan Area. We anticipate that this species will persist in the remaining 75 percent of the modeled habitat within the existing PQP Lands. The existing PQP Lands form a large habitat block, which we anticipate will be monitored and managed cooperatively to benefit this species. After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the San Diego mountain kingsnake. We reached this conclusion because most of the modeled habitat for the San Diego mountain kingsnake is within PQP Lands that will not be impacted by the Plan. In addition, the impacts associated with loss of this species' modeled habitat, when viewed in conjunction with the protection and management of the MSHCP Conservation Area, is not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Amount or Extent of Take

We anticipate the take of all San Diego mountain kingsnakes within up to 2,580 acres of modeled habitat outside of the MSHCP Conservation Area. A small, but undeterminable, number of San Diego mountain kingsnakes are anticipated to be taken as a result of management actions. Take will be in the form of harm, death, and injury. This level of anticipated take is not likely to result in jeopardy to the San Diego mountain kingsnake.

Southern rubber boa (*Charina bottae umbratica*)

Status of the Species

Listing Status

The southern rubber boa is listed as threatened by the California Department of Fish and Game. This species is not federally listed.

Species Description

The southern rubber boa (11.8-17.3 inches long) has smooth and shiny scales that look and feel like rubber. This species is olive-green or tan in color above with a contrasting yellowish or cream venter and a blunt tail (Fisher and Case 1997c).

Habitat Associations

In general, the southern rubber boa inhabits moist coniferous forests and woodland habitats (Stewart 1988), which may be interspersed with large grassy fields or other open areas (Hoyer 1974). Stebbins (1985) indicates that southern rubber boas frequent areas dominated by grassland, broken chaparral, woodland, and forest, in and beneath logs, rock, and bark.

According to Stewart (1988) prime habitat is dominated by Jeffrey pine, yellow pine, sugar pine, white fir, incense cedar, and black oak. During warmer weather, cooler and wetter riparian and forested areas become more important. In the spring, areas which contain rock outcrops with a southern exposure and with scattered surface rocks are a particularly significant habitat feature in forested and relatively open sites (Stewart 1991). Rock outcrops serve as hibernacula. Snags, logs, and other surface debris provide cover (Zeiner *et al.* 1988). Additionally, large downed logs and a well-developed litter layer are considered important for maintaining a high soil moisture. Soil moisture may be a limiting factor for rubber boas. They are frequently found during summer months in damp draws near springs, seeps and streams (Loe 1985).

Life History

While little information is available for the southern rubber boa subspecies, some information exists for the species in general. The species eats small mammals (moles, mice and shrews), birds, salamanders, lizards, snakes, and insects (Linder 1963; Shaw and Campbell 1974; Brown 1974; Macey 1983; Stebbins 1985; Zeiner *et al.* 1988). Smaller animals feed on lizards and squamate eggs, while larger animals add mammals and birds to their diet and stop taking squamate eggs. Large prey items are usually killed by constriction before swallowing (Stewart 1988). Insects may be an important food resource for young rubber boas (Stewart 1988). The rubber boa may compete for food resources with the California mountain kingsnake (Zeiner *et al.* 1988). Known predators of rubber boas include hawks, owls, skunks, and raccoons (Zeiner *et al.* 1988).

This species has been described as secretive and very difficult to observe (Stewart 1991). Stewart (1988) characterizes the species as primarily crepuscular or nocturnal in its activity, although it may move about the surface on overcast days. During the summer or fall, the rubber boa may be on or near the surface during periods of high humidity or rain and appear to be more active during the spring, late summer, and early fall (Stewart 1988). In the early spring, the southern rubber boa apparently prefers rock outcrops with a southern exposure and scattered surface rocks. When the weather warms and becomes drier, rubber boas move into cooler and moister habitats (Stewart 1988). The species may utilize rock crevices to bask in the threads of sunlight.

Breeding usually occurs between April and June (Zeiner *et al.* 1988). The rubber boa bears 2-8 live young between August (Erwin 1974) through November (Stebbins 1985). Females are thought to only bear young every two to three years (Stewart 1988).

Hoyer (in Stewart 1988) found that the species was easier to collect during the spring, late summer, and early fall, which may be the times when they are more likely to be dispersing. The only quantified movement for a southern rubber boa over a season is 300 yards (Loe 1985). It is possible that southern rubber boas may migrate short distances between suitable hibernacula and summertime activity sites (Zeiner *et al.* 1988). Rubber boas may hibernate with other snakes, including kingsnakes and rattlesnakes.

Status and Distribution

Information on historical distribution is very limited for this subspecies. The southern rubber boa is restricted to the San Gabriel, San Bernardino and San Jacinto mountains (Erwin 1974; Stebbins 1985; Zeiner *et al.* 1988) in southern California. Individuals identified within the La Panza Range, Tehachapi Mountains and Mount Pinos area may be intergrades (Stewart 1988). According to Stebbins (1985) the subspecies is found from sea level to around 10,000 feet; however, Stewart (1988) determined that they range between 5,000-8,000 feet in elevation. Fisher and Case (1997c) indicate that they occur at elevations above 2,000 meters in the San Jacinto and San Bernardino mountains.

Threats

The southern rubber boa is vulnerable to habitat loss from development on private land, water diversion/extraction, and other activities that degrade the soil and surface cover (Stephenson and Calcarone 1999). Firewood harvesting, off-highway vehicle use, fern harvesting, commercial timber harvesting, fire management, recreational activities/facilities, and federal/private land exchanges are also of great concern (Stewart 1991). All of these factors contribute to habitat loss and fragmentation, isolation of populations, and the increased probability of local extirpations (Stewart 1991). Up to 50-60 percent of habitat could be lost to development of private land, firewood harvesting, and OHV use in the next 20-40 years (Stewart 1991). Fern picking in the spring occurs at the same time that boas are coming out of hibernation. Conversion of burned forest to shrubby vegetation and loss of downed logs due to fire management practices (Southern Rubber Boa Advisory Committee 1986) is also contributing to decline.

Environmental Baseline

The southern rubber boa inhabits moist coniferous forests and woodland habitats (Stewart 1988), which may be interspersed with large grassy fields or other open areas (Hoyer 1974). The southern rubber boas may also frequent areas dominated by grassland, broken chaparral, woodland, and forest, in and beneath logs, rock, and bark (Stebbins 1985). According to Stewart (1988), prime habitat is dominated by Jeffrey pine, yellow pine, sugar pine, white fir, incense cedar, and black oak. Cool and wet riparian and forested areas become important during warmer weather. In the spring, areas which contain rock outcrops with a southern exposure and with scattered surface rocks are a particularly significant habitat feature in forested and relatively open sites (Stewart 1991).

According to the Plan and Stewart (1988), the known limits for southern rubber boa within the Plan Area are within the Forest Service's San Jacinto Wilderness and San Jacinto Management Area. The vegetation types used to model habitat for the southern rubber boa were grasslands, chaparral, montane coniferous forests, riparian scrub/woodland/forest, and woodlands/forests above 4,900 feet (1,494 meters) in elevation in the San Jacinto Mountains Bioregion. Based on this analysis, the Plan Area supports approximately 57,010 acres of modeled habitat for the southern rubber boa. Approximately 47,638 acres (84 percent) of this modeled habitat occurs within PQP Lands, consisting primarily of lands owned by the Forest Service. Because southern

rubber boas need specific microhabitat features, such as large downed logs and high soil moisture, modeled habitat likely overestimates the extent of suitable habitat for this species. Additionally, Stewart (1988) does not include chaparral as a primary habitat type for the southern rubber boa; therefore, the inclusion of chaparral into the habitat model may overestimate the amount of suitable habitat for the southern rubber boa within the Plan Area. There is a single record of a southern rubber boa in our dataset, and it is within PQP Lands.

Effects of the Action

Direct Effects

The southern rubber boa will not be considered a Covered Species Adequately Conserved by the MSHCP unless the Forest Service agrees through an MOU to manage their lands cooperatively with the Permittees for the benefit of southern rubber boa. The Plan Area includes approximately 57,010 acres of modeled habitat for southern rubber boa. If the MOU with the Forest Service is executed, the MSHCP will authorize impacts associated with development and other proposed Covered Activities over the 75-year permit term within 9,373 acres (16 percent) of the modeled habitat for the southern rubber boa. It is anticipated that most southern rubber boas in these areas will be injured or killed, as a result of habitat loss and activities such as grading and construction, although a small number may be able to escape to adjacent habitats, and some will survive in rural/mountainous areas with suitable habitat.

If the MOU with the Forest Service is signed, additional monitoring and management would occur in habitat for the southern rubber boa within Forest Service lands included in the MSHCP Conservation Area. To offset the loss of southern rubber boa habitat within the Plan Area, implementation of the MSHCP will conserve and manage large areas containing modeled habitat for the boa including 47,638 acres (84 percent) of modeled southern rubber boa habitat within PQP Lands. No modeled habitat for the southern rubber boa is within Additional Reserve Lands. In total, 84 percent of the modeled habitat for the southern rubber boa will be conserved or remain in the Plan Area.

The San Jacinto Mountains Core Area will support the southern rubber boa within the MSHCP Conservation Area. The Permittees will implement management and monitoring practices within the Additional Reserve Lands including surveys for the southern rubber boa. Following development of the MOU with the Forest Service, cooperative management and monitoring is anticipated on PQP Lands. Surveys for the southern rubber boa will be conducted at least every eight years to verify occupancy at a minimum of 75 percent of the Core Areas identified above. If a decline in the distribution of the southern rubber boa is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP. Other management actions described in Section 5, Table 5.2 of the MSHCP, such as control of unauthorized public access and off-roading, maintenance of existing habitat, including control of invasive weeds, and management of specific threats to the species will help maintain habitat and populations of southern rubber boas within Core Areas.

Management activities, such as prescribed burning and pitfall trapping, could result in a low level of death or injury to southern rubber boas. It is anticipated that any impacts to southern rubber boas from management actions will be minimized by adherence to appropriate survey protocols and other guidelines described in Section 7.4 of the MSHCP.

Indirect Effects

The southern rubber boa could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These include the indirect effects described in the “General Effects” section of this biological opinion. Because of their susceptibility to road mortality and fragmentation due to roads, the southern rubber boa is likely to be vulnerable to indirect effects (*e.g.*, increased vehicle strikes) associated with roads. The guidelines and recommendations described in Section 7 for wildlife under-crossings associated with new and expanded roadways will help minimize the impact of roads on habitat connectivity and snake mortality.

Conclusion

We anticipate the proposed action will directly and indirectly affect the southern rubber boa as described in the analyses above, including the loss of 16 percent of its modeled habitat in the Plan Area. We anticipate that this species will persist in the remaining 84 percent of the modeled habitat within the existing PQP Lands. The existing PQP Lands form a large habitat block that we anticipate will be monitored and managed cooperatively to benefit this species. After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service’s biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the southern rubber boa. We reached this conclusion because most of the modeled habitat for the southern rubber boa is within PQP Lands that will not be impacted by the Plan and thus the impacts associated with loss of this species’ modeled habitat, when viewed in conjunction with the protection and management of the MSHCP Conservation Area, is not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Amount or Extent of Take

We anticipate the take of all southern rubber boas within up to 9,373 acres of modeled habitat outside of the MSHCP Conservation Area. A small, but undeterminable, number of southern rubber boas are anticipated to be taken as a result of management actions. Take will be in the form of harm, death, and injury. This level of take is not likely to result in jeopardy to the southern rubber boa.

Southern sagebrush lizard (*Sceloporus graciosus vandenburgianus*)Status of the Species*Listing Status*

The southern sagebrush lizard (*Sceloporus graciosus vandenburgianus*) is a Species of Special Concern designated by the California Department of Fish and Game. This species is not federally listed.

Species Description

The southern sagebrush lizard is a small grayish-green to brown spiny lizard. Males have blue ventral patches on chest and throat; females have less vivid, or lack these, patches of blue (Fisher and Case 1997c). The sagebrush lizard (*Sceloporus graciosus*) has three subspecies including the southern sagebrush lizard, the only subspecies occurring in southern California. Differentiation between the subspecies is subtle at best and appears to focus around average number of dorsal scales, number of femoral pores, and coloration.

Habitat Affinities

The species, the sagebrush lizard, is widely distributed in montane chaparral, hardwood and conifer habitats, juniper habitats, and sage scrub habitats at higher elevations (Zeiner *et al.* 1988). Additionally, manzanita-ceanothus chaparral, pinon-juniper woodland, pine and fir forests are also discussed by Stebbins (1985). The subspecies, the southern sagebrush lizard occurs within the same habitats as mentioned above, but is restricted to the mountains of southern California and Baja California. Stebbins (1985) also notes that the preferred micro-habitat features of the southern sagebrush lizard include open ground, good light and scattered low bushes, and it is usually found near bushes, brush heaps, logs, or rocks.

Life History

The diurnal southern sagebrush lizard is a ground forager (Stebbins 1985) known to prey almost exclusively on small arthropods including ants and beetles (Rose 1976a), other insects, spiders, ticks, mites, scorpions, and others (Knowlton and Janes 1932; Stebbins 1985; Zeiner *et al.* 1988). Like other ectothermic species, the southern sagebrush lizard must regulate its temperature by spending time in and out of direct sunlight, though this species appears to be highly linked to bright, open areas (Stebbins 1985; Woodbury and Woodbury 1945).

Much of the following information is for the species, the sagebrush lizard, unless otherwise stated for the southern sagebrush lizard. The sagebrush lizard species emerges from hibernation in March or April (Woodbury and Woodbury 1945; Zeiner *et al.* 1988) and stays active through September or October with juveniles remaining active longer than adults (Zeiner *et al.* 1988). Juveniles emerge first, then males, followed by females (Woodbury and Woodbury 1945). Apparently males emerge from hibernation earlier than females, presumably to establish territories (Noble and Bradley 1933; Woodbury and Woodbury 1945).

Sagebrush lizards usually reproduce from late May through July with egg laying occurring between June and July (Zeiner *et al.* 1988; Stebbins 1954) within an approximate 5-week window (Woodbury and Woodbury 1945). Between two and eight eggs are laid within a hole dug in loose soil a few centimeters below the surface near the base of a shrub (Stebbins 1985; Zeiner *et al.* 1988; Woodbury and Woodbury 1945; Nussbaum *et al.* 1983). Larger females may lay more eggs and southern sagebrush lizard females may lay multiple clutches (Goldberg 1975; Punzo 1982; Stebbins 1985).

Males are known to have larger home ranges than females (Stebbins 1944) with average maximum movements for males at 24 meters and females 18 meters. Ferguson (1971) found that males actively defend a territory up to 7.5 meters in diameter during the breeding season. There is little to no information regarding dispersal; however, Zeiner *et al.* (1988) states that they may occasionally move outside the normal zone of activity to find a suitable nest or hibernation site.

Competition for food resources with the western fence lizard, where the two ranges overlap, was studied by Rose (1976b). Rose, found that there was significant overlap in the prey species taken by each species. However, the microhabitat preferences by the two species (*i.e.*, western fence lizard prefers vertical substrate while the sagebrush lizard prefers horizontal substrate) probably allow them to live with minimal conflict. Additionally, the southern sagebrush lizard occurs sympatrically with the side-blotched lizard at certain locations at high elevations (Fisher and Case 1997c). The sagebrush lizard has been known to be predated by striped whipsnakes and night snakes (Zeiner *et al.* 1988) but also are likely to fall prey to a variety of mammals, birds, and other reptile species.

Status and Distribution

Historical distribution of sagebrush lizard and subspecies, the southern sagebrush lizard, is limited. However, according to museum records (California Academy of Sciences-Department of Herpetology and the U.S. Geological Survey herpetology database), historical distribution information for southern sagebrush lizards included localities in Riverside (Fern Valley, Hemet Valley, San Jacinto Mountains, Strawberry Valley), San Diego, San Bernardino and Los Angeles counties.

While the species, the sagebrush lizard, appears to be distributed throughout the western United States (west of the Rocky Mountains) and northern Baja California, Mexico, (Balgooyen 1970; Censke 1986), the subspecies, southern sagebrush lizard, is distributed only throughout mountainous areas of southern California and northern Baja California, Mexico (Stebbins 1985) from the San Jacinto Mountains to Sierra San Pedro Martir in Baja California, Mexico. Zeiner *et al.* (1988) states that the species is found at elevations from 900 to 3200 meters. According to Fisher and Case (1997c), the subspecies, southern sagebrush lizard, is restricted to the mountains of southern California (except for Santa Ana Mountains) at elevations of 1,500 meters and above. To the best of our knowledge, the current range-wide distribution mirrors the historical distribution, with the exception of developed areas where habitat has been removed. However, there is no published research documenting persistence of populations of southern sagebrush lizards in habitat fragments, or regions where type conversion of native vegetation into non-native grassland has occurred, and these may be range limiting factors.

Threats

Threats to the southern sagebrush lizard include catastrophic fire, off-road vehicle usage, local isolation of populations, road construction, and habitat conversion through climatic or man-made causes.

Conservation Needs

Little is known of the current distribution and abundance for the southern sagebrush lizard, especially in disturbed, fragmented and converted habitats (but otherwise suitable habitats). However, it is reasonable to assume that the protection of large intact southern sagebrush lizard suitable habitat (montane chaparral, hardwood and conifer habitats, juniper habitats, and sage scrub habitats at higher elevations) in the San Jacinto and the Santa Rosa Mountains will contribute toward the conservation of this species. The San Jacinto Mountains are the most northern location of the southern sagebrush lizard range. This subspecies is distributed only throughout mountainous areas of southern California and northern Baja California, Mexico (Stebbins 1985) from the San Jacinto Mountains to Sierra San Pedro Martir in Baja California, Mexico. Therefore, it is important to conserve and manage suitable habitat within the Plan Area for the persistence of the southern sagebrush lizard within the northernmost portion of its known range.

Preferred microhabitat features including open ground, good light and scattered low bushes, brush heaps, logs, or rocks within suitable habitat also need to be protected. In addition, hydrological and other ecological processes necessary to maintain suitable habitat should be preserved. Defining additional conservation needs for the southern sagebrush lizard would require a greater understanding of the species life history, status, and threats than what is provided by the available literature.

Environmental Baseline

Historic occurrences of the southern sagebrush lizard have been recorded in the following areas in western Riverside County: Fuller's Mill at 5,850 to 7,000 feet; road between Fuller's Mill and Schain's Ranch at 5,500 feet; Hall's Mill site near Schain's Ranch at 5,500 feet; Hall Creek at about 5,000 feet; Idyllwild at 6,000 feet; Strawberry Valley at 6,000 feet; Fern Valley; Keen Camp; Tahquitz Peak at 8,000 feet; canyon east of Round Valley at 8,500 feet; Thomas Mountain; Snow Creek at 5,500 feet; and Santa Rosa Peak at 7,500 feet (Glaser 1970).

According to Glaser (1970), this species was present in the Santa Ana Mountains above 3,000 feet and in the San Jacinto and Santa Rosa Mountains at 5,000 feet and above. However, the Santa Ana Mountain locality is comprised of one museum record and despite concerted efforts, researchers have failed to find another southern sagebrush lizard in the Santa Ana Mountains. Therefore, the Santa Ana Mountains was not included as a potential area with suitable habitat. According to Fisher and Case (1997c), the southern sagebrush lizard is restricted to elevations over 4921 feet (1,500 meters) in the mountains of southern California, except for the Santa Ana Mountains. Within the Plan Area, the southern sagebrush lizard is known to occur within the San Jacinto Mountains and Santa Rosa Mountains above 4,921 feet (1,500 meters) in elevation.

According to our dataset, there are four recent high precision records (either precision 1 or 2) for the southern sagebrush lizard in the Plan Area. These records are generally localized within the eastern portion of the Plan Area, in the Riverside lowlands and the San Jacinto foothills. However, these lower elevation records are not representative of where this species is typically found and are assumed to be misidentified with another *Sceloporus* (Robert Fisher and Chris Brown, U.S. Geological Survey, Biological Resources Division, pers. comm., 2003).

Chaparral, coastal sage scrub, juniper woodlands, montane coniferous forests, and woodlands and forests habitats above 4,921 feet (1,500 meters) in elevation within San Jacinto Mountains and Desert Transition Bioregions were used to model habitat for the southern sagebrush lizard within the Plan Area. We found that the Plan Area supports approximately 52,421 acres of modeled habitat for the southern sagebrush lizard. Eighty-four percent (43,985 acres) of the modeled habitat for the southern sagebrush lizard occurs within PQP Lands, consisting primarily of lands owned by the Forest Service. Because southern sagebrush lizards need specific microhabitat features, such as open ground, good light, bushes, brush heaps, logs, or rocks, modeled habitat likely overestimates the extent of suitable habitat for this species.

Effects of the Action

Direct Effects

The southern sagebrush lizard will not be considered a Covered Species Adequately Conserved by the MSHCP unless the Forest Service agrees through an MOU to manage their lands cooperatively with the Permittees for the benefit of the southern sagebrush lizard. The Plan Area includes 52,421 acres of modeled habitat for the southern sagebrush lizard. If the MOU with the Forest Service is executed, the incidental take permit for the MSHCP will authorize impacts associated with development and other proposed Covered Activities over the 75-year permit term within 8,155 acres of the modeled habitat for the southern sagebrush lizard. It is anticipated that most southern sagebrush lizards in these areas will be injured or killed, as a result of habitat loss and activities such as grading and construction, although a small number may be able to escape to adjacent habitats.

To offset the loss of southern sagebrush lizard habitat within the Plan Area, 43,985 acres (84 percent) of modeled southern sagebrush lizard habitat will remain within PQP Lands. In addition, Additional Reserve Lands will include 280 acres (1 percent) of modeled southern sagebrush lizard habitat (chaparral above 4,921 feet [1,500 meters]) in the Plan Area. In total, 85 percent of the modeled habitat for southern sagebrush lizard will be conserved or remain in the Plan Area.

Southern sagebrush lizard habitat within the MSHCP Conservation Area will include both habitat linkages between conserved areas and microhabitat features, such as fallen debris and piles.

While only 1 percent of the modeled habitat for the southern sagebrush lizard will be conserved through the MSHCP as Additional Reserve Lands, if the MOU with the Forest Service is signed,

additional monitoring and management would occur on habitat for the southern sagebrush lizard within Forest Service lands included in the MSHCP Conservation Area.

At least two Core Areas in the San Jacinto Mountains and Santa Rosa Mountains (PQP Lands) will support the southern sagebrush lizard within the MSHCP Conservation Area. However, the majority of the Santa Rosa Mountain range occurs outside the Plan Area. Suitable habitat between the San Jacinto Mountains and Santa Rosa Mountains, in the vicinity of where SR-74 and SR-371 converge, may or may not function as a dispersal corridor for the southern sagebrush lizard. Most of this potential corridor is outside the MSHCP Conservation Area and will not be conserved. In addition, it is unknown if the effects of SR-371, such as habitat fragmentation and road mortality, preclude the southern sagebrush lizard from dispersing between Core Areas. However, lands outside the Plan Area may also provide potential dispersal habitat for the southern sagebrush lizard.

Following development of the MOU with the Forest Service, cooperative management and monitoring are anticipated on PQP Lands. Surveys for the southern sagebrush lizard will be conducted at least every eight years to verify occupancy at a minimum of 75 percent of the Core Areas identified above. If a decline in the distribution of the southern sagebrush lizard is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP.

Other management actions described in Section 5.0 and Table 5.2 of the MSHCP, such as control of unauthorized public access, maintenance of existing habitat and suitable microhabitat sites (*i.e.*, fallen debris, rock piles), control of invasive weeds, and management of specific threats to the species (*e.g.*, fire and fire suppression/catastrophic fire, predation by domestic cats, human collection), will help maintain habitat and populations of the southern sagebrush lizard within Core Areas and habitat linkages.

Management activities, such as prescribed burning, could result in a low level of death or injury to southern sagebrush lizards. It is anticipated that any impacts to southern sagebrush lizards from management actions will be minimized by adherence to appropriate survey protocols and other guidelines described in Section 7.4 of the MSHCP.

Indirect Effects

The southern sagebrush lizard could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These include the indirect effects described in the “General Effects” section of this biological opinion. The southern sagebrush lizard is vulnerable to predation by domestic cats and human collectors that gain access by roads/trails. The guidelines and recommendations, under the Urban/Wildlands Interface policy (Section 6.1.4), for incorporating barriers adjacent to the MSHCP Conservation Area will minimize these impacts. In addition, fire management activities such as fuel reduction and firebreaks have the potential to degrade or destroy essential microhabitats for the southern sagebrush lizard. Fuels Management guidelines, as described in section 6.4, include the coordination with fire protection entities to identify and map modeled fuel reduction zones or

fire break locations. Where feasible, fuel reduction zones and firebreaks will be sited to avoid impacting sensitive biological resources.

Conclusion

We anticipate the proposed action will directly and indirectly affect the southern sagebrush lizard as described in the analyses above, including the loss of 15 percent of its modeled habitat in the Plan Area. Implementation of the avoidance, minimization, and mitigation measures identified in the Plan will reduce the impacts to this species. We anticipate that this species will persist in the remaining 85 percent of its modeled habitat within both the existing PQP Lands (84 percent) and the Additional Reserve Lands (1 percent). The PQP Lands include large, habitat blocks that will be monitored and managed to benefit the southern sagebrush lizard consistent with the goals of the MSHCP.

After reviewing the current status of this species, the environmental baseline for the Plan Area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the southern sagebrush lizard. We reached this conclusion because the majority of modeled habitat for the southern sagebrush lizard in the Plan Area is within PQP Lands that will not be impacted by the Plan. In addition, the impacts associated with loss of this species' habitat, when viewed in conjunction with the protection and management of the MSHCP Conservation Area, is not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

Amount or Extent of Take

We anticipate the take of all southern sagebrush lizards within up to 8,155 acres of modeled habitat outside of the MSHCP Conservation Area. A small, but undeterminable, number of southern sagebrush lizard are anticipated to be taken as a result of management actions. Take will be in the form of harm, death, and injury. This level of anticipated take is not likely to result in jeopardy to the southern sagebrush lizard.

Western pond turtle (*Clemmys marmorata pallida*)

Status of the Species

Listing Status

Clemmys marmorata pallida, also known as the "southwestern pond turtle," is a Species of Special Concern designated by the California Department of Fish and Game. *Clemmys marmorata* was proposed for Federal listing in 1993 (58 Federal Register 42717). Listing was determined not to be warranted at the time (58 Federal Register 42718).

Species Description

There are two recognized subspecies of *Clemmys marmorata*; the northwestern pond turtle (*Clemmys marmorata marmorata*) occurring north of the American River in California and the southwestern pond turtle (*Clemmys marmorata pallida*) occurring from the coastal area south of San Francisco, California (Seelinger 1945; Holland 1994; 58 Federal Register 42718). The San Joaquin Valley in central California is considered to be a zone of intergradation between the two subspecies (Holland 1991, 1994). The subdivision of *Clemmys marmorata* into two subspecies is based on morphological variation and genetic analyses (Stebbins 1985; Holland 1991; Gray 1995; Lovitch 1999). Janzen *et al.* (1997) suggests that *Clemmys marmorata pallida* may be distinct enough to be recognized as a separate species, although all populations continue to be recognized as *Clemmys marmorata*, as no formal taxonomic revisions have been published. *Clemmys marmorata* is the only native turtle species in California (Fisher and Case 2000b; Garrison 1998).

Habitat Associations

Clemmys marmorata is a highly aquatic freshwater turtle. This species inhabits slow moving, permanent or intermittent streams, small ponds, small lakes, permanent and ephemeral shallow wetlands, arroyos, vernal pools, and altered aquatic habitats (*e.g.*, reservoirs, stock ponds, sewage treatment ponds) (Rathbun *et al.* 1992; Holland 1994). The preferred aquatic habitat for this species are pools within streams (Bury 1972). Typical habitat characteristics in these aquatic environments include the presence of logs, submerged rocks and roots, mudbanks, and ledges. These habitats provide areas for basking, refugia, and overwintering sites. Basking usually occurs in sheltered areas but may occur in exposed sites when the wind is limited to occasional small breezes or gusts (Holland 1991). Conversely, *Clemmys marmorata* generally avoids areas, particularly in stream habitats or open water, that lack significant refugia or basking sites (Holland 1994). The use of altered aquatic habitats often represents animals displaced by destruction of natural habitats, and data does not exist that *Clemmys marmorata* are capable of maintaining viable populations in reservoirs or “artificial” watercourses (Holland 1991, 1994).

Clemmys marmorata also inhabits upland habitats adjacent to aquatic habitat. Upland habitat is used for nesting, overland dispersal, cover, protection, and overwintering (Holland and Goodman 1996; Jennings and Hayes 1994). Adjacent upland habitats used by the pond turtle include grasslands, oak woodlands, chaparral, coastal sage scrub, and seasonal flood plains.

Clemmys marmorata uses both aquatic and terrestrial overwintering sites. Aquatic overwintering sites appear to be variable and occur in areas such as mud at the bottom of a watercourse, undercuts along stream banks, or under logs. Overland wintering sites often contain a thick layer of duff (leaf litter) (Holland 1994) and/or varying soil types (*e.g.*, sandy, compact) (Morey undated).

Life History

Geographical variation occurs in the seasonal activity of *Clemmys marmorata*, although in warmer portions of its range it may be active year round (Holland 1994). *Clemmys marmorata pallida* is generally diurnal, and daily activity revolves around thermoregulation and foraging patterns. *Clemmys marmorata* requires basking sites, as it often suns itself at the edge of water courses, or on branches or stones above water. The pond turtle is secretive and will seek refuge at the bottom of a pond or stream at the slightest disturbance (e.g., humans, potential predators). In the early morning and evening pond turtles may move up or downstream, moving from one pool to the next in search of basking sites, mates, or foraging areas. Foraging may occur during the late afternoon or early evening during the warmth of summer. Often they will remain quietly on the bottom of pools to avoid a critical thermal maximum of 104 degrees F (Bury 1972 as cited in Dudek 2003).

Clemmys marmorata is an omnivore believed to have a broad feeding niche. Partial herbivory occurs in adults, but they tend to prefer live or dead animal food instead of plant material (Bury 1986). Plants, however, may provide an important source of readily available nutrients and protein when animal food is unobtainable (Bury 1986). *Clemmys marmorata* scavenges but also takes live prey, acting as an opportunistic predator. Among the many types of food items eaten by this species are aquatic plants such as the pond lily, water beetles, fish, crustaceans, worms, snails, adult and larval insects, carrion, and coyote scat (Pope 1939; Evenden 1948; Carr 1952; Holland 1988; Bury 1986; Goodman and Stewart 1998, as cited in Dudek 2003).

Courtship and mating behaviors of *Clemmys marmorata* have been observed from February through November (Holland 1988; Buskirk 1991; Goodman 1997a). Depending on the latitude, the peak nesting season is from late May through early July but extends from late April through August (Holland 1994). Nests are located along stream or pond margins or on uplands that are adjacent to the watercourses that turtles inhabit. Terrestrial nest locations inspected by Rathbun *et al.* (1992) were all found in open grassy areas with a southern exposure. The distance between the watercourse and upland nest locations range from a minimum of 16 meters to a maximum of 402 meters (Jennings *et al.* 1993 unpublished data, Rathbun *et al.* 1992). If suitable nesting sites are not available, females have been observed to travel up to 1.2 miles (2 kilometers) (Brattstrom and Messer 1988 as cited in Dudek).

Holland (1994) reports that nesting forays onto land may require several days, but Rathbun *et al.* (1992) reported an overnight trip. Nest excavation usually occurs in the morning or evening (Storer 1930). Incubation periods vary with latitude but are typically 80-126 days (Goodman 1997a, Holland 1994). Hatchlings in Oregon were observed not leaving the egg if the temperature exceeded 27 degrees Celsius, but they emerged from the egg within 2-3 hours after moving the egg to a cooler environment (Feldman 1982). Environmental sex determination occurs in pond turtles; at low incubation temperatures males are produced, and females are produced at higher temperatures. Ewert *et al.* (1994) found the pivotal temperature to be approximately 86° Fahrenheit.

“Low fecundity, low hatchling and juvenile survivorship, high adult survivorship, and a potentially long life-span characterizes the unique life history of *Clemmys marmorata*” (Jennings

et al. 1993). Females typically begin breeding at 8 to 14 years of age, although sexual maturity may be reached as early as 6 to 7 years in the southern part of its range (Goodman 1997; Gray 1995; Holland 1994; U.S. Fish and Wildlife Service 1996e unpublished data). Many females do not lay eggs every year, and complete failure of nests is not uncommon in some years or locations (Holland 1994). In addition, females are sensitive to disturbance during their overland movements to nest sites and may excavate one or more nests in which no eggs are laid (Holland 1991; Rathburn *et al.* unpublished data as cited in Jennings *et al.* 1993). Hatchlings and first-year juveniles have low survivorship, averaging about 8 to 12 percent, unpublished data as cited in Jennings *et al.* 1993). Annual survivorship is approximately 8 to 15 percent for 1 to 3-year age classes (Holland 1991; Lovitch 1999), and adult survival rates are approximately 45 percent (Gray 1995). The potential life span of *Clemmys marmorata* is over 40 years old (Holland 1991; Gray 1995). In the northern portions of their range, hatchlings remain in the nest through the winter, although in southern California, most emerge in the early fall (Holland 1994).

Due to their relatively long life span, the presence of turtles in a population may be a false indication that populations are healthy (Garrison 1998). The age structure of the majority of *Clemmys marmorata* populations are markedly deficient in juvenile animals, indicating a long-term pattern of reproductive failure (Holland 1994; Holland and Goodman 1998b unpublished data; Jennings *et al.* 1992 unpublished data; Nordby 1992). Small and isolated populations are more prone to extinction due to poor habitat quality, fluctuating environments, and increased difficulties finding mates (Lande 1988 as cited in Gray 1995). In addition, fragmented and isolated populations may suffer from inbreeding and loss of genetic variation, which are known to reduce the fitness of many animals and leave them vulnerable to catastrophic events.

While there is little to no dispersal information on this species, long distance movement has been documented. Movement can occur within a watercourse or can occur on land. Overland movement has been documented up to 5 kilometers (Holland 1994; Holland and Goodman 1998a). Movement between drainages also occurs but is relatively uncommon (Holland 1994). Due to increasing isolation of local populations, successful overland dispersal in northern populations is rare, essentially eliminating immigration and emigration in other regions (Holland 1991 as cited in Gray 1995).

Bury (1972) found that the distribution of turtles is not uniform, with aggregations occurring in pools. This results in spatial competition for limited resources, such as basking sites, at any given pool. Aggressive behaviors are exhibited by western pond turtles competing for adequate spacing at basking sites (Bury and Wolfheim 1973). Biting, ramming and pushing behaviors were observed between pond turtles to secure preferred basking sites (Bury *et al.* 1973).

Home range sizes vary between age and sex classes. Bury (1972) studied a population in a northern California stream and found that adult males had the largest range, averaging 2.42 acres with a mean length of 976 meters. Adult female home ranges averaged 0.62 acre with a mean length of 248 meters. Juveniles had the smallest home ranges, averaging 0.89 acre and 363 meters. Data for in-stream movement displayed similar trends. The elevational range for the species is from sea level to approximately 2,000 meters, but it's uncommon over 1,529 meters (Stebbins 1954; Bury 1963; Holland 1991, 1994; Jennings *et al.* 1993 unpublished data).

Status and Distribution

The historical range of *Clemmys marmorata* extended along most of the west coast of North America, primarily west of the Cascade-Sierra crest, from western British Columbia to northern Baja California, Mexico (Ernst *et al.* 1994; Holland 1994). The southwestern pond turtle ranges south of San Francisco Bay to northern Baja California, Mexico, and intergrades with the northwestern pond turtle in the San Joaquin Valley area of California (Bury 1970; Stebbins 1985; Holland 1994). The southern subspecies occurred in San Luis Obispo, Santa Barbara, Ventura, Kern, Los Angeles, Orange, Riverside, San Bernardino, and San Diego counties.

In recent years, the southwestern pond turtle population has experienced an alarming decline attributed to past and ongoing threats. Between Ventura County and the Mexican border known localities decreased from 87 sites in 1960 to only 53 sites by 1987 (Brattstrom 1988; Brattstrom and Messer 1988; Lovitch 1999). Brattstrom (1988) found that out of a total of 53 sites, 25 were in Ventura County, 10 were in Los Angeles County, 8 were in San Diego County, 4 were in Orange County, 3 were in southwestern San Bernardino County, and 3 were in western Riverside County. Of these populations, only 20 were thought to contain reproductively viable populations (*i.e.*, populations with 30 or more individuals were considered viable, however, this assumption has not been scientifically validated) (Brattstrom and Messer 1988).

Threats

Clemmys marmorata is susceptible to a wide variety of threats due to its wide ranging status and reliance on both aquatic and terrestrial habitat to complete its life cycle. Destruction of suitable habitat appears to be the largest threat to populations (Brattstrom 1988, Brattstrom and Messer 1988). Over 90 percent of wetland habitat within its historic California range has been eliminated by agricultural development, flood control and water diversion projects (*e.g.*, dams, reservoirs, channelization), and urbanization (U.S. Fish and Wildlife Service 1992, 1993d; Brattstrom and Messer 1988).

Other primary threats to the species include water pollution, predation by non-native (*e.g.*, red eared sliders, bass, bullfrogs) and native (*e.g.*, racoons, opossums) animals, disease and parasitism (pond turtles are highly susceptible to disease), overexploitation due to collection and past commercial harvesting practices, accidental capture from fishing practices (*e.g.*, hooks, lines, nets), boating, off-road vehicles, grazing (*e.g.*, trampling, manure, and lowered vegetation height), mining, and logging. These threats can cause direct mortality, or destroy, degrade, and fragment habitat resulting in the extirpation or reduction in reproductively viable populations (Brattstrom and Messer 1988; Holland 1991; Jennings 1992).

Roads are another significant threat to *Clemmys marmorata*. Holland (unpublished data 1993, 1998b) found that “pond turtles frequently cross roads during overland movements and are often hit by traffic, usually resulting mortality. In situations where roads parallel watercourses, mortality from traffic may be a primary factor in loss of animals of all size and age classes due to the high frequency of movement to and from the watercourse.” Roads also cause destruction and fragmentation of suitable habitat which can limit dispersal and isolate populations; in addition,

they can increase human contact (*e.g.*, collection) and pollute (*e.g.*, runoff) the biotic environment of the pond turtle.

Fire is another threat to *Clemmys marmorata*, particularly due to their limited mobility. Direct mortality to eggs, hatchlings, and adults can occur as result of fire. Fire also results in the loss of vegetation and can increase deposition of sediment in a watercourse rendering suitable aquatic habitat unviable (Holland and Goodman 1998a).

Pond turtles are also susceptible to drought conditions. Observations in California during 1987-1992 indicated that many populations in the southern and central portions of the State were severely impacted by drought, displaying declines of up to 85 percent and possibly more. Repeated sampling of several of populations indicated that many have failed to recover (*i.e.* capture rates have remained low from 1991-1994). Coupled with anthropogenic factors, drought may have a locally and regionally significant negative impact on western pond turtle populations” (Holland 1994, 1991).

Conservation Needs

The conservation needs for this species are important for maintaining viable populations throughout the Plan Area. These needs include conserving known populations, conserving both wetland and adjacent upland habitat with adequate buffers to ensure successful breeding and overwintering, maintaining landscape connectivity, maintaining natural hydrological processes (both upstream and downstream of known locations), and reducing and/or eliminating the overall threats to the species. The maintenance of hydrological processes should include maintaining natural flow regimes, sources, and natural connectivity of waterways. In addition, watercourses should remain free of pollutants and non-native species (*e.g.*, both invasive and/or exotic plant and animal species) (Holland 1991).

Another conservation need to ensure populations remain viable is to maintain movement corridors. While there appears to be a lack of information regarding the use of wildlife crossings by the southwestern pond turtle, it may be possible that wildlife crossings will be used by this species. While studies should be conducted to determine the utility of crossings for the southwestern pond turtle, the addition of wildlife crossings, including culverts, overpasses, and underpasses, should be considered for roadways that fragment suitable habitat. In addition, fencing should be installed along roadways to ensure pond turtles do not cross open roadways. The installation of wildlife crossings and installation of fencing/barriers is particularly important along existing roadways where mortality from road strikes occurs, in situations where roads parallel watercourses, and for new roads that may be occupied by the southwestern pond turtle. Since vehicular mortality is a significant yet avoidable cause of pond turtle decline, it is important that future roads be designed to avoid suitable habitat for the southwestern pond turtle.

Additional conservation needs include removal of grazing animals from suitable habitat, protection of nesting and overwintering sites, restricting public access to known locations particularly during the breeding and overwintering season, and calculated fire management practices to avoid mortality while ensuring suitable upland habitat is maintained (Holland 1991).

Public education is also needed to conserve this species. Educating the public can potentially decrease the introduction of exotic pet species into pond turtle habitat and decrease collection of this species in the wild (K. Meyer, U.S. Forest Service, pers. comm., 2003).

Environmental Baseline

The southwestern pond turtle is distributed in relatively isolated populations throughout the Plan Area. Due to mapping limitations, our model included those areas within the Plan Area that contained historical or recent records of the southwestern pond turtle. Modeled locations included the Santa Ana River, Chino Creek, Cajalco Creek, San Jacinto River, Murrieta Creek, Temecula Creek, Santa Rosa Plateau/Cole Creek, and San Mateo Creek. The primary vegetation types used to model habitat for the southwestern pond turtle were separated into two categories: wetlands and uplands. The wetlands category included meadows and marshes, riparian scrub and woodland forest, and open water; the uplands category included chaparral, coastal sage scrub, Riversidean alluvial fan sage scrub, grassland, and woodland and forest. Upland habitat adjacent to wetland habitat was modeled extending up to 1.2 miles from the wetland habitat and up to 6562 feet (2000 meters) in elevation. Since the Plan Area has not been thoroughly surveyed for the presence or absence of this species, additional occupied areas and suitable habitat may occur outside our modeled area.

Based on this analysis, the Plan Area supports approximately 10,363 acres of modeled wetland habitat and 81,679 acres of modeled upland habitat for southwestern pond turtle. Approximately 7,401 acres (71 percent) of modeled wetland habitat and 41,082 acres (50 percent) of modeled upland habitat occurs within PQP Lands. Five of the 18 known occurrences (27 percent) in our dataset were located within PQP Lands.

All potential habitat for the southwestern pond turtle within the Plan Area has not been surveyed. Historical records show that the southwestern pond turtle occurred in the Santa Ana River (Brattstrom and Messer 1988; D. Zembal, Orange County Water District pers. comm. 2003), the San Jacinto River (unverified record, MSHCP) and Chino Creek (Brattstrom and Messer 1988). Using our dataset and additional sources, this species is known to occur in the following locations: confluence of Temecula Creek and Murrieta Creek, in tributaries to Temecula Creek (primarily on Forest Service land, M. Warburton U.S. Geological Survey pers. comm. 2003), Santa Margarita River, San Mateo Creek, Cole Creek (R. Fisher, U.S. Geological Survey, pers. comm., 2002; C. Bell, The Nature Conservancy Santa Rosa Plateau Ecological Reserve, pers. comm., 2003), Cajalco Creek, and the Chino Hills State Park (B. Goodman 1994). An additional population may occur in Carbon Creek; however, this occurrence has not been confirmed (D. Zembal, pers. comm., 2003).

The status of these populations is described below:

- Brattstrom and Messer (1988) described the only viable population in Riverside County occurring at the confluence of Temecula Creek and Murrieta Creek. This population was considered to be large, containing approximately 40-50 turtles. In 2003, a Federal flood control project (*i.e.*, Murrieta Creek Flood Control Project) was approved to channelize most of Murrieta Creek. The project will be phased, with the first phase occurring just

upstream of the confluence of Temecula Creek and Murrieta Creek. The location of the first phase is within occupied southwestern pond turtle habitat and will directly impact the Temecula Creek/Murrieta Creek population. Relocation of this population began in November 2003, and are being relocated approximately one-half mile downstream of the project site within the Santa Margarita River. With implementation of this project, it is likely that the southwestern pond turtle will be extirpated from this site.

- The Temecula Creek/Murrieta Creek population has been experiencing a decline due to impacts to its habitat from surrounding housing and urban development (Brattstrom and Messer 1988) and periodic flooding attributed to upstream development (Roberts 1993c). Upstream channelization in both creeks and mining operations upstream in Temecula Creek have altered the downstream hydrology. An additional and potentially significant threat to this population is the use of this area for recreation (*e.g.*, swimming) by the public. With increased contact between the public and the southwestern pond turtle, collection and disturbance may be a significant factor in the recent decline of this population (K. Meyer, U.S. Forest Service pers. comm. 1993).
- The Temecula Creek/Murrieta Creek population extends into the Santa Margarita River where 107 acres of wetlands were removed and a channel was excavated in 1993 (Roberts 1993c).
- Extant populations are known to be using the Santa Margarita River, however, it is unclear as to how much of these populations occur within Riverside County or the Plan Area.
- Extant populations have been documented in the San Mateo Creek (C. Bell, 2003), however, we do not have information as to the status of this population.
- Extant populations are known to occur in tributaries to Temecula Creek within Forest Service lands (M. Warburton U.S. Geological Survey pers. comm. 2003).
- We do not have information as to whether the Chino Creek populations is extant. Brattstrom and Messer (1988) noted that declines in water quality in Chino Creek may have rendered the creek unsuitable to support the turtle.
- A portion of the population in Chino Hills State Park occurs within PQP Lands in the Plan Area (Alissa Eng 2003).
- In 1988 Brattstrom and Messer confirmed populations in the Santa Ana River. Today, the Santa Ana River is currently not known to be occupied (D. Zembal, Orange County Water District, pers. comm., 2003). It is likely that past changes in hydrology due to water diversion projects, increased fill, invasion of exotic plants and animals, and increasing urbanization has rendered the Santa Ana River unsuitable to support the turtle (Brattstrom and Messer 1988; D. Zembal, Orange County Water District, pers. comm., 2003).

- The Cole Creek population (including the Santa Rosa Plateau Ecological Reserve and extending into Sylvan Meadows) contains approximately 280 southwestern pond turtles ranging from 1 to 12 years of age. This population appears to be reproductively viable, producing double clutches in some years. The majority of the Cole Creek population is not contained within the conserved lands of the Santa Rosa Plateau Ecological Reserve but is within Sylvan Meadows that is owned by Riverside County Parks and Open Space District. Southwestern pond turtles within Sylvan Meadows are threatened primarily by recreational use (*e.g.*, horses and mountain bikers that cause increased erosion and the introduction of exotic grasses) (C. Bell, The Nature Conservancy, Santa Rosa Plateau Ecological Reserve, pers. comm., 2003). In addition, the Cole Creek population has been affected by surrounding rural development, altered local hydrology (Roberts 1993c), dewatering of streams for local wells, increased human disturbance, and roads (*e.g.*, mortality on Tenaja Road has been documented during the nesting season (C. Bell, The Nature Conservancy, Santa Rosa Plateau Ecological Reserve, pers. comm., 2003). Nearby development also poses a significant risk to riparian habitat due to the lack of a buffer between the development and the habitat (U.S. Geological Survey 2002c).
- Cajalco Creek is threatened by construction of the Cajalco Creek dam (Roberts 1993c). We do not have information as to whether this population remains extant.
- We were unable to verify that an extant population in the San Jacinto River exists.

Effects of the Action

Direct Effects

The Plan Area includes 10,363 acres of modeled wetland habitat and 81,679 acres of modeled upland habitat for the southwestern pond turtle. Southwestern pond turtles will be subject to impacts associated with development and other proposed Covered Activities over the 75-year permit term within 1,025 acres (10 percent) of modeled wetland habitat and 26,200 acres (33 percent) of modeled upland habitat, which encompasses 10 of the 18 (55 percent) southwestern pond turtle observations in our dataset. It is anticipated that most southwestern pond turtles in these areas will be injured or killed as a result of habitat loss and activities such as grading, construction, water diversion/flood control projects, and fill of aquatic habitat, although some may survive in areas avoided as a result of the Riparian/Riverine Areas and Vernal Pools policy.

To offset the loss of southwestern pond turtle habitat within the Plan Area, implementation of the MSHCP will conserve and manage areas containing modeled habitat for the pond turtle. Conserved habitat within the Additional Reserve Lands will include 1,936 acres (19 percent) of modeled wetland habitat and 13,398 acres (17 percent) of modeled upland habitat that encompass 3 of the 18 (17 percent) southwestern pond turtle observations in our dataset. Another 7,401 acres (71 percent) acres of modeled wetland habitat and 41,082 acres (50 percent) of modeled upland habitat will remain within PQP Lands. PQP Lands encompass 5 of the 18 (28 percent) southwestern pond turtle observations in our dataset. In total, 90 percent of the modeled wetland habitat and 67 percent of the modeled upland habitat for the southwestern pond turtle

will be conserved or remain in the Plan Area. This modeled habitat includes 45 percent of the southwestern pond turtle observations in our dataset.

The MSHCP proposes at least eight Core Areas to support the southwestern pond turtle within the MSHCP Conservation Area. These areas are Cajalco Creek, San Mateo Creek, Santa Ana River, Chino Creek, Temecula Creek, Murrieta Creek, Santa Rosa Plateau, and San Jacinto River. The MSHCP also proposes to conserve riparian/wetland and overland dispersal habitat for the southwestern pond turtle. We expect pond turtle movement could occur in the following riparian/wetland and overland dispersal habitat, as identified in the MSHCP, based on verified occurrences in our dataset and/or the presence of potentially suitable habitat: Santa Margarita River, Temecula Creek, Murrieta Creek, Temescal Wash, Santa Ana River, San Timoteo Canyon Creek, Sycamore Canyon Creek, Kolb Creek, Wilson Creek, Tule Creek, and Vail Lake.

We do not expect southwestern pond turtle movement through the following drainages or waters due to the absence of verifiable records and/or appropriate habitat (these areas are identified in the MSHCP as viable locations): San Gorgonio Wash, Poppet Creek, Bautista Creek, Diamond Valley Lake, Lake Elsinore, Lake Mathews, Lake Perris, and Canyon Lake. (We could not locate the Cottonwood Creek location and therefore cannot confirm nor deny its utility).

While the riparian/wetland and overland dispersal areas identified above may have some movement value, the majority of the Core Areas are not connected by upland habitat linkages or are connected only by impeded drainages (*i.e.*, drainages that have been channelized, lined or dammed). The following is an analysis of the connectivity among the eight Core Areas:

- We anticipate that any populations that may occur within the Santa Ana River Core Area and Chino Creek Core Area would be able to interact with one another. We expect the Santa Ana River and Chino Creek Core Areas to be isolated from the remaining Core Areas. We are uncertain as to any connectivity between the Chino Hills State Park population and other populations in the Plan Area.
- We expect Cajalco Creek to be isolated from the remaining Core Areas due to channelization within Temescal Wash and lack of connectivity to surrounding watersheds.
- We expect the San Jacinto River to be isolated from the remaining Core Areas because it is within its own watershed and surrounding urbanization and water diversion projects would render connectivity to other Core Areas unlikely. Due to channelization between Bautista Creek and the San Jacinto River, we do not anticipate the interaction of potential populations between these two areas.
- The Cole Creek population could potentially interact with the San Mateo Creek population, but both Core Areas will be isolated from the remaining Core Areas. While both of these populations are within different watersheds, they will be connected through Proposed Linkage 9. Furthermore, the Army Corps of Engineers' Murrieta Creek Flood Control Project will isolate the Cole Creek Core Area and the Murrieta Creek Core Area.

- We expect the Temecula Creek Core Area to be isolated from the remaining Core Areas due to the Murrieta Creek Flood Control Project. The Temecula Creek population will likely benefit from potential habitat in Kolb, Tule, and Wilson Creeks; however, we do not have data that suggests that these creeks are occupied.
- Due to the anticipated channelization of Murrieta Creek associated with the Murrieta Creek Flood Control Project, we do not anticipate the Murrieta Creek Core area to provide functioning habitat for the southwestern pond turtle.

The isolation of the southwestern pond turtle within the Plan Area may lead to deleterious genetic effects associated with inbreeding depression and susceptibility to catastrophic events (*e.g.*, fire, drought), thereby causing the eventual extirpation of populations. Due to their relative isolation and low probability of movement between watersheds, extirpated populations are unlikely to be replaced by dispersing individuals from other populations.

The Permittees will implement management and monitoring practices within the Additional Reserve Lands including surveys for the southwestern pond turtle. Cooperative management and monitoring are anticipated on PQP Lands. Surveys for the southwestern pond turtle will be conducted at least every three years to verify occupancy at a minimum of 75 percent of the Core Areas identified above. If a decline in the distribution of the southwestern pond turtle is documented below this threshold, management measures will be triggered, as appropriate, to meet the species-specific objectives identified in Section 9, Table 9.2 of the MSHCP.

Other management actions described in Section 5.0, Table 5.2, and Section 7.0 (Guidelines Pertaining to the Urban/Wildlands Interface) of the MSHCP, such as maintaining natural hydrological and ecological processes, controlling unauthorized public access and off-road vehicle use, limiting livestock access from entering watercourses, limiting recreational use in certain areas, managing for urban-related predators, removing exotic vegetation and aquatic species, and managing for other specific threats to the species will help maintain habitat and populations of the southwestern pond turtle within Core Areas. In addition, we anticipate that implementation of the Riparian/Riverine Area and Vernal Pools policy will assist in providing some protection to this species' habitats by avoiding and/or minimizing direct impacts to riparian, riverine, and vernal pool habitats.

Management activities, such as prescribed burning and pitfall trapping, could result in death or injury to southwestern pond turtles. It is anticipated that any impacts to southwestern pond turtles from management actions will be minimized by adherence to appropriate survey protocols and other guidelines described in Section 7.4 of the MSHCP.

Indirect Effects

The southwestern pond turtle could be subject to indirect effects from Covered Activities both inside and outside of the MSHCP Conservation Area. These include the indirect effects described in the "General Effects" section of this biological opinion. Because of their susceptibility to mortality and fragmentation due to roads, the southwestern pond turtle is likely to be vulnerable to indirect effects (*e.g.*, increased vehicle strikes) associated with roads. The

Guidelines for Construction of Wildlife Crossing in Section 7 associated with new and expanded roadways could potentially help minimize the impact of roads on habitat connectivity and pond turtle mortality. In addition, because of the southwestern pond turtles' susceptibility to changes in hydrological processes and water quality it is likely to be vulnerable to indirect effects associated with changes in the hydrological regime of its aquatic habitat. Implementation of the Riparian/Riverine Areas and Vernal Pools policy, the Guidelines Pertaining to the Urban/Wildlands Interface, and the management provisions listed above will help to reduce these indirect effects.

Conclusion

We anticipate the proposed action will directly and indirectly affect the southwestern pond turtle as described in the analyses above, including the loss of 55 percent of its modeled habitat in the Plan Area. While the MSHCP proposes eight Core Areas for the southwestern pond turtle, four of these areas (i.e., San Jacinto River, Santa Ana River, Chino Creek, and Cajalco Creek) are no longer known to be occupied. Furthermore, the population occurring at the confluence of Murrieta Creek/Temecula Creek is anticipated to be lost due to the Murrieta Creek Flood Control Project. Surveys conducted every 3 years will verify the presence or absence of the southwestern pond turtle in these areas and any additional areas as mentioned above. We anticipate that the remaining four areas with confirmed populations (Cole Creek watershed [including the Santa Rosa Plateau Ecological Reserve], the Santa Margarita River, San Mateo Creek, and Temecula Creek) will be conserved within the Conservation Area and that these populations will persist. In addition, we anticipate that 45 percent of the modeled habitat within PQP Lands and Additional Reserve Lands will be conserved and will be monitored and managed cooperatively to benefit this species. Should new populations be discovered within the Conservation Area, the conservation of these lands should benefit the species. Implementation of the avoidance, minimization, and mitigation measures identified in the Plan will reduce the impacts to this species.

Throughout its range southwestern pond turtle populations have become increasingly isolated from one another. Implementation of the MSHCP will further isolate individual populations within the Plan Area and leave them susceptible to catastrophic events (*e.g.*, fire, floods), genetic inbreeding, and loss of genetic variation rendering them vulnerable to local extirpation. However, due to the relatively wide-ranging status of the species coupled with the protection and management of populations within the Conservation Area, the proposed project will not appreciably reduce the overall numbers of individuals throughout the species range nor appreciably reduce its distribution. In addition, while data suggests that southwestern pond turtle populations may be lacking in juvenile recruitment, the proposed project will not appreciably reduce the capacity for reproduction of this species. The impacts to modeled habitat from implementation of the MSHCP will be offset by the protection and management of the MSHCP Conservation Area. Therefore, after reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the southwestern pond turtle.

Amount or Extent of Take

We anticipate the take of all southwestern pond turtles within up to 10,363 acres of modeled wetland habitat and up to 81,679 acres of modeled upland habitat outside of the MSHCP Conservation Area. A small, but undeterminable, number of southwestern pond turtles are anticipated to be taken as a result of management actions within the Additional Reserve Lands. Take will be in the form of harm, death, and injury. This level of anticipated take is not likely to result in jeopardy to the southwestern pond turtle.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

We recommend that the following conservation measures be implemented:

The Service should provide technical assistance to the applicants throughout the term of the permit, including advice on monitoring and other biological issues associated with implementation of the Plan.

REINITIATION NOTICE

This concludes formal consultation and conference on the proposed issuance of an incidental take permit to implement the Western Riverside MSHCP. As provided by 50 CFR 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: 1) the amount or extent of incidental take is exceeded; 2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; 3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or 4) a new species not addressed by this document is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

The Incidental Take Statement provided in this conference opinion for unlisted Covered Species does not become effective until the unlisted Covered Species is listed and the conference opinion is adopted as the biological opinion issued through formal consultation. If you have any questions concerning this consultation, please contact the Service's Carlsbad Fish and Wildlife Office at (760) 431-9440.

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APPENDIX 1



Richard K. Lashbrook
Agency Director

COUNTY OF RIVERSIDE

TRANSPORTATION AND LAND MANAGEMENT AGENCY



James J. Miller
Director



George A. Johnson, P.E.
Director



Robert C. Johnson
Director

VIA OVERNIGHT DELIVERY

May 21, 2004

Jim Bartel, Field Supervisor
United States Fish & Wildlife Service
Carlsbad Office
6010 Hidden Valley Road
Carlsbad, CA 92009

Re: Western Riverside County Multiple Species Habitat Conservation Plan Errata

Dear Jim:

Enclosed please find an Errata from the County of Riverside for the Western Riverside County Multiple Species Habitat Conservation Plan ("MSHCP"). As indicated in the attached Errata, since the County of Riverside's approval of the MSHCP in June of 2003, we have identified several areas in the documents that could benefit from clarification with regard to implementation. Additionally, we have noted several minor technical errors in the document. We hope that this Errata will assist the United States Fish & Wildlife Service in final issuance of the permit for the MSHCP.

Please feel free to call me if you have any questions.

Sincerely,

Richard Lashbrook
hb

Richard Lashbrook
Transportation and Land Management Agency Director

RL:hb

Enclosure

cc: Karin Watts-Bazan, Esq., Riverside County Deputy Counsel
Michelle Ouellette, Esq., Best Best & Krieger LLP
June Collins, Dudek & Associates, Inc.
Ron Rempel, Department of Fish and Game

Errata to MSHCP

INTRODUCTION

Since the time of the County of Riverside's approval of the Final MSHCP on June 17, 2003, there have been a number of minor technical errors that have been identified. . In addition, as the USFWS and CDFG have been preparing their independent analyses related to their permit actions, it has been noted that clarification of certain items would be beneficial for implementation of the Plan. Therefore, the following errata have been prepared to address these issues. The two categories of errata are noted separately, so that the reader can easily determine which are clarifications to language and concepts discussed in the Plan and which are actual corrections to text and graphics in the Plan.

CLARIFICATIONS

CLARIFICATION: Definition

The definition of MSHCP Conservation Area is the area that will be conserved and managed for the benefit of Covered Species, including the conservation and management of Conserved Habitat.

CLARIFICATION: Species Accounts

The Species Accounts present in their entirety in the MSHCP, Volume II, Section B and in summary form in Section 9-2 of the MSHCP include quantifications of anticipated acres and percentages of conserved habitat for Covered Species. These quantifications were derived from the raw GIS data developed for the MSHCP and included intersections of the GIS layers used to define suitable habitat for each individual Covered Species with the Conceptual Reserve Design (CRD) developed for the MSHCP as described in Section 3 of the Plan. The individual Species Accounts included in Volume II, Section B of the MSHCP describe the data layers used to define suitable habitat for each individual Covered Species. Typically multiple data layers (such as vegetation (collapsed or uncollapsed), bioregion, elevation, soils) were used to define suitable habitat. These layers were then intersected with the CRD and tabular summaries of raw GIS data were created. Consultant biologists used the raw GIS data to derive the quantifications of acres and percentages of conserved habitat presented in the June 17, 2003 Final MSHCP.

During preparation of the Biological Opinion (BO) for the MSHCP, the Service requested that the County's MSHCP consultant provide shape files of the suitable habitat models developed for the Plan by the MSHCP consultant. During this process, the MSHCP consultant compared the quantifications in the suitable habitat models being provided to the Service with the quantifications appearing in the June 17, 2003 Final MSHCP. At that time, calculation errors

Errata to MSHCP

were noted and reported to the Service for the following seven species as noted on the attached table: Delhi sands flower-loving fly, Riverside fairy shrimp, vernal pool fairy shrimp, arroyo toad, southwestern pond turtle, southern rubber boa, round-leaved filaree. These errors were simply calculation errors in transferring the tabular summaries from the raw GIS data to the tables in the MSHCP and do not represent any change in the data base used to develop the MSHCP, the analysis in the MSHCP or the CRD used as a basis for the conservation analysis in the MSHCP. The changed acreages shown on the attached Table 1 do not represent substantial new information and do not alter the analysis and conclusions in the June 17, 2003 Final MSHCP.

CLARIFICATION: Winchester to Temecula CETAP Corridor

In Section 7.3.5, p. 7-38 to 7-40, the MSHCP Plan addresses alignment alternatives for the Winchester to Temecula CETAP Corridor, including alternatives identified as 1, 7a, and 7b. To reduce environmental impacts of this CETAP Corridor, the adopted alignment used less sensitive portions of alternatives 1, 7a and 7b to create a hybrid alternative. The hybrid alignment includes improvements to I-15, I-215 and Date Street, all of which are addressed in the discussion of improvements to freeways (I-15 and I-215) and Circulation Element Roads (Date Street). Therefore the hybrid alignment replaces the alternatives specifically identified in the MSHCP for the Winchester to Temecula Corridor, and it is only the hybrid alignment that is proposed as a Covered Activity.

CLARIFICATION: Flood Control

The discussion of covered flood control activities in Section 7.3.7, includes a list of anticipated flood control improvements within the Plan Area (Table 7-14), including improvements within the Prado Basin. As of the date of issuance of the permit, the Riverside County Flood Control District is not proposing any improvement projects within the Prado Basin.

CLARIFICATION: Hunting within the MSHCP Conservation Area

For clarification purposes where hunting is noted in Section 7.4.2 as a covered public access activity, coverage is provided for Incidental Take of Covered Species associated with access to allow for hunting, not for the intentional take of animals resulting from hunting.

Errata to MSHCP

CORRECTIONS

CORRECTION: PQP Lands Replacement

For clarification purposes regarding the replacement of PQP Lands that are used for purposes that would not contribute to Reserve Assembly, the following revision is made to Section 3.2.1, under the subheading of Public/Quasi-Public Lands. The last sentence is revised as follows:

Within five years of Permit issuance, the RCA shall verify the precise acreage, location, amount and status of PQP Lands in the MSHCP Conservation Area. Such information shall be submitted to the Wildlife Agencies for review. It is anticipated that during this time period, the status of PQP Lands will be verified and that periodic revisions or amendments will occur to property depicted as PQP Lands on the MSHCP Plan Map (*Figure 3-1*). If aside from this process, a Permittee elects to use property currently depicted as PQP Lands on the MSHCP Plan map (*Figure 3-1*) as may be amended or revised, in a way that alters the land use such that it would not contribute to Reserve Assembly the Permittee shall locate and acquire or otherwise encumber replacement acreage at a minimum ratio of 1:1 replacement taking into account direct and indirect effects of PQP Lands in one location with PQP Lands in another location. The Permittee must make findings that the replacement acreage is biologically equivalent or superior to the existing property using the same process identified for future facilities proposed on PQP Lands, as set forth in Section 7.2.4 of the MSHCP, Volume I.

CORRECTION: Species Surveys

Analysis conducted by FWS indicated potential suitable habitat for certain previously identified narrow endemic plant survey species and certain previously identified Criteria Area plant survey species in certain previously identified survey areas. It was recommended that the list of plants to be surveyed for in these previously identified survey areas be expanded to include the previously identified narrow endemic plant species and Criteria Area plant species noted by FWS during their analysis. The species to be added from the existing survey species list are highlighted on the attached Figures 6-1 and 6-2 and on the attached Table 6-1. Data for these additional plant species would be gathered during survey efforts as identified in the June 17, 2003 MSHCP, and survey efforts beyond those identified in the June 17, 2003 MSHCP would not be required.

CORRECTION: Species Surveys

Table 6-1 and Figures 6-1 and 6-2 are revised to be consistent with FWS recommendations.

Errata to MSHCP

CORRECTION: Definition

An additional term is added to the Definitions Section of Volume I of the MSHCP for "Emergency" as follows:

Emergency For purposes of the MSHCP, an emergency is defined as an immediate threat of death, injury or property loss that is both imminent and foreseeable. An emergency situation is one that either has occurred or will likely occur within a matter of days.

CORRECTION: Management Funding

Section 5.2, p. 5-2, 4th line is revised as follows:

"...Management to ensure that the Covered Species and vegetation Communities within the MSHCP Conservation Area are maintained and enhanced in perpetuity."

CORRECTION: Management

Section 5.2.1, p. 5-8, #7 is revised as follows:

"...species presence and continued use shall be verified at 75%..."

CORRECTION: Cores and Linkages

Section 3.2.3, p. 3-34, is revised to remove mountain lion as a planning species for Existing Core C.

CORRECTION: Covered Activities

Section 7.5.2, p. 7-84, 2nd bullet, is revised as follows:

"wildlife movement areas.."

CORRECTION: Covered Activities

Section 7.5.2, p. 7-84 heading is revised as follows:

Errata to MSHCP

“Specific Initial Guidelines for Wildlife Movement Design Considerations within the Criteria Area and PQP Lands”

CORRECTION: Area Plans

Section 3.3.13, p. 3-342 is revised to add San Jacinto Valley crownscale as a planning species for the Hemet Vernal Pool Areas-East portion of the Area Plan.

Errata to MSHCP

TABLE 1

SPECIES	OLD TOTAL ACRES	OLD CONSERVED ACRES	NEW TOTAL ACRES	NEW CONSERVED ACRES	OLD % CONSERVED	NEW % CONSERVED	DISCUSSION
Delhi sands flower-loving fly - primary habitat	502	50	582	51	10%	9%	No appreciable amount or percent conserved
Delhi sands flower-loving fly - restorable habitat	961	170	2,002	355	18%	18%	Percentage conserved remains the same.
Riverside fairy shrimp	17,810	11,942	11,042	9,224	67%	84%	While overall acreage is reduced, the percentage of available habitat conserved increases.
Vernal pool fairy shrimp	7,206	3,123	11,429	6,890	43%	60%	Overall acreage increases and percentage of available habitat conserved increases.
Arroyo toad - breeding habitat	1,898	1,602	2,072	1,947	84%	94%	Overall acreage increases and percentage of available habitat conserved increases.
Arroyo toad - upland habitat	9,326	7,005	15,543	13,030	75%	84%	Overall acreage increases and percentage of available habitat conserved increases.
Southwestern pond turtle - primary habitat	23,701	18,289	10,458	9,195	77%	88%	While overall acreage is reduced, the percentage of available habitat conserved increases.
Southwestern pond turtle - upland habitat	94,067	59,999	94,067	59,999	64%	64%	No change to this portion of the analysis.
Southern rubber boa	2,729	2,577	51,978	41,477	94%	80%	While percentage of available habitat conserved decreases, the amount of conserved habitat increases 16 fold.
Round-leaved filaree	251,771	37,663	132,374	39,614	15%	30%	Percent conserved increases.



6.0 MSHCP Implementation Structure



TABLE 6-1
NARROW ENDEMIC AND CRITERIA AREA SURVEY
PLANT SPECIES ATTRIBUTES AND HABITAT AFFINITIES

Species	NEPSSA Survey Area ID #	Annual/Perennial	Habitat	Soils	Blooming Period	Special Considerations
Narrow Endemic Plant Species (14 total)						
Brand's phacelia <i>Phacelia stellaris</i>	7	Annual	Sandy washes and/or benches in alluvial flood plains.	Sandy soils	March through June	This species is generally dependent on periodic flooding and sediment transport. Population size may vary from year to year depending upon rainfall.
California Orcutt grass <i>Orcuttia californica</i>	1, 2, 3, 4, 9	Annual	Vernal pools	Alkaline soils and southern basaltic claypan.	April through June	In Riverside County, this species can be difficult to detect as the vernal pools it inhabits may receive enough water to germinate and grow the plants only two or three times a decade. Therefore, surveys conducted during years of rainfall inadequate to germinate the species may not result in detection.
Hammitt's clay-cress (F) <i>Sibaropsis hammittii</i>	1, 2, 9	Annual	Chaparral and valley and foothill grassland habitats at elevations of 700 m to 1,100 m.	Clay soils	March through April	
Johnston's rockcress (F) <i>Arabis johnstoni</i>	6	Perennial	Chaparral and pine forest at elevations of 1,400 m to 2,150 m.	No known soils requirements.	February to June	Johnston's rockcress is known to occur in association with Munz's mariposa lily.

6.0 MSHCP Implementation Structure



**TABLE 6-1
NARROW ENDEMIC AND CRITERIA AREA SURVEY
PLANT SPECIES ATTRIBUTES AND HABITAT AFFINITIES**

Species	NEPSSA Survey Area ID #	Annual/ Perennial	Habitat	Soils	Blooming Period	Special Considerations
many-stemmed dudleya <i>Dudleya</i> <i>multicaulis</i>	1, 2, 4, 3, 3a, 4, 5, 8, 9	Perennial	Clay soils in barrens, rocky places, and ridgelines as well as thinly vegetated openings in chaparral, coastal sage scrub, and southern needlegrass grasslands on clay soils.	Clay soils	May and June although flowering can take place as early as March in coastal locations.	Observations indicate that early rains followed by prolonged dry periods during midwinter may cause individuals to become dormant while extended periods of rain throughout the rainy season encourage flowering. Many- stemmed dudleya is an ephemeral perennial originating from a corm and thus, may not be detectable from one year to the next. Population size varies considerably from year to year both in number of seedlings produced and number of mature plants leafing out. Populations may not be detectable in dry years and population boundaries may be difficult to delineate.
Munz's mariposa lily (F) <i>Calochortus</i> <i>palmeri</i> var. <i>munzii</i>	6	Perennial bulb	Seasonally-moist, fine granitic loam on exposed knolls in the shade of lower montane coniferous forest (yellow pine woodland), and on moist, sandy	Fine granitic loam and sandy clay.	May through July	Munz's mariposa lily is known to occur in association with Johnston's rockcress.

6.0 MSHCP Implementation Structure



**TABLE 6-1
NARROW ENDEMIC AND CRITERIA AREA SURVEY
PLANT SPECIES ATTRIBUTES AND HABITAT AFFINITIES**

Species	NEPSSA Survey Area ID #	Annual/ Perennial	Habitat	Soils	Blooming Period	Special Considerations
			clay in chaparral and meadows at elevations between 900 m and 1640 m.			
Munz's onion <i>Allium munzii</i>	1, 2, 3, 4	Perennial bulb	Mesic exposures or seasonally moist microsites in grassy openings in coastal sage scrub, chaparral, juniper woodland, valley and foothill grasslands in clay soils.	Munz's onion is restricted to clay soils with the exception of one population documented to occur in association with pyroxenite outcrops	April through May	A bulb-bearing perennial, this species may not flower in very dry years and may be difficult to locate during surveys conducted in such a year.
San Diego ambrosia <i>Ambrosia pumila</i>	2, 3, 3a, 4, 7	Perennial	Open floodplain terraces or on in the watershed margins of vernal pools. This species occurs in a variety of associations that are dominated by sparse non-native grasslands or ruderal habitat in association with river terraces, vernal pools, and alkali playas.	Garretson gravelly fine sandy loams when in association with floodplains, and on Las Posas loam in close proximity to silty, alkaline soils of the Willows series	San Diego ambrosia appears to be primarily a clonal species that does not, under current conditions, favor sexual reproduction.	A portion of San Diego ambrosia populations remain dormant in dry years and because of its vegetative similarity with other <i>Ambrosia</i> spp., it is difficult to inventory in terms of identification, number of individuals and true spatial extent of populations. Additional multi-year surveys are usually necessary to determine presence or absence of the species in superficially suitable habitats.
San Jacinto Mountains bedstraw (F) <i>Galium angustifolium</i> ssp. <i>jacinticum</i>	6	Annual/ perennial	Partially shady, lower montane mixed forest and coniferous forest.	No known soils requirements.	June through August	

6.0 MSHCP Implementation Structure



**TABLE 6-1
NARROW ENDEMIC AND CRITERIA AREA SURVEY
PLANT SPECIES ATTRIBUTES AND HABITAT AFFINITIES**

Species	NEPSSA Survey Area ID #	Annual/Perennial	Habitat	Soils	Blooming Period	Special Considerations
San Miguel savory (Santa Rosa Plateau, Steele Rock)	1, 7, 9	Perennial	Coastal sage scrub, chaparral, cismontane woodland, riparian woodland, and valley and foothill grasslands.	Rocky, gabbroic and metavolcanic substrates.	March through May	
<i>Satureja chandleri</i> slender-horned spine flower <i>Dodecahema leptoceras</i>	1, 5	Annual	At the majority of sites, slender-horned spine flower is found in sandy soil in association with mature alluvial scrub. In the Vail Lake area this species is also associated with gravel soils of Temecula arkose deposits in association with open chamise chaparral. The ideal habitat appears to be a terrace or bench that receives overbank deposits every 50 to 100 years.	Sandy or gravelly soils, frequently with cryptogamic crusts.	April through June	This species is generally dependent on mature alluvial scrub that is maintained by periodic flooding and sediment transport. Individuals are small, and thus may be difficult to locate. Population size varies considerably from year to year depending upon rainfall.
spreading navarretia <i>Navarretia fossalis</i>	1, 2, 3, 4, 9	Annual	Vernal pools and depressions and ditches in areas that once supported vernal pools.	Saline-alkaline	May through June	Upon fruiting, this species fades rapidly and can be difficult to detect late in the dry season or in dry years
Wright's trichocoronis <i>Trichocoronis wrightii</i> var. <i>wrightii</i>	1, 2, 3, 4, 9	Annual	Alkali playa, alkali annual grassland, and alkali vernal pools.	Alkali soils	May to September	

6.0 MSHCP Implementation Structure



**TABLE 6-1
NARROW ENDEMIC AND CRITERIA AREA SURVEY
PLANT SPECIES ATTRIBUTES AND HABITAT AFFINITIES**

Species	NEPSSA Survey Area ID #	Annual/ Perennial	Habitat	Soils	Blooming Period	Special Considerations
Yucaipa onion <i>Allium marvinii</i>	8	Perennial bulb	Openings in chaparral habitat at elevations between 760 and 1065 m.	Clay	April through May	A bulb-bearing perennial, this species may not flower in very dry years and may be difficult to locate during surveys conducted in such a year.

6.0 MSHCP Implementation Structure



**TABLE 6-1
NARROW ENDEMIC AND CRITERIA AREA SURVEY
PLANT SPECIES ATTRIBUTES AND HABITAT AFFINITIES**

Species	Criteria Area Survey	Annual/Perennial	Habitat	Soils	Blooming Period	Special Considerations
	ID #					
Criteria Area Survey Plant Species (13 total)						
Coulter's goldfields <i>Lasthenia glabrata</i> ssp. <i>coulteri</i>	1, 2, 3, 4, 7	Annual	Alkali scrub, alkali playas, vernal pools, and, alkali grasslands.	Traver, Domino and Willows soils. Most Riverside County populations are associated with the Willows soil series.	February through June	Because of its annual habit and reliance on periodic inundation, population size varies considerably from year to year, and can be difficult to recognize in dry years or after recent disturbance such as discing.
Davidson's saltscale <i>Atriplex serenana</i> var. <i>dauidsonii</i>	1, 2, 3, 4, 7	Annual	Alkali vernal pools, alkali annual grassland, alkali playa, and alkali scrub components of alkali vernal plains.	Domino, Willows and Traver soils series.	May through October	Low, obscure, and difficult to distinguish from other saltbushes. Because of its annual habit and reliance on periodic inundation, population size varies considerably from year to year. This species can be difficult to recognize in dry years or after recent disturbance such as discing.
heart-leaved pitcher sage <i>Lepechinia cardiophylla</i>	7, 8	Perennial	Closed-cone coniferous forest, chaparral and cismontane woodland.	Decomposed granite soils.	April through July	
little mousetail <i>Myosurus minimus</i>	1, 2, 3, 4	Annual	Vernal pools and within the alkali vernal pools and alkali annual grassland components of alkali vernal plains.	Alkaline soils.	April through May	Little mousetail depends on specific hydrology associated with vernal pools. This species may not germinate or be detectable in dry years. Little mousetail is associated with California Orcutt's grass, San Diego button celery, Orcutt's brodiaea, Coulter's goldfields, San Jacinto Valley crownscale, Davidson's saltscale, Parish's brittlescale, vernal barley, smooth tarplant, and thread-leaved brodiaea.

6.0 MSHCP Implementation Structure



**TABLE 6-1
NARROW ENDEMIC AND CRITERIA AREA SURVEY
PLANT SPECIES ATTRIBUTES AND HABITAT AFFINITIES**

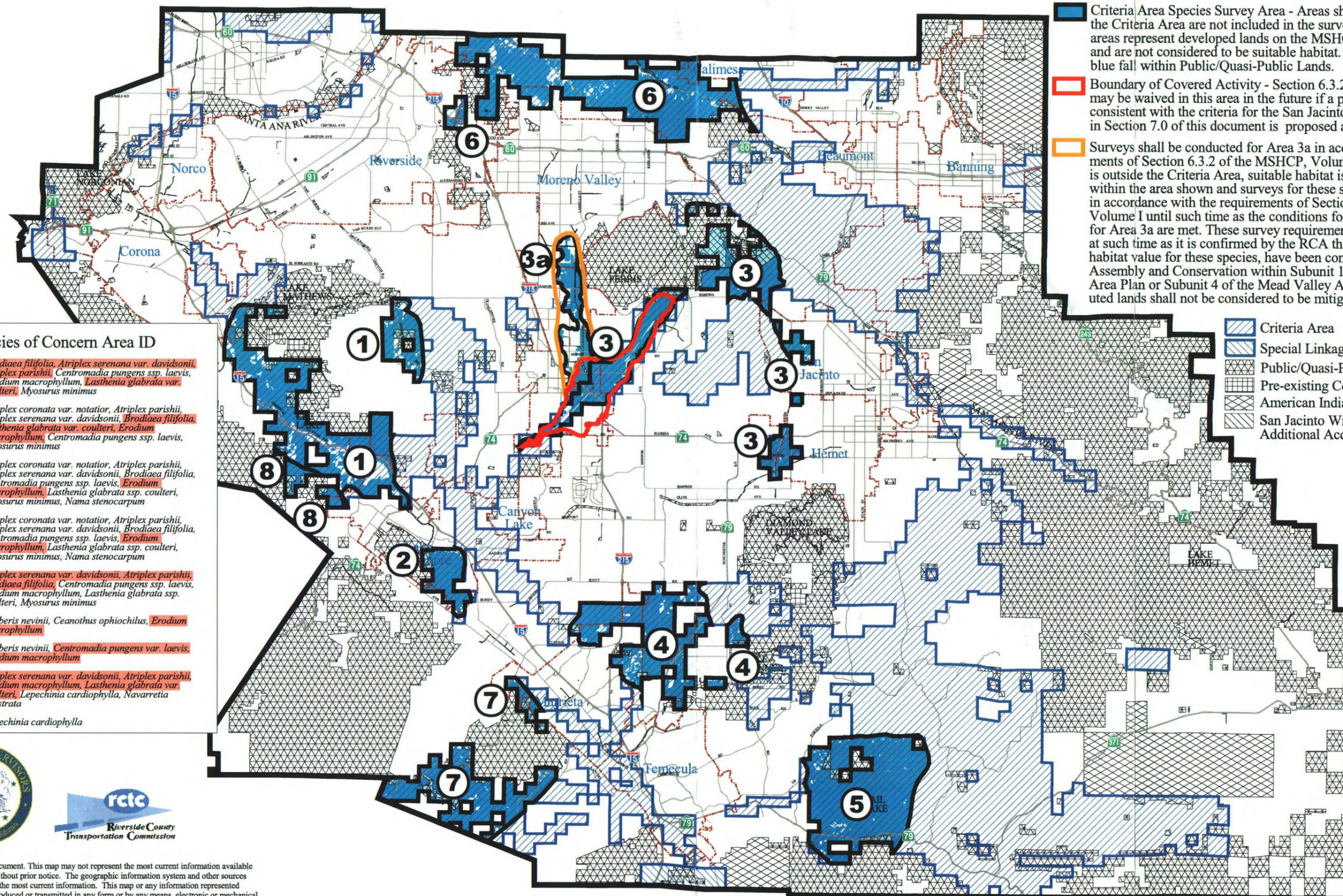
Species	Criteria Area Survey ID #	Annual/Perennial	Habitat	Soils	Blooming Period	Special Considerations
mud nama <i>Nama stenocarpum</i>	7	Annual	Muddy embankments of marshes and swamps, and within lake margins and riverbanks.		January through July	
Nevin's barberry <i>Berberis nevini</i>	5, 6	Perennial	Chaparral and alluvial scrub.	Coarse soils and rocky slopes (chaparral) and gravelly wash margins (alluvial scrub).	March through April	
Parish's brittlescale <i>Atriplex parishii</i>	1, 2, 3, 4, 7	Annual	Alkali vernal pools, alkali annual grassland, alkali playa, and alkali scrub components of alkali vernal plains.	Domino, Willows and Traver soils series.	June through October	This species is small, easily overlooked, and its habitat is often mistaken for being highly disturbed late in the dry season. Population size varies considerably from year to year depending upon rainfall and local flooding and may not be detectable every year.
prostrate navarretia <i>Navarretia prostrata</i>	3	Annual	Coastal sage scrub, valley and foothill grassland (alkaline washes) and vernal pools.		April through July	
round-leaved filaree <i>Erodium macrophyllum</i>	1, 2, 3, 3a, 4, 5, 6, 7	Annual/biennial	Open cismontane woodland and valley and foothill grassland.	Clay soils	March through May	
San Jacinto Valley crownscale <i>Atriplex coronata</i> var. <i>notatior</i>	2, 3	Annual	Floodplains (seasonal wetlands) dominated by alkali scrub, alkali playas, vernal pools, and, to a lesser extent, alkali grasslands.	San Jacinto Valley crownscale is restricted to highly alkaline, silty-clay soils in association with the Traver-Domino-Willows soil association; the majority (approximately 80 percent) of the populations being associated with the Willows soil series.	April through May	San Jacinto Valley crownscale may be difficult to distinguish from other species of <i>Atriplex</i> (particularly <i>A. rosea</i>) early or late in the season. This species is found in association with Parish's brittlescale, thread-leaved brodiaea, smooth tarplant, California Orcutt grass, Coulter's goldfields, little mousetail and spreading navarretia.

6.0 MSHCP Implementation Structure



**TABLE 6-1
NARROW ENDEMIC AND CRITERIA AREA SURVEY
PLANT SPECIES ATTRIBUTES AND HABITAT AFFINITIES**

Species	Criteria Area Survey ID #	Annual/Perennial	Habitat	Soils	Blooming Period	Special Considerations
smooth tarplant <i>Centromadia pungens</i> (formerly known as <i>Hemizonia pungens</i> ssp. <i>laevis</i>)	1, 2, 3, 4, 6	Annual	Alkali scrub, alkali playas, riparian woodland, watercourses, and alkaline grasslands.	Primarily alkaline soils.	April through November	In the spring, when in juvenile form, smooth tarplant is difficult to distinguish from <i>Hemizonia paniculata</i> . Smooth tarplant is frequently associated with other rare species, including San Jacinto Valley crownscale, Davidson's saltscale, Parish's brittlescale, vernal barley, Coulter's goldfields, and thread-leaved brodiaea.
thread-leaved brodiaea <i>Brodiaea filifolia</i>	1, 2, 3, 4	Annual	Gentle hillsides, valleys, and floodplains in semi-alkaline mudflats, vernal pools, mesic southern needlegrass grassland, mixed native-nonnative grassland and alkali grassland.	Clay, or alkaline silty-clay soils.	March through June	The size and extent of populations within suitable habitat vary in response to the timing and amount of rainfall, as well as temperature patterns. In any given year only a fraction of the plants will develop to maturity. Thread-leaved brodiaea is known to hybridize with other species of <i>Brodiaea</i> which may affect identification in areas of overlap. Thread-leaved brodiaea is associated with San Diego button-celery and California Orcutt grass.
Vail Lake ceanothus <i>Ceanothus ophiocilius</i>	5	Perennial	Dry habitats along ridgetops and north-northeast-facing slopes in chamise chaparral.	Shallow soils originating from ultra-basic parent rock and deeply weathered gabbro, which are both phosphorous-deficient.	mid-February through March	Outside of the flowering period, it is difficult to differentiate Vail Lake ceanothus from surrounding <i>Adenostoma</i> . Vail Lake ceanothus is able to hybridize with <i>Ceanothus crassifolius</i> where the two species occur together.



Criteria Area Species Survey Area - Areas shown in white within the Criteria Area are not included in the survey area because these areas represent developed lands on the MSHCP Vegetation Map and are not considered to be suitable habitat. Areas shown in lighter blue fall within Public/Quasi-Public Lands.

Boundary of Covered Activity - Section 6.3.2 survey requirements may be waived in this area in the future if a project determined to be consistent with the criteria for the San Jacinto River project presented in Section 7.0 of this document is proposed and accepted.

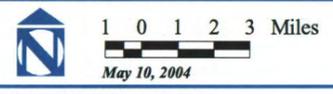
Surveys shall be conducted for Area 3a in accordance with the requirements of Section 6.3.2 of the MSHCP, Volume I. Although this area is outside the Criteria Area, suitable habitat is present for these species within the area shown and surveys for these species shall be conducted in accordance with the requirements of Section 6.3.2 of the MSHCP, Volume I until such time as the conditions for waiving the surveys for Area 3a are met. These survey requirements shall be waived at such time as it is confirmed by the RCA that 200 acres of land with habitat value for these species, have been contributed toward Reserve Assembly and Conservation within Subunit 1 of the Lakeview/Nuevo Area Plan or Subunit 4 of the Mead Valley Area Plan. The contributed lands shall not be considered to be mitigation for other projects.

- ① Species of Concern Area ID**
- Area 1: *Brodiaea filifolia*, *Atriplex serenana* var. *dauidsonii*, *Atriplex parishii*, *Centromadia pungens* ssp. *laevis*, *Erodium macrophyllum*, *Lasthenia glabrata* var. *coulteri*, *Myosurus minimus*
 - Area 2: *Atriplex coronata* var. *notatior*, *Atriplex parishii*, *Atriplex serenana* var. *dauidsonii*, *Brodiaea filifolia*, *Lasthenia glabrata* var. *coulteri*, *Erodium macrophyllum*, *Centromadia pungens* ssp. *laevis*, *Myosurus minimus*
 - Area 3: *Atriplex coronata* var. *notatior*, *Atriplex parishii*, *Atriplex serenana* var. *dauidsonii*, *Brodiaea filifolia*, *Centromadia pungens* ssp. *laevis*, *Erodium macrophyllum*, *Lasthenia glabrata* ssp. *coulteri*, *Myosurus minimus*, *Nama stenocarpum*
 - Area 3a: *Atriplex coronata* var. *notatior*, *Atriplex parishii*, *Atriplex serenana* var. *dauidsonii*, *Brodiaea filifolia*, *Centromadia pungens* ssp. *laevis*, *Erodium macrophyllum*, *Lasthenia glabrata* ssp. *coulteri*, *Myosurus minimus*, *Nama stenocarpum*
 - Area 4: *Atriplex serenana* var. *dauidsonii*, *Atriplex parishii*, *Brodiaea filifolia*, *Centromadia pungens* ssp. *laevis*, *Erodium macrophyllum*, *Lasthenia glabrata* ssp. *coulteri*, *Myosurus minimus*
 - Area 5: *Berberis nevadensis*, *Ceanothus ophiocilius*, *Erodium macrophyllum*
 - Area 6: *Berberis nevadensis*, *Centromadia pungens* var. *laevis*, *Erodium macrophyllum*
 - Area 7: *Atriplex serenana* var. *dauidsonii*, *Atriplex parishii*, *Erodium macrophyllum*, *Lasthenia glabrata* var. *coulteri*, *Lepechinia cardiophylla*, *Navarretia prostrata*
 - Area 8: *Lepechinia cardiophylla*

- Criteria Area
- Special Linkage Area
- Public/Quasi-Public Conserved Lands
- Pre-existing Conservation Agreements
- American Indian Lands (Not a Part)
- San Jacinto Wildlife Area Additional Acquisition

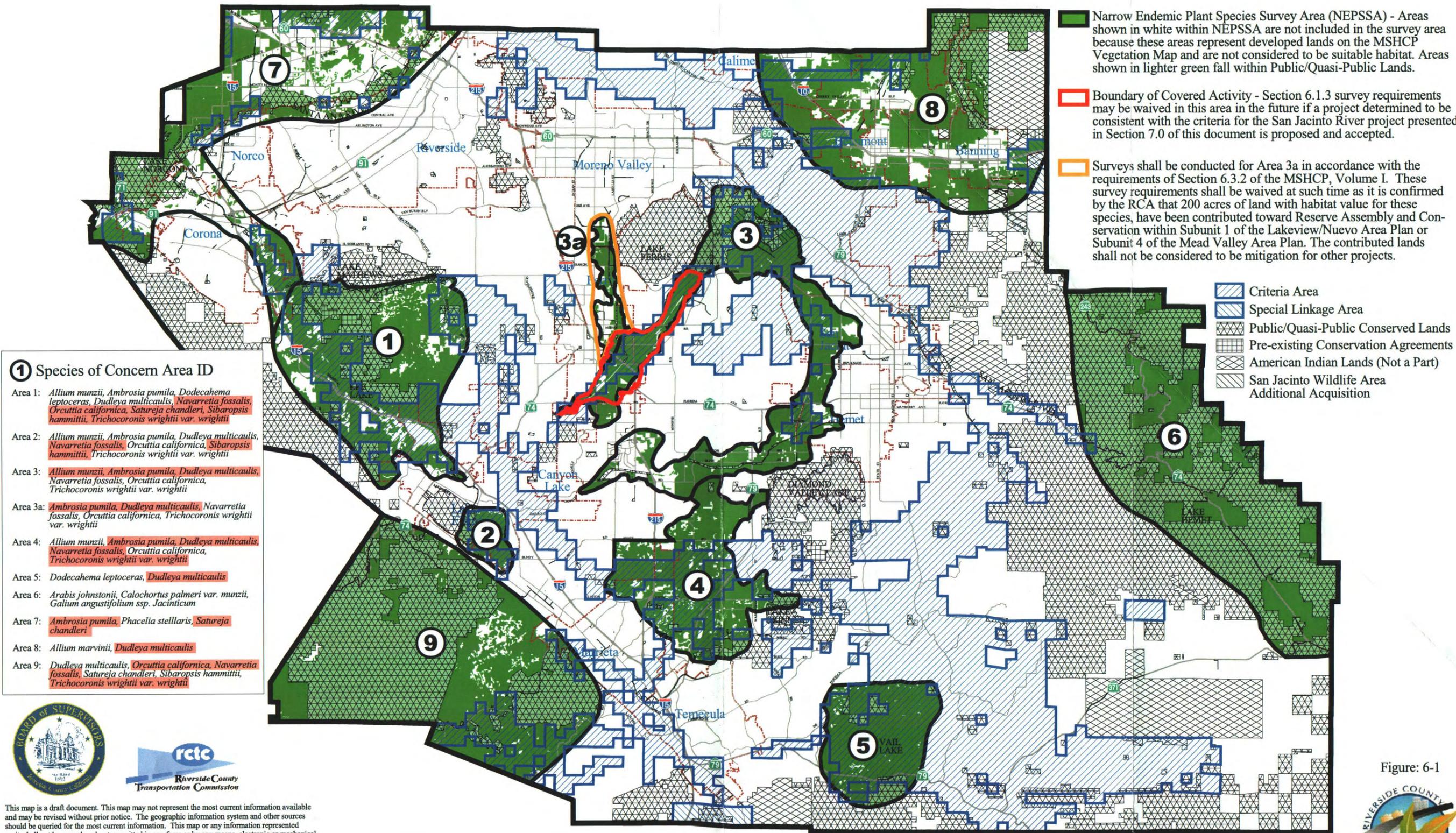


This map is a draft document. This map may not represent the most current information available and may be revised without prior notice. The geographic information system and other sources should be queried for the most current information. This map or any information represented on it, shall not be reproduced or transmitted in any form or by any means, electronic or mechanical, including photo copying and recording.



Criteria Area Species Survey Area





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Narrow Endemic Plant Species Survey Area With Criteria Area



Figure: 6-1

5/04 Created by: MAC, Duda, fig-1_repsa-revised.apr

APPENDIX 2

Proposed Special Terms and Conditions for Permit TE-088609-0
U.S. Fish and Wildlife Service, Carlsbad, California
May 26, 2004

1. All sections of Title 50 *Code of Federal Regulations*, parts 13, 17.22, and 17.32 are conditions of this Permit. The current version of these regulations is provided in Attachment 1.
2. The authorization granted by this Permit is subject to compliance with, and implementation of the Final Western Riverside County Multiple Species Habitat Conservation Plan/ Natural Community Conservation Plan (MSHCP), dated June 17, 2003, errata letter to MSHCP from the County of Riverside dated May 21, 2004, and executed Implementing Agreement all of which are hereby incorporated into this Permit. In the event of a discrepancy, the special terms and conditions of this permit included herein, the IA, and MSHCP, including its associated volumes (exclusive of the IA) and the errata letter to MSHCP from the County of Riverside dated May 21, 2004, are the controlling documents in the above order regarding the conditions and authorizations of this permit.
3. The Permittees, Agricultural Operations and Participating Special Entities that have obtained a certificate of inclusion, and Third Parties Granted Take Authorization under the direct control of the Permittees, are authorized to take the animal species identified in Attachment 2 to this Permit as "Covered Species Adequately Conserved," to the extent that take of these species would otherwise be prohibited under section 9 of the Endangered Species Act of 1973, as amended (ESA), and its implementing regulations, or pursuant to a rule promulgated under section 4(d) of the ESA. To become a Covered Species Adequately Conserved, 12 species require that a Memorandum of Understanding be entered into with the U.S. Forest Service, consistent with Section 18.0 of the IA, that addresses management of Forest Service lands within the MSHCP Conservation Area. In order for the remaining 17 species to become Covered Species Adequately Conserved, achievement of species-specific conservation objectives, as identified in Table 9-3 of the MSHCP, must be demonstrated to the satisfaction of the Service.

Take authorization is effective at Permit issuance for those animal species listed as adequately conserved in Attachment 2 that are currently listed under the ESA. For each of the remaining animal species listed as adequately conserved in this attachment that are not listed as threatened or endangered under the Act, this section 10(a)(1)(B) Permit will become effective with respect to such species concurrent with the listing of the species as threatened or endangered under the Act, to the extent that their take is prohibited by the ESA. Take must be incidental to otherwise lawful Covered Activities within the Plan Area as described and defined

in the MSHCP and IA, and as further conditioned herein. The amount and nature of the take is described in the Attachment 3 for each species.

4. Because take of plants is not prohibited under the ESA, incidental take cannot be authorized under this Permit. Plant species included on the Permit in special terms and conditions and in Attachment 2 are named in recognition of the conservation benefits provided for such plants in the MSHCP, IA, and other documents identified in condition 2, and receive those assurances identified in the IA.
5. The following conditions apply to birds:
 - a. Bald eagle and golden eagle - No lethal take is authorized. Take or disturbance of active nests is not authorized. The Service will not refer the incidental take of any bald eagle for prosecution under the Migratory Bird Treaty Act of 1918, as amended (16 U.S.C. §§ 703-712) (MBTA), or the Bald and Golden Eagle Protection Act of 1940, as amended (16 U.S.C. §§ 668-668d), if such take is in compliance with the terms and conditions specified herein.
 - b. For birds other than the bald eagle and golden eagle, this section 10(a)(1)(B) permit under the ESA also constitutes a Special Purpose Permit under 50 CFR 21.27 for the take, as defined by 50 CFR 10.12, of those Covered Species Adequately Conserved that are listed as threatened or endangered under the Endangered Species Act of 1973, as amended, and protected by the MBTA, except for both eagles. Such Special Purpose Permit shall be valid for a period of 3 years from the effective date, provided the section 10(a)(1)(B) permit remains in effect for such period. Such Special Purpose Permit shall be renewed, provided that the Permittees continues to fulfill their obligations under this agreement. Each such renewal shall be valid for the maximum period of time allowed by 50 CFR 21.27 or its successor at the time of renewal.

Take, as defined by 50 CFR 10.12, associated with habitat loss for bird species on the list of Covered Species Adequately Conserved (Attachment 2) is avoided or minimized by the restrictions provided in Sections 5.2.1, 7.5.3, and 6.1.2, and Table 9-2 of the MSHCP. In addition, these restrictions shall include the following restrictions and prohibitions for birds included as Covered Species Adequately Conserved (Attachment 2) that are subject to incidental take as defined by 50 CFR 17.3:

- Coastal California gnatcatcher - Clearing of occupied habitat within PQP lands and the Criteria

Area between March 1 and August 15 is prohibited.

- Least Bell's vireo and southwestern willow flycatcher - Avoid occupied habitat pursuant to the species objectives.

Other birds protected by the MBTA and not listed under the ESA - No take is authorized under the MBTA (including the killing and wounding of any such birds, or take of eggs and active nests).

6. Unless take is authorized by the California Department of Fish and Game's Take Authorization for the MSHCP, Fully Protected Species under California Fish and Game Code may not be taken or possessed at any time and no provision of any other law shall be construed to authorize the issuance of permits or licenses to take any fully protected species. The following species are Fully Protected species: bald eagle, golden eagle, peregrine falcon, and white-tailed kite.
7. Where Covered Activities result in the incidental take of Covered Species Adequately Conserved within U.S. Army Corps of Engineers' jurisdictional wetlands or other waters of the United States, or where Covered Activities are federally funded or require a Federal permit or authorization, such incidental take is authorized by this Permit provided that appropriate authorization is first secured from the Corps or any other applicable Federal agency with jurisdiction. Where Covered Activities require formal section 7 consultation under the ESA, exemption for any associated incidental take by the applicable Federal agency(ies) shall be provided through future formal consultation, while authorization for any associated incidental take by the Permittee(s), Third Parties Granted Take Authorization, and Participating Special shall be provided through this Permit. This permit term and condition does not alter the provisions of Section 14.9 of the IA.
8. Because the Management and Monitoring activities are anticipated to extend beyond the term of the 75-year Permit and pursuant to Section 8.8 of the MSHCP, the Permittees have permanent responsibility for managing the conservation lands in perpetuity. At the end of the 75-year Permit term, the endowment for Adaptive Management shall be maintained in a non-wasting account.
9. The Orange County-Riverside County Corridor, like the Cajalco Road Improvements, State Route 79 Improvements, and San Jacinto River Project, may be a Covered Activity subject to the identified process in the MSHCP for each project and the Minor Amendment Procedure described in Section 20.4.2 of the IA.

10. The intermediate mariposa lily shall be considered a "Species Adequately Conserved" only after the species-specific conservation objectives are achieved.
11. The Permittees shall implement species Objective 1B for the Delhi sands flower-loving fly in accordance with Table 9-2 of the MSHCP. To clarify a potential result of a "meet and confer" with the applicable Local Permittee(s) and Service regarding an occupied project site described in Objective 1B of Table 9-2 of the MSHCP, the language "the Service concurs that such conservation would not contribute to the long-term conservation of the species" is interpreted to mean "the Service determines that the proposed, 75 percent conservation on site would not contribute to the long-term conservation of the species."
12. Consistent with the biological issue and consideration identified in the REMAP Area Plan (Section 3.3.12 of the MSHCP) to conserve undeveloped uplands including agricultural land, annual grassland, and coastal sage scrub that support or provide potential Habitat for Quino checkerspot butterfly, the Regional Conservation Authority (RCA) shall work to conserve the Quino checkerspot butterfly within the Tule Creek/Anza Valley Subunit of the REMAP Area Plan and, if necessary, use the Criteria Refinement Process to achieve this conservation.
13. Reserve Managers, in coordination with the RCA and Reserve Management Oversight Committee (RMOC), shall prepare Reserve Management Plans for each management unit that contains significant Additional Reserve Lands under Local Permittee control. Such plans shall be submitted to the RMOC within 5 years of significant acquisition of Additional Reserve Lands in a management unit.
14. Notwithstanding the authorized incidental take associated with Reserve Management, Monitoring and Scientific Research Activities (section 7.4.1 of the MSHCP), this Permit does not alter any permitting requirements authorized under section 10(a)(1)(A) of the ESA for biologists conducting surveys provided for in the Plan nor does this Permit alter any of the survey protocols associated with such permits.
15. Where management activities associated with vernal pools call for salvage, creation, restoration, or enhancement, such efforts involving vernal pool species shall employ the following procedure or an alternative procedure mutually agreed upon with the Service:
 - a. Fairy shrimp pond soil (inoculum) will be collected when it is dry to avoid damaging or destroying fairy shrimp cysts, which are fragile when wet. A hand trowel or similar instrument will be used to collect the soil. Whenever possible, soil will be collected in

chunks. The trowel will be used to pry up intact chunks of soil, rather than loosening the soil by raking and shoveling, which can damage cysts. Soil will not be collected from any ponds until approved by the Service.

- b. The soil from each pond will be stored individually in labeled bags or boxes that are adequately ventilated and kept out of direct sunlight to prevent the occurrence of fungus or excessively heating the soil.
 - c. Inoculum will not be introduced into the created ponds until after the created ponds have been demonstrated to retain water for a minimum 60 days and will be placed in a manner that preserves, to the maximum extent possible, the orientation of the fairy shrimp cysts within the surface layer of soil (e.g., collected inoculum will be shallowly distributed within the pond so that cysts have the potential to be brought into solution upon inundation).
16. This Permit does not authorize the intentional pursuit or killing of animals associated with hunting.
17. The following procedure and analysis shall apply if a Permittee elects to use Public/Quasi-Public Lands within the MSHCP Conservation Area in a way that alters the land use such that it would not contribute to Reserve Assembly:

The Permittee shall make findings that the replacement acreage is biologically equivalent or superior to the existing property. The biological equivalency or superior analysis shall address the effects on habitats, Covered Species, core areas (as identified on the MSHCP Core and Linkage Map), linkages and constrained linkages (as identified on the MSHCP Core and Linkage Map), MSHCP Conservation Area configuration and management (such as increases or decreases in edge), and ecotones (defined as the areas of adjoining Vegetation Communities, generally characterized by greater biological diversity) and other conditions affecting species diversity (such as invasion by exotic species). The Permittees shall submit the equivalency analysis in narrative and graphic form comparing the effects/benefits of the proposed project to the Wildlife Agencies (Service and California Department of Fish and Game) for review and concurrence. Impacts to Habitats within existing Public/Quasi-Public Lands shall be compensated by purchase and dedication into the MSHCP Conservation Area of land of no less than a ratio of 1:1 that is in addition to the Additional Reserve Lands.

18. Pursuant to the policy on Riparian/Riverine Areas and Vernal Pools:
 - a. Where the avoidance alternative is selected, the other appropriate mechanisms incorporated into the project design to ensure the long-term Conservation of unsurveyed avoided areas shall include appropriate management.
 - b. Where the avoidance alternative is not selected and focused surveys confirm occupancy by Covered Species identified in Section 6.1.2 of the MSHCP and pursuant to the species objectives, 90 percent (to 100 percent for the southwestern willow flycatcher and western yellow-billed cuckoo) of the occupied portions of the property that provide for the long-term Conservation value for the species (including the watershed of individual vernal pools occupied by fairy shrimp species) shall be conserved unless a Determination of Biologically Equivalent or Superior Preservation concludes that a proposed alternative will provide equal or better conservation.
19. Permittees shall incorporate the appropriate guidelines (MSHCP Section 7.5) and specific design features (MSHCP Table 7-4) into individual planned roadway projects within the Criteria Area and Public/Quasi-Public Lands.
20. The Monitoring Program Administrator shall consult with the Service on the development and implementation of the long-term monitoring plan.
21. Prior to each Status Meeting with the Wildlife Agencies pursuant to Section 6.6.2.F.2 of the MSHCP, the RCA shall provide to the Wildlife Agencies a copy of the Permittee's final decision document for each development application in the Criteria Area submitted for the joint project/application review process that have been received since the last Status Meeting or Permit issuance, whichever is later. In addition, the RCA shall provide to the Wildlife Agencies a copy of the final decision documents that have been received since the last Status Meeting or Permit issuance, whichever is later, confirming that individual planned roadway projects within the Criteria Area, which are described in Section 7.3.5 of the Plan and depicted in Figure 7-1 of the Plan, are consistent with the Criteria, appropriate guidelines (MSHCP Section 7.5), and specific design features (MSHCP Table 7-4).
22. The first annual report is due to the Wildlife Agencies 15 months from the date of Permit issuance. Subsequently, annual reports shall be submitted to the Wildlife Agencies every 12 months for the life of the Permit. A copy of the annual report shall be submitted to the Field Supervisor of the Carlsbad Fish and Wildlife Office, 6010 Hidden Valley Road, Carlsbad,

California 92008, and one copy shall be submitted to the Assistant Regional Director, Ecological Services, U.S. Fish and Wildlife Service, 911 NE 11th Avenue, Portland, Oregon 97232. Aside from the information requirements set forth in Section 10.1 of the IA, the annual report shall address for that year:

- a. Permit implementation of Covered Activities within the Criteria Area, including the Criteria Refinement Process; and implementation of policies on Protection of Species Associated with Riparian/Riverine Areas and Vernal Pools, Protection of Narrow Endemic Plant Species, and Additional Survey Needs and Procedures.
 - b. Biologically Equivalent or Superior Preservation determinations.
23. In addition to the reporting requirements identified in Section 10.0 of the IA and the MSHCP, the following monitoring and/or reporting conditions shall apply:
- a. Within 6 months of execution of the IA, the Cities and County (Local Permittees) shall transmit to the Wildlife Agencies and RCA relevant documents showing adoption and/or execution of each Local Permittee's MSHCP implementation mechanism. Any subsequent amendments to the implementation mechanism throughout the life of the Permit shall be transmitted to the Service.
 - b. Copies of maps of existing disturbed use areas at County Waste facilities shall be provided to the Service.
 - c. Copies of the initial baseline assessment of Additional Reserve Lands pursuant to Section 5.2.1 of the MSHCP shall be provided to the Service.
 - d. Among the other items described in Section 5.3.7 of the MSHCP, the Monitoring Program Administrator shall monitor and include in the Biological Monitoring Report an analysis of the effectiveness of wildlife movement features for target species where such features are incorporated into the design of roadway projects within the MSHCP Conservation Area. The Wildlife Agencies, in consultation with the Monitoring Program Administrator, shall jointly agree on how, where, and when the effectiveness monitoring will be done and how the data will be analyzed to inform the Permittees regarding design and siting of future wildlife movement features.

- e. Permittees shall require biologists send copies of all habitat assessments and focused survey reports for all Covered Species to the California Natural Diversity Data Base.
 - f. Within 30 days of completion of an emergency repair pursuant to Section 7.4.1 of the MSHCP, the RCA shall provide a copy of their administrative record documentation regarding any such repair, including any revegetation plans determined to be warranted and the associated revegetation implementation.
24. The Permittees shall contact that the Service's Carlsbad Fish and Wildlife Office (6010 Hidden Valley Road, Carlsbad, California 92008, telephone 760-431-9440) immediately regarding any violations or potential violations of the Federal Endangered Species Act or Migratory Bird Treaty Act.
25. Within 1 working day of finding dead, injured, or sick endangered or threatened wildlife species, the Permittees or its designated agents must orally notify the Service's Carlsbad Fish and Wildlife Office. Written notification to the Carlsbad Fish and Wildlife Office and the Division of Law Enforcement (185 W. "F" Street, Suite 440, San Diego, California 92101) must be made within 5 calendar days and must include the date, time, and location of the specimen and any other pertinent information.
26. A copy of this Permit must be in on file in the possession of the Permittees, and Third Parties under their direct control, while conducting taking activities. Please refer to the Permit number in all correspondence and reports concerning Permit activities. Any questions you may have about this Permit should be directed to the Field Supervisor, Carlsbad Fish and Wildlife Office, 6010 Hidden Valley Road, Carlsbad, California 92008, telephone 760-431-9440.
27. In the event that any judicial decision or determination, including without limitation the decision from the District Court for the District of Columbia in *Spirit of the Sage, et al. v. Norton, et al.*, 98-CV-1873 (D.D.C. 2003), may hold that the Department of the Interior's "No Surprises" assurances rule (or similar successive rule) is vacated, unenforceable or enjoined for any reason or to any extent, Sections 3.81, 3.109, 4.3(C), 14.10, 14.12, and 17.6 of the IA; and page numbers Def/Acr x and Def/Acr xiii, and Sections 1.2.4 and Section 6.8 of the MSHCP shall be enforceable only to the degree allowed by any such decision or determination; provided that the remainder of the Permit, Implementing Agreement, and MSHCP shall remain in full force and effect to the maximum extent permitted by law. In the event that the "No Surprises" assurances rule may be vacated, unenforceable or enjoined by such decision or determination but is later reinstated, Sections 3.81, 3.109, 4.3(C), 14.10, 14.12, and 17.6 of the IA;

and page numbers Def/Acr x and Def/Acr xiii, and Sections 1.2.4 and Section 6.8 of the MSHCP shall likewise be automatically reinstated and apply to the entire term of the MSHCP. If, in response to any such judicial decision or determination, the "No Surprises" assurances rule is revised, Sections 3.81, 3.109, 4.3(C), 14.10, 14.12, and 17.6 of the IA; and page numbers Def/Acr x and Def/Acr xiii, and Sections 1.2.4 and Section 6.8 of the MSHCP shall be automatically amended in a manner consistent with the revised rule so as to afford the maximum protection to the Permittees consistent with the revised rule. Notwithstanding anything to the contrary in the IA (particularly Section 23.5) and MSHCP, the Service retains statutory authority, under both sections 7 and 10 of the ESA, to revoke incidental take permits that are found likely to jeopardize the continued existence of a Covered Species, subject to any new rule regarding permit revocation.

APPENDIX 3

Appendix 3. California Native Plant Society status codes.

The California Native Plant Society has five lists that categorize the different levels of concern for sensitive plant species in California. The different lists are generalized as follows:

List 1A	Plants presumed to be extinct in California
List 1B	Plants rare, threatened or endangered in California and elsewhere
List 2	Plants rare, threatened or endangered in California, but more common elsewhere
List 3	Plants that need more information before an assignment to a List can be made; acts as a review list
List 4	Plants of limited distribution but not considered rare from a statewide perspective; acts as a watch list

Sensitive plant species assigned to a List are also assigned a R-E-D Code. The CNPS R-E-D Code is a classification system that breaks down the different factors that contribute to the List assignments. These different factors are as follows, each factor is divided into degrees of concern, as represented by a number (the larger the number, the greater the concern):

R-E-D Code	Rarity	Endangerment	Distribution
1	Rare, but found in sufficient numbers and distributed widely enough that the potential for extinction is low at this time	Not endangered	More or less widespread outside California
2	Distributed in a limited number of occurrences, occasionally more if each occurrence is small	Endangered in a portion of its range	Rare outside California
3	Distributed in one to several highly restricted occurrences, or present in such small numbers that it is seldom reported	Endangered throughout its range	Endemic to California

APPENDIX 4

Appendix 4. List of common and scientific names.

1

COMMON NAME

SCIENTIFIC NAME

alder	<i>Alnus</i> spp.
alkali heath	<i>Frankenia grandifolia</i>
alkali plantain	<i>Plantago elongata</i>
alkali weed	<i>Cressa truxillensis</i>
American brooklime	<i>Veronica americana</i>
American crow	<i>Corvus brachyrhynchos</i>
American pronghorn antelope	<i>Antilocarpa americana</i>
Anna's hummingbird	<i>Calypte anna</i>
Argentine ants	<i>Linepithema humile</i>
arroyo willow	<i>Salix lasiolepis</i>
aspen	<i>Populus</i> spp.
Audubon cottontail	<i>Sylvilagus audubonii</i>
badger	<i>Taxidea taxus</i>
barn owl	<i>Tyto alba</i>
beaver	<i>Castor canadensis</i>
bee	Family Bombyliidae
bee mimic flower fly	Family Syrphidae
bembicine wasp	<i>Stenolia duplicata</i> and <i>Bembix occidentalis</i>
bighorn sheep	<i>Ovis canadensis</i>
bitterbrush	<i>Purshia tridentata</i> var. <i>glandulosa</i>
black sage	<i>Salvia mellifera</i>
black vulture	<i>Coragyps atratus</i>
black willows	<i>Salix gooddingii</i>
blackberries	<i>Rubus alleghaniensis</i>
black-chinned hummingbird	<i>Arhiloachus alexandri</i>
bluegill	<i>Lepomis macrochirus</i>
bobcat	<i>Lynx rufus</i>
bracted saltbush	<i>Atriplex serenana</i>
brittlebush	<i>Encelia farinosa</i>
broad-footed mole	<i>Scapanus latimanus</i>
broom baccharis	<i>Baccharis sarathroides</i>
brown trout	<i>Salmo trutta</i>
brown-headed cowbird	<i>Molothrus ater</i>
bullfrog	<i>Rana catesbeiana</i>
bullhead	<i>Ameiurus</i> spp.
bulrushes	<i>Scirpus</i> spp.
bumble bee	<i>Bombus</i> spp.
bush penstemon	<i>Keckiella antirrhinoides</i>
California acorn woodpecker	<i>Melanerpes formicivorus</i>
California buckwheat	<i>Eriogonum fasciculatum</i>
California buttercup	<i>Ranunculus californicus</i>
California croton	<i>Croton californicus</i>
California goldfields	<i>Lasthenia californica</i>

Appendix 4. List of common and scientific names.

2

<u>COMMON NAME</u>	<u>SCIENTIFIC NAME</u>
California ground squirrel	<i>Spermophilus beecheyi</i>
California horned lizard	<i>Phrynosoma coronatum frontale</i>
California jay	<i>Cyanocitta</i> spp.
California Juniper	<i>Juniperus californica</i>
California king snake	<i>Lampropeltis getulus californiae</i>
California lilac	<i>Ceanothus</i> spp.
California live oak	<i>Quercus agrifolia</i>
California mice	<i>Peromyscus californicus</i>
California orcutt's grass	<i>Orcuttia californica</i>
California scrub oak	<i>Quercus berberidifolia</i>
California sycamore	<i>Platanus racemosa</i>
California wild rose	<i>Rosa californica</i>
cattails	<i>Typha</i> spp.
chamise	<i>Adenostoma fasciculatum</i>
channel catfish	<i>Ictalurus punctatus</i>
chaparral pea	<i>Pickeringia montana</i>
cheat grass	<i>Bromus tectorum</i>
checkerbloom	<i>Sidalcea malvaeflora</i>
chocolate lily	<i>Fritillaria biflora</i>
cholla	<i>Opuntia</i> spp.
Cleveland's shooting star	<i>Dodecatheon clevelandii</i>
coachwhip snake	<i>Masticophis flagellum</i>
coast live oak	<i>Quercus agrifolia</i>
coastal prickly pear	<i>Opuntia littoralis</i>
coastal sagebrush	<i>Artemisia californica</i>
coastal western whiptail	<i>Cnemidophorus tigris multiscutatus</i>
common carp	<i>Cyprinus carpio</i>
common fiddleneck	<i>Amsinckia mensiesii</i>
common raven	<i>Corvus corax</i>
convergent apiocerid fly	<i>Apiocera convergens</i>
Cooper's hawk	<i>Accipiter cooperii</i>
corvids	<i>Cornus</i> spp.
cottonwoods	<i>Populus</i> spp.
Coulter pine	<i>Pinus coulteri</i>
coyote	<i>Canis latrans</i>
crayfish	<i>Procambarus clarkii</i>
deer mice	<i>Peromyscus</i> spp.
deerbrush	<i>Ceanothus integrimus</i>
delhi sands jerusalem cricket	<i>Stenopelmatus</i> undescribed species
delhi sands metalmark butterfly	<i>Apodemia mormo nigrescens</i>
digger bees	Family Anthophoridae
domestic cat	<i>Felis catus</i>
domestic dog	<i>Canis familiaris</i>

Appendix 4. List of common and scientific names.

3

COMMON NAMESCIENTIFIC NAME

Douglas fir	<i>Pseudotsuga menziesii</i>
Douglas' lupine	<i>Lupinus bicolor</i>
Douglas' microseris	<i>Microseris douglasii</i> ssp. <i>platycephala</i>
dusky-footed woodrat	<i>Neotoma fuscipes</i>
dwarf peppergrass	<i>Lepidium latipes</i>
dwarf plantain	<i>Plantago erecta</i>
encelia	<i>Encelia</i> spp.
european starling	<i>Sturnus vulgaris</i>
fastigate golden aster	<i>Heterotheca fastigiata</i>
fathead minnow	<i>Pimephales promelus</i>
ferruginous hawk	<i>Buteo regalis</i>
filaree	<i>Erodium cicutarium</i>
five-hook bassia	<i>Bassia hyssopifolia</i>
flying squirrel	<i>Glaucomys sabrinus</i>
foothill needlegrass	<i>Nassella lepida</i>
foxtail chess	<i>Bromus madritensis</i>
foxtail fescue	<i>Vulpia myuros</i>
fremont's cottonwood	<i>Populus fremontii</i> ssp. <i>fremontii</i>
garter snake	<i>Thamnophis sirtalis</i>
giant flower-loving fly	<i>Rhaphiomidas acton acton</i>
giant reed	<i>Arundo donax</i>
gold fields	<i>Lasthenia</i> spp.
golden eagle	<i>Aquila chrysaetos</i>
goldenstar	<i>Bloomeria crocea</i>
gopher snake	<i>Pituophis melanoleucus</i>
grasshopper sparrow	<i>Ammodramus savannarum</i>
gray fox	<i>Urocyon cinereoargenteus</i>
grease-wood	<i>Sacobatus vermiculatus</i>
great horned owl	<i>Bubo virginianus</i>
green sunfish	<i>Lepomis cyanellus</i>
ground squirrel	<i>Spermophilus</i> spp.
hairgrass	<i>Deschampsia danthoides</i>
harvester ant	<i>Pogonomyrmex</i> spp.
hawkmoths	<i>Hyles lineata</i> and <i>Hyles perelegans</i>
hemlock	<i>Tsuga heterophylla</i>
holly-leaved cherry	<i>Prunus ilicifolia</i>
honeybees	<i>Apis mellifera</i>
house sparrow	<i>Passer domesticus</i>
javelina	<i>Tayassu tajacu</i>
jeffery pine	<i>Pinus jeffreyi</i>
juniper	<i>Juniperus</i> spp.
kangaroo rat	<i>Dipodomys</i> spp.
killdeer	<i>Charadrius vociferus</i>

Appendix 4. List of common and scientific names.

4

<u>COMMON NAME</u>	<u>SCIENTIFIC NAME</u>
knotweed spine flower	<i>Chorizanthe polygonoides</i> var. <i>longispina</i>
lace parsnip	<i>Lomatium dasycarpum</i>
lagomorph	<i>Lepus</i> spp.
largemouth bass	<i>Micropterus salmoides</i>
laurel sumac	<i>Malosma laurina</i>
legless lizard	<i>Anniella pulchra</i>
lemonadeberry	<i>Rhus integrifolia</i>
little mouselike lizard	<i>Myosurus minimus</i> var. <i>apus</i>
lodgepole pine	<i>Gerrhonotus</i>
lomatium	<i>Pinus contortus</i>
long-eared owl	<i>Lomatium utriculatum</i>
long-spined flower	<i>Asio otus</i>
long-tailed weasel	<i>Chorizanthe polygonoides</i> var. <i>longispina</i>
lynx	<i>Mustela frenata latirostra</i>
many-stemmed dudleya	<i>Lynx canadensis</i>
manzanita	<i>Dudleya multicaulis</i>
marten	<i>Arctostaphylos</i> spp.
metallic sweat bee	<i>Martes americana</i>
Mojave silver scale	Family Halictidae
monkeyflower	<i>Atriplex argentea</i>
montane spruce-fir	<i>Mimulus clevelandii</i>
mosquito fish	<i>Picea</i> spp. - <i>Abies</i> spp.
mountain beaver	<i>Gambusia affinis</i>
mountain mahogany	<i>Aplodontia rufa</i>
mule deer	<i>Cercocarpus betuloides</i>
mule fat	<i>Odocoileus hemionus</i>
Munz's onion	<i>Baccharis salicifolia</i>
muskrat	<i>Allium munzii</i>
needlegrass	<i>Ondatra zibethicus</i>
nevin's barberry	<i>Nassella</i> spp.
northern goshawk	<i>Berberis nevinii</i>
northern harrier	<i>Accipiter gentilis</i>
oak	<i>Circus cyaneus</i>
opossum	<i>Quercus</i> spp.
Orcutt's brodiaea	<i>Didelphis marsupialis</i>
Owens sucker	<i>Brodiaea orcuttii</i>
owl's-clover	<i>Catostomus fumeiventris</i>
pacific treefrog	<i>Castilleja exserta</i>
Palmer's grappling hook	<i>Hyla regilla</i>
perennial pepperweed	<i>Harpagonella palmeri</i>
pinon-juniper	<i>Lepidium latifolium</i>
pinyon	<i>Pinus</i> spp. – <i>Juniperus</i> spp.
	<i>Pinus</i> spp.

Appendix 4. List of common and scientific names.

<u>COMMON NAME</u>	<u>SCIENTIFIC NAME</u>
pocket gophers	<i>Thomomys bottae</i>
poison oak	<i>Rhus diversiloba</i>
poison oak	<i>Toxicodendron diversiloba</i>
pond lily	<i>Nuphar polysepalum</i>
ponderosa pine	<i>Pinus ponderosa</i>
popcorn flower	<i>Cryptantha</i> spp.
porcupine	<i>Erethizon dorsatum</i>
prairie dogs	<i>Cynomys</i> spp.
prairie falcon	<i>Falco mexicanus</i>
prickly pear	<i>Opuntia littoralis</i> and <i>Opuntia oricola</i>
Pringle's monardella	<i>Monardella pringlei</i>
prostrate spine flower	<i>Chorizanthe procumbens</i>
purple needlegrass	<i>Nassella pulchra</i>
purple sanicle	<i>Sanicula bipinnatifida</i>
quaking aspen	<i>Populus tremuloides</i>
rabbits	<i>Sylvilagus</i> spp.
raccoon	<i>Procyon lotor</i>
rainbow trout	<i>Oncorhynchus mykiss</i>
rattlesnake	<i>Crotalus</i> spp.
red berry	<i>Rhamnus ilicifolia</i>
red diamond rattlesnake	<i>Crotalus ruber ruber</i>
red fox	<i>Vulpes vulpes</i>
redeye bass	<i>Micropterus coosae</i>
red-skinned onion	<i>Allium haematochiton</i>
red-tailed hawk	<i>Buteo jamaicensis</i>
ripgut brome	<i>Bromus diandrus</i>
ripgut grass	<i>Bromus diandrus</i>
river cane	<i>Arundo donax</i>
sage	<i>Salvia</i> spp.
sagebrush	<i>Artemisia</i> spp.
saltbush	<i>Atriplex</i> spp.
saltgrass	<i>Distichlis spicata</i>
San Diego button celery	<i>Eryngium aristulatum</i> var. <i>parishii</i>
San Diego fairy shrimp	<i>Branchinecta sandiegonensis</i>
San Diego gopher snake	<i>Pituophis melanoleucus annectens</i>
San Diego horned lizard	<i>Phrynosoma coronatum blainvillii</i>
San Diego mesa mint	<i>Pogogyne abramsii</i>
San Jacinto valley crowscale	<i>Atriplex coronata</i> var. <i>notatior</i>
sand spurry	<i>Spergularia marina</i>
sandbar willow	<i>Salix hindsiana</i>
Santa Rosa Plateau fairy shrimp	<i>Linderiella santarosae</i>
scalebroom	<i>Lepidospartum squamatum</i>
seablite	<i>Suaeda moquinii</i>

Appendix 4. List of common and scientific names.

6

COMMON NAMESCIENTIFIC NAME

sharp-shinned hawk	<i>Accipiter striatus</i>
sharp-tooth peppergrass	<i>Lepidium dictyotum</i>
sheepshead minnow	<i>Cyprinodon variegatus</i>
side-blotched lizard	<i>Uta stansburiana</i>
small-flowered morning-glory	<i>Convolvulus simulans</i>
smooth tarplant	<i>Centromadia pungens</i> ssp. <i>laevis</i>
smooth tarplant	<i>Hemizonia pungens</i> ssp. <i>laevis</i>
snake	<i>Contia</i> spp.
snakeroot	<i>Sanicula arguta</i>
soaproot	<i>Chlorogalum parviflorum</i>
soft-winged flower beetle	<i>Dasytes</i> spp.
solitary bees	<i>Andrena</i> and <i>Panurginus</i>
solitary digger bee	<i>Micranthophora flavocincta</i>
southern mountain misery	<i>Chamaebatia australis</i>
southern mule's ear	<i>Wyethia ovata</i>
southern pacific rattlesnake	<i>Crotalus viridis helleri</i>
spike rush	<i>Eleocharis palustris</i>
spotted owl	<i>Strix occidentalis</i>
spreading navarretia	<i>Navarretia fossalis</i>
star thistle	<i>Centaurea melitensis</i>
Stephen's kangaroo rat	<i>Dipodomys stephensi</i>
stork's bill	<i>Erodium</i> spp.
striped racer snake	<i>Masticophis lateralis</i>
striped skunk	<i>Mephitis mephitis</i>
sucker	<i>Catostomus</i> spp.
sugar pine	<i>Pinus lambertiana</i>
sugarbush	<i>Rhus ovata</i>
sun-cups	<i>Camissonia</i> spp.
Swainson's hawk	<i>Buteo swainsoni</i>
sycamore	<i>Platanus</i> spp.
tamarisk	<i>Tamarix</i> spp.
tar plant	<i>Hemizonia fasciculata</i>
tarweed	<i>Hemizonia</i> spp.
telegraph weed	<i>Heterotheca grandifolia</i>
Texas horned lizard	<i>Phrynosoma cornutum</i>
thread-leaved bird's beak	<i>Cordylanthus rigidus</i>
tilapia	<i>Oreochromis</i> spp.
toad rush	<i>Juncus bufonius</i>
toyon	<i>Heteromeles arbutifolia</i>
trout	<i>Oncorhynchus</i> spp.
turkey-mullein	<i>Eremocarpus setigerus</i>
turtle	<i>Clemmys</i> spp.

Appendix 4. List of common and scientific names.

7

COMMON NAMESCIENTIFIC NAME

valley cholla	<i>Opuntia californica</i> var. <i>parkeri</i> (formerly <i>Opuntia parryi</i>)
vernal pool fairy shrimp	<i>Branchinecta lynchi</i>
versatile fairy shrimp	<i>Branchinecta lindahli</i>
Virginia opossum	<i>Didelphis virginiana</i>
vole	<i>Microtus</i> spp.
western fence lizard	<i>Sceloporus occidentalis</i>
western gray squirrel	<i>Sciurus griseus</i>
western scrub-jay	<i>Aphelocoma californica</i>
western sycamore	<i>Platanus racemosa</i>
western toad	<i>Bufo boreas</i>
western whiptail lizard	<i>Cnemidophorus tigris</i>
white fir	<i>Abies concolor</i>
white snapdragon	<i>Antirrhinum coulterianum</i>
white-tailed antelope ground squirrels	<i>Ammospermophilus leucurus</i>
white-tailed deer	<i>Odocoileus virginianus</i>
wild oat	<i>Avena</i> spp.
wild rose	<i>Rosa</i> spp.
willow sp.	<i>Salix</i> spp.
wire-stem popcorn flower	<i>Plagiobothrys leptocladus</i>
wolf	<i>Canis lupus</i>
woodchuck	<i>Marmota monax</i>
woodrat	<i>Neotoma</i> spp.
woolly marbles	<i>Psilocarphus brevisimms</i>
woolly plantain	<i>Plantago patagonica</i>
yarrow	<i>Achillea millefolium</i>
Yerba Santa	<i>Eriodictyon trichocalyx</i>
yucca	<i>Yucca whipplei</i>

APPENDIX 5

Date	FWS Reference #	Project Name	Species Common Name	Take	Habitat acres		*Comments
					Impacted / Lost	Conserved	
1989	1-6-89-F-41	Homestead Land Development / Canyon Lake	Stephens' kangaroo rat	282 acres*	282	282	approximately 115 individuals
1989	1-6-88-F-6	Prado Mainstem / Santa Ana River	least Bell's vireo	9 pairs	133	130+*	restoration / compensation ongoing
1989	1-6-88-F-6	Prado Mainstem / Santa Ana River	Santa Ana River woolly star	N/A*	not quantified**	760	*no defined take for plants / **population in the wash reduced to 1400 acres
1990	1-6-90-F-30	Heavy Equipment Training / Potrero Valley	Stephens' kangaroo rat	1 individual	4	9	
1990	1-190-FW-21	SKR Short-term HCP / Intra-Service Section 7	Stephens' kangaroo rat	4400 acres*	4400*	4400*	acreage included within the SKR Long-term HCP (1-6-96-FW-27)
1990	1-6-90-F-29	State Route 215 Improvements	Stephens' kangaroo rat	89 acres*	89*	108*	acreage included within the SKR Long-term HCP (1-6-96-FW-27)
1991	1-6-91-F-45	Andreas Cove Country Club Project	least Bell's vireo	25 individuals	0.33	0*	impacts to riparian habitat will be fully mitigated via restoration and/or enhancement
1991	1-6-92-FW-10	Corona Ranch Development / Intra-Service Section 7	Stephens' kangaroo rat	69.79 acres	69.79	0	
1992	1-6-93-F-8	Cahuilla Country Club Estates	Stephens' kangaroo rat	264 acres	264	275	
1992	PRT-760140	Citation Builders Ridge Permit App. / Intra-Service Section 7	Stephens' kangaroo rat	21.60 acres	21.60	0	
1992	1-6-92-C-228	Cottonwood Hills	cactus wren	1 pair	1019*	1110*	total acres lost/conserved for all species
1992	1-6-92-C-228	Cottonwood Hills	Belding's orange-throated whiptail	1019 acres*	1019*	1110*	total acres lost/conserved for all species
1992	1-6-92-C-228	Cottonwood Hills	San Diego horned lizard	1019 acres*	1019*	1110*	total acres lost/conserved for all species

Date	FWS Reference #	Project Name	Species Common Name	Take	Habitat acres		*Comments
					Impacted / Lost	Conserved	
1992	1-6-92-F-38	East Benton Road Federal-Aid Project	Stephens' kangaroo rat	100 individuals	38	46	
1992	1-6-92-F-45	Preferred Alternative of So. Coast Resource Mgmt. Plan	Stephens' kangaroo rat	600 individuals	296	not quantified*	land exchange is available on 5043 acres
1992	Intra-Service Conf. Report*	SW Riverside County MSHCP	coastal California gnatcatcher	44 pairs	1220	1400	Refer to June 17, 1993 letter to MWD that adopted conference opinion as formal consultation
1993	1-6-95-FW-009	Finisterra Farms / Section 7 / SW Riv. MSHCP Ammend.	Stephens' kangaroo rat	188 individuals*	96*	205*	included within the SKR Long-term HCP (1-6-96-FW-27)
1993	1-6-91-F-33 / 33-R	March Airforce Base	Stephens' kangaroo rat	1174.50 acres*	1174.50*	2200*	acreage included within the SKR Long-term HCP (1-6-96-FW-27)
1993	1-6-93-F-7	Prado Basin Water Conservation	least Bell's vireo	23 pairs	100	150+*	restoration / compensation ongoing
1993	1-6-93-F-10	Riverside National Cemetery Expansion / Management Plan	Stephens' kangaroo rat	87 acres*	87*	83.50*	approximately 250 SKR individuals; acreage included within the SKR Long-term HCP (1-6-96-FW-27)
1994	1-6-94-F-14 / F-15 / F-14-R2	Cajalco Dam & Detention Basin	coastal California gnatcatcher	1 individual	22.50	73.80	
1994	1-6-94-F-14 / F-15 / F-14-R2	Cajalco Dam & Detention Basin	Stephens' kangaroo rat	21 acres*	21*	21*	approximately 40 SKR / acre; acreage included within the SKR Long-term HCP (1-6-96-FW-27)
1994	1-6-94-F-31	Pacific Gateway Homes HCP / Intra-Service Section 7	Stephens' kangaroo rat	26.60 acres*	26.60	26.60	take of 60-220 SKR will likely result
1994	1-6-94-F-47	Prado Basin Water Treatment	bald eagle	1 individual	not quantified	567	
1994	1-6-94-F-47	Prado Basin Water Treatment	least Bell's vireo	4 individuals	not quantified	102*	riparian woodland habitat
1994	1-6-94-F-47	Prado Basin Water Treatment	southwestern willow flycatcher	1 individual	not quantified	102*	riparian woodland habitat
1994	Intra-Service Section 7	Riverside County Weed abatement	coastal California gnatcatcher	10 pairs / year	400*	0*	weed abatement program with annual impacts

Date	FWS Reference #	Project Name	Species Common Name	Take	Habitat acres		*Comments
					Impacted / Lost	Conserved	
1994	Intra-Service Section 7	Riverside County Weed abatement	Stephens' kangaroo rat	700 indiv. / year	1540*	0*	weed abatement program with annual impacts
1994	1-6-94-F-12	Splatter S Duck Club Project	least Bell's vireo	1 pair	1	1	
1995	1-6-94-F-29	Cox-West / Norco Hills Diamond Valley Golf	coastal California gnatcatcher	1 pair	86.70	320*	total acres conserved for both species
1995	1-6-94-F-29	Cox-West / Norco Hills Diamond Valley Golf	Stephens' kangaroo rat	234 acres	234	320*	total acres conserved for both species
1995	1-6-94-F-30	Diamond Valley Development	Stephens' kangaroo rat	245.20 acres*	245.20*	240*	acreage is likely included within the SKR Long-term HCP (1-6-96-FW-27)
1995	1-6-95-FW-22	John Laing Properties / Intra-Service BO Incidental Take	Stephens' kangaroo rat	30	10.40	10.40	
1995	1-6-95-F-13	Mockingbird Canyon Estates + permit verification	coastal California gnatcatcher	2 pairs	20	15.20	
1995	1-6-95-F-37	Rincon St. Phase II / Prado Basin	least Bell's vireo	24 individuals	4.72*	10.72	permanent loss of 3.44 acres + temporary loss of 1.28 acres = 4.72 acres
1995	1-6-95-F-37	Rincon St. Phase II / Prado Basin	southwestern willow flycatcher	2 individuals	4.72*	10.72	permanent loss of 3.44 acres + temporary loss of 1.28 acres = 4.72 acres
1995	1-6-95-F-41	Riverside Co. Road Improve. / Intra-Service Section 7	coastal California gnatcatcher	3 pairs*	41.97	0	harassment only
1995	1-6-95-FW-31	Santa Rosa Plateau Ecological Reserve	San Diego button celery	N/A*	<1% of 25 acres**	0	*no defined take of plants / **temporary impacts to vernal pool
1995	1-6-95-FW-31	Santa Rosa Plateau Ecological Reserve	thread-leaved brodiaea	N/A*	<1% of 25 acres**	0	*no defined take of plants / **temporary impacts to vernal pool
1996	1-6-96-FW-27	SKR Long-term HCP / Intra-Service Section 7	Stephens' kangaroo rat	15,000 acres*	15,000	15,000	approximately 30,000 individuals
1996	1-6-97-F-12	Agua Mansa Industrial Growth / Intra-Service Section 7	Delhi Sands flower-loving fly	44.20 acres	44.20	6	

Date	FWS Reference #	Project Name	Species Common Name	Take	Habitat acres		*Comments
					Impacted / Lost	Conserved	
1996	1-6-96-FW-05	Lake Mathews HCP / NCCP	bald eagle	0*	618-1275**	2544**	*harassment only / **total acres impacted and conserved for all species
1996	1-6-96-FW-05	Lake Mathews HCP / NCCP	coastal California gnatcatcher	8 pairs	415.2	1649	
1996	1-6-96-FW-05	Lake Mathews HCP / NCCP	least Bell's vireo	1 individual / year*	618-1275**	2544**	*harassment only / **total acres impacted and conserved for all species
1996	1-6-96-FW-05	Lake Mathews HCP / NCCP	Munz's onion	N/A*	234.90	274.30	no defined take of plants
1996	1-6-96-FW-05	Lake Mathews HCP / NCCP	Quino checkerspot butterfly	1 individual / year*	618-1275**	69.80	*harassment only / **total acres impacted for all species
1996	1-6-96-FW-05	Lake Mathews HCP / NCCP	slender-horned spineflower	N/A*	618-1275**	2544**	*no defined take of plants / **total acres impacted and conserved for all species
1996	1-6-96-FW-05	Lake Mathews HCP / NCCP	southwestern willow flycatcher	1 individual / year*	618-1275**	2544**	*harassment only / **total acres impacted and conserved for all species
1996	1-6-96-FW-05	Lake Mathews HCP / NCCP	Stephens' kangaroo rat	289 acres*	289*	2321.30*	acreage included within the SKR Long-term HCP (1-6-96-FW-27)
1996	1-6-96-F-25	Norco Bluffs Bank Stabilization	least Bell's vireo	2 pairs + 1 individual*	4.90	4.90**	*harassment only / **plus 51.5 acres of giant reed removed
1996	1-6-96-F-25	Norco Bluffs Bank Stabilization	southwestern willow flycatcher	not quantified*	4.90	4.90**	*harassment only / **plus 51.5 acres of giant reed removed
1996	1-6-96-F-34	Santa Rosa Plateau Ecological Reserve / Bullfrog Removal	California red-legged frog	not quantified*	*	0	up to 5% larvae taken within 8000 acres / all life stages affected in form of harassment from bullfrog removal
1997	1-6-97-F-22	3M Industrial Quarry Mineral	coastal California gnatcatcher	1 pair	77.50	7.50	
1997	1-6-97-F-7	Corona Wastewater Treatment / Prado Basin	least Bell's vireo	0	0.13*	0.39	temporary disturbance of critical habitat
1997	1-6-97-F-7 / 7R1	Corona Wastewater Treatment / Prado Basin	southwestern willow flycatcher	2 pairs	0.13*	0.39	temporary disturbance of critical habitat

Date	FWS Reference #	Project Name	Species Common Name	Take	Habitat acres		*Comments
					Impacted / Lost	Conserved	
1997	1-6-98-F-06	Mary's Crossing / Sandia Creek	arroyo toad	0.11 acres	0.11*	0	permanent loss of 0.04 acre + temporary loss of 0.07 acre = 0.11 acres
1997	1-6-97-F-38	Tequesquite Landfill Flood Protection	least Bell's vireo	1 pair	2	4.12	
1997	1-6-97-F-38	Tequesquite Landfill Flood Protection	southwestern willow flycatcher	0	2	4.12	
1997	1-6-97-F-10	Western Riverside County Wasterwater Treatment	least Bell's vireo	2 individuals	5.40	0*	mitigation funds for habitat enhancement / restoration
1997	1-6-97-F-10	Western Riverside County Wasterwater Treatment	southwestern willow flycatcher	0	5.40	0*	mitigation funds for habitat enhancement / restoration
1998	1-6-98-F-40 / F-40-R1	Canyon Lake Firebreak	coastal California gnatcatcher	6 pairs*	3.37	6.74	take of 3 pairs as harassment only
1998	1-6-98-F-17	Corona Airport Walls / Prado Basin	least Bell's vireo	2 pairs	0.41	0.40	
1998	1-6-98-F-17	Corona Airport Walls / Prado Basin	southwestern willow flycatcher	0	0.41	0.40	
1998	1-6-99-F-2	Norco Hills Development	Stephens' kangaroo rat	148 acres	148	148	
1998	1-6-98-F-30	Orchard 91 Sewer Line / Development	coastal California gnatcatcher	3 pairs	31.82	90*	atleast 60 acres with 3 pairs or 90 acres with 2 pairs
1998	1-6-98-F-34	Route 71 Hwy Bridge Seismic Retrofit	least Bell's vireo	5 individuals	3.75	2.25	
1999	1-6-99-F-60	Ashby Financial Company / Iodine Springs Road	coastal California gnatcatcher	5 pairs	96.88	182	
1999	1-6-99-F-60	Ashby Financial Company / Iodine Springs Road	Quino checkerspot butterfly	14 acres*	14	14	14 acres nectaring resources
1999	1-6-94-F-14-R3	Cajalco Dam & Detention Basin / Amendment #3	coastal California gnatcatcher	1 pair + 1 individual	7.20	45.40	

Date	FWS Reference #	Project Name	Species Common Name	Take	Habitat acres		*Comments
					Impacted / Lost	Conserved	
1999	1-6-94-F-14-R3	Cajalco Dam & Detention Basin / Amendment #3	Stephens' kangaroo rat	27.70 acres*	11.40	48.90	permanent loss of 11.40 acres + 16.30 acres of project modifications for roads = 27.70
1999	1-6-99-F-1	Centex Homes Development	Quino checkerspot butterfly	10 acres*	10	40	all larvae lost in <10 acres of habitat
1999	1-6-99-F-58	City of Corona Operation & Maintenance Flood Control	least Bell's vireo	10 individuals	18.48*	36.96*	18.48 acres critical habitat but impacts may be less; conserved:lost = up to 2:1 or 10:1 for some trees
1999	1-6-99-F-58	City of Corona Operation & Maintenance Flood Control	southwestern willow flycatcher	0	18.48*	36.96*	18.48 acres critical habitat but impacts may be less; conserved:lost = up to 2:1 or 10:1 for some trees
1999	1-6-99-F-55	Four Seasons	coastal California gnatcatcher	4 pairs	30	90	
1999	1-6-99-F-13	March Air Force Base	Stephens' kangaroo rat	104.90 acres*	104.90*	1178*	acreage included within the SKR Long-term HCP (1-6-96-FW-27)
1999	1-6-99-F-18	Metropolitan Water District / San Bern. & Riverside Co.	coastal California gnatcatcher	2 individuals*	241**	81.50**	*harassment only expected / **total impacts for all species
1999	1-6-99-F-18	Metropolitan Water District / San Bern. & Riverside Co.	San Jacinto Valley crowscale	N/A*	2.50**	81.50***	*no defined take of plants / **0.09 occupied + 2.41 ac seedbank / ***total conserved for all species
1999	1-6-99-F-18	Metropolitan Water District / San Bern. & Riverside Co.	spreading navarretia	N/A*	241**	81.50**	*no defined take of plants / **total impacts and acres conserved for all species
1999	1-6-99-F-18	Metropolitan Water District / San Bern. & Riverside Co.	thread-leaved brodiaea	N/A*	241**	81.50**	*no defined take of plants / **total impacts and acres conserved for all species
1999	1-6-95-F-13-R1	Mockingbird Canyon / Nationwide Permit Verification	coastal California gnatcatcher	2 pairs	20	7.60	
1999	1-6-99-F-44	North Peak Development	burrowing owl	146.70 acres	146.70	94.90	
1999	1-6-99-F-44	North Peak Development	Belding's orange-throated whiptail	558 acres	558	461.60	
1999	1-6-99-F-44	North Peak Development	Bell's sage sparrow	455 acres	455	398	

Appendix 5. Summary of past Federal actions.

Date	FWS Reference #	Project Name	Species Common Name	Take	Habitat acres		*Comments
					Impacted / Lost	Conserved	
1999	1-6-99-F-44	North Peak Development	California horned lark	146.70 acres	146.70	94.90	
1999	1-6-99-F-44	North Peak Development	coastal California gnatcatcher	6 pairs	335	340.10	
1999	1-6-99-F-44	North Peak Development	coastal western whiptail	558 acres	558	461.60	
1999	1-6-99-F-44	North Peak Development	Cooper's hawk	621 acres*	621	511**	*621 acres of prey / foraging habitat / **total conservation for all species +156 acres of golf turf
1999	1-6-99-F-44	North Peak Development	downy woodpecker	6 acres	6	19	
1999	1-6-99-F-44	North Peak Development	ferruginous hawk	147 acres*	147	94.60**	*147 acres of prey / foraging habitat / **plus 156 acres of gold turf
1999	1-6-99-F-44	North Peak Development	golden eagle	621 acres*	621	511**	*621 acres of prey / foraging habitat / **total conservation for all species +156 acres of golf turf
1999	1-6-99-F-44	North Peak Development	granite night lizard	547 acres	547	459	
1999	1-6-99-F-44	North Peak Development	grasshopper sparrow	146.70 acres	146.70	94.90	
1999	1-6-99-F-44	North Peak Development	least Bell's vireo	1 acre	1	6	
1999	1-6-99-F-44	North Peak Development	loggerhead shrike	344 acres	344	368.50	
1999	1-6-99-F-44	North Peak Development	Los Angeles pocket mouse	344 acres	344	368.50	
1999	1-6-99-F-44	North Peak Development	merlin	621 acres*	621	511**	*621 acres of prey / foraging habitat / **total conservation for all species +156 acres of golf turf
1999	1-6-99-F-44	North Peak Development	mountain lion	621 acres*	621	511**	*621 acres of prey / foraging habitat / **total conservation for all species +156 acres of golf turf

Date	FWS Reference #	Project Name	Species Common Name	Take	Habitat acres		*Comments
					Impacted / Lost	Conserved	
1999	1-6-99-F-44	North Peak Development	Northern harrier	147 acres*	147	94.60**	*147 acres of prey / foraging habitat / **plus 156 acres of gold turf
1999	1-6-99-F-44	North Peak Development	northern red diamond rattle snake	455 acres	455	511*	*total conservation for all species
1999	1-6-99-F-44	North Peak Development	Northwestern San Diego pocket mouse	602 acres	602	511*	*total conservation for all species
1999	1-6-99-F-44	North Peak Development	peregrine falcon	621 acres*	621	511**	*621 acres of prey / foraging habitat / **total conservation for all species +156 acres of golf turf
1999	1-6-99-F-44	North Peak Development	prairie falcon	621 acres*	621	511**	*621 acres of prey / foraging habitat / **total conservation for all species +156 acres of golf turf
1999	1-6-99-F-44	North Peak Development	San Diego banded gecko	547 acres	547	511*	*total conservation for all species
1999	1-6-99-F-44	North Peak Development	San Diego black-tailed jackrabbit	602 acres	602	511*	*total conservation for all species
1999	1-6-99-F-44	North Peak Development	San Diego desert woodrat	558 acres	558	461.60	
1999	1-6-99-F-44	North Peak Development	San Diego horned lizard	558 acres	558	461.60	
1999	1-6-99-F-44	North Peak Development	sharp-shinned hawk	621 acres*	621	511**	*621 acres of prey / foraging habitat / **total conservation for all species +156 acres of golf turf
1999	1-6-99-F-44	North Peak Development	southern California rufous crowned sparrow	558 acres	558	461.60	
1999	1-6-99-F-44	North Peak Development	Stephens' kangaroo rat	220 acres	220	511*	total conservation for all species
1999	1-6-99-F-44	North Peak Development	western spadefoot toad	608 acres	608	511*	total conservation for all species
1999	1-6-99-F-44	North Peak Development	white-tailed kite	621 acres*	621	511**	*621 acres of prey / foraging habitat / **total conservation for all species +156 acres of golf turf

Date	FWS Reference #	Project Name	Species Common Name	Take	Habitat acres		*Comments
					Impacted / Lost	Conserved	
1999	1-6-99-F-44	North Peak Development	yellow warbler	1 acre	1	6	
1999	1-6-99-F-44	North Peak Development	yellow-breasted chat	1 acre	1	6	
1999	1-6-99-F-69	Rilington Communities	coastal California gnatcatcher	1 pair	11	33	
1999	1-6-99-F-36	State Route 71 / Section 7 Consultation	least Bell's vireo	5 individuals	1.97	5.42	
1999	1-6-99-F-36	State Route 71 / Section 7 Consultation	Santa Ana sucker	0.33 acres	0.33	0.99	
2000	1-6-01-F-725.2	Assessment District 161 Subregional HCP	Belding's orange-throated whiptail	1302 acres	1302	754	
2000	1-6-01-F-725.2	Assessment District 161 Subregional HCP	Bell's sage sparrow	748 acres	748	704	
2000	1-6-01-F-725.2	Assessment District 161 Subregional HCP	burrowing owl	554 acres	554	1441*	total conservation for all species
2000	1-6-01-F-725.2	Assessment District 161 Subregional HCP	California orcutt grass	N/A*	≥4**	0	*no defined take of plants / **part of project not quantified / more habitat will be lost
2000	1-6-01-F-725.2	Assessment District 161 Subregional HCP	coastal California gnatcatcher	39 pairs*	748**	704	*loss of 34 pairs and effects to use area of 5 pairs / **895 acres of critical habitat lost
2000	1-6-01-F-725.2	Assessment District 161 Subregional HCP	Cooper's hawk	1302 acres	1399	1441*	total conservation for all species
2000	1-6-01-F-725.2	Assessment District 161 Subregional HCP	ferruginous hawk	1302 acres	1302	1441*	total conservation for all species
2000	1-6-01-F-725.2	Assessment District 161 Subregional HCP	golden eagle	1302 acres	1302	1441*	total conservation for all species
2000	1-6-01-F-725.2	Assessment District 161 Subregional HCP	grasshopper sparrow	554	554	1441*	total conservation for all species

Date	FWS Reference #	Project Name	Species Common Name	Take	Habitat acres		*Comments
					Impacted / Lost	Conserved	
2000	1-6-01-F-725.2	Assessment District 161 Subregional HCP	long-spined spineflower	N/A*	0.27	0	no defined take of plants
2000	1-6-01-F-725.2	Assessment District 161 Subregional HCP	merlin	1302 acres	1302	1441*	total conservation for all species
2000	1-6-01-F-725.2	Assessment District 161 Subregional HCP	Palmer's grapplinghook	N/A*	2495**	1441**	*no defined take of plants / **total acres lost and conserved for all species
2000	1-6-01-F-725.2	Assessment District 161 Subregional HCP	peregrine falcon	1302 acres	1302	1441*	total conservation for all species
2000	1-6-01-F-725.2	Assessment District 161 Subregional HCP	Quino checkerspot butterfly	6 pops.*	1695	1180	could affect up to 8 populations in 1135 acres of landscape habitat
2000	1-6-01-F-725.2	Assessment District 161 Subregional HCP	Riverside fairy shrimp	≥4 acres*	≥4*	0	part of project not quantified / more habitat will be lost
2000	1-6-01-F-725.2	Assessment District 161 Subregional HCP	San Diego horned lizard	1302 acres	1302	754	
2000	1-6-01-F-725.2	Assessment District 161 Subregional HCP	sharp-shinned hawk	1302 acres	1302	1441*	total conservation for all species
2000	1-6-01-F-725.2	Assessment District 161 Subregional HCP	southern California rufous crowned sparrow	660 acres	660	627	
2000	1-6-01-F-725.2	Assessment District 161 Subregional HCP	western spadefoot toad	1230 acres	1230	723	
2000	1-6-01-F-725.2	Assessment District 161 Subregional HCP	white-tailed kite	1302 acres	1302	1441*	total conservation for all species
2000	1-6-00-F-35	Cornerstone Homes / Railroad Canyon / Intra-Service Sec. 7	coastal California gnatcatcher	1 pair	9.2	20	
2000	1-6-00-F-38	Eagle Glen Specific Plan Amendment III	coastal California gnatcatcher	2 pairs	74.94	150	
2000	1-6-00-F-827.5	Granite Homes	coastal California gnatcatcher	3 pairs	14	24	

Date	FWS Reference #	Project Name	Species Common Name	Take	Habitat acres		*Comments
					Impacted / Lost	Conserved	
2000	1-6-00-XF-779.2	Lusk Elsinore Development	coastal California gnatcatcher	3 individuals	44.47	84	
2000	1-6-99-F-80	Murietta SCGA / HighPointe	coastal California gnatcatcher	2 pairs	39.50	37.29	
2000	1-6-99-F-80	Murietta SCGA / HighPointe	Quino checkerspot butterfly	1 population	106	27.29	
2000	1-6-00-F-4	Murrieta Hot Springs Road Extension	coastal California gnatcatcher	2 pairs	9.40	31	
2000	1-6-00-F-4	Murrieta Hot Springs Road Extension	Quino checkerspot butterfly	30 acres	30	31	
2000	1-6-01-XF-775.5	Old Bridge Road Project	coastal California gnatcatcher	1 pair	2.50	5	
2000	1-6-01-XF-775.5	Old Bridge Road Project	least Bell's vireo	1 individual	0.10	1.50	
2000	1-6-00-F-18	Painted Hills Development	coastal California gnatcatcher	1 pair	3.60	6.36	
2000	1-6-99-F-75	Prado Basin Conservation & Water Control / Section 7	least Bell's vireo	95 pairs	100	300	
2000	1-6-99-F-75	Prado Basin Conservation & Water Control / Section 7	southwestern willow flycatcher	0	100	300	
2000	1-6-99-F-70	Pulte Home Corp. / Silverhawk	coastal California gnatcatcher	14 pairs*	150	114	plus harassment of 2 pairs and 1 individual
2000	1-6-99-F-70	Pulte Home Corp. / Silverhawk	Quino checkerspot butterfly	1 sub-population	406	18*	18 acres avoided on project site / see AD 161 (1-6-01-F-725.2) for mitigation
2000	1-6-00-FW-12	Rancho Bella Vista Development	Bell's sage sparrow	2 pairs	68.1	114.80	
2000	1-6-00-FW-12	Rancho Bella Vista Development	burrowing owl	2 pairs	88.90	69.80	

Date	FWS Reference #	Project Name	Species Common Name	Take	Habitat acres		*Comments
					Impacted / Lost	Conserved	
2000	1-6-00-FW-12	Rancho Bella Vista Development	California orcutt grass	N/A*	102.30**	33.50	*no defined take of plants / 100 individuals lost
2000	1-6-00-FW-12	Rancho Bella Vista Development	coastal California gnatcatcher	2 pairs	68.10	114.80	
2000	1-6-00-FW-12	Rancho Bella Vista Development	least Bell's vireo	2 pairs	4.40	10.60	
2000	1-6-00-FW-12	Rancho Bella Vista Development	Munz's onion	N/A*	102.30**	170	*no defined take of plants / 25 individuals lost
2000	1-6-00-FW-12	Rancho Bella Vista Development	Quino checkerspot butterfly	97.80 acres*	97.80	156	unquantifiable # within 97.80 acres of suitable habitat
2000	1-6-00-FW-12	Rancho Bella Vista Development	Riverside fairy shrimp	1 acre	1	0	
2000	1-6-00-FW-12	Rancho Bella Vista Development	San Diego ambrosia	N/A*	102.30**	170	*no defined take of plants / 10 stems lost
2000	1-6-00-FW-12	Rancho Bella Vista Development	spreading navarretia	N/A*	5	33.50	*no defined take of plants / <10 individuals lost
2000	1-6-00-FW-12	Rancho Bella Vista Development	southern California rufous crowned sparrow	3 pairs	68.10	114.80	
2000	1-6-00-FW-12	Rancho Bella Vista Development	southwestern pond turtle	4 individuals	4.60	0.05*	0.05 acre pond created - turtles onsite moved to pond
2000	1-6-00-FW-12	Rancho Bella Vista Development	thread-leaved brodiaea	N/A*	5	79.6	*no defined take of plants / <5 individuals lost
2000	1-6-00-FW-12	Rancho Bella Vista Development	western spadefoot toad	102.20 acres*	102.20	121.20	unquantifiable # within 102.20 acres of breeding and aestivation habitat
2000	1-6-00-F-23	Rancho Miramosa / OBED	coastal California gnatcatcher	1 pair	3.71	*	*for total conservation refer to AD 161 (1-6-01-F-725.2)
2000	1-6-00-F-23	Rancho Miramosa / OBED	least Bell's vireo	1 pair	0.58	*	*for total conservation refer to AD 161 (1-6-01-F-725.2)

Date	FWS Reference #	Project Name	Species Common Name	Take	Habitat acres		*Comments
					Impacted / Lost	Conserved	
2000	1-6-00-F-23	Rancho Miramosa / OBED	Quino checkerspot butterfly	1 population	154	*	*for total conservation refer to AD 161 (1-6-01-F-725.2)
2000	1-6-99-F-21	Riparian Species and Forest Activities*	arroyo toad	3 adults**	N/A**	N/A**	*Cleveland, Angeles, San Bern., Los Pad. NFs / **+50 tadpoles +3 egg masses / acres neither lost/conserved
2000	1-6-99-F-83 / 1-6-99-XF-1045.1	San Jacinto Seasonal Storage	San Bernadino kangaroo rat	5 acres	5	10	
2000	1-6-00-FA-796.2	State Route 74 Realignment / Widening	coastal California gnatcatcher	3 pairs	11	22	
2000	1-6-00-F-26	Victoria Grove Phase III	coastal California gnatcatcher	1 individual	2	6	
2000	1-6-00-F-26	Victoria Grove Phase III	least Bell's vireo	2 individuals	0.30	2	
2000	1-6-00-F-33	Williams Communications Fiber Optic Cable System	coastal California gnatcatcher	4 acres*	4	9	harassment only
2000	1-6-00-F-33	Williams Communications Fiber Optic Cable System	Stephens' kangaroo rat	1 acre	1	1	
2000	1-6-01-XF.738.2	Willows Development	coastal California gnatcatcher	2 pairs	22.40*	67*	total acres lost/conserved for both species
2000	1-6-01-XF.738.2	Willows Development	Quino checkerspot butterfly	22.40 acres	22.40*	67*	total acres lost/conserved for both species
2001	FWS-CFWO-1694	Cleveland Nat'l Forest's livestock grazing program*	arroyo toad	1 egg mass / year	N/A**	N/A**	*Orange and Riverside Co. / **acres neither lost nor conserved = temporary
2001	FWS-CFWO-1694	Cleveland Nat'l Forest's livestock grazing program*	thread-leaved brodiaea	N/A**	163**	N/A**	*Orange and Riverside Co. / **no defined take of plants and acres neither lost nor conserv. = temporary
2001	FWS-WRIV-1224.1	El Sobrante Landfill HCP	Belding's orange-throated whiptail	450 acres	450	1071	
2001	FWS-WRIV-1224.1	El Sobrante Landfill HCP	Bell's sage sparrow	450 acres	450	1071	

Date	FWS Reference #	Project Name	Species Common Name	Take	Habitat acres		*Comments
					Impacted / Lost	Conserved	
2001	FWS-WRIV-1224.1	El Sobrante Landfill HCP	burrowing owl	49 acres*	264	220	plus sparse Riverside Sage Scub
2001	FWS-WRIV-1224.1	El Sobrante Landfill HCP	cactus wren	450 acres*	450	685	8 suitable cactus patches
2001	FWS-WRIV-1224.1	El Sobrante Landfill HCP	California horned lark	41 acres	41	219	
2001	FWS-WRIV-1224.1	El Sobrante Landfill HCP	coastal California gnatcatcher	15 pairs	450	1071	
2001	FWS-WRIV-1224.1	El Sobrante Landfill HCP	coastal California gnatcatcher	15 pairs	450 acres	1071	
2001	FWS-WRIV-1224.1	El Sobrante Landfill HCP	coastal western whiptail	450 acres	450	1071	
2001	FWS-WRIV-1224.1	El Sobrante Landfill HCP	Cooper's hawk	493.20*	493.20	1305	0.20 acre breeding habitat + 493 acres foraging habitat
2001	FWS-WRIV-1224.1	El Sobrante Landfill HCP	golden eagle	41 acres	41	219	
2001	FWS-WRIV-1224.1	El Sobrante Landfill HCP	grasshopper sparrow	41 acres	41	219	
2001	FWS-WRIV-1224.1	El Sobrante Landfill HCP	loggerhead shrike	49 acres	49	232.50	
2001	FWS-WRIV-1224.1	El Sobrante Landfill HCP	long-spined spineflower	N/A*	10 plants	685	*no defined take of plants
2001	FWS-WRIV-1224.1	El Sobrante Landfill HCP	many-stemmed dudleya	N/A*	25 occurrences	685	*no defined take of plants
2001	FWS-WRIV-1224.1	El Sobrante Landfill HCP	mountain lion	499 acres	499	1305	
2001	FWS-WRIV-1224.1	El Sobrante Landfill HCP	Northern harrier	41 acres	41	219	

Date	FWS Reference #	Project Name	Species Common Name	Take	Habitat acres		*Comments
					Impacted / Lost	Conserved	
2001	FWS-WRIV-1224.1	El Sobrante Landfill HCP	northern red diamond rattle snake	450 acres	450	1071	
2001	FWS-WRIV-1224.1	El Sobrante Landfill HCP	Northwestern San Diego pocket mouse	491 acres	491	1290	
2001	FWS-WRIV-1224.1	El Sobrante Landfill HCP	prairie falcon	41 acres	41	219	
2001	FWS-WRIV-1224.1	El Sobrante Landfill HCP	San Diego banded gecko	14 locations	13 rock outcrops	685	
2001	FWS-WRIV-1224.1	El Sobrante Landfill HCP	San Diego black-tailed jackrabbit	41 acres	41	219	
2001	FWS-WRIV-1224.1	El Sobrante Landfill HCP	San Diego horned lizard	450 acres	450	1071	
2001	FWS-WRIV-1224.1	El Sobrante Landfill HCP	sharp-shinned hawk	41 acres	41	219	
2001	FWS-WRIV-1224.1	El Sobrante Landfill HCP	southern California rufous crowned sparrow	450 acres	450	1071	
2001	FWS-WRIV-1224.1	El Sobrante Landfill HCP	Stephens' kangaroo rat	222 acres	222	223	
2001	FWS-WRIV-1224.1	El Sobrante Landfill HCP	western spadefoot toad	5 acres	5	13.5	
2001	FWS-WRIV-1224.1	El Sobrante Landfill HCP	white-tailed kite	493.20*	493.20	1305	0.20 acre breeding habitat + 493 acres foraging habitat
2000 / 2001	1-6-00-XF-759.3 / FWS-WRIV-759.6	Lake Hills Crest + Amendment #3	coastal California gnatcatcher	3 pairs	25.94	235	
2000 / 2001	1-6-00-XF-759.3 / FWS-WRIV-759.6	Lake Hills Crest + Amendment #3	least Bell's vireo	2 pairs	1.75	36.20	
2001	FWS-WRIV-1183.2	La Sierra Avenue / El Sobrante Road	coastal California gnatcatcher	2 pairs	3.60	8.80	

Date	FWS Reference #	Project Name	Species Common Name	Take	Habitat acres		*Comments
					Impacted / Lost	Conserved	
2001	FWS-WRIV-1183.2	La Sierra Avenue / El Sobrante Road	least Bell's vireo	1 pair	0.41	1	
2001	FWS-WRIV-675.2	Norco Ridge Ranch	coastal California gnatcatcher	1 pair	279	356.90	
2001	FWS-WRIV-675.2	Norco Ridge Ranch	Stephens' kangaroo rat	161.80 acres	161.80	300	
2001	FWS-SB-909.6	Prado Mainstem / Santa Ana River	least Bell's vireo	31 pairs	52.50	133	
2001	FWS-SB-909.6	Prado Mainstem / Santa Ana River	Santa Ana sucker	30*	9**	9***	*+10 per relocation event (# events ?) / **+4.20 acres temp. effects / ***9 ac created-no perm. conservation
2001	1-6-00-F-773.2	Resource Mgmt. Plans for 4 Southern CA Nat'l Forests*	arroyo toad	**	**	**	*Cleveland, Angeles, San Bernardino, and Los Padres Nat'l forests / ** See Riparian BO (1-6-99-F-21)
2001	1-6-00-F-773.2	Resource Mgmt. Plans for 4 Southern CA Nat'l Forests*	bald eagle	1 individual (harr. only)	206**	N/A**	*Cleveland, Angeles, San Bernardino, and Los Padres Nat'l forests / **acres neither lost nor conserved
2001	1-6-00-F-773.2	Resource Mgmt. Plans for 4 Southern CA Nat'l Forests*	mountain yellow-legged frog	2 larvae	68**	N/A**	*Cleveland, Angeles, San Bernardino, and Los Padres Nat'l forests / **acres neither lost nor conserved
2001	1-6-00-F-773.2	Resource Mgmt. Plans for 4 Southern CA Nat'l Forests*	San Bernadino kangaroo rat	2 individuals	15**	N/A**	*Cleveland, Angeles, San Bernardino, and Los Padres Nat'l forests / **acres neither lost nor conserved
2001	FWS-WRIV-1678.3	Section 28 Pipeline	least Bell's vireo	1 pair	0.47	1.46	
2001	1-6-01-7F-1065.2	Southern CA Gas Co Line 6900 Gas Pipeline	California orcutt grass	N/A*	not quantified**	1**	*no defined take of plants / **potential habitat exists - if found, 1 acre conserved
2001	1-6-01-7F-1065.2	Southern CA Gas Co Line 6900 Gas Pipeline	coastal California gnatcatcher	2 individuals	3.58*	26.08	2 acres occupied habitat + 1.58 acres critical habitat
2001	1-6-01-7F-1065.2	Southern CA Gas Co Line 6900 Gas Pipeline	least Bell's vireo	1 pair	0.11	0.22	
2001	1-6-01-7F-1065.2	Southern CA Gas Co Line 6900 Gas Pipeline	Munz's onion	N/A*	not quantified**	1	*no defined take of plants / **potential habitat exists on slopes surrounding disturbed wetland

Date	FWS Reference #	Project Name	Species Common Name	Take	Habitat acres		*Comments
					Impacted / Lost	Conserved	
2001	1-6-01-7F-1065.2	Southern CA Gas Co Line 6900 Gas Pipeline	Quino checkerspot butterfly	14.35 acres	14.35	36.32	
2001	1-6-01-F-1184.2	Sycamore Creek	coastal California gnatcatcher	6 pairs	134.20	241.30	
2001	1-6-01-F-1184.2	Sycamore Creek	Munz's onion	N/A*	22.20	18.30	no defined take of plants / atleast 1200 individuals lost due to transplantation effort
2002	FWS-WRIV-3128.1	Antelope Road HCP / Intra-Service Section 7	coastal California gnatcatcher	2 pairs	37.10	74	
2002	FWS-WRIV-2752.5	Blackmore Development	coastal California gnatcatcher	0	55.20*	130.40	55.20 acres critical habitat
2002	FWS-WRIV-2752.5	Blackmore Development	least Bell's vireo	0	0.60	3.80	
2002	FWS-WRIV-2778.2	Border Patrol Facility Project	Stephens' kangaroo rat	10 acres*	10*	0*	monetary compensation of \$500/acre; included within the SKR Long-term HCP (1-6-96-FW-27)
2002	FWS-WRIV-1190.5	Canyon Lake 44	coastal California gnatcatcher	1 pair	17	43.20	
1992 / 2002	1-6-92-C-228 / F-14 / FWS-WRIV-2770.1 / 2770.2	Cottonwood Hills	Stephens' kangaroo rat	1300 individuals*	318*	1110*	included within the SKR Long-term HCP (1-6-96-FW-27) total acres conserved for all species
1992 / 2002	1-6-92-C-228 / FWS-WRIV-2770.1 / 2770.2	Cottonwood Hills	coastal California gnatcatcher	5 pairs	234	655*	655 acres of CAGN habitat within total of 1110 acres conserved for all species
2002	FWS-WRIV-2054.3	Green River Ranch	coastal California gnatcatcher	3 individuals	4.47	20.20	
2002	FWS-WRIV-1054.4 / .5	Khalda Development / BO Amendment	coastal California gnatcatcher	3 individuals	51.50	137	
2002	FWS-WRIV-3059.1	La Estrella Road / Nutmeg Street Extension Project	coastal California gnatcatcher	0	9.70*	254.90**	*9.70 ac crit. habitat / **188.10 ac crit. habitat / acres conserv. in assoc. w/ road ext.- services Greer Ranch
2002	FWS-WRIV-3059.1	La Estrella Road / Nutmeg Street Extension Project	least Bell's vireo	0	0.33	23.46	

Date	FWS Reference #	Project Name	Species Common Name	Take	Habitat acres		*Comments
					Impacted / Lost	Conserved	
2002	FWS-WRIV-2723.2	Menifee Meadows Project	coastal California gnatcatcher	1 pair	40	85	
2002	FWS-WRIV-2537.2	MV Development Empire Homes Project	coastal California gnatcatcher	0	24.80	46.06	
2002	FWS-WRIV-1083.4	North Ramsgate Development Project	coastal California gnatcatcher	2 pairs	35.90*	73	413 acres of critical habitat lost
2002	FWS-WRIV-1083.4	North Ramsgate Development Project	least Bell's vireo	1 pair	0.76	8	
2002	FWS-SB-2371.2 / 2731.3 / 2731.4	River Road Bridge / Sand Mining + Amendment	Santa Ana sucker	315 individuals	14	65.50*	65.50 acres Arundo removed
2002	FWS-WRIV-1856.2	Secured Equities Sun City Project	coastal California gnatcatcher	0	5.60*	10	36 acres if critical habitat lost
2002	FWS-WRIV-1281.3	Spring Mtn Ranch Spec. Plan 323 / Landfill	coastal California gnatcatcher	1 individual	97.10*	220.10	127.5 acres of critical habitat lost
2002	FWS-WRIV-796.3	State Route 74 Realignment / Widening	coastal California gnatcatcher	3 pairs	26.55	22	
2002	FWS-WRIV-2452.4	Temecula Ridge Apartments / Temecula Village HCP	coastal California gnatcatcher	2 pairs	43.97	70	
2002	FWS-WRIV-2239.2	Warmington Murrieta Scott Road LLC Subdivision	coastal California gnatcatcher	1 pair	16.69*	18.47	unit 10 proposed critical habitat
2002	FWS-WRIV-2239.2	Warmington Murrieta Scott Road LLC Subdivision	Quino checkerspot butterfly	1 population	16.69*	65.50	unit 2 proposed critical habitat
2003	FWS-WRIV-3426.2	Cleveland Way	coastal California gnatcatcher	1 pair	12.78*	38.34	
2003	FWS-WRIV-688.7	Harley John Reservoir	coastal California gnatcatcher	1 pair	2.30	7	
2003	FWS-WRIV-2415.5	Highpointe Communities / Clayton Ranch	coastal California gnatcatcher	1 pair	16.43	68.43	

Date	FWS Reference #	Project Name	Species Common Name	Take	Habitat acres		*Comments
					Impacted / Lost	Conserved	
2003	FWS-WRIV-2415.5	Highpointe Communities / Clayton Ranch	Riverside fairy shrimp	0.36 acres	25.86*	1	0.36 acre occupied habitat impacted + 25.50 acres watershed = 25.86
2003	FWS-WRIV-688.7	Intra-Service Section 7 / Harley John Reservoir Replacement	coastal California gnatcatcher	1 pair	2.30	7	
2003	FWS-WRIV-830	Newport Estates HCP	coastal California gnatcatcher	1 pair / 2 pairs*	139 / 139*	138 / 182*	two phases for project / Phase I - complete / Phase II - likely covered in western Riverside MSCHP
2003	FWS-WRIV-2344.6	Redhawk Communities HCP / Intra-Service Section 7	Riverside fairy shrimp	1.01 acres	1.01	1.50	
2003	FWS-WRIV-3544.2	Tenative Tract 28728	coastal California gnatcatcher	0	41.52	41.85	
2003	FWS-WRIV-674.6	Victoria Grove Phase IV	coastal California gnatcatcher	2 pairs	14.50*	24	12 acres RSS / 2.50 acres critical habitat
2004	FWS-WRIV-2945.9 / 2945.10	Creekside Village	coastal California gnatcatcher	1 pair	71.6	36.8*	includes 21.1 acres of RSS restoration and 0.3 acres of riparian restoration
2004	FWS-WRIV-3610	Lake Elsinore Unified School District 15	coastal California gnatcatcher	1 pair	10	28.5	
2004	FWS-WRIV-3610	Lake Elsinore Unified School District 15	Quino checkerspot butterfly	14 acres*	14	28.5	take for all lifestages of Quino - none found on site

APPENDIX 6

Appendix 6. Summary of modeled habitat for each species by Narrow Endemic Plant Species Survey Area (NEPSSA).

Green highlights represent NEPSSA regions targeted for surveys for that species

Orange highlights represent "other" habitat that would not be surveyed

OTHER = all modeled habitat other than (excluding) PQP and ARL

		INSIDE NEPSSA REGIONS (Percent of each NEPSSA region covered by species models - acres (% of NEPSSA region))											OUTSIDE NEPSSA REGION					
		1 - WEST	2 - ELSIN	3 - RIVERS	3A - RIVERS-(10)	4 - MIDDLE	5 - VAIL	6 - SBNF	7 - SARIV	8 - NORTHEAST	9 - SOUTHWEST	TOTAL INSIDE NEPSSA REGIONS THAT WILL BE SURVEYED	TOTAL INSIDE NEPSSA REGIONS THAT WILL NOT BE SURVEYED	TOTAL INSIDE NEPSSA REGIONS	TOTAL MODELED HABITAT OUTSIDE NEPSSA REGIONS	TOTAL THAT WILL NOT BE SURVEYED (SUM OF OTHER'S IN UNSURVEYED NEPSSA REGIONS AND OUTSIDE NEPSSA)	TOTAL PQP + ARL	TOTAL MODELED HABITAT
Brand's Phacelia	PQP											0	0	0				
	ARL											0	0	0				
	PQP+ARL											0	0	0				
	OTHER											0	0	0				
Brand's Phacelia Total												0	0	0				
Calicornia Orcutt's Grass	PQP	1043.02 (02%)	403.4 (10%)	4544.5 (11%)	215.5 (05%)	256 (01%)					1330.3 (02%)	7793	0	7793				
	ARL	389 (01%)	525.5 (12%)	5459.6 (13%)	0 (00%)	362 (01%)					876 (01%)	7613	0	7613				
	PQP+ARL	1432 (03%)	928.9 (22%)	10004 (24%)	215.5 (05%)	619 (02%)					2207 (03%)	15406	0	15406	1112		16518	
	OTHER	1875 (04%)	250.2 (06%)	14758 (35%)	3370 (75%)	3534 (12%)					259 (00%)	24046	0	24046	1786	1786		
Calicornia Orcutt's Grass Total		3307 (07%)	1179 (28%)	24762 (59%)	3585 (80%)	4153 (14%)					2465 (03%)	39452	0	39452	2898		42350	
Hammitt's Clay Cress	PQP											0	0	0				
	ARL											0	0	0				
	PQP+ARL											0	0	0				
	OTHER											0	0	0				
Hammitt's Clay Cress Total												0	0	0				
Johnston's Rock Cress	PQP											34865 (44%)	0	34865				
	ARL											0 (00%)	0	0				
	PQP+ARL											34865 (44%)	0	34865				
	OTHER											8917 (11%)	0	8917	0	0	34865	
Johnston's Rock Cress Total												43773 (55%)	0	43773	0		43773	
Many-stemmed Dudleya	PQP	8949 (19%)	448 (11%)	884 (02%)	9 (00%)	1021 (04%)	152 (01%)		2479 (04%)	34 (00%)	27318 (33%)	41294	0	41293.59				
	ARL	8771 (18%)	1201 (28%)	301 (01%)	0 (00%)	4962 (17%)	2230 (11%)		1491 (02%)	333 (00%)	1864 (02%)	21153	0	21152.53				
	PQP+ARL	17720 (37%)	1648 (39%)	1185 (03%)	9 (00%)	5983 (21%)	2382 (12%)		3970 (06%)	367 (01%)	29182 (35%)	62446	0	62446.12	76135		138581	
	OTHER	12375 (26%)	1185 (28%)	3652 (09%)	71 (02%)	5029 (17%)	2145 (11%)		9500 (15%)	3795 (05%)	15357 (18%)	53111	0	53110.85	119462	119462		
Many-stemmed Dudleya Total		30095 (63%)	2833 (67%)	4837 (12%)	81 (02%)	11012 (38%)	4527 (23%)		13470 (21%)	4162 (06%)	44540 (53%)	115557	0	115557	195598		311155	
Munz's Mariposa Lily	PQP											45944 (58%)	0	45944				
	ARL											0 (00%)	0	0				
	PQP+ARL											45944 (58%)	0	45944				
	OTHER											12163 (15%)	0	12163	0	0	45944	
Munz's Mariposa Lily Total												58107 (73%)	0	58107	0		58107	
Munz's Onion	PQP	998 (02%)		0 (00%)		198.1 (01%)					49 (00%)	1196	49	1245				
	ARL	283 (01%)		0 (00%)		332.42 (01%)					0 (00%)	616	0	616				
	PQP+ARL	1282 (03%)		0 (00%)		530.52 (02%)					49 (00%)	1812	49	1861	180		2042	
	OTHER	624 (01%)		600 (01%)		1748.4 (06%)					9 (00%)	2973	9	2982	314	323		
Munz's Onion Total		1906 (04%)		600 (01%)		2279 (08%)					58 (00%)	4785	58	4843	495		5338	
San Diego Ambrosia	PQP	153 (00%)	447 (11%)	2225 (05%)	9 (00%)	22 (00%)	0 (00%)		1182 (02%)		0 (00%)	4039	0	4039				
	ARL	887 (02%)	1096 (26%)	3070 (07%)	0 (00%)	0 (00%)	82 (00%)		96 (00%)		0 (00%)	5149	82	5231				
	PQP+ARL	1041 (02%)	1544 (37%)	5295 (13%)	9 (00%)	22 (00%)	82 (00%)		1279 (02%)		0 (00%)	9189	82	9270	2288		11558	
	OTHER	295 (01%)	1010 (24%)	1276 (03%)	79 (02%)	0 (00%)	1 (00%)		668 (01%)		4 (00%)	3327	6	3332	3798	3803		
San Diego Ambrosia Total		1335 (03%)	2553 (61%)	6571 (16%)	88 (02%)	22 (00%)	83 (00%)		1946 (03%)		4 (00%)	12515	87	12602	6086		18688	
San Jacinto Mountains Bedstraw	PQP											12044 (15%)	0	12044				
	ARL											0 (00%)	0	0				
	PQP+ARL											12044 (15%)	0	12044				
	OTHER											5774 (07%)	0	5774	0	0	12044	
San Jacinto Mountains Bedstraw Total												17818 (22%)	0	17818	0		17818	
San Miguel Savory	PQP	1660 (03%)										46315 (55%)	0	46315				
	ARL	1523 (03%)										2051 (02%)	0	2051				
	PQP+ARL	3183 (07%)										48366 (58%)	0	48366	21149		73251	
	OTHER	1623 (03%)										17183 (20%)	0	17183	10392	10392		
San Miguel Savory Total		4806 (10%)										71196 (87%)	0	71196	31541		102737	
Slender-horned Spineflower	PQP											1365 (07%)	0	1365				
	ARL											3458 (17%)	0	3458				
	PQP+ARL											4822 (24%)	0	4822	2452		7274	
	OTHER											2666 (13%)	0	2666	441	441		
Slender-horned Spineflower Total												7488 (38%)	0	7488	2892		10381	
Spreading Navarretia	PQP	1043 (02%)	403 (10%)	4544 (11%)	216 (05%)	256 (01%)					1330 (02%)	7792	0	7792				
	ARL	389 (01%)	526 (12%)	5460 (13%)	0 (00%)	362 (01%)					876 (01%)	7613	0	7613				
	PQP+ARL	1432 (03%)	929 (22%)	10004 (24%)	216 (05%)	619 (02%)					2207 (03%)	15407	0	15407	1112		16519	
	OTHER	1875 (04%)	250 (06%)	14758 (35%)	3370 (75%)	3534 (12%)					259 (00%)	24046	0	24046	1786	1786		
Spreading Navarretia Total		3307 (07%)	1179 (28%)	24762 (59%)	3585 (80%)	4153 (14%)					2465 (03%)	39451	0	39451	2898		42349	
Wright's Trichocoronis	PQP	1043 (02%)	403 (10%)	4544 (11%)	215 (05%)	256 (01%)					1330 (02%)	7793	0	7793				
	ARL	389 (01%)	526 (12%)	5460 (13%)	0 (00%)	362 (01%)					876 (01%)	7613	0	7613				
	PQP+ARL	1432 (03%)	929 (22%)	10004 (24%)	215 (05%)	619 (02%)					2207 (03%)	15406	0	15406	1112		16517	
	OTHER	1875 (04%)	250 (06%)	14758 (35%)	3370 (75%)	3534 (12%)					259 (00%)	24046	0	24046	1786	1786		
Wright's Trichocoronis Total		3307 (07%)	1179 (28%)	24762 (59%)	3585 (80%)	4153 (14%)					2465 (03%)	39452	0	39452	2897.22		42349	
Yucaipa Onion	PQP											1095 (02%)	0	1095				
	ARL											650 (01%)	0	650				
	PQP+ARL											1744 (02%)	0	1744	0		1744	
	OTHER											6591 (09%)	0	6591	0	0		
Yucaipa Onion Total												15780 (23%)	0	15780	0		15780	
TOTAL ACREAGE IN NEPSSA REGION		47569	4215	41753	4493	28777	19797	79865	64514	70125	84026			445133				

NOTE: ALL NUMBERS ARE IN ACRES, DISCREPANCIES OF UP TO 10 ACRES CAN OCCUR DUE TO MULTIPLE STEPS OF ROUNDING

PQP = Public/Quasi-Public Land

ARL = Additional Reserve Lands

APPENDIX 7

Appendix 7a. Summary of modeled habitat for each species by Criteria Area Species Survey Area (CASSA).

Green highlights represent CASSA regions targeted for surveys for that species
 Orange highlights represent "other" modeled habitat that would not be surveyed
 "OTHER" = all modeled habitat other than (excluding) PQP and ARL

INSIDE CASSA REGIONS (Percent of each CASSA region covered by species models - acres (% of CASSA region))													OUTSIDE CASSA REGIONS			TOTAL THAT WILL NOT BE SURVEYED (SUM OF OTHER'S IN UNSURVEYED CASSA REGIONS AND OUTSIDE CASSA)		TOTAL PQP + ARL		TOTAL MODELED HABITAT
		1	2	3	3A (9)	4	5	6	7	8	TOTAL INSIDE CASSA REGIONS THAT WILL BE SURVEYED	TOTAL INSIDE CASSA REGIONS THAT WILL NOT BE SURVEYED	TOTAL INSIDE ALL CASSA REGIONS	TOTAL MODELED HABITAT OUTSIDE CASSA REGIONS						
Coulter's Goldfields	PQP	125 (01%)	208.7 (07%)	1440.2 (10%)	231 (05%)	35 (00%)			502 (05%)		2542	0	2542							
	ARL	389 (02%)	525.5 (18%)	5459.5 (38%)	0 (00%)	362 (03%)			876 (08%)		7612	0	7612							
	PQP+ARL	514 (03%)	734.2 (26%)	6899.8 (47%)	231 (05%)	398 (03%)			1379 (13%)		10155	0	10155	6362			16517			
	OTHER	1234 (06%)	201 (07%)	3952.8 (27%)	3627 (76%)	696 (06%)			158 (02%)		9869	0	9869	15963	15963					
Coulter's Goldfields Total		1748 (09%)	935.2 (33%)	10853 (75%)	3858 (81%)	1094 (09%)			1537 (15%)		20024	0	20024	22325			42349			
Davidson's Saltscale	PQP	125 (01%)	208.7 (07%)	1440.2 (10%)	230.9 (05%)	35 (00%)			502 (05%)		2542	0	2542							
	ARL	389 (02%)	525.5 (18%)	5459.5 (38%)	0 (00%)	362 (03%)			876 (08%)		7612	0	7612							
	PQP+ARL	514 (03%)	734.2 (26%)	6899.8 (47%)	230.9 (05%)	398 (03%)			1379 (13%)		10155	0	10155	6362			16517			
	OTHER	1234 (06%)	201 (07%)	3952.8 (27%)	3627 (76%)	696 (06%)			158 (02%)		9869	0	9869	15963	15963					
Davidson's Saltscale Total		1748 (09%)	935.2 (33%)	10853 (75%)	3858 (81%)	1094 (09%)			1537 (15%)		20024	0	20024	22325			42349			
Heart-leaved Pitcher Sage	PQP	0 (00%)							645 (06%)	476 (31%)	1121	0	1121							
	ARL	4 (00%)							939 (09%)	596 (38%)	1535	4	1539							
	PQP+ARL	4 (00%)							1584 (15%)	1072 (69%)	2656	4	2660	53802			56462			
	OTHER	0 (00%)							788 (08%)	208 (13%)	996	0	996	13242	13242					
Heart-leaved Pitcher Sage Total		4 (00%)							2372 (23%)	1280 (82%)	3652	4	3656	67044			70700			
Little Mousetail	PQP	125 (01%)	208.7 (07%)	1440.2 (10%)	230.9 (05%)	35 (00%)			502 (05%)		2040	502	2542							
	ARL	389 (02%)	525.5 (18%)	5459.5 (38%)	0 (00%)	362 (03%)			876 (08%)		6736	876	7612							
	PQP+ARL	514 (03%)	734.2 (26%)	6899.8 (47%)	230.9 (05%)	398 (03%)			1379 (13%)		8776	1379	10155	6362			16517			
	OTHER	1234 (06%)	201 (07%)	3952.8 (27%)	3627 (76%)	696 (06%)			158 (02%)		9711	158	9869	15963	16121					
Little Mousetail Total		1748 (09%)	935.2 (33%)	10853 (75%)	3858 (81%)	1094 (09%)			1537 (15%)		18487	1537	20024	22325			42349			
Mud Nama	PQP	9 (00%)	52 (02%)	874 (06%)	2 (00%)	0 (00%)	0 (00%)				875	61	936							
	ARL	110 (01%)	22 (01%)	3576 (25%)	0 (00%)	15 (00%)	37 (00%)				3576	184	3759							
	PQP+ARL	119 (01%)	73 (03%)	4449 (31%)	2 (00%)	15 (00%)	37 (00%)				4451	245	4696	5170			9865			
	OTHER	6 (00%)	91 (03%)	560 (04%)	97 (02%)	13 (00%)	0 (00%)				657	110	767	1504	1614					
Mud Nama Total		125 (01%)	164 (06%)	5010 (34%)	99 (02%)	28 (00%)	37 (00%)				5109	355	5463	6674			12137			
Nevin's Barberry	PQP						352 (02%)	49 (00%)			401	0	401							
	ARL						3285 (20%)	1436 (07%)			4720	0	4720							
	PQP+ARL						3637 (22%)	1484 (08%)			5121	0	5121	2220			7341			
	OTHER						1690 (10%)	738 (04%)			2427	0	2427	2007	2007					
Nevin's Barberry Total							5326 (32%)	2222 (11%)			7549	0	7549	4227			11775			
Parish's Brittslescale	PQP	125 (01%)	208.7 (07%)	1440.2 (10%)	230.9 (05%)	35 (00%)			502 (05%)		2542	0	2542							
	ARL	389 (02%)	525.5 (18%)	5459.5 (38%)	0 (00%)	362 (03%)			876 (08%)		7612	0	7612							
	PQP+ARL	514 (03%)	734.2 (26%)	6899.8 (47%)	230.9 (05%)	398 (03%)			1379 (13%)		10155	0	10155	6362			16517			
	OTHER	1234 (06%)	201 (07%)	3952.8 (27%)	3627 (76%)	696 (06%)			158 (02%)		9869	0	9869	15963	15963					
Parish's Brittslescale Total		1748 (09%)	935.2 (33%)	10853 (75%)	3858 (81%)	1094 (09%)			1537 (15%)		20024	0	20024	22325			42349			
Prostrate Navarretia	PQP	0 (00%)							502 (05%)		502	0	502							
	ARL	24 (00%)							876 (08%)		876	24	900							
	PQP+ARL	24 (00%)							1379 (13%)		1379	24	1402	827			2229			
	OTHER	72 (00%)							158 (02%)		158	72	230	112	184					
Prostrate Navarretia Total		96 (00%)							1537 (15%)		1537	96	1632	939			2571			
Round-leaved Filaree	PQP	271 (01%)	196.2 (07%)	106 (01%)	9 (00%)	83 (01%)	3 (00%)	87 (00%)	621 (06%)	5 (00%)	1376	5	1381							
	ARL	973 (05%)	1126 (39%)	216 (01%)	0 (00%)	1647 (13%)	331 (02%)	2024 (10%)	1500 (14%)	44 (03%)	7816	44	7860							
	PQP+ARL	1244 (06%)	1322 (46%)	322 (02%)	9 (00%)	1730 (14%)	334 (02%)	2111 (11%)	2120 (20%)	48 (03%)	9192	48	9240	29354			38594			
	OTHER	787 (04%)	762.9 (27%)	421 (03%)	69 (01%)	754 (06%)	63 (00%)	1758 (09%)	1383 (13%)	0 (00%)	5997	0	5997	75082	75082					
Round-leaved Filaree Total		2031 (11%)	2085 (73%)	743 (05%)	79 (02%)	2484 (20%)	396 (02%)	3869 (20%)	3503 (34%)	48 (03%)	15190	48	15238	104436			119674			
San Jacinto Valley Crownscale	PQP	3 (00%)	158 (05%)	799 (05%)	6 (00%)	0 (00%)					963	3	966							
	ARL	24 (00%)	498 (17%)	3512 (24%)	0 (00%)	11 (00%)					4010	35	4045							
	PQP+ARL	27 (00%)	656 (23%)	4311 (30%)	6 (00%)	11 (00%)					4973	38	5011	2120			7131			
	OTHER	17 (00%)	100 (03%)	614 (04%)	155 (03%)	14 (00%)					869	31	900	925	956					
San Jacinto Valley Crownscale Total		44 (00%)	756 (26%)	4924 (34%)	161 (03%)	25 (00%)					5841	69	5910	3045			8955			
Smooth Tarplant	PQP	125 (01%)	208.7 (07%)	1440.2 (10%)	230.9 (05%)	35 (00%)			502 (05%)		2040	502	2542							
	ARL	389 (02%)	525.5 (18%)	5459.5 (38%)	0 (00%)	362 (03%)			876 (08%)		6736	876	7612							
	PQP+ARL	514 (03%)	734.2 (26%)	6899.8 (47%)	230.9 (05%)	398 (03%)			1379 (13%)		8776	1379	10155	6362			16517			
	OTHER	1234 (06%)	201 (07%)	3952.8 (27%)	3627 (76%)	696 (06%)			158 (02%)		9711	158	9869	15963	16121					
Smooth Tarplant Total		1748 (09%)	935.2 (33%)	10853 (75%)	3858 (81%)	1094 (09%)			1537 (15%)		18487	1537	20024	22325			42349			
Thread-leaved Brodiaea	PQP	72 (00%)	158.3 (06%)	799 (05%)	6 (00%)	22 (00%)			4 (00%)		1057	4	1061							
	ARL	146 (01%)	497.6 (17%)	3524 (24%)	0 (00%)	172 (01%)			0 (00%)		4340	0	4340							
	PQP+ARL	218 (01%)	655.9 (23%)	4323 (30%)	6 (00%)	194 (02%)			4 (00%)		5397	4	5401	2846			8247			
	OTHER	96 (00%)	100 (03%)	646 (04%)	155.3 (03%)	200 (02%)			0 (00%)		1196	0	1196	2035	2035					
Thread-leaved Brodiaea Total		314 (02%)	756 (26%)	4969 (34%)	161 (03%)	393 (03%)			4 (00%)		6593	4	6597	4881			11478			
Vail Lake Ceanothus	PQP						364 (02%)				364	0	364							
	ARL						3664 (22%)				3664	0	3664							
	PQP+ARL						4029 (25%)				4029	0	4029	8758			12787			
	OTHER						1988 (12%)				1988	0	1988	1691	1691					
Vail Lake Ceanothus Total							6017 (37%)				6017	0	6017	10449			16466			
TOTAL ACREAGE IN CASSA REGION		19310	2875	14541	4771	12282	16432 (100%)	19474	10364	1552	16432	85169	101601							

NOTE: ALL NUMBERS ARE IN ACRES, DISCREPANCIES OF UP TO 10 ACRES CAN OCCUR DUE TO MULTIPLE STEPS OF ROUNDING
 PQP = Public/Quasi-Public Land
 ARL = Additional Reserve Lands

Appendix 7b. Summary of modeled habitat by species within the Amphibian Species, Mammal Species, and Burrowing Owl Survey Areas.

SPECIES		INSIDE SURVEY AREA	OUTSIDE SURVEY AREA	TOTAL MODELED HABITAT
Amphibians				
Arroyo Toad	PQP	1196 (32%)	2596 (68%)	3792
	ARL	4590 (78%)	1313 (22%)	5903
	PQP+ARL	5786 (60%)	3909 (40%)	9695
	NON-CONSERVED	2659 (25%)	7905 (75%)	10564
Arroyo Toad Total		8445 (42%)	11814 (58%)	20259
California Red-legged Frog	PQP	38821 (100%)	0 (0%)	38821
	ARL	1182 (100%)	0 (0%)	1182
	PQP+ARL	40003 (100%)	0 (0%)	40003
	NON-CONSERVED	9051 (100%)	0 (0%)	9051
California Red-legged Frog Total		49054 (100%)	0 (0%)	49054
Mountain Yellow-legged Frog	PQP	1714 (94%)	118 (6%)	1832
	ARL	19599 (93%)	1403 (7%)	21002
	PQP+ARL	21313 (93%)	1521 (7%)	22834
	NON-CONSERVED	6921 (86%)	1173 (14%)	8094
Mountain Yellow-legged Frog Total		28234 (91%)	2694 (9%)	30928
Mammals				
Aguanga Kangaroo Rat	PQP	185 (25%)	563 (75%)	748
	ARL	5069 (82%)	1133 (18%)	6202
	PQP+ARL	5254 (76%)	1696 (24%)	6950
	NON-CONSERVED	2460 (85%)	430 (15%)	2890
Aguanga Kangaroo Rat Total		7714 (78%)	2126 (22%)	9840
Los Angeles Pocket Mouse	PQP	16072 (84%)	3071 (16%)	19143
	ARL	19294 (90%)	2120 (10%)	21414
	PQP+ARL	35366 (87%)	5191 (13%)	40557
	NON-CONSERVED	21906 (88%)	2926 (12%)	24832
Los Angeles Pocket Mouse Total		57272 (88%)	8117 (12%)	65389
San Bernardino Kangaroo Rat	PQP	839 (23%)	2851 (77%)	3690
	ARL	1159 (14%)	7003 (86%)	8162
	PQP+ARL	1998 (17%)	9854 (83%)	11852
	NON-CONSERVED	359 (8%)	4198 (92%)	4557
San Bernardino Kangaroo Rat Total		2357 (14%)	14052 (86%)	16409
Birds				
Burrowing Owl	PQP	25611 (100%)	0 (0%)	25611
	ARL	19902 (100%)	0 (0%)	19902
	PQP+ARL	45513 (100%)	0 (0%)	45513
	NON-CONSERVED	164910 (100%)	0 (0%)	164910
Burrowing Owl Total		210423 (100%)	0 (0%)	210423

Units = Acres

PQP = Public/Quasi-Public Land

ARL = Additional Reserve Lands

APPENDIX 8

Appendix 8a. Analysis of vegetation communities in the Agua Tibia Mountains Bioregion within Additional Reserve Lands (ARL) and Public/Quasi-Public Lands (PQP).

Habitat Category	Vegetation Subassociation	Agua Tibia Mtns. ARL Acres	Agua Tibia Mtns. PQP Acres	Agua Tibia Mtns. Not Conserved Acres	Agua Tibia Mtns. Total Acres	% of Agua Tibia Mtns. Total Conserved	Grand Total Plan Area Acres	% of Grand Total in Agua Tibia Mtns.	% of Grand Total in Agua Tibia Mtns. ARL	% of Grand Total in Agua Tibia Mtns. PQP	Grand Total Conserved Acres in Plan Area	% of Grand Total Conserved	% of Grand Total Conserved in ARL	% of Grand Total Conserved in PQP
Agricultural Land	Dairy & Livestock Feedyards	0.00	0.00	0.00	0.00		5,335.08	0.00	0.00	0.00	429.65	8.05	5.32	2.74
	Field Croplands	4.70	0.00	104.72	109.42	4.29	113,818.63	0.10	0.00	0.00	14,581.99	12.81	4.64	8.18
	Grove/Orchard	5.66	0.00	0.00	5.66	100.00	36,455.05	0.02	0.02	0.00	1,954.31	5.36	1.86	3.50
Agricultural Land Total		10.36	0.00	104.72	115.08	9.00	155,608.76	0.07	0.01	0.00	16,965.96	10.90	4.01	6.90
Chaparral	Chamise Chaparral	0.00	0.00	0.00	0.00		355.03	0.00	0.00	0.00	86.97	24.50	21.40	3.10
	Chaparral	756.65	8,069.21	1,166.05	9,991.91	88.33	344,591.94	2.90	0.22	2.34	232,543.09	67.48	17.02	50.46
	Red Shank Chaparral	0.00	0.00	0.00	0.00		62,947.32	0.00	0.00	0.00	38,209.41	60.70	8.61	52.09
	Semi-Desert Chaparral	0.00	0.00	0.00	0.00		15.16	0.00	0.00	0.00	0.00	0.02	0.00	0.02
Chaparral Total		756.65	8,069.21	1,166.05	9,991.91	88.33	407,909.46	2.45	0.19	1.98	270,839.47	66.40	15.73	50.67
Cismontane Alkali Marsh	Cismontane Alkali Marsh	0.00	0.00	0.00	0.00		149.90	0.00	0.00	0.00	27.44	18.30	17.06	1.24
Cismontane Alkali Marsh Total		0.00	0.00	0.00	0.00		149.90	0.00	0.00	0.00	27.44	18.30	17.06	1.24
Coastal Sage Scrub	Coastal Scrub	0.00	0.00	0.00	0.00		3,633.52	0.00	0.00	0.00	1,890.82	52.04	2.11	49.93
	Diegan Coastal Sage Scrub	2.63	10.54	6.36	19.53	67.43	15,437.63	0.13	0.02	0.07	6,369.83	41.26	7.75	33.51
	Riversidean Sage Scrub	78.01	16.88	27.27	122.16	77.68	129,532.88	0.09	0.06	0.01	70,390.57	54.34	33.67	20.67
Coastal Sage Scrub Total		80.64	27.42	33.63	141.69	76.27	148,604.03	0.10	0.05	0.02	78,651.22	52.93	30.20	22.72
Desert Scrubs	Big Sagebrush Scrub	0.00	0.00	0.00	0.00		6,206.54	0.00	0.00	0.00	1,942.50	31.30	16.17	15.13
	Semi-desert Succulent Scrub	0.00	0.00	0.00	0.00		2,423.49	0.00	0.00	0.00	2,343.92	96.72	96.72	0.00
	Sonoran Desert Scrub	0.00	0.00	0.00	0.00		281.78	0.00	0.00	0.00	160.54	56.97	0.00	56.97
Desert Scrubs Total		0.00	0.00	0.00	0.00		8,911.80	0.00	0.00	0.00	4,446.96	49.90	37.56	12.34
Developed or Disturbed Land	Residential/Urban/Exotic	27.40	1.47	95.23	124.10	23.26	259,450.56	0.05	0.01	0.00	11,502.79	4.43	0.61	3.82
Developed or Disturbed Land Total		27.40	1.47	95.23	124.10	23.26	259,450.56	0.05	0.01	0.00	11,502.79	4.43	0.61	3.82
Grassland	Non-native Grassland	90.60	430.72	166.73	688.05	75.77	129,754.78	0.53	0.07	0.33	38,093.88	29.36	14.33	15.03
	Valley and Foothill Grassland	0.00	0.00	0.00	0.00		2,730.64	0.00	0.00	0.00	2,704.90	99.06	14.27	84.79
Grassland Total		90.60	430.72	166.73	688.05	75.77	132,485.42	0.52	0.07	0.33	40,798.78	30.79	14.33	16.47
Meadow	Meadow (Montane)	0.00	11.29	0.00	11.29	100.00	147.17	7.67	0.00	7.67	58.54	39.78	0.00	39.78
	Wet Montane Meadow	0.00	0.00	0.00	0.00		324.53	0.00	0.00	0.00	25.69	7.91	0.00	7.91
Meadow Total		0.00	11.29	0.00	11.29	100.00	471.70	2.39	0.00	2.39	84.23	17.86	0.00	17.86
Meadows and Marshes	Coastal and Valley Freshwater Marsh	0.00	0.00	0.00	0.00		373.86	0.00	0.00	0.00	340.96	91.20	33.78	57.42
	Marsh	0.00	0.00	0.00	0.00		80.61	0.00	0.00	0.00	46.54	57.73	34.02	23.72
Meadows and Marshes Total		0.00	0.00	0.00	0.00		454.47	0.00	0.00	0.00	387.50	85.26	33.82	51.44
Montane Coniferous Forest	Jeffrey Pine	0.00	0.00	0.00	0.00		11,664.73	0.00	0.00	0.00	7,702.85	66.04	0.00	66.04
	Lodgepole Pine	0.00	0.00	0.00	0.00		578.91	0.00	0.00	0.00	577.46	99.75	0.00	99.75
	Lower Montane Coniferous Forest	0.00	96.15	0.00	96.15	100.00	6,685.38	1.44	0.00	1.44	4,969.21	74.33	0.27	74.06
	Mixed Evergreen Forest	0.00	0.00	0.00	0.00		4,344.88	0.00	0.00	0.00	3,886.20	89.44	0.00	89.44
	S. Cal. White Fir	0.00	0.00	0.00	0.00		3,700.32	0.00	0.00	0.00	3,219.17	87.00	0.00	87.00
	Subalpine Coniferous	0.00	0.00	0.00	0.00		27.80	0.00	0.00	0.00	26.65	95.88	0.00	95.88
Montane Coniferous Forest Total		0.00	96.15	0.00	96.15	100.00	27,002.02	0.36	0.00	0.36	20,381.54	75.48	0.07	75.41
Penninsular Juniper Woodland and Scrub	Peninsular Juniper Woodland and Scrub	0.00	0.00	0.00	0.00		1,067.20	0.00	0.00	0.00	609.00	57.06	31.46	25.60

Appendix 8a. Analysis of vegetation communities in the Agua Tibia Mountains Bioregion within Additional Reserve Lands (ARL) and Public/Quasi-Public Lands (PQP).

Habitat Category	Vegetation Subassociation	Agua Tibia Mtns. ARL Acres	Agua Tibia Mtns. PQP Acres	Agua Tibia Mtns. Not Conserved Acres	Agua Tibia Mtns. Total Acres	% of Agua Tibia Mtns. Total Conserved	Grand Total Plan Area Acres	% of Grand Total in Agua Tibia Mtns.	% of Grand Total in Agua Tibia Mtns. ARL	% of Grand Total in Agua Tibia Mtns. PQP	Grand Total Conserved Acres in Plan Area	% of Grand Total Conserved	% of Grand Total Conserved in ARL	% of Grand Total Conserved in PQP
Penninsular Juniper Woodland and Scrub Total		0.00	0.00	0.00	0.00		1,067.20	0.00	0.00	0.00	609.00	57.06	31.46	25.60
Playas and Vernal Pools	Alkali Playa	0.00	0.00	0.00	0.00		7,004.62	0.00	0.00	0.00	6,028.14	86.06	48.01	38.05
	Southern Interior Basalt Vernal Pool	0.00	0.00	0.00	0.00		51.33	0.00	0.00	0.00	44.24	86.19	25.57	60.62
	Vernal Pool	0.00	0.00	0.00	0.00		18.78	0.00	0.00	0.00	17.35	92.37	3.90	88.47
Playas and Vernal Pools Total		0.00	0.00	0.00	0.00		7,074.73	0.00	0.00	0.00	6,089.73	86.08	47.73	38.35
Riparian Scrub, Woodland, Forest	Arundo/Riparian Forest	0.00	0.00	0.00	0.00		489.23	0.00	0.00	0.00	483.04	98.73	8.77	89.97
	Montane Riparian Forest	0.00	0.00	0.00	0.00		285.87	0.00	0.00	0.00	216.24	75.64	1.56	74.08
	Montane Riparian Scrub	0.00	0.00	0.00	0.00		6.48	0.00	0.00	0.00	6.48	99.98	85.54	14.44
	Mule Fat Scrub	25.76	28.72	2.47	56.95	95.66	515.84	11.04	4.99	5.57	331.41	64.25	48.52	15.73
	Riparian Forest	0.00	0.00	0.00	0.00		1,212.00	0.00	0.00	0.00	904.05	74.59	25.47	49.12
	Riparian Scrub	0.00	0.00	0.00	0.00		2,925.22	0.00	0.00	0.00	1,814.97	62.05	36.44	25.61
	Southern Cottonwood/Willow Riparian	44.11	6.59	0.13	50.83	99.75	6,434.54	0.79	0.69	0.10	5,787.64	89.95	14.49	75.46
	Southern Sycamore/Alder Riparian Woodland	0.00	11.58	102.65	114.23	10.14	186.64	61.20	0.00	6.20	68.93	36.93	4.93	32.00
	Southern Willow Scrub	0.00	4.15	0.00	4.15	100.00	1,509.80	0.28	0.00	0.28	740.91	49.07	36.51	12.56
	Tamarisk Scrub	0.00	0.00	0.00	0.00		271.94	0.00	0.00	0.00	271.86	99.97	99.97	0.00
Riparian Scrub, Woodland, Forest Total		69.87	51.04	105.25	226.16	53.46	13,837.56	1.63	0.50	0.37	10,625.53	76.79	24.88	51.91
Riversidean Alluvial Fan Sage Scrub	Disturbed Alluvial	0.00	0.00	0.00	0.00		1,018.86	0.00	0.00	0.00	790.19	77.56	51.26	26.29
	Riversidean Alluvial Fan Sage Scrub	61.45	0.00	0.18	61.63	99.72	5,262.24	1.17	1.17	0.00	3,611.36	68.63	42.38	26.24
Riversidean Alluvial Fan Sage Scrub Total		61.45	0.00	0.18	61.63	99.72	6,281.09	0.98	0.98	0.00	4,401.55	70.08	43.83	26.25
Water	Open Water/Reservoir/Pond	0.00	0.00	0.00	0.00		11,576.09	0.00	0.00	0.00	10,192.35	88.05	9.80	78.25
Water Total		0.00	0.00	0.00	0.00		11,576.09	0.00	0.00	0.00	10,192.35	88.05	9.80	78.25
Woodlands and Forests	Black Oak Forest	0.00	4.11	0.00	4.11	100.00	4.11	100.00	0.00	100.00	4.11	100.00	0.00	100.00
	Broadleaved Upland Forest	0.00	0.00	0.00	0.00		2,356.57	0.00	0.00	0.00	2,273.51	96.48	0.00	96.48
	Coast Live Oak Woodland	4.88	6.26	3.30	14.44	77.12	6,302.24	0.23	0.08	0.10	3,011.94	47.79	12.90	34.89
	Dense Engelmann Oak Woodland	0.00	0.00	0.00	0.00		4,057.97	0.00	0.00	0.00	2,467.81	60.81	17.57	43.25
	Oak Woodland	92.14	185.69	66.27	344.10	80.74	18,906.44	1.82	0.49	0.98	15,021.56	79.45	4.40	75.05
Woodlands and Forests Total		97.02	196.05	69.58	362.65	80.81	31,627.33	1.15	0.31	0.62	22,778.92	72.02	7.46	64.57
Grand Total		1,194.00	8,883.35	1,741.36	11,818.71	85.27	1,212,512.12	0.97	0.10	0.73	498,782.97	41.14	12.60	28.54

Appendix 8b. Analysis of vegetation communities in the Desert Transition Bioregion within Additional Reserve Lands (ARL) and Public/Quasi-Public Lands (PQP).

Habitat Category	Vegetation Subassociation	Desert Transition ARL Acres	Desert Transition PQP Acres	Desert Transition Not Conserved Acres	Desert Transition Total Acres	% of Desert Transition Total Conserved	Grand Total Plan Area Acres	% of Grand Total in Desert Transition	% of Grand Total in Desert Transition ARL	% of Grand Total in Desert Transition PQP	Grand Total Conserved Acres in Plan Area	% of Grand Total Conserved	% of Grand Total Conserved in ARL	% of Grand Total Conserved in PQP
Agricultural Land	Dairy & Livestock Feedyards	0.00	0.00	12.02	12.02	0.00	5,335.08	0.23	0.00	0.00	429.65	8.05	5.32	2.74
	Field Croplands	0.00	2.38	2,816.84	2,819.23	0.08	113,818.63	2.48	0.00	0.00	14,581.99	12.81	4.64	8.18
	Grove/Orchard	0.21	0.00	19.45	19.66	1.08	36,455.05	0.05	0.00	0.00	1,954.31	5.36	1.86	3.50
Agricultural Land Total		0.21	2.38	2,848.31	2,850.91	0.09	155,608.76	1.83	0.00	0.00	16,965.96	10.90	4.01	6.90
Chaparral	Chamise Chaparral	0.00	0.00	0.00	0.00		355.03	0.00	0.00	0.00	86.97	24.50	21.40	3.10
	Chaparral	340.19	2,842.66	3,563.74	6,746.59	47.18	344,591.94	1.96	0.10	0.82	232,543.09	67.48	17.02	50.46
	Red Shank Chaparral	5,019.67	17,474.31	18,962.93	41,456.91	54.26	62,947.32	65.86	7.97	27.76	38,209.41	60.70	8.61	52.09
	Semi-Desert Chaparral	0.00	0.00	15.16	15.16	0.02	15.16	100.00	0.00	0.02	0.00	0.02	0.00	0.02
Chaparral Total		5,359.85	20,316.98	22,541.84	48,218.66	53.25	407,909.46	11.82	1.31	4.98	270,839.47	66.40	15.73	50.67
Cismontane Alkali Marsh	Cismontane Alkali Marsh	25.27	0.00	108.23	133.51	18.93	149.90	89.07	16.86	0.00	27.44	18.30	17.06	1.24
Cismontane Alkali Marsh Total		25.27	0.00	108.23	133.51	18.93	149.90	89.07	16.86	0.00	27.44	18.30	17.06	1.24
Coastal Sage Scrub	Coastal Scrub	0.00	0.00	8.25	8.25	0.00	3,633.52	0.23	0.00	0.00	1,890.82	52.04	2.11	49.93
	Diegan Coastal Sage Scrub	0.00	0.00	0.00	0.00		15,437.63	0.00	0.00	0.00	6,369.83	41.26	7.75	33.51
	Riversidean Sage Scrub	1,432.10	542.04	787.37	2,761.50	71.49	129,532.88	2.13	1.11	0.42	70,390.57	54.34	33.67	20.67
Coastal Sage Scrub Total		1,432.10	542.04	795.61	2,769.75	71.27	148,604.03	1.86	0.96	0.36	78,651.22	52.93	30.20	22.72
Desert Scrubs	Big Sagebrush Scrub	978.23	791.35	3,292.74	5,062.32	34.96	6,206.54	81.56	15.76	12.75	1,942.50	31.30	16.17	15.13
	Semi-desert Succulent Scrub	0.00	0.00	0.00	0.00		2,423.49	0.00	0.00	0.00	2,343.92	96.72	96.72	0.00
	Sonoran Desert Scrub	0.00	160.54	95.80	256.34	62.63	281.78	90.97	0.00	56.97	160.54	56.97	0.00	56.97
Desert Scrubs Total		978.23	951.90	3,388.54	5,318.66	36.29	8,911.80	59.68	10.98	10.68	4,446.96	49.90	37.56	12.34
Developed or Disturbed Land	Residential/Urban/Exotic	41.78	12.89	3,739.02	3,793.70	1.44	259,450.56	1.46	0.02	0.00	11,502.79	4.43	0.61	3.82
Developed or Disturbed Land Total		41.78	12.89	3,739.02	3,793.70	1.44	259,450.56	1.46	0.02	0.00	11,502.79	4.43	0.61	3.82
Grassland	Non-native Grassland	1,078.29	152.66	4,594.06	5,825.01	21.13	129,754.78	4.49	0.83	0.12	38,093.88	29.36	14.33	15.03
	Valley and Foothill Grassland	0.00	0.00	0.00	0.00		2,730.64	0.00	0.00	0.00	2,704.90	99.06	14.27	84.79
Grassland Total		1,078.29	152.66	4,594.06	5,825.01	21.13	132,485.42	4.40	0.81	0.12	40,798.78	30.79	14.33	16.47
Meadow	Meadow (Montane)	0.00	0.00	0.00	0.00		147.17	0.00	0.00	0.00	58.54	39.78	0.00	39.78
	Wet Montane Meadow	0.00	0.00	0.00	0.00		324.53	0.00	0.00	0.00	25.69	7.91	0.00	7.91
Meadow Total		0.00	0.00	0.00	0.00		471.70	0.00	0.00	0.00	84.23	17.86	0.00	17.86
Meadows and Marshes	Coastal and Valley Freshwater Marsh	0.00	0.00	0.51	0.51	0.00	373.86	0.14	0.00	0.00	340.96	91.20	33.78	57.42
	Marsh	0.00	0.00	0.00	0.00		80.61	0.00	0.00	0.00	46.54	57.73	34.02	23.72
Meadows and Marshes Total		0.00	0.00	0.51	0.51	0.00	454.47	0.11	0.00	0.00	387.50	85.26	33.82	51.44
Montane Coniferous Forest	Jeffrey Pine	0.00	0.00	0.00	0.00		11,664.73	0.00	0.00	0.00	7,702.85	66.04	0.00	66.04
	Lodgepole Pine	0.00	0.00	0.00	0.00		578.91	0.00	0.00	0.00	577.46	99.75	0.00	99.75
	Lower Montane Coniferous Forest	0.00	0.00	0.00	0.00		6,685.38	0.00	0.00	0.00	4,969.21	74.33	0.27	74.06
	Mixed Evergreen Forest	0.00	0.00	0.00	0.00		4,344.88	0.00	0.00	0.00	3,886.20	89.44	0.00	89.44
	S. Cal. White Fir	0.00	0.00	0.00	0.00		3,700.32	0.00	0.00	0.00	3,219.17	87.00	0.00	87.00
	Subalpine Coniferous	0.00	0.00	0.00	0.00		27.80	0.00	0.00	0.00	26.65	95.88	0.00	95.88
Montane Coniferous Forest Total		0.00	0.00	0.00	0.00		27,002.02	0.00	0.00	0.00	20,381.54	75.48	0.07	75.41

Appendix 8b. Analysis of vegetation communities in the Desert Transition Bioregion within Additional Reserve Lands (ARL) and Public/Quasi-Public Lands (PQP).

Habitat Category	Vegetation Subassociation	Desert Transition ARL Acres	Desert Transition PQP Acres	Desert Transition Not Conserved Acres	Desert Transition Total Acres	% of Desert Transition Total Conserved	Grand Total Plan Area Acres	% of Grand Total in Desert Transition	% of Grand Total in Desert Transition ARL	% of Grand Total in Desert Transition PQP	Grand Total Conserved Acres in Plan Area	% of Grand Total Conserved	% of Grand Total Conserved in ARL	% of Grand Total Conserved in PQP
Penninsular Juniper Woodland and Scrub	Peninsular Juniper Woodland and Scrub	0.00	75.91	41.76	117.67	64.51	1,067.20	11.03	0.00	7.11	609.00	57.06	31.46	25.60
Penninsular Juniper Woodland and Scrub Total		0.00	75.91	41.76	117.67	64.51	1,067.20	11.03	0.00	7.11	609.00	57.06	31.46	25.60
Playas and Vernal Pools	Alkali Playa	0.00	0.00	0.00	0.00		7,004.62	0.00	0.00	0.00	6,028.14	86.06	48.01	38.05
	Southern Interior Basalt Vernal Pool	0.00	0.00	0.00	0.00		51.33	0.00	0.00	0.00	44.24	86.19	25.57	60.62
	Vernal Pool	0.00	0.00	0.00	0.00		18.78	0.00	0.00	0.00	17.35	92.37	3.90	88.47
Playas and Vernal Pools Total		0.00	0.00	0.00	0.00		7,074.73	0.00	0.00	0.00	6,089.73	86.08	47.73	38.35
Riparian Scrub, Woodland, Forest	Arundo/Riparian Forest	0.00	0.00	0.00	0.00		489.23	0.00	0.00	0.00	483.04	98.73	8.77	89.97
	Montane Riparian Forest	0.00	0.00	0.00	0.00		285.87	0.00	0.00	0.00	216.24	75.64	1.56	74.08
	Montane Riparian Scrub	0.00	0.00	0.00	0.00		6.48	0.00	0.00	0.00	6.48	99.98	85.54	14.44
	Mule Fat Scrub	0.00	0.00	0.00	0.00		515.84	0.00	0.00	0.00	331.41	64.25	48.52	15.73
	Riparian Forest	6.22	6.32	25.15	37.68	33.26	1,212.00	3.11	0.51	0.52	904.05	74.59	25.47	49.12
	Riparian Scrub	39.71	21.61	85.77	147.09	41.69	2,925.22	5.03	1.36	0.74	1,814.97	62.05	36.44	25.61
	Southern Cottonwood/Willow Riparian	34.35	0.70	0.02	35.08	99.93	6,434.54	0.55	0.53	0.01	5,787.64	89.95	14.49	75.46
	Southern Sycamore/Alder Riparian Woodland	0.00	0.00	0.00	0.00		186.64	0.00	0.00	0.00	68.93	36.93	4.93	32.00
	Southern Willow Scrub	0.00	0.00	0.00	0.00		1,509.80	0.00	0.00	0.00	740.91	49.07	36.51	12.56
	Tamarisk Scrub	0.00	0.00	0.00	0.00		271.94	0.00	0.00	0.00	271.86	99.97	99.97	0.00
Riparian Scrub, Woodland, Forest Total		80.28	28.63	110.94	219.85	49.54	13,837.56	1.59	0.58	0.21	10,625.53	76.79	24.88	51.91
Riversidean Alluvial Fan Sage Scrub	Disturbed Alluvial	0.00	0.00	0.00	0.00		1,018.86	0.00	0.00	0.00	790.19	77.56	51.26	26.29
	Riversidean Alluvial Fan Sage Scrub	90.08	46.61	104.08	240.77	56.77	5,262.24	4.58	1.71	0.89	3,611.36	68.63	42.38	26.24
Riversidean Alluvial Fan Sage Scrub Total		90.08	46.61	104.08	240.77	56.77	6,281.09	3.83	1.43	0.74	4,401.55	70.08	43.83	26.25
Water	Open Water/Reservoir/Pond	0.00	1.52	113.61	115.13	1.32	11,576.09	0.99	0.00	0.01	10,192.35	88.05	9.80	78.25
Water Total		0.00	1.52	113.61	115.13	1.32	11,576.09	0.99	0.00	0.01	10,192.35	88.05	9.80	78.25
Woodlands and Forests	Black Oak Forest	0.00	0.00	0.00	0.00		4.11	0.00	0.00	0.00	4.11	100.00	0.00	100.00
	Broadleaved Upland Forest	0.00	0.00	0.00	0.00		2,356.57	0.00	0.00	0.00	2,273.51	96.48	0.00	96.48
	Coast Live Oak Woodland	0.00	0.00	6.93	6.93	0.00	6,302.24	0.11	0.00	0.00	3,011.94	47.79	12.90	34.89
	Dense Engelmann Oak Woodland	0.00	0.00	0.00	0.00		4,057.97	0.00	0.00	0.00	2,467.81	60.81	17.57	43.25
	Oak Woodland	0.00	94.31	37.02	131.33	71.81	18,906.44	0.69	0.00	0.50	15,021.56	79.45	4.40	75.05
Woodlands and Forests Total		0.00	94.31	43.95	138.26	68.21	31,627.33	0.44	0.00	0.30	22,778.92	72.02	7.46	64.57
Grand Total		9,086.09	22,225.84	38,430.46	69,742.40	44.90	1,212,512.12	5.75	0.75	1.83	498,782.97	41.14	12.60	28.54

Appendix 8c. Analysis of vegetation communities in the Riverside Lowlands Bioregion within Additional Reserve Lands (ARL) and Public/Quasi-Public Lands (PQP).

Habitat Category	Vegetation Subassociation	Riverside Lowland ARL Acres	Riverside Lowland PQP Acres	Riverside Lowland Not Conserved Acres	Riverside Lowland Total Acres	% of Riverside Lowlands Total Conserved	Grand Total Plan Area Acres	% of Grand Total in Riverside Lowlands	% of Grand Total in Riverside Lowland ARL	% of Grand Total in Riverside Lowland PQP	Grand Total Conserved Acres in Plan Area	% of Grand Total Conserved	% of Grand Total Conserved in ARL	% of Grand Total Conserved in PQP
Agricultural Land	Dairy & Livestock Feedyards	268.14	146.03	4,809.97	5,224.14	7.93	5,335.08	97.92	5.03	2.74	429.65	8.05	5.32	2.74
	Field Croplands	4,554.33	9,191.99	92,536.74	106,283.07	12.93	113,818.63	93.38	4.00	8.08	14,581.99	12.81	4.64	8.18
	Grove/Orchard	112.59	1,161.24	20,953.18	22,227.00	5.73	36,455.05	60.97	0.31	3.19	1,954.31	5.36	1.86	3.50
Agricultural Land Total		4,935.05	10,499.26	118,299.90	133,734.20	11.54	155,608.76	85.94	3.17	6.75	16,965.96	10.90	4.01	6.90
Chaparral	Chamise Chaparral	75.96	11.01	268.06	355.03	24.50	355.03	100.00	21.40	3.10	86.97	24.50	21.40	3.10
	Chaparral	24,281.52	8,733.21	44,767.56	77,782.29	42.45	344,591.94	22.57	7.05	2.53	232,543.09	67.48	17.02	50.46
	Red Shank Chaparral	0.00	0.00	0.00	0.00		62,947.32	0.00	0.00	0.00	38,209.41	60.70	8.61	52.09
	Semi-Desert Chaparral	0.00	0.00	0.00	0.00		15.16	0.00	0.00	0.00	0.00	0.02	0.00	0.02
Chaparral Total		24,357.48	8,744.22	45,035.62	78,137.32	42.36	407,909.46	19.16	5.97	2.14	270,839.47	66.40	15.73	50.67
Cismontane Alkali Marsh	Cismontane Alkali Marsh	0.30	1.86	14.23	16.39	13.19	149.90	10.93	0.20	1.24	27.44	18.30	17.06	1.24
Cismontane Alkali Marsh Total		0.30	1.86	14.23	16.39	13.19	149.90	10.93	0.20	1.24	27.44	18.30	17.06	1.24
Coastal Sage Scrub	Coastal Scrub	4.23	2.57	1,364.59	1,371.39	0.50	3,633.52	37.74	0.12	0.07	1,890.82	52.04	2.11	49.93
	Diegan Coastal Sage Scrub	697.64	170.60	1,997.99	2,866.23	30.29	15,437.63	18.57	4.52	1.11	6,369.83	41.26	7.75	33.51
	Riverside Sage Scrub	26,300.08	21,306.46	51,396.64	99,003.19	48.09	129,532.88	76.43	20.30	16.45	70,390.57	54.34	33.67	20.67
Coastal Sage Scrub Total		27,001.95	21,479.64	54,759.22	103,240.81	46.96	148,604.03	69.47	18.17	14.45	78,651.22	52.93	30.20	22.72
Desert Scrubs	Big Sagebrush Scrub	0.00	0.00	0.00	0.00		6,206.54	0.00	0.00	0.00	1,942.50	31.30	16.17	15.13
	Semi-desert Succulent Scrub	0.00	0.00	0.00	0.00		2,423.49	0.00	0.00	0.00	2,343.92	96.72	96.72	0.00
	Sonoran Desert Scrub	0.00	0.00	0.00	0.00		281.78	0.00	0.00	0.00	160.54	56.97	0.00	56.97
Desert Scrubs Total		0.00	0.00	0.00	0.00		8,911.80	0.00	0.00	0.00	4,446.96	49.90	37.56	12.34
Developed or Disturbed Land	Residential/Urban/Exotic	821.56	9,369.44	223,907.76	234,098.75	4.35	259,450.56	90.23	0.32	3.61	11,502.79	4.43	0.61	3.82
Developed or Disturbed Land Total		821.56	9,369.44	223,907.76	234,098.75	4.35	259,450.56	90.23	0.32	3.61	11,502.79	4.43	0.61	3.82
Grassland	Non-native Grassland	11,970.98	13,737.18	71,389.61	97,097.77	26.48	129,754.78	74.83	9.23	10.59	38,093.88	29.36	14.33	15.03
	Valley and Foothill Grassland	0.00	0.00	0.00	0.00		2,730.64	0.00	0.00	0.00	2,704.90	99.06	14.27	84.79
Grassland Total		11,970.98	13,737.18	71,389.61	97,097.77	26.48	132,485.42	73.29	9.04	10.37	40,798.78	30.79	14.33	16.47
Meadow	Meadow (Montane)	0.00	0.00	0.00	0.00		147.17	0.00	0.00	0.00	58.54	39.78	0.00	39.78
	Wet Montane Meadow	0.00	0.00	0.00	0.00		324.53	0.00	0.00	0.00	25.69	7.91	0.00	7.91
Meadow Total		0.00	0.00	0.00	0.00		471.70	0.00	0.00	0.00	84.23	17.86	0.00	17.86
Meadows and Marshes	Coastal and Valley Freshwater Marsh	55.08	214.68	32.39	302.14	89.28	373.86	80.82	14.73	57.42	340.96	91.20	33.78	57.42
	Marsh	16.20	19.12	32.89	68.20	51.78	80.61	84.60	20.09	23.72	46.54	57.73	34.02	23.72
Meadows and Marshes Total		71.27	233.80	65.27	370.34	82.38	454.47	81.49	15.68	51.44	387.50	85.26	33.82	51.44
Montane Coniferous Forest	Jeffrey Pine	0.00	0.00	0.00	0.00		11,664.73	0.00	0.00	0.00	7,702.85	66.04	0.00	66.04
	Lodgepole Pine	0.00	0.00	0.00	0.00		578.91	0.00	0.00	0.00	577.46	99.75	0.00	99.75
	Lower Montane Coniferous Forest	0.00	0.00	0.00	0.00		6,685.38	0.00	0.00	0.00	4,969.21	74.33	0.27	74.06
	Mixed Evergreen Forest	0.00	0.00	0.00	0.00		4,344.88	0.00	0.00	0.00	3,886.20	89.44	0.00	89.44
	S. Cal. White Fir	0.00	0.00	0.00	0.00		3,700.32	0.00	0.00	0.00	3,219.17	87.00	0.00	87.00
	Subalpine Coniferous	0.00	0.00	0.00	0.00		27.80	0.00	0.00	0.00	26.65	95.88	0.00	95.88
Montane Coniferous Forest Total		0.00	0.00	0.00	0.00		27,002.02	0.00	0.00	0.00	20,381.54	75.48	0.07	75.41
Penninsular Juniper Woodland and Scrub	Peninsular Juniper Woodland and Scrub	333.79	182.59	397.39	913.77	56.51	1,067.20	85.62	31.28	17.11	609.00	57.06	31.46	25.60
Penninsular Juniper Woodland and Scrub Total		333.79	182.59	397.39	913.77	56.51	1,067.20	85.62	31.28	17.11	609.00	57.06	31.46	25.60
Playas and Vernal Pools	Alkali Playa	3,362.81	2,665.33	976.48	7,004.62	86.06	7,004.62	100.00	48.01	38.05	6,028.14	86.06	48.01	38.05
	Southern Interior Basalt Vernal Pool	13.07	0.00	7.09	20.16	64.84	51.33	39.28	25.47	0.00	44.24	86.19	25.57	60.62
	Vernal Pool	0.73	16.62	1.43	18.78	92.37	18.78	100.00	3.90	88.47	17.35	92.37	3.90	88.47
Playas and Vernal Pools Total		3,376.61	2,681.95	985.00	7,043.56	86.02	7,074.73	99.56	47.73	37.91	6,089.73	86.08	47.73	38.35
Riparian Scrub, Woodland, Forest	Arundo/Riparian Forest	42.90	440.13	6.19	489.23	98.73	489.23	100.00	8.77	89.97	483.04	98.73	8.77	89.97
	Montane Riparian Forest	0.00	0.00	0.00	0.00		285.87	0.00	0.00	0.00	216.24	75.64	1.56	74.08
	Montane Riparian Scrub	5.55	0.94	0.00	6.48	99.98	6.48	100.00	85.54	14.44	6.48	99.98	85.54	14.44
	Mule Fat Scrub	140.82	42.40	117.13	300.36	61.00	515.84	58.23	27.30	8.22	331.41	64.25	48.52	15.73
	Riparian Forest	122.81	70.75	115.38	308.94	62.65	1,212.00	25.49	10.13	5.84	904.05	74.59	25.47	49.12
	Riparian Scrub	760.90	209.44	803.49	1,773.83	54.70	2,925.22	60.64	26.01	7.16	1,814.97	62.05	36.44	25.61
	Southern Cottonwood/Willow Riparian	570.83	4,614.60	627.68	5,813.11	89.20	6,434.54	90.34	8.87	71.72	5,787.64	89.95	14.49	75.46
	Southern Sycamore/Alder Riparian Woodland	5.18	17.99	6.42	29.60	78.30	186.64	15.86	2.78	9.64	68.93	36.93	4.93	32.00

Appendix 8c. Analysis of vegetation communities in the Riverside Lowlands Bioregion within Additional Reserve Lands (ARL) and Public/Quasi-Public Lands (PQP).

Habitat Category	Vegetation Subassociation	Riverside Lowland ARL Acres	Riverside Lowland PQP Acres	Riverside Lowland Not Conserved Acres	Riverside Lowland Total Acres	% of Riverside Lowlands Total Conserved	Grand Total Plan Area Acres	% of Grand Total in Riverside Lowlands	% of Grand Total in Riverside Lowland ARL	% of Grand Total in Riverside Lowland PQP	Grand Total Conserved Acres in Plan Area	% of Grand Total Conserved	% of Grand Total Conserved in ARL	% of Grand Total Conserved in PQP
	Southern Willow Scrub	364.13	109.91	700.41	1,174.46	40.36	1,509.80	77.79	24.12	7.28	740.91	49.07	36.51	12.56
	Tamarisk Scrub	1.43	0.00	0.00	1.43	100.00	271.94	0.53	0.53	0.00	271.86	99.97	99.97	0.00
	Riparian Scrub, Woodland, Forest Total	2,014.56	5,506.16	2,376.71	9,897.43	75.99	13,837.56	71.53	14.56	39.79	10,625.53	76.79	24.88	51.91
	Riversidean Alluvial Fan Sage Scrub													
	Disturbed Alluvial	423.82	250.07	210.11	884.00	76.23	1,018.86	86.76	41.60	24.54	790.19	77.56	51.26	26.29
	Riversidean Alluvial Fan Sage Scrub	870.57	571.64	1,088.60	2,530.81	56.99	5,262.24	48.09	16.54	10.86	3,611.36	68.63	42.38	26.24
	Riversidean Alluvial Fan Sage Scrub Total	1,294.39	821.71	1,298.70	3,414.80	61.97	6,281.09	54.37	20.61	13.08	4,401.55	70.08	43.83	26.25
	Water													
	Open Water/Reservoir/Pond	483.00	8,955.12	1,074.16	10,512.28	89.78	11,576.09	90.81	4.17	77.36	10,192.35	88.05	9.80	78.25
	Water Total	483.00	8,955.12	1,074.16	10,512.28	89.78	11,576.09	90.81	4.17	77.36	10,192.35	88.05	9.80	78.25
	Woodlands and Forests													
	Black Oak Forest	0.00	0.00	0.00	0.00		4.11	0.00	0.00	0.00	4.11	100.00	0.00	100.00
	Broadleaved Upland Forest	0.00	0.00	0.00	0.00		2,356.57	0.00	0.00	0.00	2,273.51	96.48	0.00	96.48
	Coast Live Oak Woodland	159.70	70.64	627.31	857.65	26.86	6,302.24	13.61	2.53	1.12	3,011.94	47.79	12.90	34.89
	Dense Engelmann Oak Woodland	1.58	0.00	27.24	28.82	5.49	4,057.97	0.71	0.04	0.00	2,467.81	60.81	17.57	43.25
	Oak Woodland	359.02	160.57	626.71	1,146.30	45.33	18,906.44	6.06	1.90	0.85	15,021.56	79.45	4.40	75.05
	Woodlands and Forests Total	520.30	231.21	1,281.26	2,032.77	36.97	31,627.33	6.43	1.65	0.73	22,778.92	72.02	7.46	64.57
	Grand Total	77,181.25	82,444.11	520,884.83	680,510.19	23.46	1,212,512.12	56.12	6.37	6.80	498,782.97	41.14	12.60	28.54

Appendix 8d. Analysis of vegetation communities in the San Bernardino Bioregion within Additional Reserve Lands (ARL) and Public/Quasi-Public Lands (PQP).

Habitat Category	Vegetation Subassociation	San Bernardino Mtns. ARL Acres	San Bernardino Mtns. PQP Acres	San Bernardino Mtns. Not Conserved Acres	San Bernardino Mtns. Total Acres	% of San Bernardino Mountains Total Conserved	Grand Total Plan Area Acres	% of Grand Total in San Bernardino Mtns.	% of Grand Total in San Bernardino Mtns. ARL	% of Grand Total in San Bernardino Mtns. PQP	Grand Total Acres in Plan Area	% of Grand Total Conserved	% of Grand Total Conserved in ARL	% of Grand Total Conserved in PQP
Agricultural Land	Dairy & Livestock Feedyards	0.00	0.00	10.76	10.76	0.00	5,335.08	0.20	0.00	0.00	429.65	8.05	5.32	2.74
	Field Croplands	2.06	86.07	1,054.99	1,143.11	7.71	113,818.63	1.00	0.00	0.08	14,581.99	12.81	4.64	8.18
	Grove/Orchard	0.00	0.18	3.49	3.67	4.98	36,455.05	0.01	0.00	0.00	1,954.31	5.36	1.86	3.50
Agricultural Land Total		2.06	86.25	1,069.23	1,157.54	7.63	155,608.76	0.74	0.00	0.06	16,965.96	10.90	4.01	6.90
Chaparral	Chamise Chaparral	0.00	0.00	0.00	0.00	0.00	355.03	0.00	0.00	0.00	86.97	24.50	21.40	3.10
	Chaparral	648.18	6,231.67	4,877.32	11,757.16	58.52	344,591.94	3.41	0.19	1.81	232,543.09	67.48	17.02	50.46
	Red Shank Chaparral	0.00	0.00	0.00	0.00	0.00	62,947.32	0.00	0.00	0.00	38,209.41	60.70	8.61	52.09
	Semi-Desert Chaparral	0.00	0.00	0.00	0.00	0.00	15.16	0.00	0.00	0.00	0.00	0.02	0.00	0.02
Chaparral Total		648.18	6,231.67	4,877.32	11,757.16	58.52	407,909.46	2.88	0.16	1.53	270,839.47	66.40	15.73	50.67
Cismontane Alkali Marsh	Cismontane Alkali Marsh	0.00	0.00	0.00	0.00	0.00	149.90	0.00	0.00	0.00	27.44	18.30	17.06	1.24
Cismontane Alkali Marsh Total		0.00	0.00	0.00	0.00	0.00	149.90	0.00	0.00	0.00	27.44	18.30	17.06	1.24
Coastal Sage Scrub	Coastal Scrub	0.00	7.54	0.27	7.81	96.55	3,633.52	0.21	0.00	0.21	1,890.82	52.04	2.11	49.93
	Diegan Coastal Sage Scrub	0.00	0.00	0.00	0.00	0.00	15,437.63	0.00	0.00	0.00	6,369.83	41.26	7.75	33.51
	Riversidean Sage Scrub	1.52	63.87	271.36	336.75	19.42	129,532.88	0.26	0.00	0.05	70,390.57	54.34	33.67	20.67
Coastal Sage Scrub Total		1.52	71.41	271.63	344.56	21.17	148,604.03	0.23	0.00	0.05	78,651.22	52.93	30.20	22.72
Desert Scrubs	Big Sagebrush Scrub	0.00	0.00	0.00	0.00	0.00	6,206.54	0.00	0.00	0.00	1,942.50	31.30	16.17	15.13
	Semi-desert Succulent Scrub	0.00	0.00	0.00	0.00	0.00	2,423.49	0.00	0.00	0.00	2,343.92	96.72	96.72	0.00
	Sonoran Desert Scrub	0.00	0.00	0.00	0.00	0.00	281.78	0.00	0.00	0.00	160.54	56.97	0.00	56.97
Desert Scrubs Total		0.00	0.00	0.00	0.00	0.00	8,911.80	0.00	0.00	0.00	4,446.96	49.90	37.56	12.34
Developed or Disturbed Land	Residential/Urban/Exotic	1.73	152.29	1,683.10	1,837.12	8.38	259,450.56	0.71	0.00	0.06	11,502.79	4.43	0.61	3.82
Developed or Disturbed Land Total		1.73	152.29	1,683.10	1,837.12	8.38	259,450.56	0.71	0.00	0.06	11,502.79	4.43	0.61	3.82
Grassland	Non-native Grassland	18.15	324.29	1,777.32	2,119.77	16.15	129,754.78	1.63	0.01	0.25	38,093.88	29.36	14.33	15.03
	Valley and Foothill Grassland	0.00	0.00	0.00	0.00	0.00	2,730.64	0.00	0.00	0.00	2,704.90	99.06	14.27	84.79
Grassland Total		18.15	324.29	1,777.32	2,119.77	16.15	132,485.42	1.60	0.01	0.24	40,798.78	30.79	14.33	16.47
Meadow	Meadow (Montane)	0.00	4.18	53.61	57.79	7.23	147.17	39.26	0.00	2.84	58.54	39.78	0.00	39.78
	Wet Montane Meadow	0.00	0.00	0.00	0.00	0.00	324.53	0.00	0.00	0.00	25.69	7.91	0.00	7.91
Meadow Total		0.00	4.18	53.61	57.79	7.23	471.70	12.25	0.00	0.89	84.23	17.86	0.00	17.86
Meadows and Marshes	Coastal and Valley Freshwater Marsh	0.00	0.00	0.00	0.00	0.00	373.86	0.00	0.00	0.00	340.96	91.20	33.78	57.42
	Marsh	0.00	0.00	0.00	0.00	0.00	80.61	0.00	0.00	0.00	46.54	57.73	34.02	23.72
Meadows and Marshes Total		0.00	0.00	0.00	0.00	0.00	454.47	0.00	0.00	0.00	387.50	85.26	33.82	51.44
Montane Coniferous Forest	Jeffrey Pine	0.00	0.00	0.00	0.00	0.00	11,664.73	0.00	0.00	0.00	7,702.85	66.04	0.00	66.04
	Lodgepole Pine	0.00	0.00	0.00	0.00	0.00	578.91	0.00	0.00	0.00	577.46	99.75	0.00	99.75
	Lower Montane Coniferous Forest	18.22	1,268.77	195.18	1,482.17	86.83	6,685.38	22.17	0.27	18.98	4,969.21	74.33	0.27	74.06
	Mixed Evergreen Forest	0.00	0.00	0.00	0.00	0.00	4,344.88	0.00	0.00	0.00	3,886.20	89.44	0.00	89.44
	S. Cal. White Fir	0.00	0.00	0.00	0.00	0.00	3,700.32	0.00	0.00	0.00	3,219.17	87.00	0.00	87.00
	Subalpine Coniferous	0.00	0.00	0.00	0.00	0.00	27.80	0.00	0.00	0.00	26.65	95.88	0.00	95.88
Montane Coniferous Forest Total		18.22	1,268.77	195.18	1,482.17	86.83	27,002.02	5.49	0.07	4.70	20,381.54	75.48	0.07	75.41
Pennisular Juniper Woodland and Scrub	Peninsular Juniper Woodland and Scrub	0.00	0.00	0.00	0.00	0.00	1,067.20	0.00	0.00	0.00	609.00	57.06	31.46	25.60
Pennisular Juniper Woodland and Scrub Total		0.00	0.00	0.00	0.00	0.00	1,067.20	0.00	0.00	0.00	609.00	57.06	31.46	25.60
Playas and Vernal Pools	Alkali Playa	0.00	0.00	0.00	0.00	0.00	7,004.62	0.00	0.00	0.00	6,028.14	86.06	48.01	38.05
	Southern Interior Basalt Vernal Pool	0.00	0.00	0.00	0.00	0.00	51.33	0.00	0.00	0.00	44.24	86.19	25.57	60.62
	Vernal Pool	0.00	0.00	0.00	0.00	0.00	18.78	0.00	0.00	0.00	17.35	92.37	3.90	88.47

Appendix 8d. Analysis of vegetation communities in the San Bernardino Bioregion within Additional Reserve Lands (ARL) and Public/Quasi-Public Lands (PQP).

Habitat Category	Vegetation Subassociation	San Bernardino Mtns. ARL Acres	San Bernardino Mtns. PQP Acres	San Bernardino Mtns. Not Conserved Acres	San Bernardino Mtns. Total Acres	% of San Bernardino Mountains Total Conserved	Grand Total Plan Area Acres	% of Grand Total in San Bernardino Mtns.	% of Grand Total in San Bernardino Mtns. ARL	% of Grand Total in San Bernardino Mtns. PQP	Grand Total Conserved Acres in Plan Area	% of Grand Total Conserved	% of Grand Total Conserved in ARL	% of Grand Total Conserved in PQP
Playas and Vernal Pools Total		0.00	0.00	0.00	0.00		7,074.73	0.00	0.00	0.00	6,089.73	86.08	47.73	38.35
Riparian Scrub, Woodland, Forest														
	Arundo/Riparian Forest	0.00	0.00	0.00	0.00		489.23	0.00	0.00	0.00	483.04	98.73	8.77	89.97
	Montane Riparian Forest	0.00	20.81	30.00	50.81	40.96	285.87	17.77	0.00	7.28	216.24	75.64	1.56	74.08
	Montane Riparian Scrub	0.00	0.00	0.00	0.00		6.48	0.00	0.00	0.00	6.48	99.98	85.54	14.44
	Mule Fat Scrub	0.00	5.69	7.56	13.25	42.96	515.84	2.57	0.00	1.10	331.41	64.25	48.52	15.73
	Riparian Forest	0.00	0.00	0.00	0.00		1,212.00	0.00	0.00	0.00	904.05	74.59	25.47	49.12
	Riparian Scrub	3.29	27.83	9.56	40.68	76.51	2,925.22	1.39	0.11	0.95	1,814.97	62.05	36.44	25.61
	Southern Cottonwood/Willow Riparian	0.00	77.84	0.00	77.84	100.00	6,434.54	1.21	0.00	1.21	5,787.64	89.95	14.49	75.46
	Southern Sycamore/Alder Riparian Woodland	0.00	0.00	0.00	0.00		186.64	0.00	0.00	0.00	68.93	36.93	4.93	32.00
	Southern Willow Scrub	0.00	0.00	0.00	0.00		1,509.80	0.00	0.00	0.00	740.91	49.07	36.51	12.56
	Tamarisk Scrub	0.00	0.00	0.00	0.00		271.94	0.00	0.00	0.00	271.86	99.97	99.97	0.00
Riparian Scrub, Woodland, Forest Total		3.29	132.17	47.11	182.57	74.20	13,837.56	1.32	0.02	0.96	10,625.53	76.79	24.88	51.91
Riversidean Alluvial Fan Sage Scrub														
	Disturbed Alluvial	0.00	0.00	0.00	0.00		1,018.86	0.00	0.00	0.00	790.19	77.56	51.26	26.29
	Riversidean Alluvial Fan Sage Scrub	0.00	610.82	115.21	726.03	84.13	5,262.24	13.80	0.00	11.61	3,611.36	68.63	42.38	26.24
Riversidean Alluvial Fan Sage Scrub Total		0.00	610.82	115.21	726.03	84.13	6,281.09	11.56	0.00	9.72	4,401.55	70.08	43.83	26.25
Water														
	Open Water/Reservoir/Pond	0.00	0.00	0.00	0.00		11,576.09	0.00	0.00	0.00	10,192.35	88.05	9.80	78.25
Water Total		0.00	0.00	0.00	0.00		11,576.09	0.00	0.00	0.00	10,192.35	88.05	9.80	78.25
Woodlands and Forests														
	Black Oak Forest	0.00	0.00	0.00	0.00		4.11	0.00	0.00	0.00	4.11	100.00	0.00	100.00
	Broadleaved Upland Forest	0.00	109.03	10.38	119.41	91.31	2,356.57	5.07	0.00	4.63	2,273.51	96.48	0.00	96.48
	Coast Live Oak Woodland	86.14	62.18	391.80	540.12	27.46	6,302.24	8.57	1.37	0.99	3,011.94	47.79	12.90	34.89
	Dense Engelmann Oak Woodland	0.00	0.00	0.00	0.00		4,057.97	0.00	0.00	0.00	2,467.81	60.81	17.57	43.25
	Oak Woodland	0.00	34.24	185.75	219.99	15.56	18,906.44	1.16	0.00	0.18	15,021.56	79.45	4.40	75.05
Woodlands and Forests Total		86.14	205.44	587.93	879.52	33.15	31,627.33	2.78	0.27	0.65	22,778.92	72.02	7.46	64.57
Grand Total		779.29	9,087.29	10,677.65	20,544.23	48.03	1,212,512.12	1.69	0.06	0.75	498,782.97	41.14	12.60	28.54

Appendix 8e. Analysis of vegetation communities in the San Jacinto Foothills Bioregion within Additional Reserve Lands (ARL) and Public/Quasi-Public Lands (PQP).

Habitat Category	Vegetation Subassociation	San Jacinto Foothills ARL Acres	San Jacinto Foothills PQP Acres	San Jacinto Foothills Not Conserved Acres	San Jacinto Foothills Total Acres	% of San Jacinto Foothills Total Conserved	Grand Total Plan Area Acres	% of Grand Total in San Jacinto Foothills	% of Grand Total in San Jacinto Foothills ARL	% of Grand Total in San Jacinto Foothills PQP	Grand Total Conserved Acres in Plan Area	% of Grand Total Conserved	% of Grand Total Conserved in ARL	% of Grand Total Conserved in PQP
Agricultural Land	Dairy & Livestock Feedyards	0.00	0.00	21.55	21.55	0.00	5,335.08	0.40	0.00	0.00	429.65	8.05	5.32	2.74
	Field Croplands	620.75	25.37	1,425.99	2,072.11	31.18	113,818.63	1.82	0.55	0.02	14,581.99	12.81	4.64	8.18
	Grove/Orchard	237.40	35.23	2,862.16	3,134.79	8.70	36,455.05	8.60	0.65	0.10	1,954.31	5.36	1.86	3.50
Agricultural Land Total		858.16	60.60	4,309.71	5,228.46	17.57	155,608.76	3.36	0.55	0.04	16,965.96	10.90	4.01	6.90
Chaparral	Chamise Chaparral	0.00	0.00	0.00	0.00	0.00	355.03	0.00	0.00	0.00	86.97	24.50	21.40	3.10
	Chaparral	20,104.13	15,314.61	15,843.66	51,262.39	69.09	344,591.94	14.88	5.83	4.44	232,543.09	67.48	17.02	50.46
	Red Shank Chaparral	402.41	0.00	5.07	407.48	98.76	62,947.32	0.65	0.64	0.00	38,209.41	60.70	8.61	52.09
	Semi-Desert Chaparral	0.00	0.00	0.00	0.00	0.00	15.16	0.00	0.00	0.00	0.00	0.02	0.00	0.02
Chaparral Total		20,506.54	15,314.61	15,848.72	51,669.87	69.33	407,909.46	12.67	5.03	3.75	270,839.47	66.40	15.73	50.67
Cismontane Alkali Marsh	Cismontane Alkali Marsh	0.00	0.00	0.00	0.00	0.00	149.90	0.00	0.00	0.00	27.44	18.30	17.06	1.24
Cismontane Alkali Marsh Total		0.00	0.00	0.00	0.00	0.00	149.90	0.00	0.00	0.00	27.44	18.30	17.06	1.24
Coastal Sage Scrub	Coastal Scrub	61.03	279.26	102.00	442.30	76.94	3,633.52	12.17	1.68	7.69	1,890.82	52.04	2.11	49.93
	Diegan Coastal Sage Scrub	231.79	0.00	0.00	231.79	100.00	15,437.63	1.50	1.50	0.00	6,369.83	41.26	7.75	33.51
	Riversidean Sage Scrub	14,263.37	4,667.25	6,350.87	25,281.49	74.88	129,532.88	19.52	11.01	3.60	70,390.57	54.34	33.67	20.67
Coastal Sage Scrub Total		14,556.20	4,946.51	6,452.87	25,955.58	75.14	148,604.03	17.47	9.80	3.33	78,651.22	52.93	30.20	22.72
Desert Scrubs	Big Sagebrush Scrub	0.00	0.00	0.00	0.00	0.00	6,206.54	0.00	0.00	0.00	1,942.50	31.30	16.17	15.13
	Semi-desert Succulent Scrub	2,153.73	0.00	66.86	2,220.59	96.99	2,423.49	91.63	88.87	0.00	2,343.92	96.72	96.72	0.00
	Sonoran Desert Scrub	0.00	0.00	0.00	0.00	0.00	281.78	0.00	0.00	0.00	160.54	56.97	0.00	56.97
Desert Scrubs Total		2,153.73	0.00	66.86	2,220.59	96.99	8,911.80	24.92	24.17	0.00	4,446.96	49.90	37.56	12.34
Developed or Disturbed Land	Residential/Urban/Exotic	560.59	101.50	4,859.51	5,521.60	11.99	259,450.56	2.13	0.22	0.04	11,502.79	4.43	0.61	3.82
Developed or Disturbed Land Total		560.59	101.50	4,859.51	5,521.60	11.99	259,450.56	2.13	0.22	0.04	11,502.79	4.43	0.61	3.82
Grassland	Non-native Grassland	4,530.38	1,484.74	5,486.23	11,501.35	52.30	129,754.78	8.86	3.49	1.14	38,093.88	29.36	14.33	15.03
	Valley and Foothill Grassland	0.00	0.00	0.00	0.00	0.00	2,730.64	0.00	0.00	0.00	2,704.90	99.06	14.27	84.79
Grassland Total		4,530.38	1,484.74	5,486.23	11,501.35	52.30	132,485.42	8.68	3.42	1.12	40,798.78	30.79	14.33	16.47
Meadow	Meadow (Montane)	0.00	0.00	0.00	0.00	0.00	147.17	0.00	0.00	0.00	58.54	39.78	0.00	39.78
	Wet Montane Meadow	0.00	0.00	0.00	0.00	0.00	324.53	0.00	0.00	0.00	25.69	7.91	0.00	7.91
Meadow Total		0.00	0.00	0.00	0.00	0.00	471.70	0.00	0.00	0.00	84.23	17.86	0.00	17.86
Meadows and Marshes	Coastal and Valley Freshwater Marsh	71.21	0.00	0.00	71.21	100.00	373.86	19.05	19.05	0.00	340.96	91.20	33.78	57.42
	Marsh	11.23	0.00	1.18	12.41	90.45	80.61	15.40	13.93	0.00	46.54	57.73	34.02	23.72
Meadows and Marshes Total		82.44	0.00	1.18	83.62	98.58	454.47	18.40	18.14	0.00	387.50	85.26	33.82	51.44
Montane Coniferous Forest	Jeffrey Pine	0.00	0.00	0.00	0.00	0.00	11,664.73	0.00	0.00	0.00	7,702.85	66.04	0.00	66.04
	Lodgepole Pine	0.00	0.00	0.00	0.00	0.00	578.91	0.00	0.00	0.00	577.46	99.75	0.00	99.75
	Lower Montane Coniferous Forest	0.00	0.00	0.00	0.00	0.00	6,685.38	0.00	0.00	0.00	4,969.21	74.33	0.27	74.06
	Mixed Evergreen Forest	0.00	0.00	0.00	0.00	0.00	4,344.88	0.00	0.00	0.00	3,886.20	89.44	0.00	89.44
	S. Cal. White Fir	0.00	0.00	0.00	0.00	0.00	3,700.32	0.00	0.00	0.00	3,219.17	87.00	0.00	87.00
	Subalpine Coniferous	0.00	0.00	0.00	0.00	0.00	27.80	0.00	0.00	0.00	26.65	95.88	0.00	95.88
Montane Coniferous Forest Total		0.00	0.00	0.00	0.00	0.00	27,002.02	0.00	0.00	0.00	20,381.54	75.48	0.07	75.41
Penninsular Juniper Woodland and Scrub	Peninsular Juniper Woodland and Scrub	1.95	0.00	0.00	1.95	100.00	1,067.20	0.18	0.18	0.00	609.00	57.06	31.46	25.60
Penninsular Juniper Woodland and Scrub Total		1.95	0.00	0.00	1.95	100.00	1,067.20	0.18	0.18	0.00	609.00	57.06	31.46	25.60
Playas and Vernal Pools	Alkali Playa	0.00	0.00	0.00	0.00	0.00	7,004.62	0.00	0.00	0.00	6,028.14	86.06	48.01	38.05

Appendix 8e. Analysis of vegetation communities in the San Jacinto Foothills Bioregion within Additional Reserve Lands (ARL) and Public/Quasi-Public Lands (PQP).

Habitat Category	Vegetation Subassociation	San Jacinto Foothills ARL Acres	San Jacinto Foothills PQP Acres	San Jacinto Foothills Not Conserved Acres	San Jacinto Foothills Total Acres	% of San Jacinto Foothills Total Conserved	Grand Total Plan Area Acres	% of Grand Total in San Jacinto Foothills	% of Grand Total in San Jacinto Foothills ARL	% of Grand Total in San Jacinto Foothills PQP	Grand Total Conserved Acres in Plan Area	% of Grand Total Conserved	% of Grand Total Conserved in ARL	% of Grand Total Conserved in PQP
	Southern Interior Basalt Vernal Pool	0.00	0.00	0.00	0.00		51.33	0.00	0.00	0.00	44.24	86.19	25.57	60.62
	Vernal Pool	0.00	0.00	0.00	0.00		18.78	0.00	0.00	0.00	17.35	92.37	3.90	88.47
Playas and Vernal Pools Total		0.00	0.00	0.00	0.00		7,074.73	0.00	0.00	0.00	6,089.73	86.08	47.73	38.35
Riparian Scrub, Woodland, Forest														
	Arundo/Riparian Forest	0.00	0.00	0.00	0.00		489.23	0.00	0.00	0.00	483.04	98.73	8.77	89.97
	Montane Riparian Forest	0.02	10.99	5.67	16.69	66.01	285.87	5.84	0.01	3.85	216.24	75.64	1.56	74.08
	Montane Riparian Scrub	0.00	0.00	0.00	0.00		6.48	0.00	0.00	0.00	6.48	99.98	85.54	14.44
	Mule Fat Scrub	83.70	0.00	50.15	133.85	62.53	515.84	25.95	16.23	0.00	331.41	64.25	48.52	15.73
	Riparian Forest	135.90	218.44	21.45	375.79	94.29	1,212.00	31.01	11.21	18.02	904.05	74.59	25.47	49.12
	Riparian Scrub	140.03	15.54	92.15	247.72	62.80	2,925.22	8.47	4.79	0.53	1,814.97	62.05	36.44	25.61
	Southern Cottonwood/Willow Riparian	275.41	0.01	8.73	284.15	96.93	6,434.54	4.42	4.28	0.00	5,787.64	89.95	14.49	75.46
	Southern Sycamore/Alder Riparian Woodland	4.02	14.05	0.00	18.06	100.00	186.64	9.68	2.15	7.53	68.93	36.93	4.93	32.00
	Southern Willow Scrub	187.15	5.37	26.79	219.31	87.79	1,509.80	14.53	12.40	0.36	740.91	49.07	36.51	12.56
	Tamarisk Scrub	270.43	0.00	0.07	270.50	99.97	271.94	99.47	99.45	0.00	271.86	99.97	99.97	0.00
Riparian Scrub, Woodland, Forest Total		1,096.66	264.40	205.01	1,566.08	86.91	13,837.56	11.32	7.93	1.91	10,625.53	76.79	24.88	51.91
Riversidean Alluvial Fan Sage Scrub														
	Disturbed Alluvial	86.78	17.81	13.18	117.77	88.81	1,018.86	11.56	8.52	1.75	790.19	77.56	51.26	26.29
	Riversidean Alluvial Fan Sage Scrub	913.70	68.55	90.61	1,072.87	91.55	5,262.24	20.39	17.36	1.30	3,611.36	68.63	42.38	26.24
Riversidean Alluvial Fan Sage Scrub Total		1,000.48	86.36	103.79	1,190.63	91.28	6,281.09	18.96	15.93	1.37	4,401.55	70.08	43.83	26.25
Water	Open Water/Reservoir/Pond	645.54	4.71	13.84	664.09	97.92	11,576.09	5.74	5.58	0.04	10,192.35	88.05	9.80	78.25
Water Total		645.54	4.71	13.84	664.09	97.92	11,576.09	5.74	5.58	0.04	10,192.35	88.05	9.80	78.25
Woodlands and Forests														
	Black Oak Forest	0.00	0.00	0.00	0.00		4.11	0.00	0.00	0.00	4.11	100.00	0.00	100.00
	Broadleaved Upland Forest	0.00	0.00	0.00	0.00		2,356.57	0.00	0.00	0.00	2,273.51	96.48	0.00	96.48
	Coast Live Oak Woodland	276.46	179.12	743.85	1,199.43	37.98	6,302.24	19.03	4.39	2.84	3,011.94	47.79	12.90	34.89
	Dense Engelmann Oak Woodland	0.00	6.49	0.00	6.49	100.00	4,057.97	0.16	0.00	0.16	2,467.81	60.81	17.57	43.25
	Oak Woodland	161.52	87.67	425.21	674.39	36.95	18,906.44	3.57	0.85	0.46	15,021.56	79.45	4.40	75.05
Woodlands and Forests Total		437.97	273.27	1,169.06	1,880.30	37.83	31,627.33	5.95	1.38	0.86	22,778.92	72.02	7.46	64.57
Grand Total		46,430.64	22,536.69	38,516.80	107,484.13	64.17	1,212,512.12	8.86	3.83	1.86	498,782.97	41.14	12.60	28.54

Appendix 8f. Analysis of vegetation communities in the San Jacinto Mountains Bioregion within Additional Reserve Lands (ARL) and Public/Quasi-Public Lands (PQP).

Habitat Category	Vegetation Subassociation	San Jacinto Mtns. ARL Acres	San Jacinto Mtns. PQP Acres	San Jacinto Mtns. Not Conserved Acres	San Jacinto Mtns. Total Conserved Acres	% of San Jacinto Mtns. Total Conserved	Grand Total Plan Area Acres	% of Grand Total in San Jacinto Mtns.	% of Grand Total in San Jacinto Mtns. ARL	% of Grand Total in San Jacinto Mtns. PQP	Grand Total Conserved Acres in Plan Area	% of Grand Total Conserved	% of Grand Total Conserved in ARL	% of Grand Total Conserved in PQP
Agricultural Land	Dairy & Livestock Feedyards	15.49	0.00	0.05	15.54	99.68	5,335.08	0.29	0.29	0.00	429.65	8.05	5.32	2.74
	Field Croplands	25.35	0.00	869.61	894.97	2.83	113,818.63	0.79	0.02	0.00	14,581.99	12.81	4.64	8.18
	Grove/Orchard	35.90	0.00	7.21	43.11	83.28	36,455.05	0.12	0.10	0.00	1,954.31	5.36	1.86	3.50
Agricultural Land Total		76.74	0.00	876.87	953.62	8.05	155,608.76	0.61	0.05	0.00	16,965.96	10.90	4.01	6.90
Chaparral	Chamise Chaparral	0.00	0.00	0.00	0.00	0.00	355.03	0.00	0.00	0.00	86.97	24.50	21.40	3.10
	Chaparral	9,117.46	70,362.02	22,714.68	102,194.16	77.77	344,591.94	29.66	2.65	20.42	232,543.09	67.48	17.02	50.46
	Red Shank Chaparral	0.00	15,313.03	5,769.91	21,082.94	72.63	62,947.32	33.49	0.00	24.33	38,209.41	60.70	8.61	52.09
	Semi-Desert Chaparral	0.00	0.00	0.00	0.00	0.00	15.16	0.00	0.00	0.00	0.00	0.02	0.00	0.02
Chaparral Total		9,117.46	85,675.05	28,484.59	123,277.09	76.89	407,909.46	30.22	2.24	21.00	270,839.47	66.40	15.73	50.67
Cismontane Alkali Marsh	Cismontane Alkali Marsh	0.00	0.00	0.00	0.00	0.00	149.90	0.00	0.00	0.00	27.44	18.30	17.06	1.24
Cismontane Alkali Marsh Total		0.00	0.00	0.00	0.00	0.00	149.90	0.00	0.00	0.00	27.44	18.30	17.06	1.24
Coastal Sage Scrub	Coastal Scrub	11.37	1,524.82	267.59	1,803.78	85.16	3,633.52	49.64	0.31	41.97	1,890.82	52.04	2.11	49.93
	Diegan Coastal Sage Scrub	0.00	0.00	0.00	0.00	0.00	15,437.63	0.00	0.00	0.00	6,369.83	41.26	7.75	33.51
	Riversidean Sage Scrub	1,488.25	180.16	254.63	1,923.05	86.76	129,532.88	1.48	1.15	0.14	70,390.57	54.34	33.67	20.67
Coastal Sage Scrub Total		1,499.62	1,704.99	522.22	3,726.83	85.99	148,604.03	2.51	1.01	1.15	78,651.22	52.93	30.20	22.72
Desert Scrubs	Big Sagebrush Scrub	25.38	144.38	971.30	1,141.05	14.88	6,206.54	18.38	0.41	2.33	1,942.50	31.30	16.17	15.13
	Semi-desert Succulent Scrub	190.19	0.00	12.71	202.89	93.74	2,423.49	8.37	7.85	0.00	2,343.92	96.72	96.72	0.00
	Sonoran Desert Scrub	0.00	0.00	25.44	25.44	0.00	281.78	9.03	0.00	0.00	160.54	56.97	0.00	56.97
Desert Scrubs Total		215.56	144.38	1,009.44	1,369.38	26.29	8,911.80	15.37	2.42	1.62	4,446.96	49.90	37.56	12.34
Developed or Disturbed Land	Residential/Urban/Exotic	65.21	174.32	5,871.05	6,110.57	3.92	259,450.56	2.36	0.03	0.07	11,502.79	4.43	0.61	3.82
Developed or Disturbed Land Total		65.21	174.32	5,871.05	6,110.57	3.92	259,450.56	2.36	0.03	0.07	11,502.79	4.43	0.61	3.82
Grassland	Non-native Grassland	424.89	1,359.23	3,414.17	5,198.28	34.32	129,754.78	4.01	0.33	1.05	38,093.88	29.36	14.33	15.03
	Valley and Foothill Grassland	0.00	0.00	0.00	0.00	0.00	2,730.64	0.00	0.00	0.00	2,704.90	99.06	14.27	84.79
Grassland Total		424.89	1,359.23	3,414.17	5,198.28	34.32	132,485.42	3.92	0.32	1.03	40,798.78	30.79	14.33	16.47
Meadow	Meadow (Montane)	0.00	43.07	35.02	78.09	55.15	147.17	53.06	0.00	29.27	58.54	39.78	0.00	39.78
	Wet Montane Meadow	0.00	25.69	298.84	324.53	7.91	324.53	100.00	0.00	7.91	25.69	7.91	0.00	7.91
Meadow Total		0.00	68.76	333.86	402.62	17.08	471.70	85.36	0.00	14.58	84.23	17.86	0.00	17.86
Meadows and Marshes	Coastal and Valley Freshwater Marsh	0.00	0.00	0.00	0.00	0.00	373.86	0.00	0.00	0.00	340.96	91.20	33.78	57.42
	Marsh	0.00	0.00	0.00	0.00	0.00	80.61	0.00	0.00	0.00	46.54	57.73	34.02	23.72
Meadows and Marshes Total		0.00	0.00	0.00	0.00	0.00	454.47	0.00	0.00	0.00	387.50	85.26	33.82	51.44
Montane Coniferous Forest	Jeffrey Pine	0.00	7,702.85	3,961.88	11,664.73	66.04	11,664.73	100.00	0.00	66.04	7,702.85	66.04	0.00	66.04
	Lodgepole Pine	0.00	577.46	1.46	578.91	99.75	578.91	100.00	0.00	99.75	577.46	99.75	0.00	99.75
	Lower Montane Coniferous Forest	0.00	3,586.08	1,520.99	5,107.06	70.22	6,685.38	76.39	0.00	53.64	4,969.21	74.33	0.27	74.06
	Mixed Evergreen Forest	0.00	3,886.20	458.68	4,344.88	89.44	4,344.88	100.00	0.00	89.44	3,886.20	89.44	0.00	89.44
	S. Cal. White Fir	0.00	3,219.17	481.16	3,700.32	87.00	3,700.32	100.00	0.00	87.00	3,219.17	87.00	0.00	87.00
Montane Coniferous Forest Total		0.00	18,998.40	6,425.30	25,423.70	74.73	27,002.02	94.15	0.00	70.36	20,381.54	75.48	0.07	75.41
Penninsular Juniper Woodland and Scrub	Peninsular Juniper Woodland and Scrub	0.00	14.75	0.00	14.75	100.00	1,067.20	1.38	0.00	1.38	609.00	57.06	31.46	25.60
Penninsular Juniper Woodland and Scrub Total		0.00	14.75	0.00	14.75	100.00	1,067.20	1.38	0.00	1.38	609.00	57.06	31.46	25.60
Playas and Vernal Pools	Alkali Playa	0.00	0.00	0.00	0.00	0.00	7,004.62	0.00	0.00	0.00	6,028.14	86.06	48.01	38.05

Appendix 8f. Analysis of vegetation communities in the San Jacinto Mountains Bioregion within Additional Reserve Lands (ARL) and Public/Quasi-Public Lands (PQP).

Habitat Category	Vegetation Subassociation	San Jacinto Mtns. ARL Acres	San Jacinto Mtns. PQP Acres	San Jacinto Mtns. Not Conserved Acres	San Jacinto Mtns. Total Acres	% of San Jacinto Mtns. Total Conserved	Grand Total Plan Area Acres	% of Grand Total in San Jacinto Mtns.	% of Grand Total in San Jacinto Mtns. ARL	% of Grand Total in San Jacinto Mtns. PQP	Grand Total Conserved Acres in Plan Area	% of Grand Total Conserved	% of Grand Total Conserved in ARL	% of Grand Total Conserved in PQP
	Southern Interior Basalt Vernal Pool	0.00	0.00	0.00	0.00		51.33	0.00	0.00	0.00	44.24	86.19	25.57	60.62
	Vernal Pool	0.00	0.00	0.00	0.00		18.78	0.00	0.00	0.00	17.35	92.37	3.90	88.47
Playas and Vernal Pools Total		0.00	0.00	0.00	0.00		7,074.73	0.00	0.00	0.00	6,089.73	86.08	47.73	38.35
Riparian Scrub, Woodland, Forest														
	Arundo/Riparian Forest	0.00	0.00	0.00	0.00		489.23	0.00	0.00	0.00	483.04	98.73	8.77	89.97
	Montane Riparian Forest	4.43	179.98	33.96	218.37	84.45	285.87	76.39	1.55	62.96	216.24	75.64	1.56	74.08
	Montane Riparian Scrub	0.00	0.00	0.00	0.00		6.48	0.00	0.00	0.00	6.48	99.98	85.54	14.44
	Mule Fat Scrub	0.00	0.00	0.00	0.00		515.84	0.00	0.00	0.00	331.41	64.25	48.52	15.73
	Riparian Forest	28.67	87.76	63.83	180.26	64.59	1,212.00	14.87	2.37	7.24	904.05	74.59	25.47	49.12
	Riparian Scrub	28.24	0.40	35.69	64.34	44.52	2,925.22	2.20	0.97	0.01	1,814.97	62.05	36.44	25.61
	Southern Cottonwood/Willow Riparian	0.00	0.00	0.00	0.00		6,434.54	0.00	0.00	0.00	5,787.64	89.95	14.49	75.46
	Southern Sycamore/Alder Riparian Woodland	0.00	0.00	0.00	0.00		186.64	0.00	0.00	0.00	68.93	36.93	4.93	32.00
	Southern Willow Scrub	0.00	0.00	0.00	0.00		1,509.80	0.00	0.00	0.00	740.91	49.07	36.51	12.56
	Tamarisk Scrub	0.00	0.00	0.00	0.00		271.94	0.00	0.00	0.00	271.86	99.97	99.97	0.00
Riparian Scrub, Woodland, Forest Total		61.35	268.14	133.49	462.97	71.17	13,837.56	3.35	0.44	1.94	10,625.53	76.79	24.88	51.91
Riversidean Alluvial Fan Sage Scrub														
	Disturbed Alluvial	11.58	0.00	0.00	11.58	100.00	1,018.86	1.14	1.14	0.00	790.19	77.56	51.26	26.29
	Riversidean Alluvial Fan Sage Scrub	154.42	16.02	145.93	316.36	53.87	5,262.24	6.01	2.93	0.30	3,611.36	68.63	42.38	26.24
Riversidean Alluvial Fan Sage Scrub Total		166.00	16.02	145.93	327.95	55.50	6,281.09	5.22	2.64	0.26	4,401.55	70.08	43.83	26.25
Water														
	Open Water/Reservoir/Pond	5.42	97.05	155.07	257.54	39.79	11,576.09	2.22	0.05	0.84	10,192.35	88.05	9.80	78.25
Water Total		5.42	97.05	155.07	257.54	39.79	11,576.09	2.22	0.05	0.84	10,192.35	88.05	9.80	78.25
Woodlands and Forests														
	Black Oak Forest	0.00	0.00	0.00	0.00		4.11	0.00	0.00	0.00	4.11	100.00	0.00	100.00
	Broadleaved Upland Forest	0.00	205.49	67.82	273.31	75.19	2,356.57	11.60	0.00	8.72	2,273.51	96.48	0.00	96.48
	Coast Live Oak Woodland	145.84	309.96	647.50	1,103.29	41.31	6,302.24	17.51	2.31	4.92	3,011.94	47.79	12.90	34.89
	Dense Engelmann Oak Woodland	0.00	0.00	0.00	0.00		4,057.97	0.00	0.00	0.00	2,467.81	60.81	17.57	43.25
	Oak Woodland	35.41	12,550.29	1,423.85	14,009.54	89.84	18,906.44	74.10	0.19	66.38	15,021.56	79.45	4.40	75.05
Woodlands and Forests Total		181.24	13,065.73	2,139.16	15,386.14	86.10	31,627.33	48.65	0.57	41.31	22,778.92	72.02	7.46	64.57
Grand Total		11,813.48	121,586.81	49,511.16	182,911.46	72.93	1,212,512.12	15.09	0.97	10.03	498,782.97	41.14	12.60	28.54

Appendix 8g. Analysis of vegetation communities in the Santa Ana Mountains Bioregion within Additional Reserve Lands (ARL) and Public/Quasi-Public Lands (PQP).

Habitat Category	Vegetation Subassociation	Santa Ana Mtns. ARL Acres	Santa Ana Mtns. PQP Acres	Santa Ana Mtns. Not Conserved Acres	Santa Ana Mtns. Total Acres	% of Santa Ana Mountains Total Conserved	Grand Total Plan Area Acres	% of Grand Total in Santa Mtns.	% of Grand Total in Santa Ana Mtns. ARL	% of Grand Total in Santa Ana Mtns. PQP	Grand Total Conserved Acres in Plan Area	% of Grand Total Conserved	% of Grand Total Conserved in ARL	% of Grand Total Conserved in PQP
Agricultural Land	Dairy & Livestock Feedyards	0.00	0.00	51.08	51.08	0.00	5,335.08	0.96	0.00	0.00	429.65	8.05	5.32	2.74
	Field Croplands	68.68	0.31	427.73	496.72	13.89	113,818.63	0.44	0.06	0.00	14,581.99	12.81	4.64	8.18
	Grove/Orchard	285.15	80.75	10,655.25	11,021.15	3.32	36,455.05	30.23	0.78	0.22	1,954.31	5.36	1.86	3.50
Agricultural Land Total		353.83	81.05	11,134.06	11,568.95	3.76	155,608.76	7.43	0.23	0.05	16,965.96	10.90	4.01	6.90
Chaparral	Chamise Chaparral	0.00	0.00	0.00	0.00		355.03	0.00	0.00	0.00	86.97	24.50	21.40	3.10
	Chaparral	3,413.84	62,327.75	19,115.85	84,857.44	77.47	344,591.94	24.63	0.99	18.09	232,543.09	67.48	17.02	50.46
	Red Shank Chaparral	0.00	0.00	0.00	0.00		62,947.32	0.00	0.00	0.00	38,209.41	60.70	8.61	52.09
	Semi-Desert Chaparral	0.00	0.00	0.00	0.00		15.16	0.00	0.00	0.00	0.00	0.02	0.00	0.02
Chaparral Total		3,413.84	62,327.75	19,115.85	84,857.44	77.47	407,909.46	20.80	0.84	15.28	270,839.47	66.40	15.73	50.67
Cismontane Alkali Marsh	Cismontane Alkali Marsh	0.00	0.00	0.00	0.00		149.90	0.00	0.00	0.00	27.44	18.30	17.06	1.24
Cismontane Alkali Marsh Total		0.00	0.00	0.00	0.00		149.90	0.00	0.00	0.00	27.44	18.30	17.06	1.24
Coastal Sage Scrub	Coastal Scrub	0.00	0.00	0.00	0.00		3,633.52	0.00	0.00	0.00	1,890.82	52.04	2.11	49.93
	Diegan Coastal Sage Scrub	264.30	4,992.33	7,063.45	12,320.08	42.67	15,437.63	79.81	1.71	32.34	6,369.83	41.26	7.75	33.51
	Riversidean Sage Scrub	48.75	1.81	54.17	104.74	48.28	129,532.88	0.08	0.04	0.00	70,390.57	54.34	33.67	20.67
Coastal Sage Scrub Total		313.05	4,994.15	7,117.62	12,424.82	42.71	148,604.03	8.36	0.21	3.36	78,651.22	52.93	30.20	22.72
Desert Scrubs	Big Sagebrush Scrub	0.00	3.16	0.00	3.16	100.00	6,206.54	0.05	0.00	0.05	1,942.50	31.30	16.17	15.13
	Semi-desert Succulent Scrub	0.00	0.00	0.00	0.00		2,423.49	0.00	0.00	0.00	2,343.92	96.72	96.72	0.00
	Sonoran Desert Scrub	0.00	0.00	0.00	0.00		281.78	0.00	0.00	0.00	160.54	56.97	0.00	56.97
Desert Scrubs Total		0.00	3.16	0.00	3.16	100.00	8,911.80	0.04	0.00	0.04	4,446.96	49.90	37.56	12.34
Developed or Disturbed Land	Residential/Urban/Exotic	61.37	111.25	7,792.11	7,964.73	2.17	259,450.56	3.07	0.02	0.04	11,502.79	4.43	0.61	3.82
Developed or Disturbed Land Total		61.37	111.25	7,792.11	7,964.73	2.17	259,450.56	3.07	0.02	0.04	11,502.79	4.43	0.61	3.82
Grassland	Non-native Grassland	479.64	2,012.13	4,832.78	7,324.55	34.02	129,754.78	5.64	0.37	1.55	38,093.88	29.36	14.33	15.03
	Valley and Foothill Grassland	389.55	2,315.36	25.73	2,730.64	99.06	2,730.64	100.00	14.27	84.79	2,704.90	99.06	14.27	84.79
Grassland Total		869.19	4,327.48	4,858.51	10,055.19	51.68	132,485.42	7.59	0.66	3.27	40,798.78	30.79	14.33	16.47
Meadow	Meadow (Montane)	0.00	0.00	0.00	0.00		147.17	0.00	0.00	0.00	58.54	39.78	0.00	39.78
	Wet Montane Meadow	0.00	0.00	0.00	0.00		324.53	0.00	0.00	0.00	25.69	7.91	0.00	7.91
Meadow Total		0.00	0.00	0.00	0.00		471.70	0.00	0.00	0.00	84.23	17.86	0.00	17.86
Meadows and Marshes	Coastal and Valley Freshwater Marsh	0.00	0.00	0.00	0.00		373.86	0.00	0.00	0.00	340.96	91.20	33.78	57.42
	Marsh	0.00	0.00	0.00	0.00		80.61	0.00	0.00	0.00	46.54	57.73	34.02	23.72
Meadows and Marshes Total		0.00	0.00	0.00	0.00		454.47	0.00	0.00	0.00	387.50	85.26	33.82	51.44
Montane Coniferous Forest	Jeffrey Pine	0.00	0.00	0.00	0.00		11,664.73	0.00	0.00	0.00	7,702.85	66.04	0.00	66.04
	Lodgepole Pine	0.00	0.00	0.00	0.00		578.91	0.00	0.00	0.00	577.46	99.75	0.00	99.75
	Lower Montane Coniferous Forest	0.00	0.00	0.00	0.00		6,685.38	0.00	0.00	0.00	4,969.21	74.33	0.27	74.06
	Mixed Evergreen Forest	0.00	0.00	0.00	0.00		4,344.88	0.00	0.00	0.00	3,886.20	89.44	0.00	89.44
	S. Cal. White Fir	0.00	0.00	0.00	0.00		3,700.32	0.00	0.00	0.00	3,219.17	87.00	0.00	87.00
	Subalpine Coniferous	0.00	0.00	0.00	0.00		27.80	0.00	0.00	0.00	26.65	95.88	0.00	95.88
Montane Coniferous Forest Total		0.00	0.00	0.00	0.00		27,002.02	0.00	0.00	0.00	20,381.54	75.48	0.07	75.41
Penninsular Juniper Woodland and Scrub	Peninsular Juniper Woodland and Scrub	0.00	0.00	19.06	19.06	0.00	1,067.20	1.79	0.00	0.00	609.00	57.06	31.46	25.60
Penninsular Juniper Woodland and Scrub Total		0.00	0.00	19.06	19.06	0.00	1,067.20	1.79	0.00	0.00	609.00	57.06	31.46	25.60
Playas and Vernal Pools	Alkali Playa	0.00	0.00	0.00	0.00		7,004.62	0.00	0.00	0.00	6,028.14	86.06	48.01	38.05

Appendix 8g. Analysis of vegetation communities in the Santa Ana Mountains Bioregion within Additional Reserve Lands (ARL) and Public/Quasi-Public Lands (PQP).

Habitat Category	Vegetation Subassociation	Santa Ana Mtns. ARL Acres	Santa Ana Mtns. PQP Acres	Santa Ana Mtns. Not Conserved Acres	Santa Ana Mtns. Total Acres	% of Santa Ana Mountains Total Conserved	Grand Total Plan Area Acres	% of Grand Total in Santa Mtns.	% of Grand Total in Santa Ana Mtns. ARL	% of Grand Total in Santa Ana Mtns. PQP	Grand Total Acres in Plan Area	% of Grand Total Conserved	% of Grand Total Conserved in ARL	% of Grand Total Conserved in PQP
	Southern Interior Basalt Vernal Pool	0.05	31.11	0.00	31.17	100.00	51.33	60.72	0.10	60.62	44.24	86.19	25.57	60.62
	Vernal Pool	0.00	0.00	0.00	0.00		18.78	0.00	0.00	0.00	17.35	92.37	3.90	88.47
Playas and Vernal Pools Total		0.05	31.11	0.00	31.17	100.00	7,074.73	0.44	0.00	0.44	6,089.73	86.08	47.73	38.35
Riparian Scrub, Woodland, Forest														
	Arundo/Riparian Forest	0.00	0.00	0.00	0.00		489.23	0.00	0.00	0.00	483.04	98.73	8.77	89.97
	Montane Riparian Forest	0.00	0.00	0.00	0.00		285.87	0.00	0.00	0.00	216.24	75.64	1.56	74.08
	Montane Riparian Scrub	0.00	0.00	0.00	0.00		6.48	0.00	0.00	0.00	6.48	99.98	85.54	14.44
	Mule Fat Scrub	0.00	4.31	7.12	11.43	37.70	515.84	2.22	0.00	0.84	331.41	64.25	48.52	15.73
	Riparian Forest	15.06	212.13	82.14	309.33	73.45	1,212.00	25.52	1.24	17.50	904.05	74.59	25.47	49.12
	Riparian Scrub	93.78	474.19	83.59	651.56	87.17	2,925.22	22.27	3.21	16.21	1,814.97	62.05	36.44	25.61
	Southern Cottonwood/Willow Riparian	7.46	155.75	10.33	173.54	94.05	6,434.54	2.70	0.12	2.42	5,787.64	89.95	14.49	75.46
	Southern Sycamore/Alder Riparian Woodland	0.00	16.11	8.64	24.75	65.10	186.64	13.26	0.00	8.63	68.93	36.93	4.93	32.00
	Southern Willow Scrub	0.00	70.19	41.69	111.88	62.73	1,509.80	7.41	0.00	4.65	740.91	49.07	36.51	12.56
	Tamarisk Scrub	0.00	0.00	0.00	0.00		271.94	0.00	0.00	0.00	271.86	99.97	99.97	0.00
Riparian Scrub, Woodland, Forest Total		116.30	932.67	233.52	1,282.49	81.79	13,837.56	9.27	0.84	6.74	10,625.53	76.79	24.88	51.91
Riversidean Alluvial Fan Sage Scrub														
	Disturbed Alluvial	0.12	0.00	5.38	5.51	2.27	1,018.86	0.54	0.01	0.00	790.19	77.56	51.26	26.29
	Riversidean Alluvial Fan Sage Scrub	140.17	67.34	106.26	313.77	66.13	5,262.24	5.96	2.66	1.28	3,611.36	68.63	42.38	26.24
Riversidean Alluvial Fan Sage Scrub Total		140.30	67.34	111.64	319.28	65.03	6,281.09	5.08	2.23	1.07	4,401.55	70.08	43.83	26.25
Water	Open Water/Reservoir/Pond	0.00	0.00	27.05	27.05	0.00	11,576.09	0.23	0.00	0.00	10,192.35	88.05	9.80	78.25
Water Total		0.00	0.00	27.05	27.05	0.00	11,576.09	0.23	0.00	0.00	10,192.35	88.05	9.80	78.25
Woodlands and Forests														
	Black Oak Forest	0.00	0.00	0.00	0.00		4.11	0.00	0.00	0.00	4.11	100.00	0.00	100.00
	Broadleaved Upland Forest	0.00	1,958.99	4.86	1,963.85	99.75	2,356.57	83.34	0.00	83.13	2,273.51	96.48	0.00	96.48
	Coast Live Oak Woodland	139.92	1,570.85	869.61	2,580.38	66.30	6,302.24	40.94	2.22	24.93	3,011.94	47.79	12.90	34.89
	Dense Engelmann Oak Woodland	711.28	1,748.46	1,562.92	4,022.66	61.15	4,057.97	99.13	17.53	43.09	2,467.81	60.81	17.57	43.25
	Oak Woodland	183.98	1,076.75	1,120.07	2,380.80	52.95	18,906.44	12.59	0.97	5.70	15,021.56	79.45	4.40	75.05
Woodlands and Forests Total		1,035.17	6,355.04	3,557.47	10,947.69	67.50	31,627.33	34.61	3.27	20.09	22,778.92	72.02	7.46	64.57
Grand Total		6,303.10	79,231.02	53,966.89	139,501.01	61.31	1,212,512.12	11.51	0.52	6.53	498,782.97	41.14	12.60	28.54