United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ecological Services
Carlsbad Fish and Wildlife Office
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Carlsbad, California 92011

In Reply Refer To:
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Memorandum

To: Deputy Regional Director, Endangered Species Division, Region 8, Sacramento, California

From: Assistant Field Supervisor, Carlsbad Fish and Wildlife Office, Carlsbad, California

Subject: Intra-Service Formal Section 7 Consultation for Issuance of a Section 10(a)(1)(B) (TE- 104604-0) Incidental Take Permit under the Endangered Species Act for the Coachella Valley Multiple Species Habitat Conservation Plan, Riverside County, California

This document transmits our Biological and Conference 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[1]) for the Coachella Valley Multiple Species Habitat Conservation Plan and Natural Communities Conservation Plan (MSHCP or Plan) pursuant to section 10(a)(1)(B) of the Act.

The proposed incidental take would occur within Riverside County as a result of habitat loss and disturbance associated with urban development and other proposed activities (Covered Activities) identified in the MSHCP. Proposed Covered Activities include public and private development within the Plan Area that requires discretionary and ministerial actions by a Permittee subject to consistency with MSHCP policies, regional transportation facilities, maintenance of and safety improvements on existing roads, the circulation elements of the Permittees, maintenance, and operation of flood control facilities, and compatible uses in the proposed Reserve System. The Management and Monitoring Program is also included in the MSHCP. The MSHCP also incorporates the Public Use and Trails Plan, which includes recreational activities on Federal and non-Federal lands in the Santa Rosa and San Jacinto Mountains. The Bureau of Land Management (BLM) is a cooperating agency in this planning process and will make decisions on BLM-administered public lands pertaining to trail use in the Santa Rosa and San Jacinto Mountains based on the National Environmental Policy Act analysis for the MSHCP.

[1] As an aid to the reader, terminology that is specifically defined in the MSHCP or the IA is denoted in upper case throughout this Biological Opinion.

The MSHCP identifies a proposed Reserve System that would be established from lands within the proposed 21 Conservation Areas, which are either adjacent or linked by Biological Corridors. The acquisition program for the Reserve System, involving conservation of 129,690 acres, is anticipated to occur over the first 30 years of Permit issuance. When completed, the Reserve System would include Core Habitat for species that are being addressed under the MSHCP (Covered Species), Essential Ecological Processes, and Biological Corridors and Linkages to provide for the conservation of the proposed Covered Species.

The MSHCP proposes 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 would require coordinated actions among the Permit Applicants. A single incidental take Permit is proposed for issuance to 19 Permittees for a period of 75 years. The MSHCP provides for the inclusion of special districts and other non-permittee entities in the Permit with a Certificate of Inclusion as set forth in the MSHCP and the Implementation Agreement (IA). The MSHCP is also a "subregional" plan under the State of California's Natural Community Conservation Planning (NCCP) Act, as amended. The term "Permits" refers to the section 10(a)(1)(B) and NCCP permits.

The Coachella Valley Association of Governments (CVAG), County of Riverside (County), Riverside County Flood Control and Water Conservation District, Riverside County Parks and Open Space District, Riverside County Waste Management District, Coachella Valley Water District (CVWD), Imperial Irrigation District (IID), California Department of Transportation, California Department of Parks and Recreation, Coachella Valley Mountains Conservancy, and the cities of Cathedral City, Coachella, Indian Wells, Indio, La Quinta, Palm Desert, Palm Springs, and Rancho Mirage (Applicants/Permittees) have developed the MSHCP in support of an application for an incidental take permit. The local Permittees pursuant to the requirements of the California Government Code and other appropriate legal authorities created a joint powers regional authority, the Coachella Valley Conservation Commission (CVCC), which is also a Permittee. CVCC would oversee and administer implementation of the MSHCP and has signed the IA.

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 would be authorized through the section 7 consultation process. Activities conducted by non-Permittees would not receive incidental take authorization under the subject Permit, including those entities that have entered into a Memorandum of Understanding or Cooperative Management Agreement, unless the non-Permittees seek incidental take authorization pursuant to the provisions of the MSHCP. Development projects that have obtained vested development rights prior to Permit issuance would 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. In addition, Federal wetland permitting within the Plan Area remains subject to the U.S. Fish and Wildlife Coordination Act and Clean Water Act and may require additional avoidance, minimization, and mitigation measures.

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BIOLOGICAL AND CONFERENCE OPINION

1.0 INTRODUCTION

1.1 Covered Species and Critical Habitat (Non-Covered Species)

This Biological Opinion addresses 10 listed species and 17 unlisted species. Collectively, the 27 listed and unlisted species (Table 1) are referred to as Covered Species by the MSHCP and include 5 plant species (2 endangered, 3 unlisted); 2 insect species (both unlisted); 1 fish species (endangered); 1 amphibian species (endangered); 3 reptile species (2 threatened, 1 unlisted); 11 bird species (3 endangered, 8 unlisted); and 4 mammal species (1 endangered, 1 candidate, and 2 unlisted). Critical habitat for the federally endangered Peninsular bighorn sheep (*Ovis canadensis nelsoni*), endangered least Bell's vireo (*Vireo bellii pusillus*), endangered arroyo toad (*Bufo californicus*); and threatened desert tortoise (*Gopherus agassizii*) is also addressed. Of those 27 species proposed for coverage (See Table 1) under the MSHCP, species are "Covered" with acceptance of the associated Permit Terms and Conditions. As part of the species coverage, we expect completion of a Memorandum of Understanding (MOU) or a Cooperative Management Agreement (CMA), as anticipated in the MSHCP. Specifically, CVCC is required to enter into an MOU or similar agreement with the owners or managers of the Existing Conservation Lands to ensure that management of the lands is consistent with the MSHCP. Once this action is complete, an exchange of letters between the Service and the CVCC will suffice as documentation that these agreements have been completed.

To meet issuance criteria under section 10(a)(2)(B) of the Act, such that taking would be incidental to otherwise lawful activities, and to the extent Covered Activities would 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. To date, the State and Federal governments have created guidelines for minimizing wildlife impacts for certain species, such as the Final Statewide Guidelines for Reducing Impacts to Birds and Bats from Wind Energy Development (CEC-700-2007-008-CMF) and the Service Guidance on Avoiding and Minimizing Wind Energy Impacts from Wind Turbines for energy projects. Incorporating the guidance will help minimize take and will be the best available direction for meeting the requirements of the Federal Migratory Bird Treaty Act.

Upon issuance of the Permit, incidental take would be authorized for "Covered" animal species adequately conserved. Plant species are "Covered" by the Permit in recognition of the conservation measures incorporated into the MSHCP for such species and, as with covered animal species, would receive assurances under the Service's "No Surprises" rule. Incidental take as used in this opinion in reference to the Adequately Conserved Covered Species refers solely to Covered animal Species. Under the Endangered Species Act, take is not authorized for plant species.

In accordance with our "No Surprises" regulation (50 CFR Part 17), we would 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 Permit coverage for 17 unlisted species (including take authorization for 14 unlisted animal 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 would be identified as Covered Species on the Permit. Take authorization for the animal species would only become effective if, and when, each of those currently unlisted Covered Species is listed.

Conservation measures for all species would 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 would review the effects analyses contained within this Biological 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 jeopardy for that species, the Permit would be suspended or revoked for that species.

Table 1. Twenty-seven Proposed Covered Species and their Federal/State listing status

Species Name	Federal/State Status
LISTED PLANTS	
Coachella Valley milk-vetch (*Astragalus lentiginosus* var. *coachellae*)	FE/-
Triple-ribbed milkvetch (*Astragalus tricarinatus*)	FE/-
UNLISTED PLANTS	
Mecca aster (*Xylorhiza cognate*)	-/-
Orocopia sage (*Salvia greatae*)	-/-
Little San Bernardino Mountains linanthus (*Linanthus maculates*) or (*Gilia maculata*)	-/-
UNLISTED INVERTEBRATES	
Coachella Valley giant sand-treader cricket (*Macrobaenetes valgum*)	-/-
Coachella Valley Jerusalem cricket (*Stenopelmatus cahuilaensis*)	-/-
LISTED FISH	
Desert pupfish (*Cyprinodon macularius*)	FE/SE
LISTED AMPHIBIANS	
Arroyo toad (*Bufo californicus*)	FE/CSC

Species Name	Federal/State Status
LISTED REPTILES	
Desert tortoise (*Gopherus agassizii*)	FT/ST
Coachella Valley fringe-toed lizard (*Uma inornata*)	FT/SE
UNLISTED LISTED REPTILES	
Flat-tailed horned lizard (*Phrynosoma mcalli*)	-/CSC
LISTED BIRDS	
Yuma clapper rail (*Rallus longirostris yumanensis*)	FE & MBTA/ ST & SFP
Southwestern willow flycatcher (*Empidonax traillii extimus*)	FE & MBTA/SE
Least Bell's vireo (*Vireo bellii pusillus*)	FE & MBTA/SE
UNLISTED BIRDS	
California black rail (*Laterallus jamaicensis coturniculus*)	MBTA/ST & SFP
Burrowing owl (*Athene cunicularia*)	MBTA/CSC
Crissal thrasher (*Toxostoma crissale*)	MBTA/CSC
Le Conte's thrasher (*Toxostoma lecontei*)	MBTA/CSC
Gray vireo (*Vireo vicinior*)	MBTA/CSC
Yellow warbler (*Dendroica petechia brewsteri*)	MBTA/CSC
Yellow-breasted chat (*Icteria virens*)	MBTA/CSC
Summer tanager (*Piranga rubra*)	MBTA/-
LISTED MAMMALS	
Peninsular bighorn sheep (*Ovis canadensis*)	FE/ST & SFP
UNLISTED MAMMALS	
Coachella Valley round-tailed ground squirrel (*Spermophilus tereticaudus chlorus*)	FC/CSC
Southern yellow bat (*Lasiurus ega xanthinus*)	-/-
Palm Springs pocket mouse (*Perognathus longimembris bangsi*)	-/CSC

Status Codes:
FT - Federally Threatened
FE - Federally Endangered
FC - Federal Candidate for Listing
MBTA - Migratory Bird Treaty Act
ST - State Threatened
SE - State Endangered
SFP - State Fully Protected
CSC- State Species of Concern

1.2 Critical Habitat

Designated critical habitat for the federally endangered Peninsular bighorn sheep, endangered arroyo toad, and threatened desert tortoise occurs within the MSHCP Plan Area. In addition, there is also proposed critical habitat for the federally endangered Peninsular bighorn sheep that has recently been noticed. The MSHCP's effects to designated and proposed critical habitats are fully analyzed in the individual species accounts section of this Biological Opinion (Appendix A). We are also conferencing on the critical habitat proposal for Peninsular bighorn sheep. For the purpose of this Biological Opinion, we will be analyzing both the designated and the proposed critical habitat.

1.3 Summary of Conclusion (Jeopardy/Adverse Modification)

Appendix A contains the analysis for all 27 species. The analysis demonstrates that although all of the species are impacted by the Plan, none of the take being authorized is to a level of jeopardy. A finding of no jeopardy was made for all of the species. A finding of no adverse modification was made for the Peninsular bighorn sheep (for both designated and proposed critical habitat), desert tortoise, and arroyo toad.

1.4 Consultation History

Prior to initiation of this consultation, the Service was involved with the MSHCP planning process and provided input on multiple versions of the Draft MSHCP. Hundreds of meetings were held during the planning process that began in 1995. A Planning Agreement among the signatories to the MSHCP was signed in late 1995 and early 1996. The Planning Agreement was amended in late 1996 and early 1997 to stipulate that the MSHCP would meet the requirements of the NCCP as well as the California Endangered Species Act. A comprehensive list of the meetings can be found in *Appendices for the Final Recirculated Coachella Valley Multiple Species Habitat Conservation Plan and Natural Community Conservation Plan and associated Santa Rosa and San Jacinto Mountains Trails Plan, September 2007, Volume 4, Appendix I*, and are herein incorporated by reference. Meetings were held by various groups and included the Project Advisory Group, CVAG Energy and Environment Committee, CVAG Technical Advisory Committee, CVAG Executive Committee, as well as working group meetings, public forums, scoping for the EIR/EIS, presentations to individual jurisdictions and entities, and public meetings related to trails planning. In addition to the public meetings identified in Appendix I, meetings were held with local jurisdictions, CVAG, and other entities (water districts, utilities, etc.) to discuss issues related to their participation in the MSHCP. These meetings included all the entities that ultimately decided to be the MSHCP Permittees, as well as those that are not Permittees.

1.5 Administrative Record

The complete administrative record for this consultation is on file at the Carlsbad Fish and

Wildlife Service Office. This Biological Opinion was prepared using the following documents, references, and information:

1. Final Recirculated Coachella Valley Multiple Species Habitat Conservation Plan and Natural Community Conservation Plan and associated Santa Rosa and San Jacinto Mountains Trails Plan, September 2007. Volume 1: The Plan or MSHCP.

2. Final Recirculated Implementing Agreement for the Final Recirculated Coachella Valley Multiple Species Habitat Conservation Plan and Natural Community Conservation Plan and associated Santa Rosa and San Jacinto Mountains Trails Plan, September 2007. Volume 2: Implementing Agreement.

3. Final Recirculated Environmental Impact Report/Supplemental Final Environmental Impact Statement for the Final Recirculated Coachella Valley Multiple Species Habitat Conservation Plan and Natural Community Conservation Plan and associated Santa Rosa and San Jacinto Mountains Trails Plan, September 2007. Volume 3: EIR/EIS.

4. Appendices for the Final Recirculated Coachella Valley Multiple Species Habitat Conservation Plan and Natural Community Conservation Plan and associated Santa Rosa and San Jacinto Mountains Trails Plan, September 2007, Volume 4.

5. Response to Comments on the Final Recirculated Coachella Valley Multiple Species Habitat Conservation Plan and Natural Community Conservation Plan and associated Santa Rosa and San Jacinto Mountains Trails Plan, September 2007, Volume 5.

6. California Desert Conservation Area Plan (CDCA) Amendment for the Coachella Valley October 2002; associated Record of Decision, dated December 27, 2002; and associated biological opinion, dated December 24, 2002.

7. Other relevant information in the CVAG, consultants, and Service's files.

2.0 PROJECT DESCRIPTION

2.1 Description of the Proposed Action

The proposed Federal action is the issuance of a section 10(a)(1)(B) incidental take permit for a period of 75-years to the Applicants (Permittees) that would authorize incidental take of animal species that have been determined to be adequately conserved under the MSHCP, as a result of the proposed action. Additionally, the Service is proposing to sign the IA along with the Applicants and the California Department of Fish and Game (CDFG) to implement the MSHCP.

2.2 MSHCP Background

A scoping study prepared for the Coachella Valley Association of Governments (CVAG) by the Coachella Valley Mountains Conservancy (CVMC) in 1994 recommended that a Multiple Species Habitat Conservation Plan be prepared for the entire Coachella Valley and surrounding mountains to address current and potential future State and Federal Endangered Species Act issues in the Plan Area. Subsequently, a Memorandum of Understanding (Planning Agreement) was developed to govern the preparation of the Plan. In late 1995 and early 1996, the cities of Cathedral City, Coachella, Desert Hot Springs, Indian Wells, Indio, La Quinta, Palm Desert, Palm Springs, and Rancho Mirage; the County of Riverside; Service; CDFG; the BLM; the U.S. Forest Service (USFS); and the National Park Service (NPS) signed the Planning Agreement to initiate the planning effort. In late 1996 and early 1997, the parties to the Planning Agreement approved an amendment stipulating that the MSHCP would be developed with the intent of meeting the requirements under the Natural Community Conservation Planning Act, as amended and the Act.

The "Final" MSHCP was approved by the CVAG's Executive Committee on February 6, 2006, and by all local Applicants except one between March and June 2006. No action was taken by State Permittees. Desert Hot Springs declined to approve the MSHCP on June 20, 2006, and the Executive Committee rescinded its approval. The MSHCP was revised at the direction of the Executive Committee, following the City of Desert Hot Springs' decision not to approve the MSHCP. On November 20, 2006, the City of Desert Hot Springs sent a letter to the Service requesting the withdrawal of their incidental take permit application. The Final Recirculated MSHCP includes all of original Applicants with the exception of the City of Desert Hot Springs.

The stated overall goal of the MSHCP is to enhance and maintain biological diversity and ecosystem processes while allowing future economic growth. This goal is intended to preserve a quality of life characterized by well-managed and well-planned growth integrated with an associated habitat conservation and open-space Reserve System. The primary goals/objectives of the MSHCP are to:

1. Protect Core Habitat for 27 species and 27 natural communities, maintain the essential ecological processes to keep the core habitat viable and link core habitat to maximize the conservation value of the land.

2. Improve the future economic development in the Coachella Valley by providing an efficient, streamlined regulatory process. The MSHCP is intended to provide a means to standardize mitigation/compensation measures for the Covered Species so that, with respect to public and private development actions, mitigation/compensation measures established by the Plan will concurrently satisfy applicable provisions of Federal and State laws pertaining to endangered species protection.

3. Provide for permanent open space, community edges, and recreational opportunities within the Coachella Valley.

2.3 Action Area (Plan Area)

The MSHCP Plan Area encompasses approximately 1.1 million acres in the Coachella Valley of Riverside County. An additional 69,000 acres of Indian Reservation lands are not included in the MSHCP, but are within the Plan Area boundary (Figure 1-2 MSHCP). An additional 3,800 acres of land is owned by the Agua Caliente Band of Cahuilla Indians within the Santa Rosa and San Jacinto Mountains Conservation Area and may be subject to a land exchange with BLM. The Plan Area is located in the central portion of Riverside County, approximately 100 miles east of Los Angeles. The Plan Area includes lands that are controlled or owned by both Permittees and non-Permittees. For purposes of this consultation under section 7 of the Act, the action area is defined at 50 CFR 402 to mean "all of the areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action." Specifically, the action area includes the entire MSHCP Plan Area and the interdigitated lands of the Agua Caliente Band of Cahuilla Indians.

2.4 MSHCP Conservation Areas

Within the Plan Area boundary, the Reserve System will be assembled from lands within 21 Conservation Areas. Lands outside of the Conservation Areas will be subject to incidental take and, regarding conservation of species, are assumed lost for analysis purposes. The proposed MSHCP would assist in the establishment of a Reserve System that protects and manages approximately 723,480 acres of habitat for the proposed Covered Species. As of November 2006, this included approximately 557,100 acres of Existing Conservation Lands. An additional 158,580 acres in the Conservation Areas will be included in the Reserve System as acres of Complementary Conservation and Additional Conservation Lands. Within the Plan Area there are 7,800 acres within three Conservation Areas that will be subject to a Conservation Objective to maintain the fluvial sand transport processes without the obligation of acquisition.

2.5 Conservation Strategy

The general conservation strategy of the MSHCP is intended to: 1) provide native ecosystem types or natural communities across their natural range of variation in a system of conserved areas; 2) maintain or restore viable populations of the proposed Covered Species; 3) sustain ecological and evolutionary processes necessary to maintain the viability of the conserved natural communities and habitats for the proposed Covered Species; and 4) monitor/manage the system adaptively to be responsive to short-term and long-term environmental change and to maintain the evolutionary potential of lineages. Implementation of the conservation approach is described in Section 4 of the MSHCP for protection-related activities, including acquisition; in Section 6 of the MSHCP for obligations and implementation structure; in Section 8 of the MSHCP, for monitoring, ongoing management, and Adaptive Management; and Section 9 of the MSHCP for the implementation of Species Conservation Goals and Objectives. The Conservation Area Conservation Goals, Objectives, and Required Measures for the Covered Species are described for each Conservation Area in Section 4.3 of the MSHCP. The conservation strategy for each species is found in Section 9.2 of the MSHCP. The

Implementation Manual is referenced in several places within the MSHCP. Portions of the Implementation Manual have been prepared to enable us to include those aspects of the Implementation Manual into the Project Description and our analysis in the Biological Opinion. The above referenced Sections of the MSHCP, associated Implementing Agreement (IA), and applicable sections of the Implementation Manual are herein incorporated by reference.

2.6 Reserve System Assembly

The Reserve System is intended to provide for the conservation of the Covered Species in the Plan Area. Conservation Areas are described in terms of Core Habitat, Other Conserved Habitat, Natural Communities, Essential Ecological Processes, and Biological Corridors and Linkages. The Reserve System will be assembled from lands within 21 Conservation Areas, which comprise a total of 745,900 acres. As compared to the baseline date of 1996, a total of 22,660 acres of habitat was originally anticipated to have been lost within the Conservation Areas. Since the 2006 revision of the figures, a maximum of 22,420 acres is anticipated to be lost within the Conservation Areas (see Table 4-1 of the Plan), ultimately resulting in a Reserve System consisting of 723,480 acres (7,800 acres of this total is proposed to be achieved through a Conservation Objective for fluvial sand transport and not land acquisition). The MSHCP Reserve System consists of Existing Reserve Lands, Complementary Conservation Lands, and Additional Conservation Lands, as described in Section 4.1 and 4.2 of the MSHCP. As of November 2006, the Reserve System encompassed about 557,100 acres of Existing Conservation Lands. As a part of the MSHCP, an additional 166,380 acres in the Conservation Areas will be included in the Reserve System, comprised of 29,990 acres of Complementary Conservation; 21,390 acres expected to be acquired by State and Federal agencies as a contribution to MSHCP implementation; 10,800 acres of other non-Permittee public and quasi-public lands which will be conserved by those non-Permittees or remain undeveloped; 7,500 acres of Local Permittee owned land for which there will be cooperation to conserve; 88,900 acres to be acquired or otherwise conserved by the Local Permittees as mitigation; and 7,800 acres that are subject to the Conservation Objective to maintain fluvial sand transport by means other than through land acquisition. The Permittees contribution to this is described below.

2.6.1 Permittees Contribution to Reserve Assembly

The Permittees will conserve 96,940 acres, as described in Section 4.2.2.2 of the Plan (inclusive of Caltrans' and the State Parks' obligations) in the Conservation Areas. Of this, 7,500 acres are already owned by the Local Permittees and will be conserved through a recorded legal instrument as described in the MSHCP. The MSHCP estimates that most of the 88,900 acres of the Local Permittee obligation will be conserved through land acquisition (4,200 acres have been conserved since 1996). In addition to acquisition, land may be conserved through dedication, deed restrictions, or granting conservation easements. Permittees could use planning tools and land use regulation to secure habitat, however, it is not anticipated to exceed 1,700 acres. Further, the Permittees will also ensure that fluvial sand transport shall be maintained at not less than its current functionality in an additional area of 7,800 acres. The Local Permittees will establish an endowment to fund the Monitoring and Management Programs for those lands in

perpetuity. Monitoring and management of 18,200 acres of Local and State Permittee Existing Conservation Lands will be consistent with the MSHCP. The Local Permittees must also comply with all other terms and conditions of Section 6.6.1 of the MSHCP and any other obligations set forth in the MSHCP and IA (see Section 13 of the IA) and the Permit Terms and Conditions.

2.6.2 Fluvial Sand Transport

The Local Permittees will protect the Fluvial Sand Transport Essential Ecological Process on 7,800 acres in the Cabazon, Long Canyon, and West Deception Canyon Conservation Areas to ensure no net reduction in fluvial sand transport in these areas as described in Section 4.2.2.2.4 of the MSHCP. The Permittees will require that natural flows onto parcels in the fluvial sand transport areas shall be conveyed offsite in the natural pre-disturbance direction of flow. The only Conservation Objective in the MSHCP for these Conservation Areas is to maintain existing levels of fluvial sand transport within this 7,800-acre area. Thus, it is not anticipated that these 7,800 acres, other than what is needed to maintain these processes, will be acquired to meet this Conservation Objective.

2.6.3 Joint Project Review Process within Conservation Areas

For purposes of overseeing compliance with the requirements of the MSHCP and the IA, a Joint Project Review Process will be instituted by CVCC for all projects under the Local Permittees' jurisdiction in a Conservation Area that would result in disturbance to habitat, Natural Communities, Biological Corridors and Linkages, or Essential Ecological Processes. The Joint Project Review Process is a five-step process that is discussed in detail in Section 6.6.1.1 of the MSHCP and is herein incorporated by reference. The Joint Project Review Process allows CVCC to facilitate and monitor implementation of the MSHCP and provide the Wildlife Agencies an opportunity to provide guidance on the MSHCP. To assist the Local Permittees in meeting the Conservation Goals and Objectives and Required Measures of the MSHCP, Local Permittees proposing Covered Activities identified in Tables 7-1 through 7-11 of the MSHCP that have the potential to affect connectivity within the Conservation Areas will consult with CVCC at the pre-design stage regarding the size, location, and configuration of wildlife undercrossings. Consultation with CVCC at this early stage is intended to ensure that alternatives are fully evaluated to achieve Conservation Area Conservation Goals, Objectives, and Required Measures prior to public release of environmental documents prepared pursuant to CEQA. The Wildlife Agencies will also participate in this process. The Wildlife Agencies will be provided copies of project applications and comments on the proposed project applications prepared by the CVCC.

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

The County and the applicable cities will employ HANS in conjunction with the Joint Project Review Process in portions of the Santa Rosa and San Jacinto Mountains Conservation Area.

HANS applies to private property in the identified areas that may be needed for inclusion in the MSHCP Reserve System. A map of the area where the HANS process will be used is shown in Section 4.3.21 of the MSHCP and details of the HANS process are in Section 6.6.1.2 of the MSHCP. HANS ensures that a determination will be made as to which properties are needed for the MSHCP Reserve System; that the property owners are compensated; and that property owners of land not necessary for inclusion in the Reserve System will receive take authorization.

2.6.5 Reserve Assembly Accounting Process

A Reserve Assembly accounting process ("Rough Step and Rough Proportionality"), described in Sections 5.2.2.3 and 6.5 of the MSHCP will be implemented to ensure that conservation of lands occurs in rough proportionality to development; that lands are being assembled in the configuration as generally described in the MSHCP; and that Conservation Goals and Objectives are being achieved. An annual report (Section 6.4 MSHCP) that includes, but is not limited to, documenting habitat loss and conservation within the Plan Area will be prepared by the CVCC and provided to the Wildlife Agencies and Permittees by March 30, for the preceding year. The annual Rough Step analysis will be done for each Conservation Objective and for each Species Goal and Objective. In addition, a real-time Rough Step analysis will be prepared for a Conservation Area whenever development is proposed in that Conservation Area. 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. Each year, an analysis of each species will be updated.

2.7 Reserve Management and Monitoring

The Management Program is intended to provide for conservation of species and natural communities and the Monitoring Program is intended to assess the condition of species and natural communities in the MSHCP Reserve System. The Management Program will include ongoing management responsibilities and Adaptive Management. The Monitoring and Management Programs are designed to: 1) determine if the MSHCP is achieving its Conservation Goals for the Covered Species and conserved Natural Communities; 2) determine if the MSHCP is achieving its Species Goals and Objectives; 3) specify the primary components of MSHCP Reserve System management; and 4) determine how Adaptive Management strategies will be used and how effective they are to address changes in habitat condition, natural communities, and/or species status.

2.7.1 Reserve Management

The Management Program will include ongoing management responsibilities and Adaptive Management. The framework is adaptive and subject to modification as system stressors change and as new information on how better to manage the MSHCP Reserve System to achieve the species and habitat Goals and Objectives becomes available. The Management Program will incorporate Adaptive Management, including an integrated multidisciplinary approach to addressing management practices, evaluating management actions, and assessing threats using

appropriate experimental approaches at species, community, and landscape levels. A Reserve Management Plan will be developed within three years of permit issuance. Additional details regarding the Management Program can be found in Section 8.1.2 of the MSHCP and are herein incorporated by reference.

The MSHCP establishes Reserve Management Units (RMUs) to ensure the coordinated management to achieve the Conservation Goals and Objectives for Species and Conservation Areas. The Plan Area consists of six RMUs. RMUs encompass one or more Conservation Areas, based on habitat/natural community patterns, land ownership, and similar management needs. Within the RMUs, management obligations under the MSHCP may vary depending on land ownership or administrating agency. A Land Manager, as described in Section 6.1.5 of the MSHCP, will be retained or contracted by CVCC to manage Permittee RMU lands and coordinate through the Reserve Management Unit Committee (RMUCs).

CVCC or its designee will work with the RMUCs to develop Reserve Management Unit Plans (RMUPs), for review and approval by the Reserve Management Oversight Committee (RMOC), to define specific management actions, schedules, and responsibilities for each RMU. Each RMUP will be prepared within three years after Permit issuance. The RMUP will incorporate the Management Program measures and activities in Section 8 of the MSHCP and coordination with other RMUs will be reflected in the RMUP.

2.7.2 Species Management

Section 9 of the MSHCP identifies species-specific Conservation Goals and Objectives intended to provide for the long-term conservation of the proposed Covered Species. A critical relationship exists among the Management Plan, Species Goals and Objectives, Monitoring Program, and Adaptive Management strategy. Available information on Covered Species, Natural Communities, and threats is necessary to ensure the effectiveness of the Management Program. Additional data will be needed to adequately inform implement the Management Program. Quantitative distributional studies are needed to accurately estimate population numbers and trends. Therefore, the initial objective of the MSHCP Management Program is to gather baseline data for Covered Species. The primary objective of the baseline phase will be to conduct baseline surveys and to develop and test methods and protocols.

2.7.3 Adaptive Management

Adaptive Management is the application of the scientific method to management strategies. The MSHCP proposes to use Adaptive Management strategies as applicable throughout the Reserve System. As discussed in Section 8.2.4.3 in the MSHCP, the Adaptive Management approach will include the identification of potential threats, knowledge gaps, and the development of hypotheses about whether those threats may have a detrimental impact on the resources and associated ecological processes. Linking the Monitoring Program with Adaptive Management actions will inform reserve managers of the status of Covered Species, Natural Communities, and Essential Ecological Processes, as well as the effectiveness of management actions.

2.7.4 Trails Management

As described in Section 6.3 and Section 7.3.3.2 of the MSHCP, a Trails Management Subcommittee will be established by CVCC to annually review and evaluate the Public Use and Trails Plan for the Santa Rosa and San Jacinto Mountains Conservation Area. Information to be considered yearly will include data gathered through monitoring activities and relevant information from other sources. The Subcommittee will report to both the RMOC and the Monument Advisory Committee regarding implementation of and recommended modifications to the Public Use and Trails Plan. Additionally, Section 8.5.1 of the MSHCP describes the implementation of a focused research program to evaluate the effects of recreational trail use on Peninsular bighorn sheep health, behavior, habitat selection, and long-term population dynamics.

2.7.5 Monitoring and Reporting

The Monitoring Program is intended to provide scientifically reliable data on: 1) the status of Covered Species; 2) spatial and temporal dynamics (amplitude and magnitude) of ecosystem components for the Covered Species and Natural Communities; conserved natural communities; 3) the threats to these species and natural communities; 4) the results of research and the management of Covered Species; and 5) the results and effectiveness of Adaptive Management actions. The Monitoring Program will be implemented in phases starting with the collection of baseline data that will be used to evaluate conceptual monitoring strategies followed by implementation of long-term species and Natural Communities monitoring. The baseline phase will begin in year one of MSHCP implementation. The baseline data will be collected during the first five years of the MSHCP and will be designed and implemented according to the Scientific Principles described in Section 8.3.2. Monitoring will include landscape, Natural Community, and species level monitoring. The Monitoring Program will incorporate new protocols and techniques, as appropriate. Monitoring protocols will be developed during the first two years of MSHCP implementation. This task is large and complex, given the ecology of the Covered Species and the complexity of their habitats. Sampling designs will be consistent with the Scientific Principles. Any future modifications to the Monitoring Program will improve efficiency of data gathering methods and increase the reliability of the data. The Monitoring Program data will be used to both determine if the MSHCP is meeting its Conservation Goals and Objectives and identify the need for and the success of Adaptive Management of the Reserve Lands. Additional details regarding the Monitoring Program can be found in Section 8.1.1 of the MSHCP.

The CVCC is responsible for Monitoring Program administration. The administration of the Monitoring Program will be accomplished under contract, with a specific individual to be identified as the Monitoring Program Administrator (MPA), as described in Section 6.1.6 of the MSHCP. The MPA will report to the CVCC Executive Director or his/her designee. CVCC will consult with the Wildlife Agencies regarding the provisions for the MPA in developing the Request for Proposals for the Monitoring Program contract.

Annual monitoring reports that summarize the results of each year's efforts will be provided to the RMOC, RMUCs, and Land Manager. The MPA will be responsible for preparing and distributing these reports. The contents of the annual reports are described in Section 8.7 of the MSHCP and are herein incorporated by reference.

2.8 MSHCP Implementation

The Permittees will enter into an IA with Wildlife Agencies. The IA in conjunction with any Permit Terms and Conditions, and Section 6.6 of the MSHCP address the obligations of 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. It is understood that the lands that are conserved through the MSHCP are obligated in perpetuity and will not be withdrawn from the Reserve System before, during, or after the 75-year Permit term as described in Section 19.5 of the IA. Likewise, the Additional Conservation lands within Reserve System will be managed in perpetuity per the obligations set forth in the MSHCP, IA, and any Permit Terms and Conditions. As described in Section 4.2.2.2.1 of the MSHCP, the Permittees are obligated to conserve 7,500 acres of non-conserved Local Permittee-owned lands by recording a legal instrument that guarantees conservation in perpetuity within three years of Permit issuance. The CVWD and IID lands totaling about 6,700 acres will be conserved incrementally over time through a legal instrument. As described in Section 4.2.2.2.2 of the MSHCP, 88,900 acres of Permittee mitigation lands to be acquired or otherwise conserved will be protected by the CVCC by a legal instrument that guarantees conservation in perpetuity. Acquisitions that occurred prior to Permit issuance will be protected by a legally binding instrument within five years of Permit issuance; acquisitions that occur after Permit issuance shall be protected by a legally binding instrument (Legal Instrument) within five years of acquisition. Such instruments may be removed from a parcel with Wildlife Agencies' concurrence if it is necessary to accomplish an exchange of lands that results in higher quality conservation. A conservation easement shall be substantially in the form of the Model Conservation Easement included in the IA as Exhibit H.

The Permittees have selected legal mechanisms to ensure implementation of the terms of the MSHCP and IA (Section 11.1 of the IA). After the adoption of an implementation mechanism, the Permittees will transmit to the CVCC 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 Reserve System, as generally described in Sections 4, 6, and 9 of the MSHCP, is assembled in a manner consistent with the Conservation Area Goals and Objectives and Required Measures, as well as Species Conservation Goals and Objectives. Section 7 of the MSHCP details the obligations set forth for the Trails Plan.

As described in Section 6.1.1 of the MSHCP, implementation of the MSHCP will be overseen and administered by CVCC, a joint powers authority formed by the Local Permittees pursuant to the requirements of the California Government Code and other appropriate legal authorities. CVCC will have adequate authority to carry out its responsibilities under the MSHCP. As

discussed above, CVCC will sign the IA as a Permittee. Duties and responsibilities of the CVCC are described in detail in Section 6.1.1.2 of the MSHCP. To assist in implementing its duties under the MSHCP, CVCC will form an Acquisition and Funding Coordinating Committee to provide input on funding priorities and Permittee acquisitions within 120 days of the issuance of the Permits. The CVCC will track the extent to which the MSHCP is achieving compliance with the Species and Conservation Area Conservation Goals and Objectives of the Plan.

The RMOC is the primary inter-agency group that will coordinate implementation of the MSHCP. The RMOC will be assembled within 120 days of the issuance of the Permits and will report to CVCC. A RMUC will be established by CVCC for each of the RMUs within 120 days of the issuance of the Permit. As described above under the Reserve Management section of this biological opinion, the RMUs are geographic areas within the MSHCP Reserve System where coordinated management is needed to achieve the Conservation Goals and Objectives. A Trails Management Subcommittee will be established by CVCC to annually review and evaluate the Public Use and Trails Plan for the Santa Rosa and San Jacinto Mountains Conservation Area.

2.8.1 Obligations of the Local Permittees

The Local Permittees propose to conserve 96,940 acres (inclusive of Caltrans' and the State Parks' obligations) in the Conservation Areas. The Local Permittees already own 7,500 acres that will be conserved in perpetuity through a recorded legal instrument per the MSHCP within 3 years of permit issuance, as set forth in Sections 4.2.2.2.1 and 6.6.1 of the MSHCP. An endowment to fund the Monitoring and Management Programs will also be established. Caltrans, CVAG, and CVCC will acquire 1,795 acres in accordance with Section 6.2 of Appendix I and Caltrans or CVAG will contribute $1,077,000 to the endowment for the Monitoring Program, Management Program, and Adaptive Management of those lands to mitigate the impacts of the interchange and related arterial projects identified in Section 7.2.1 (Table 7-1) of the MSHCP. To mitigate the impacts of transportation projects identified in Section 7.2.3 of the MSHCP, $30 million from Measure A will be contributed towards MSHCP implementation.

In addition to the specific obligations detailed below for individual Local Permittees, they must also comply with the MSHCP, IA, and any Permit Terms and Conditions (See Section 13 of the IA), including, but not limited to: 1) Ensure achievement of the Conservation Goals and Objectives and Required Measures in each Conservation Area as detailed in Section 4.3 of the MSHCP, and attainment of the Species Conservation Goals and Objectives as detailed in Section 9 of the MSHCP; 2) Participate in the Joint Project Review Process for projects within Conservation Areas; 3) Jurisdictions that received Take Authorization for the Coachella Valley fringe-toed lizard will surrender the Permit; 4) Ensure that habitat preservation is occurring in rough proportionality with development and that Reserve Assembly occurs as contemplated in the MSHCP; 5) Ensure compliance for public and private projects with all applicable Required Avoidance, Minimization, and Mitigation Measures in Section 4.4 of the MSHCP; 6) Require compliance with Land Use Adjacency Guidelines as set forth in Section 4.5 of the MSHCP; 7) Ensure compliance with MSHCP requirements for public projects; 8) Impose local development mitigation fees; 9) Adopt an Implementation Mechanism as set forth in Section 11.1 of the IA;

10) Maintain a record of total acres and location of development within its jurisdiction and transmit this information to CVCC monthly; 11) Convey any changes in city boundaries or general plan land use designations to CVCC annually; and 12) Adopt and maintain ordinances or resolutions as necessary, and amend general plans as appropriate, to implement the requirements and to fulfill the purposes of the Permit, the MSHCP, and the IA.

2.8.1.1 CVCC

CVCC will provide the policy direction for the implementation of the MSHCP and will provide opportunities for public participation in the decision-making process as described in Section 6.1.1.2 of the MSHCP. Specific duties of CVCC include, but are not limited to, the following: 1) Establish the Acquisition and Funding Coordinating Committee, RMOC, and RMUCs, and ensure designation of the MPA; 2) Establish a Trails Management Subcommittee to the RMUC for the Santa Rosa and San Jacinto Mountains Conservation Area; 3) Establish policies as appropriate under which the Acquisition and Funding Coordinating Committee will make recommendations to CVCC; 4) Identify and make decisions on Permittee MSHCP Reserve System acquisitions; 5) Ensure adequate management of locally managed Reserve Lands; 6) Contract with outside entities for specific services, such as land management and law enforcement; 7) Manage and coordinate the MSHCP local funding plan; 8) Develop and implement financing strategies to maximize funding sources; 9) Develop an investment policy and review policy annually; 10) Adopt an annual budget, including but not limited to expenses associated with land acquisition, the Monitoring Program, the Management Program, and Adaptive Management, consistent with their respective annual work plans as described in Section 8.7; 11) Annually review Local Development Mitigation Fee remittance for compliance and accuracy; 12) Act as custodian of records for information concerning MSHCP implementation; 13) Maintain a record of the amount of Take and Habitat loss for each Local Permittee; 14) Maintain a record of the amount of Take Authorization to Participating Special Entities; 15) Extend Take coverage to Participating Special Entities; 16) Hold regularly scheduled public meetings; 17) Prepare or cause to be prepared an annual audit; and 18) Accept and manage MSHCP Reserve System property including conservation easements that have been conveyed to it by the County, cities or other entity, agency or individual. A Required Measure for the East Indio Hills Conservation Area commits the CVCC to undertake additional mesquite hummocks restoration in the East Indio Hills Conservation Area to ensure a total of 40 acres of mesquite habitat is created. If 80 percent of the mesquite hummocks natural community in the south half of Section 17, T5S, R8E, is not conserved under the Plan, CVCC shall ensure the establishment of an additional 40 acres (80 acres total) of mesquite hummocks in this Conservation Area if Feasible. To the extent Feasible, the acreage to be established by CVCC will be sited on the CVWD land where CVWD establishes its required mesquite habitat. To the extent that the CVWD site does not accommodate the CVCC-required acres of mesquite hummocks restoration, CVCC will seek to establish the remaining requirement elsewhere in this Conservation Area. If establishment of the full acreage is not Feasible in this Conservation Area, establishment of acreage needed to reach the required total will occur in other appropriate Conservation Areas proximate to Coachella Valley round-tailed ground squirrel habitat.

2.8.1.2 CVWD

Of the approximately 7,000 acres that CVWD owns in the Conservation Areas, CVWD will cooperate with CVCC toward the conservation of those lands, as follows: 1) Prior to cancellation of the Coachella Valley fringe-toed lizard (CVFTL) HCP permit, CVWD shall conserve 1,200 acres in the Whitewater Floodplain Conservation Area that was conserved pursuant to the CVFTL HCP by recording an appropriate legal instrument pursuant to Section 6.6.1.3 of the MSHCP; 2) Lands where CVWD has take authorization for O&M of the facilities, will be conserved only to the extent compatible with the O&M of the facilities; 3) Future facilities described in Section 7 of the MSHCP requiring a Minor Plan Amendment with criteria will be mitigated by commitment of CVWD lands within essential Peninsular bighorn sheep habitat (as defined in the Recovery Plan) to conservation at a 1:1 ratio of conservation to development. If CVWD develops any of its land in a Conservation Area consistent with the Conservation Goals and Objectives, CVWD may commit an equivalent dollar value of its lands in the Conservation Areas to permanent conservation in lieu of paying the development mitigation fee; 4) For future projects outside the Conservation Areas, CVWD may commit an equivalent dollar value of its lands in the Conservation Areas to permanent conservation in lieu of paying the Local Development Mitigation Fee; 5) If before year 50 of MSHCP implementation, CVWD still owns land in the Conservation Areas that has not been conserved by any of the foregoing methods, CVWD will cooperate with CVCC in the conservation of these lands through acquisition by CVCC or other means; 6) Conservation will be accomplished through conveyance of fee title to CVCC, recordation of a conservation easement (recording a legal instrument providing conservation in perpetuity), and entering into an MOU for cooperative management with CVCC; 7) CVWD will contribute $3,583,400 toward the Endowment Fund for the Monitoring Program, the Management Program, and Adaptive Management as described in Section 6 of the MSHCP; 8) CVWD will establish 66 acres of permanent habitat for California black rail and Yuma clapper rail consistent with the Required Measures in the Coachella Valley Stormwater Channel and Delta Conservation Area to replace habitat that is periodically altered by flood control and drain maintenance activities; 9) CVWD will establish permanent riparian habitat including at least 44 acres of Sonoran cottonwood-willow riparian forest consistent with the Required Measures in the Coachella Valley Stormwater Channel and Delta Conservation Area to replace habitat that is periodically altered by flood control maintenance activities; 10) CVWD will establish at least 25 acres of managed replacement habitat on a 1:1 ratio for desert pupfish consistent with the Required Measures for the Coachella Valley Stormwater Channel and Delta Conservation Area, using low selenium water, at a site or sites with concurrence from the Wildlife Agencies; and 11) Consistent with the Required Measures in Section 4.3 of the Plan for the Indio Hills and Coachella Valley Stormwater Channel and Delta Conservation Areas, CVWD will restore, enhance, and manage mesquite Coachella Valley round-tailed ground squirrel habitat on land it owns in the East Indio Hills Conservation Area.

2.8.1.3 IID

IID owns approximately 900 acres in the Conservation Areas. IID will cooperate with CVCC toward the conservation of those lands, as follows: 1) Lands on which IID has Take Authorization for O&M of facilities that are Covered Activities, will be conserved only to the extent compatible with the O&M of the facilities; 2) For future projects outside the Conservation Areas, IID may commit an equivalent dollar value of its lands in the Conservation Areas to permanent Conservation in lieu of paying the local development mitigation fee; 3) If before year 50 of Plan implementation, IID still owns land in the Conservation Areas that has not been conserved by any of the foregoing methods, IID will cooperate with CVCC in the conservation of this land through acquisition by CVCC or other means; 4) Conservation will be accomplished through conveyance of fee title to CVCC or recordation of a conservation easement (recording a legal instrument), and entering into an MOU for cooperative management with CVCC; and 5) IID will contribute $525,000 toward the Endowment Fund for the Monitoring Program, the Management Program, and Adaptive Management.

2.8.2 Obligation of the State Permittees

As described in Section 6.6.2.1 of the MSHCP, the Wildlife Agencies and the appropriate State Permittee will jointly review proposed State Permittee projects that are Covered Activities within the Conservation Areas. The State Permittees include Caltrans, CVMC, and State Parks. The State Permittees' obligations are described in 6.6.2 of the MSHCP.

2.8.2.1 California Department of Transportation (Caltrans)

Caltrans has the following obligations under the MSHCP: 1) In three phases, in years 2010, 2015, and 2020, acquire and convey to CVCC or provide funding to the CVCC sufficient to acquire 5,791 acres of Additional Conservation Lands in the Conservation Areas as a contribution to Plan implementation for the Covered Activities described in Section 7.2.2. This acreage is included in the 96,400 acres described in Section 6.6.1; 2) Not later than 2011, Caltrans will provide $7,600,000 to CVCC for the Monitoring and Management Program for the 5,791 acres, and CVCC shall monitor and manage the lands as part of the MSHCP Reserve System; 3) As described above and in Section 6.6.1 of the MSHCP, Caltrans will cooperate with CVAG and CVCC in the acquisition of 1,795 acres to mitigate the interchange and associated arterial projects, and the contribution of $1,077,000 to the endowment for the Monitoring Program, Management Program, and Adaptive Management of those lands; 4) Implement Required Measures identified as needed in Section 4.3 of the MSHCP for Caltrans' Covered Activities; and 5) If a project shares a common boundary with a Conservation Area, comply with Land Use Adjacency Guidelines set forth in Section 4.5 of the MSHCP.

2.8.2.2 Coachella Valley Mountains Conservancy (CVMC)

CVMC will cooperate with CVCC and other agencies as appropriate to ensure management and monitoring of the approximately 2,600 acres of CVMC Existing Conservation Lands and any additional lands CVMC acquires in the Conservation Areas.

2.8.2.3 California State Parks

State Parks has the following obligations on its land within the Conservation Areas under the MSHCP: 1) Participate as a member of the RMUC for RMUs within which State Parks manages lands; 2) Monitor and manage State Parks lands for the benefit of Covered Species; 3) Monitor and control/eradicate invasive and exotic species; 4) Prescribed fire management and wildfire management; 5) Erosion control; 6) Ecological restoration/rehabilitation on previously damaged lands; and 7) Law enforcement patrols. With respect to its Covered Activities, State Parks will: 1) Implement the required avoidance, minimization, and mitigation measures for desert tortoise and burrowing owl as set forth in Section 4.4 of the MSHCP; 2) Comply with Land Use Adjacency Guidelines set forth in Section 4.5 of the MSHCP; and 3) Prior to construction of camping, trailhead, and trail facilities as a Covered Activity in the Indio Hills/Joshua Tree National Park Linkage Conservation Area, acquire a minimum of 640 acres in the Conservation Area, of which a maximum of 100 acres may be developed as the Covered Activity. Development of the camping and trailhead facility must be consistent with the Conservation Goals and Objectives for the Conservation Area.

2.9 Like Exchanges to Conservation Areas

Like Exchanges may be proposed by a Permittee to modify the boundary of one or more Conservation Area as described in Section 6.12.2 of the MSHCP. A Like Exchange must result in equal or greater benefits to Covered Species and conserved Natural Communities as compared to those benefits analyzed in the MSHCP. Take associated with a Like Exchange must be no greater than that analyzed in the MSHCP. Permittee(s) will meet and confer with the Wildlife Agencies prior to submittal of Like Exchange analysis to the CVCC. The Permittee will prepare an equivalency analysis that will be submitted to the CVCC and Wildlife Agencies. If the Wildlife Agencies do not concur with the analysis the action will require an amendment to the MSHCP.

2.10 Cancellation of the Coachella Valley Fringe-toed Lizard HCP

The Permittees proposed to surrender the section 10(a)(1)(B) permit pursuant to 50 CFR 13.26 and 17.22(b)(7) and regional guidance on post-termination mitigation (issued February 23, 2000). The Permittee will return the CVFTL permit to the Service with a written statement surrendering the permit for cancellation. Because the CVFTL permit can be cancelled only upon a determination by the Service that there are no outstanding minimization and mitigation measures for take that occurred prior to surrender of the permit, the Permittees will need to provide evidence that they have fully complied with the permit and no outstanding mitigation is owed.

Prior to cancellation of the CVFTL HCP permit, the applicable Local Permittees will provide a final accounting of all local mitigation funds collected pursuant to the CVFTL HCP, the take and conservation that occurred pursuant to the CVFTL HCP, the funds collected pursuant to the

October 4, 2000 MOU between the cities, the County, CNLM, and the Wildlife Agencies regarding measures to minimize take of the CVFTL, and the take and conservation that occurred pursuant to that MOU. As part of the final report, all biological data collected over the life of the permit will be submitted. The Service will then make a finding or determination in writing that all measures of the HCP have been met.

As described in 6.6.1.3 of the MSHCP, CVCC and applicable Permittees will cancel the CVFTL incidental take permit. Prior to cancellation of the CVFTL permit, CVCC shall obtain an appropriate legal instrument guaranteeing protection in perpetuity to the non-State and non-Federal lands in the CVFTL Preserve system acquired with CVFTL mitigation fees, including the Whitewater Floodplain Reserve owned by CVWD. CVCC will assume responsibility for the CVFTL endowment, which will be incorporated into the MSHCP endowment and earmarked for expenditure on Monitoring and Management of the CVFTL and its associated habitat in perpetuity. If the MSHCP is permitted prior to the surrender of the CVFTL permit, the MSHCP Permit requirements will supersede the CVFTL permit requirements.

2.11 Funding

As described in Section 5.2 of the MSHCP, which is hereby incorporated by reference, the Permittees' funding program includes funding from a variety of potential sources, including, but not limited to: Local Development Mitigation Fees, fees on the importation of waste into landfills in Riverside County, transportation project mitigation, mitigation for regional infrastructure projects, and the Eagle Mountain Landfill Environmental Mitigation Trust Fund.

2.11.1 Acquisition Costs

The estimated purchase price for the Local Permittee share of land to be acquired is $301,459,900 in 2006 dollars, based on an updated Market Study with a validation date of August 2006. The related transaction costs for appraisals, escrow fees, and other fees are estimated to be approximately 5 percent of the total purchase price, or $15,072,995. The total for the acquisition program, not including staff costs is $316,532,895 in 2006 dollars. CVCC proposes to complete the acquisition program in 30 years to minimize costs and potential land use conflicts. Assuming an annual increase in land value of 3.29 percent, the total cost over 30 years is estimated to be $526,705,000. The CVCC will update the Nexus Study at least every five years, and more often if deemed necessary, to ensure that the Local Development Mitigation Fee is adequate over the life of the acquisition program to fund the necessary land acquisition and land improvement.

2.11.2 Land Improvement Costs

Land improvement cost refers to capital costs that occur when land is acquired in the Conservation Areas in order to render the land usable for the intended conservation purposes. The costs include, but are not limited to, fencing as necessary (but not ongoing maintenance of fencing), signage, and removal of trash and invasive species. In the first year of the acquisition

program, $182,000 will be allocated to land improvement (see Section 5.2 in Appendix I for additional information regarding the derivation of this cost). The land improvement cost is subject to 3.29 percent annual inflation. Over the 30-year term of the acquisition program, the total projected for land improvement is $9,080,000.

2.11.3 Acquisition Program Administration Costs

Administration costs associated with the acquisition program include acquisition staff costs, and a proportionate share of other administrative costs to ensure collection of Local Development Mitigation Fees, administration of the revenues, etc. The total of administration costs allocated to the acquisition program in the first year is $493,000. The acquisition program administration cost is subject to 3.29 percent annual inflation. At the end of the 30-year term, when land acquisition is expected to be completed, administration costs for acquisition will terminate. The total projected administration costs for the land acquisition and improvement program are $24,565,000 (see Section 5.3 in Appendix I of the MSHCP for additional information on administrative costs, including acquisition program administrative costs).

2.11.4 Interest Payments on Loans to the Acquisition Program

In order to complete land acquisition in the first 30 years of MSHCP implementation, $67,580,000 in loans from the Endowment Fund to the Land Acquisition and Improvement Fund are necessary. To offset the losses to the Endowment Fund, including lost interest, 5.73 percent will be paid to the Endowment Fund along with payment of the principal. The total interest cost will be $61,151,388.

2.11.5 Non-Acquisition Program Administration Costs

Non-acquisition program administration costs include staffing the CVCC for matters including, but not limited to, Joint Project Review, preparation of annual reports, accounting, contract oversight, and meeting attendance. The total cost of the non-acquisition program administrative services is estimated to be $56,000 in the first year, increasing by 3.29 percent annually to offset inflation. In addition, administration costs are reallocated at the conclusion of the acquisition program. The projected cost for the 75-year term of the permits is $115,414,000. Costs thereafter will be funded with revenue from the Endowment Fund (see Section 5.3 of Appendix I of the MSHCP for additional information on the cost for administrative services).

2.11.6 Monitoring, Management, and Adaptive Management Costs

For the 75-year term of the Permits, the total cost of the Monitoring Program is projected to be approximately $254,294,000; the total expended for the Management Program is projected to be approximately $221,252,000; and the total set aside for Adaptive Management is projected to be $14,903,000. As described in Section 8.2.4.2 of the MSHCP, a one-time Management Contingency Fund of $5,000,000 will be established within the first 10 years after permit

issuance. During the 75-year term of the Permits, an endowment will be established to fund the Monitoring Program, the Management Program, and Adaptive Management in perpetuity. The CVFTL HCP Endowment Fund of $3,200,000 will become part of the MSHCP Endowment Fund, and CVCC will assume responsibility for monitoring and management of the CVFTL Preserves as part of the MSHCP Reserve System. An additional $82,117,788 will be contributed to the Endowment Fund to fully fund it; this includes the $661,151,388 in debt service costs to repay the loans from the Endowment Fund to the acquisition program, and $20,966,400 in contributions from the Permittees related to mitigation for regional infrastructure and transportation projects. Revenue from this endowment will fund the Monitoring Program, Management Program, and Adaptive Management, as well as non-acquisition administration costs, in perpetuity after the endowment is fully funded in year 75. In the 75th year, reflecting a 3.29 percent annual increase over the previous 74 years, the annual cost for the Monitoring Program is $8,804,000; the annual cost for the Management Program is $7,648,000; and the annual set aside for Adaptive Management is $413,000. Each of these costs is projected to increase by 3.29 percent annually thereafter. The endowment is projected to generate a 5.73 percent annual rate of return, such that 2.44 percent of the return will be sufficient to fund these annual costs as well as the annual cost for Plan administration. The remaining 3.29 percent of the return will be reinvested to ensure that the endowment grows annually to offset inflation.

As stated above, an Adaptive Management fund is incorporated into the MSHCP budget. This fund will provide $100,000 in year 1 of MSHCP implementation, and the same amount inflated annually by 3.29 percent thereafter for Adaptive Management as described in Section 8 of the MSHCP. The MSHCP anticipates that expenditure of these funds will not be required every year. Any unspent funds will be carried over and be available in subsequent years.

The MSHCP assumes that Federal and State agencies will contribute to monitoring and land management by committing staff time and other available resources to participate with the Permittees in a coordinated Monitoring Program and to manage the State and Federal lands in the Conservation Areas.

2.11.7 Trails Plan Costs

Section 7.3.3.2 of the MSHCP describes the Trails Plan component of the MSHCP. The MSHCP assumes that trails and related facilities may be constructed or removed over time in some of the Conservation Areas. Construction of the trails and facilities are not a Permittee obligation. Rather, construction of trails and other facilities are Covered Activities that will be funded from non-MSHCP sources. CVCC will actively pursue funding sources, including grants and local contributions. As described in Section 7.3.3.2.1 of the MSHCP, the monitoring and research components of the Trails Management Plan are funded as part of the Monitoring and Management budgets described above. Additional descriptions of funding for the Trails Plan monitoring and research is in Section 8.8.3 of the MSHCP.

2.12 Required Avoidance, Minimization, and Mitigation Measures

The MSHCP specifies a variety of measures for Covered Activities that will be implemented in association with Covered Activities to ensure impacts to Covered Species are avoided, minimized, and mitigated. The measures are detailed in Section 4.4 of the MSHCP, are herein incorporated by reference, and summarized below. Additional measures are described in Section 4.3 of the MSHCP for each Conservation Area. CVCC will maintain maps of modeled habitat and natural communities that they will provide to the Local Permittees to assist with implementation of the avoidance, minimization, and mitigation measures. CVCC will also maintain a list of Acceptable Biologists who may be used to conduct surveys for specified Covered Species identified in Section 4.4 of the MSHCP. Within one year of Permit issuance, the Wildlife Agencies and the MPA, in consultation with CVCC, will develop survey protocols for those species for which a protocol is required.

2.12.1 Biological Corridors

Section 9 of the MSHCP outlines goals for various species to maintain Biological Corridors and Linkages among all conserved populations. Specific roads in Conservation Areas, where culverts or undercrossings are required to maintain Biological Corridors, are delineated in the respective Conservation Areas, as described in Section 4.3 of the MSHCP.

2.12.2 Burrowing Owl

The Plan did not provide modeled habitat for the burrowing owl, but the reserve design of the Plan focused on inclusion of areas of contiguous habitat around locations where burrowing owls were known to occur. This contiguous habitat also would provide adequate foraging areas. The primary purpose of the burrowing owl conservation measures identified in the Plan would be to ensure conservation of known burrow sites for burrowing owls within the Conservation Areas. Because the burrowing owl conservation measures do not include the conservation of acres, but include the conservation of historical or known burrowing owl burrows, the avoidance and minimization measures are more detailed and specific to burrow occupancy and presence. The conservation measures for this species include: Conservation Objectives and Required Measures for the Conservation Areas (Section 4.3), avoidance and minimization measures (Section 4.4; see below), the Conservation Objectives (Section 9.7.3), and the Burrowing Owl Interim Conservation Strategy (Section 8.5.2; see below).

The Permittees will require surveys in the Conservation Areas using an accepted protocol (as determined by the CVCC in coordination with the Permittees and Wildlife Agencies). Prior to development, the construction area and adjacent areas within 500 feet of the development site, or to the edge of the property if less than 500 feet, will be surveyed by an Acceptable Biologist for burrows that could be used by burrowing owl. If a burrow is located, the biologist will determine if an owl is present in the burrow. If the burrow is determined to be occupied, the burrow will be flagged and a 160 foot buffer during the non-breeding season and a 250-foot buffer during the breeding season, or a buffer to the edge of the property boundary if less than 500 feet, will be established around the burrow. The buffer will be staked and flagged. No development or O&M activities will be permitted within the buffer until the young are no longer dependent on the burrow.

If the burrow is unoccupied, the burrow will be made inaccessible to owls, and the Covered Activity may proceed. If either a nesting or escape burrow is occupied, owls shall be relocated pursuant to accepted Wildlife Agency protocols. A burrow is assumed occupied if records indicate that, based on surveys conducted following protocol, as least one burrowing owls has been observed occupying the burrow on site during the past three years. If there are not records for the site, surveys must be conducted to determine, prior to construction, if burrowing owls are present. Determination of the appropriate method of relocation such as eviction/passive relocation or active relocation shall be based on the specific site conditions (e.g., distance to nearest suitable habitat and presence of burrows within that habitat) with concurrence with the Wildlife Agencies. Active relocation and eviction/passive relocation require the preservation and maintenance of suitable burrowing owl habitat determined through coordination with the Wildlife Agencies.

Within one year of Permit issuance, CVCC will cooperate with County Flood, CVWD, and IID to conduct an inventory of levees, berms, dikes, and similar features in the Plan Area maintained by those Permittees. Burrowing owl burrow locations will be mapped and each of these Permittees will incorporate the information into its O&M practices to avoid impacts to the burrowing owl to the maximum extent Feasible. County Flood, CVWD and IID will prepare a manual for employees, educating them about the burrowing owl and appropriate actions to take when owls are encountered to avoid impacts to the maximum extent Feasible. Each agency's manual will be submitted to the Wildlife Agencies for review and comment within two years of Permit issuance. In conjunction with the Monitoring Program, the maps of the burrowing owl locations along the above-described levees, berms, dikes, and similar features will be periodically updated.

The Interim Conservation Strategy calls for a phased approach that includes: surveys of the Conservation Areas, management actions to eliminate threats to burrowing owls within the Conservation Areas and ensure the maintenance of a minimum of 16 pairs of owls, hypothesis-based research to identify key features required by the species, and a long-term conservation strategy developed from the information gathered in the previous phases.

2.12.3 Covered Riparian Bird Species

Covered Activities, including O&M of facilities and construction of new projects, in riparian habitat, as defined in Section 4.4 of the MSHCP, will be conducted outside of the March 15 through September 15 nesting season to the maximum extent Feasible for least Bell's vireo, and the May 1 through September 15 nesting season for southwestern willow flycatcher, summer tanager, yellow warbler, and yellow-breasted chat. If Covered Activities must occur during the nesting season, surveys will be conducted to determine if any active nests are present. If active nests are identified, the Covered Activity will not be conducted within 200 feet of an active nest.

2.12.4 Crissal Thrasher

In modeled crissal thrasher habitat within the Willow Hole, Thousand Palms, Indio Hills Palms,

East Indio Hills, Dos Palmas, and Coachella Valley Stormwater Channel and Delta Conservation Areas, surveys will be conducted by an Acceptable Biologist prior to the start of construction activities during the breeding season (January 15 through June 15). If crissal thrashers are found to be nesting, a 500-foot buffer, or a buffer to the edge of the property boundary if less than 500 feet, will be established around the nest site that will be staked and flagged. No construction activities will be permitted within the buffer during the breeding season until the young have fledged.

2.12.5 Le Conte's Thrasher

In modeled Le Conte's thrasher habitat within the Conservation Areas, surveys will be conducted by an Acceptable Biologist prior to the start of construction activities during the breeding season (January 15 through June 15). If Le Conte's thrashers are found to be nesting, a 500-foot buffer, or a buffer to the edge of the property boundary if less than 500 feet, will be established around the nest site that will be staked and flagged. No construction activities will be permitted within the buffer during the breeding season until the young have fledged.

2.12.6 Desert Tortoise

The Permittees will require surveys for desert tortoise within modeled habitat inside the Conservation Areas. Prior to development, an Acceptable Biologist will conduct a presence/absence survey of the proposed development area and within 200 feet of the adjacent area, or to the property boundary if less than 200 feet and permission from the adjacent landowner cannot be obtained. The presence/absence survey must be conducted during the window between February 15 and October 31 and requires 100 percent coverage of the survey area. A presence/absence survey is valid for 90 days or indefinitely if tortoise-proof fencing is installed around the development site.

If fresh sign is located, the development area must be fenced with tortoise-proof fencing and a clearance survey conducted during the clearance window. Desert tortoise clearance survey must be conducted during the clearance window from February 15 to June 15 and September 1 to October 31 or in accordance with the most recent Wildlife Agency protocols. Clearance surveys must cover 100 percent of the proposed development area. All tortoises encountered will be moved to a specified location. Prior to issuance of a Permit, CVCC will either use the *Permit Statement Pertaining to High Temperatures for Handling Desert Tortoises and Guidelines for Handling Desert Tortoises During Constructions Projects*, revised July 1999, or develop a similar protocol for relocation and monitoring of desert tortoise, to be reviewed and approved by the Wildlife Agencies. Thereafter, the protocol will be revised as needed based on the results of monitoring and other information that becomes available.

For O&M activities in the Conservation Areas, the Permittees will ensure that personnel conducting such activities are instructed to be alert for the presence of desert tortoise. If a tortoise is spotted, activities adjacent to the tortoise's location will be halted and the tortoise will be allowed to move away from the activity area. If the tortoise is not moving, it will be relocated

by an Acceptable Biologist to nearby suitable habitat and placed in the shade of a shrub. O&M activities should avoid conducting activities from February 15 and October 31.

Utility development protocols have been developed to avoid or minimize potential adverse impacts to the desert tortoise in the Conservation Areas. The objectives of these protocols are to provide reliable and consistent direction on utility development within the Conservation Areas. Two utility development protocols, inactive and active season, provide specific direction on site preparation and construction phases of utility projects in the Conservation Areas. The inactive season protocol must be used for utility maintenance or development within the November 1 through February 14 time frame; the active season protocol must be used for utility maintenance or development within the February 15 through October 31 time frame.

2.12.7 Fluvial Sand Transport

Activities within the fluvial sand transport areas in the Cabazon, Stubbe and Cottonwood Canyons, Snow Creek/Windy Point, Whitewater Canyon, Whitewater Floodplain, Upper Mission Creek/Big Morongo Canyon, Mission Creek/Morongo Wash, Willow Hole, Long Canyon, Edom Hill, Thousand Palms, West Deception Canyon, and Indio Hills/Joshua Tree National Park Linkage Conservation Areas will be conducted in a manner to maintain the fluvial sand transport capacity of the system.

2.12.8 Mesquite Hummocks and Mesquite Bosque Natural Communities

Construction activities in the Cabazon, Willow Hole, Thousand Palms, Indio Hills Palms, East Indio Hills, Dos Palmas, Coachella Valley Stormwater Channel and Delta, and Santa Rosa and San Jacinto Mountains Conservation Areas will avoid mesquite hummocks and mesquite bosque to the maximum extent Feasible. The mesquite hummocks Natural Community will subject to a "no net loss" requirement as described in Section 8 of the Plan.

2.12.9 Peninsular Bighorn Sheep Habitat

Covered Activities in Peninsular bighorn sheep habitat within the Cabazon, Snow Creek/Windy Point, and Santa Rosa and San Jacinto Mountains Conservation Areas will be conducted outside of the lambing season (January 1 through June 30) unless otherwise authorized through a Minor Amendment with concurrence from the Wildlife Agencies. O&M of Covered Activities, including but not limited to refinishing the inside of water storage tanks, will be scheduled to avoid the lambing season, but may extend into the lambing season period if necessary to complete the activity, upon concurrence with the Wildlife Agencies. No toxic or invasive plant species may be used for landscaping. Within one year of Permit issuance, Permittees with existing public infrastructure facilities within the Conservation Areas that have Peninsular bighorn sheep habitat will develop and implement a plan to remove or prevent access to oleander and any other plants known to be toxic to Peninsular bighorn sheep.

2.12.10 Triple-ribbed Milk-vetch

For Covered Activities within modeled triple-ribbed milk-vetch habitat within the Whitewater Canyon, Whitewater Floodplain, Upper Mission Creek/Big Morongo Canyon, and Santa Rosa and San Jacinto Mountains Conservation Areas, surveys by an Acceptable Biologist will be required for activities during the growing and flowering period (February 1 through May 15). Any occurrences of the species will be flagged and public infrastructure projects will avoid impacts to the plants. Any known occurrences on a map maintained by CVCC will not be disturbed.

2.12.11 Palm Springs Pocket Mouse

To avoid impacts to the Palm Springs pocket mouse and its habitat in the Upper Mission Creek/Big Morongo Canyon and Willow Hole Conservation Areas, Flood Control-related construction activities will comply with the avoidance and minimization measures for: 1) clearing; 2) revegetation; 3) trapping/holding; and 4) translocation pursuant to Section 4.4 of the MSHCP.

2.12.12 Little San Bernardino Mountains Linanthus

To avoid and minimize impacts to this species as much as possible, salvage of top soil and/or seeds should occur prior to ground disturbance in accordance with Section 6.6.1. Salvage should be conducted by or in cooperation with the CVCC.

2.13 Land Use Adjacency Guidelines

The Land Use Adjacency Guidelines, described in Section 4.5 of the MSHCP, are intended to avoid or minimize indirect effects from development adjacent to or within the Conservation Areas. Such effects may include noise, toxics, lighting, drainage, barriers, grading/land development, intrusion of people, and the introduction of non-native plants and non-native predators such as dogs and cats. Edge effects resulting from activities adjacent to or within the Conservation Areas will also be addressed through reserve management activities such as fencing. The Land Use Adjacency Guidelines shall be implemented where applicable by the Permittees in their review of individual public and private development projects adjacent to or within the Conservation Areas to minimize edge effects.

2.14 Trails Plan

<u>Public Use and Trails Management on Reserve Lands within the Santa Rosa and San Jacinto Mountains Conservation Area</u>

The Santa Rosa and San Jacinto Mountains Conservation Area includes trails that cross both Federal and non-Federal land. The MSHCP addresses impacts to Covered Species for the construction of specified trails and for the use of identified trails on non-Federal land. BLM is

pursuing a section 7 consultation for the components of the coordinated Plan on Federal lands within the Reserve System. The USFS will determine whether public use and trails management will require consultation with the Service pursuant to section 7 of the Act. Use of trails on CDFG land is subject to the regulations of the California Fish and Game Commission. The MSHCP trails planning process has coordinated with CDFG to seek CDFG concurrence on trail use on CDFG land.

Impacts to Covered Species associated with the public use and trails management plan ("Trails Plan") are authorized under the MSHCP. For existing trails in bighorn sheep habitat, this authorization applies only to those trails specifically listed in Section 7.3.3.2.1, Elements 1 and 2.

2.14.1 Trails Management Program

The trails management program in the Santa Rosa and San Jacinto Mountains Conservation Area has adopted an Adaptive Management approach with an emphasis on research. The Trails Plan will initially focus on multi-agency scientific data gathering to evaluate the effects of recreational trail use on Peninsular bighorn sheep health, habitat selection, and long-term population dynamics. The overarching goal of this research program is to obtain empirical data from the Plan Area to guide trails management. The research program will be coordinated with monitoring of human trail use, and will be integrated with educational and public awareness efforts, and other trail management prescriptions. The basic research questions relate, in part, to the proximate response of bighorn sheep to recreation disturbance. The research program is discussed further in Element 2 of the trails management described in Section 7 and Section 8.8 of the MSHCP which are is herein incorporated by reference.

The trails management program is composed of eight elements that are summarized below. The eight elements, include: 1) use of existing trails, which will remain open all year; manipulation of use levels on some trails may occur as part of the research program; 2) initiation in Plan year 1 of a research program designed to ascertain bighorn sheep response to, and any significant adverse impacts from, recreational trail use in the Santa Rosa and San Jacinto Mountains. This research may include manipulation or limitation of use levels or closures on selected trails as an element of the study design to address specific hypothesis-based research questions; 3) gathering of data on human trail use, primarily on trails within sensitive bighorn sheep lambing habitat and other trails as appropriate. A year-round mandatory self-issue permit system for selected trails, and other methods as appropriate, will be part of the human use monitoring program. Ongoing monitoring of bighorn sheep populations will be expanded to include regular monitoring of the distribution, abundance, recruitment, survival and cause-specific mortality of bighorn sheep throughout the Plan Area; 4) closure of three trails from June 15 through September 30 to minimize the potential impediments for access to water by bighorn sheep and other wildlife during the hot season; 5) deferral of construction of new trails, pending the results of the initial research program, monitoring of trail use, and monitoring of bighorn sheep populations; 6) implementation of a public awareness and education program; 7) annual review of the effectiveness of the public use and trails management program, including results of monitoring, research, and trail management prescriptions. This annual review will consider prudent

management actions, including potential trail closures, in response to scientific data or sheep population declines below identified threshold levels; and 8) rerouting and decommissioning of trails to protect sensitive resource values, pending results of the research program. In addition, the public use and trails management plan addresses other public access issues, such as dogs and cross country travel described in Section 7.3.3.2.2 of the MSHCP and summarized below.

A RMUP will be prepared within 3 years after Permit issuance (see Section 6.2 of the MSHCP). The Santa Rosa and San Jacinto Mountains Conservation Area (Reserve Management Unit 6) will include public use and trails management. In the interim, a sample Memorandum of Understanding is provided in Appendix III of the MSHCP to describe potential management of the Conservation Areas.

2.14.1.1 Trails Management Program Element 1: Trails Open All Year

Trails within essential bighorn sheep habitat that will be available for year-round non-motorized use subject to annual review and modification as described in Element 7 can be found in Section 7.3.3.2.1 of the MSHCP. As part of the research program, some of the trails may be subject to manipulation of trail use levels.

2.14.1.2 Trails Management Program Element 2: Research Program

A focused research program to evaluate the effects of recreational trail use on Peninsular bighorn sheep within essential habitat in the Santa Rosa and San Jacinto Mountains will be initiated during year one of Plan implementation. The research will address the proximate response of bighorn sheep to recreation disturbance as well as broader questions about the population-level effects and impacts to long-term persistence of bighorn sheep. A separate research program focusing on the effects of recreational trail use on captive bighorn sheep is also proposed in year one. Additional description of the research program is provided in Section 8.5.1 of the MSHCP.

Implementation of the research program will be coordinated with the Trails Management Subcommittee. Upon completion of the research program, study results and management recommendations will be integrated into a revised public use and trails management plan and implemented by Plan Year 10, using best available science, professional judgment, and wildlife management principles where study results may be less than definitive. The initial trails research will be carried out during an approximately five year period. It is anticipated that interim feedback from the bighorn sheep and trails research will also be available via annual reports which will be provided to the various management committees and the CVCC for their use. The research program will be carried out through a contract (or contracts), solicited by a Request for Proposals (RFP) to qualified research institutions or scientists. The roles and responsibilities of participating agencies are outlined in Section 8.5.1 of the MSHCP and funding for this research is outlined in Section 8.8.2 of the MSHCP. All contracted research on recreational trail use must be based on research proposals that confirm to the Scientific Principles.

Trails or trail segments listed in Section 7.3.3.2.1 of the MSHCP will be subject to the self issue

permit system. The same trails will also be the initial focus of the research program.

2.14.1.3 Trails Management Program Element 3: Monitoring of Trail Use and Peninsular Bighorn Sheep Population

The Monitoring Program for the Plan will focus on further evaluation of the use of recreational trails by hikers, equestrians, and mountain bikers as it relates to habitat use by bighorn sheep. Compliance with the mandatory self-issue permit system, hot season closures, and other trails management prescriptions will also be assessed as part of the Monitoring Program. As described in Section 8.8.2 of the MSHCP, the monitoring effort will involve statistically valid methods to assess human use levels.

Monitoring of bighorn sheep will be a cooperative effort involving CDFG, USFWS, BLM, CVCC, and other partners, with funding provided primarily by CDFG, to the extent possible, and CVCC. The more intensive monitoring during the initial research phase is necessary for the Trails Management Subcommittee's annual review of bighorn sheep data (see Trails Plan Element 7). All data used in decisions regarding the public use and trails management plan will be available to the CVCC and appropriate committees, including the Trails Management Subcommittee.

2.14.1.4 Trails Management Program Element 4: Hot Season Trail Closures

As shown on Figure 7-13 of the MSHCP, three trails will be closed to recreational activities during the hot season to minimize the potential impediments for access to water by bighorn sheep and other wildlife. The trails will be closed from June 15 through September 30. The trails include portions of the Art Smith Trail; Bear Creek Canyon Trail south of its intersection with the Bear Creek Oasis Trail; and Bear Creek Oasis Trail. Carrizo Canyon and Magnesia Canyon are within CDFG Ecological Reserves and are closed to public access from June 15 through September 30, in accordance with the California Code of Regulations. Compliance with the hot season closures will be evaluated as part of the monitoring described in Element 3.

2.14.1.5 Trails Management Program Element 5: Construction of New Trails

Construction and use of new perimeter trails described in this section will be a Covered Activity unless research results indicate that the proposed trails would not adversely affect bighorn sheep. Additional research will be conducted through Element 2 (described above) to further analyze impacts to Peninsular bighorn sheep from recreational trail use, thereby confirming and expanding upon previous impact assessments. Proposals to construct perimeter trails and other new trails will be deferred until the initial phase of the monitoring and research program has been completed.

New Perimeter Trails

New perimeter trails were proposed to provide alternative hiking opportunities and thereby reduce trail usage in more sensitive bighorn sheep habitat areas. Appropriateness of perimeter

trails will be determined upon completion of the research program described in Element 2. If research results show that recreational trail use would not adversely impact bighorn sheep health, behavior, demography, and population sustainability and connectivity, construction of these perimeter trails could be initiated as soon as feasible, depending on funding availability and acquisition of easements or other authorizations, and completion of applicable NEPA and CEQA requirements. Actions on certain lands cannot begin until easements or other authorizations from landowners are acquired.

Actions regarding trails on BLM lands are not a Covered Activity under the MSHCP; BLM will undertake its own approval process for trails on lands it administers. Construction of new trails on CDFG lands requires authorization from CDFG. New perimeter trail alignments have been identified and are shown in Figures 7-11 and 7-14 of the MSHCP, including anticipated alignments of trails being addressed separate from the Trails Plan. Once constructed, these trails will be available for use by all means of non-motorized conveyance (e.g., on foot, bicycle, horse), unless restrictions on a particular use are deemed necessary. General guidelines for development of perimeter trails are as follows are included in Section 7.3.3.2.1 of the MSHCP.

Perimeter Trail Corridor

Specific alignments for these perimeter trails have not been ascertained. The proposed corridors for perimeter trails are shown in Figure 7-15 of the MSHCP.

Palm Desert to La Quinta Connector Trail

An alignment for a trail connecting the interpretive loop trail south of the Santa Rosa and San Jacinto Mountains National Monument Visitor Center with the northwest portion of La Quinta Cove has been identified and is known as the Palm Desert to La Quinta Connector Trail. Portions of this trail traverse known sheep use areas. Therefore, construction of the Palm Desert to La Quinta Connector Trail between the Visitor Center and *The Living Desert* will be a Covered Activity unless research results indicate that the proposed segment would adversely affect bighorn sheep. If impacts to native and/or captive breeding populations could result as determined through the research program described in Element 2 and feasible mitigation measures cannot be implemented to reduce this impact, then all or a portion of the preferred alignment of the connector trail may not be constructed. At the end of the research program, the best available science professional judgment, and wildlife management principles where study results may be less than definitive, would be used to make the determination as to the potential for impacts. At that time, mitigation measures will be considered that will reduce potential adverse impacts. Subsequent CEQA and/or NEPA analysis of the connector trail will also be conducted.

Depending on the results of the research, construction of the connector trail and alternative access trail could be initiated as soon as feasible, depending on funding availability and acquisition of easements or other authorizations, and completion of applicable NEPA and CEQA requirements. A trail beginning on Portola Avenue in Palm Desert just north of The Living

Desert and connecting with the Palm Desert to La Quinta Connector Trail is under consideration. Because a specific alignment for this trail near *The Living Desert* has not been fully analyzed in the EIR/EIS, a preliminary trail alignment as well as the corridor in which this trail may be constructed is identified. (see Figure 7-13 of the MSHCP). This trail would be available for use by all means of non-motorized conveyance (e.g., on foot, bicycle, horse), unless restrictions on a particular use are deemed necessary. Limits on the use of this trail by equestrians may be necessary pending coordination with *The Living Desert*.

Trailheads

Trailheads are defined as locations where individuals commence their use of a trail or network of trails, and often transfer from motorized to non-motorized conveyance (e.g., arrive by car to begin travel on foot, horse, or bicycle).

Trailheads are defined as locations where individuals commence their use of a trail or network of trails, and often transfer from motorized to non-motorized conveyance (e.g., arrive by car to begin travel on foot, horse, or bicycle).

2.14.1.6 Trails Management Program Element 6: Public Awareness and Education Program

A public awareness and education program will be developed and implemented by CVCC and BLM in consultation with the Trails Management Subcommittee and the Monument Advisory Committee. Existing educational materials may be used or modified as appropriate. The program will include information about Peninsular bighorn sheep ecology and behavior in the Santa Rosa and San Jacinto Mountains, as well as the overall conservation program for this species. Information will include the specific elements of the public use and trails management program including trails open all year, trails that are subject to the mandatory self-issue permit, trails that are closed during the hot season, and approved dog use areas.

2.14.1.7 Trails Management Program Element 7: Review of Trails Program

The Trails Management Subcommittee will annually review effectiveness of the overall public use and trails management program. Annual review will include progress reports and recommendations from the researcher(s) working on bighorn sheep within the Plan Area; an assessment of bighorn sheep population trends; recreational trail use data; compliance with the hot season closures, mandatory self-issue permits, and other trail management prescriptions; and other new data acquired. Until such time as the initial phase of the monitoring and research program is completed, the annual review will consider the best information available to evaluate the public use and trails management program and any effects on the Peninsular bighorn sheep.

The Subcommittee will make recommendations to both the RMOC and the Santa Rosa and San Jacinto Mountains National Monument Advisory Committee regarding modifications to the public use and trails management program. The RMOC will make recommendations to CVCC

for the portions of trails on non-Federal land. The Monument Advisory Committee will make recommendations to BLM and USFS regarding trails on Federal land.

2.14.1.8 Trails Management Program Element 8: Rerouting and Decommissioning of Trails

Trail Rerouting

As with construction of new trails, proposals to reroute trails will be deferred until the initial five-year phase of the monitoring and research program has been completed. The deferral will ensure that trail conditions (e.g., use levels) are as consistent as possible once the research and monitoring programs are initiated. Trail rerouting as a Covered Activity will be evaluated after the monitoring and research program is complete. Trails will be rerouted to protect sensitive resource values (e.g., cultural resources, wildlife habitat, soils) where feasible.

Trail Decommission and Removal

Trails may be decommissioned and removed if their use is determined to cause adverse impacts to resource values, including visual resources where multiple trails occur in close proximity to one another (e.g., "braided" trails). Measures to mitigate adverse impacts will be considered as an alternative to trail removal. Recommendations for decommissioning and removing trails will be made by the Trails Management Subcommittee to the RMOC and the Monument Advisory Committee. Final approval for trail decommissions and removal rests with the entity having jurisdiction over the applicable lands. Trail removal in essential bighorn sheep habitat will be allowed from October 1 through December 31 only. Removal of trails listed in Section 7.3.3.2.1 and shown in Figure 7- 16 of the MSHCP shall be completed within nine years of Permit issuance.

Other Public Access Issues and Uses on Reserve Lands in the Santa Rosa and San Jacinto Mountains Conservation Area

As described in Section 7.3.3.2.2 of the MSHCP, the Plan addresses other recreational activities on non-Federal lands in the Santa Rosa and San Jacinto Mountains Conservation Area. Restrictions apply to non-Federal lands within essential bighorn sheep habitat on Reserve Lands in the Santa Rosa and San Jacinto Mountains Conservation Area. The restrictions or limitations apply to the following: Cross-Country Travel, Camping, Dogs, Bicycle Restrictions, Pack Stock, Noncommercial, Noncompetitive Organized Group Activities, Non-Motorized Commercial Recreation Activities, Competitive Recreation Events, and Motorized-Vehicle Use on Trails.

Existing Trails outside the Santa Rosa and San Jacinto Mountains Conservation Area

Trails on Reserve Lands outside the Santa Rosa and San Jacinto Mountains Conservation Area have been established primarily in association with existing parks, preserves, and wilderness areas and are considered as compatible activities under the Plan. The existing trails outside of

the Santa Rosa and San Jacinto Conservation Area are described in Section 7.3.3.2.3 of the MSHCP.

2.15 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 of the MSHCP and is herein incorporated by reference. The proposed Covered Activities will be carried out or conducted by Permittees, Participating Special Entities, and Third Parties Granted Take Authorization and are subject to consistency with MSHCP. As stated previously, take authorization will not be granted to approved development projects with legal vested rights as of the date the Permits are issued. Development projects with legal vested rights (as of the date of Permit issuance) could obtain take coverage if the applicable Permittee requires the execution of a Certificate of Inclusion by the project applicant that requires with all applicable MSHCP requirements. Alternatively, a project applicant with legal vested rights (at the time of Permit issuance) could seek take authorization directly from the Wildlife Agencies.

Upon execution of the IA and issuance of the Permits, the Permittees may approve Covered Activities consistent with the Plan, IA, and Permit. Such Covered Activities must be under the direct control of the Permittees and be in compliance with the MSHCP. Such Covered Activities must be carried out in conformance with approvals granted by the Permittees, or carried out in conformity with a Certificate of Inclusion or other executed written instrument, or applicable ordinance. As set forth in Section 17.1 of the IA, Permittees will include as a part of any discretionary or certain City Ministerial Approvals, a Certificate of Inclusion or other executed written instrument, or applicable ordinance, a condition requiring compliance with the Permits, the MSHCP and this Agreement, and that describes the take authorization granted.

Any public facility provider, such as a utility company or a public district, including, but not limited to, school, water, or irrigation district, that operates facilities and/or owns land within the Plan Area may request take authorization for its activities pursuant to the Permits as a Participating Special Entity. Such activities must comply with all of the terms and requirements of the MSHCP. If the proposed activity complies with all terms and requirements of the MSHCP, a Certificate of Inclusion will be issued and the proposed activity will be deemed a Covered Activity (See Section 11.7 of the IA). Participating Special Entities shall contribute to Plan implementation through payment of a fee or other appropriate mechanism based on the type of proposed activity.

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 be exempted through the section 7 process, not through the MSHCP. The Service's Obligations and Assurances provided for in Section 14.8 of the IA describe how section 7 consultations will be processed for Covered Activities.

Covered activities include development on agricultural lands; however, the Permits do not provide take authorization for agricultural operations. Pesticide and herbicide use are not a Covered Activity, but are Allowable Uses as described in Section 7.3.2.2 in the MSHCP.

2.15.1 Outside Conservation Areas

Development permitted by Local Permittees includes projects approved pursuant to the County's and cities' general plans. The development projects include circulation elements, transportation improvement plans, interchange projects, drainage plans, water and waste management plans, the County's adopted Trails Master Plan, etc., as described in Sections 7.1 and 7.2 of the MSHCP and are herein incorporated by reference. Public facility construction, operation, and maintenance and safety activities conducted by the Permittees are also proposed as Covered Activities outside of the Conservation Areas. Such facilities include publicly maintained roads, material pits, landfills, transfer stations, water production and distribution facilities, solid waste facilities, among others, and other public utility facilities providing services essential to health and safety, and welfare of the public. Lastly, emergency responses by the Permittees required for protection of the public, health, safety, and welfare are Covered Activities outside of the MSHCP Conservation Areas. The emergency response activities include responses from earthquake, wildfire, and flooding.

2.15.2 Inside Conservation Areas

Tables 7-1 through 7-11 in the MSHCP identify specific projects and activities that are Covered Activities for Permittees in the Conservation Areas (portions of the interchanges and arterials are outside of the Conservation Areas). The above referenced tables describe the activities proposed by the Local and State Permittees and are herein incorporated by reference. The projects listed in Tables 7-1 through 7-11 are required to adhere to the Avoidance, Minimization, and Mitigation Measures described in Section 4.4, and the Land Use Adjacency Guidelines described in Section 4.5 of the MSHCP, as applicable. Section 7.3.2 describes the various types of activities that are Allowable Uses that are not Covered Activities, but compatible with the MSHCP; Section 7.3.3 describes Compatible Activities that are Covered Activities under the MSHCP; and Section 7.3.4 describes Conditionally Compatible Uses within the Conservation Areas.

The following Covered Activities will be consistent with the Conservation Goals and Objectives for the Conservation Areas and the Species Conservation Goals and Objectives. Covered Activities within Conservation Areas include: 1) Construction and maintenance of trails and public access facilities, except those portions that are on Federal land, as provided for in the MSHCP, consistent with the guidelines for trails and public access in Section 7.3.4.2; 2) Specific projects and operation and maintenance activities listed in Tables 7-1 through 7-11. A list of operation and maintenance activities is in Section 7.3.1.1 of the MSHCP; 3) Development permitted or approved by Local Permittees; 4) Construction, operation, and maintenance of new local roadways (less than 74 feet in width and no more than one through travel lane in each direction) that are either approved as part of a development proposal or dedicated, or offered for

dedication, for public use; and 5) Expansion of mining operations on non-Federal land. Expansion of mining operations holding a valid existing permit as of the date of Permit issuance must be consistent with the Conservation Goals and Conservation Objectives for the applicable Conservation Area.

2.15.3 Transportation Projects In and Outside Conservation Areas

Transportation projects identified in Tables 7-1 through 7-3 of the MSHCP are Covered Activities and are herein incorporated by reference. The projects listed in Tables 7-1 through 7-3 are required to adhere to the Avoidance, Minimization, and Mitigation Measures described in Section 4.4, and the Land Use Adjacency Guidelines described in Section 4.5 of the MSHCP, as applicable. Portions of the above referenced transportation projects are in and outside of the Conservation Areas. Widening of the local arterials associated with these interchange projects described in Table 7-1 in the MSHCP are also Covered Activities. The Conservation Areas that will be affected include Willow Hole, Whitewater Floodplain, Edom Hill, and Thousand Palms. The mitigation obligation for the interchange projects and associated arterials is described in Section 6.6.1 of the MSHCP.

2.15.3.1 Caltrans

The Caltrans' projects listed in Table 7-2 of the MSHCP are also Covered Activities. The Caltrans projects occur both in and outside of the Conservation Areas. The Conservation Areas affected by the Caltrans' projects include Cabazon, Stubbe/Cottonwood Canyons, Snow Creek/Windy Point, Highway 111/I-10, Willow Hole, Whitewater Floodplain, Desert Tortoise and Linkage, Upper Mission Creek/Big Morongo Canyon, Coachella Valley Stormwater Channel and Delta, and Dos Palmas.

2.15.3.2 Regional Road Projects

The Permits will also provide take authorization for regional road projects shown in Table 7-3. The local transportation projects are located within the cities of Palm Springs, Desert Hot Springs, Cathedral City, Rancho Mirage, Indian Wells, Palm Desert, Indio, La Quinta, Coachella, and unincorporated areas of the valley or within Caltrans' jurisdiction.

2.16 Covered Activities Subject to Amendments

Minor Amendments are amendments to the MSHCP of a minor or technical nature where the effect on Covered Species is not significantly different than those described in the MSHCP and analyzed by the Service in the Findings and the Biological Opinion. Minor Amendments to the MSHCP will not require amendments to the IA or the Permits, as described in 20.4 of the IA. Two types of Minor Amendments are described in Section 6.12.3 of the MSHCP and include Minor Amendments not requiring Wildlife Agencies' concurrence and Minor Amendments requiring Wildlife Agencies' concurrence.

2.16.1 Minor Amendments Not Requiring Wildlife Agencies' Concurrence

Minor Amendments that do not require Wildlife Agencies' concurrence include activities such as minor corrections to land ownership; adjustment of land ownership specifically involving BLM and Agua Caliente Band of Cahuilla Indians lands within the Santa Rosa and San Jacinto Mountains Conservation Area; minor revisions to survey, monitoring, reporting and/or management protocols; application of take authorization to development projects by the Permittees; annexation or deannexation of property pursuant to Section 11.4 of the IA; updates/corrections to the conserved natural communities map and/or species occurrence data; and changes to the RMU boundaries.

2.16.2 Minor Amendments Requiring Wildlife Agencies' Concurrence

Minor Amendments that require Wildlife Agencies' concurrence include proposed Like Exchanges not determined to be biologically equivalent or superior to the existing Conservation Areas; construction and operation of CVWD water recharge and storage facilities as described in Section 7.3 of the MSHCP; modification of the alignment of the Palm Desert to La Quinta Connector Trail; transfer of Conservation Goals and Objectives for conserved natural communities and/or identified Covered Species between Conservation Areas or between Recovery Zones in the Santa Rosa and San Jacinto Mountains Conservation Area; changes to the list of exotic species; future proposals for new trails on Reserve Lands in the Santa Rosa and San Jacinto Mountains Conservation Area, other than the identified new trails (including perimeter trails); and construction of the proposed Morongo Wash Flood Control Facility as described in Section 7.3.1 of the MSHCP.

2.17 Allowable Uses in and outside the Conservation Areas

Allowable Uses are activities that may occur on non-Federal Reserve Lands in and outside the Conservation Areas that are not Covered Activities as described in Section 7.3.2.1 of the MSHCP. Such Allowable Uses in Conservation Areas include emergency, safety, and police services and emergency response activities by Permittees required to protect the public health, safety, and welfare. Allowable Uses in and outside of the Conservation Areas include pesticide use. It is anticipated that these activities will be compatible with the Conservation Goals and Objectives of the MSHCP.

2.18 Compatible Activities in the Conservation Areas

Compatible Uses are activities that may occur on non-Federal Reserve Lands in the Conservation Areas that are Covered Activities. As described in 7.3.3 of the MSHCP, Compatible Uses include emergency repairs by Permittees, reserve management and monitoring; and public use and trails on Reserve System Lands within the Santa Rosa and San Jacinto Mountains Conservation Area.

2.19 Conditionally Compatible Uses

Conditionally Compatible Uses pertain to Reserve Lands outside the Santa Rosa and San Jacinto Mountains Conservation Area that are conditionally compatible with the Species Conservation Goals and Objectives and the Conservation Area Conservation Objectives as described in Section 7.3.4 of the MSHCP.

Covered public access activities on Reserve Lands described in the Section 7.3.4.1 of the MSHCP consist of trails, facilities, and passive recreational activities. The primary public access component on Reserve Lands will be trails. Section 7.3.4.2 of the MSHCP describes guidelines for public access and recreation on Reserve Lands to provide sufficient protection for natural and biological resources. The guidelines are intended to regulate the covered public access activities. The guidelines include: 1) Siting and Design and 2) Operations and Maintenance. Finally, Section 7.3.4.3 of the MSHCP addresses the review process for approving public access and recreation on Reserve Lands. Trails and facilities not addressed in an RMUP would require an amendment to the RMUP.

2.20 Implementation Manual

The Implementation Manual is referenced in several places within the MSHCP. Portions of the Implementation Manual have been prepared to enable us to include those aspects of the Implementation Manual into the Project Description and our analysis. The Implementation Manual is intended to provide details on various aspects of the Plan including how to implement projects to minimize impacts to Covered Species within the Conservation Areas.

3.0 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 defined as the Plan Area and interspersed Native American reservation lands that would be affected by the indirect effects of implementing the MSHCP. As explained in more detail below, we anticipate these indirect effects would include potential changes to physical and ecological processes. Because of the landscape nature of the proposed action, we are providing a general assessment of the existing conditions in the Action Area. General information regarding the existing conditions within the Plan Area can be found in Section 3 of the EIR/EIS and is herein incorporated by reference. The environmental baseline

for individual species is provided in the Species-by-Species Evaluation appended to this Biological Opinion.

3.1 General Overview of the Plan Area

Though the Plan Area encompasses approximately 1.1 million acres within the Coachella Valley and the surrounding mountains up to the ridgeline, inclusion of Indian reservation lands expands the Action Area to approximately 1.2 million acres. Lands within the Plan Area consist of mountainous and desert open space, agricultural uses, resorts, hotels and other components of the tourist industry, conventional residential neighborhoods and business districts, public and private conservation lands, land dedicated to the production of wind energy, and lakes, reservoirs, rivers and other bodies of water.

The Plan Area extends westward to Cabazon where it is bounded by the township line common to Range 1 East and Range 2 East. The western boundary of the Plan Area borders the eastern boundary of the Western Riverside County MSHCP and is the approximate limit of the Sonoran (Colorado Division) Desert in the San Gorgonio Pass area. The easternmost extent of the Plan Area is the township line common to Range 13 East and Range 14 East. The ridgeline of the Little San Bernardino Mountains and the boundary line with San Bernardino County, where the ridgeline extends north of the County line, bound the Plan Area on the north. In the south, the boundary line with San Diego and Imperial counties forms the southern Plan Area boundary.

Of the three deserts that occur in California, the hottest, driest, and southernmost is the Colorado Division of the Sonoran Desert which includes the southeastern corner of California and the Coachella Valley, and extends southward into Mexico (USFWS 1998). The Sonoran Desert occurs at elevations primarily below 2,000 feet (600 meters), where a diverse mixture of cacti and succulent plants comprise a significant component of the vegetation (USFWS 1998). The desert floor of the Coachella Valley ranges in elevation from more than 150 feet below sea level at the southeast end to nearly 2,000 feet at the northwest end of the valley on the alluvial fans. The mountains surrounding the Coachella Valley range in elevation up to 10,804 feet, with elevations on the southern side of the valley substantially higher than those on the north side. This range of elevations and accompanying differences in temperature, precipitation, and other environmental variables are significant factors contributing to the area's high biological diversity.

Many canyons in the mountains support riparian areas not typical of a desert environment. Streams and seeps also support many desert fan palm oases, especially in the Santa Rosa Mountains. Desert dry wash woodlands occur along major drainage systems on alluvial fans and the valley floor. The alluvial fans along the toe-of-slope of the major mountain ranges provide another major land form and distinctive biological community. Another feature contributing to the biological diversity are the strong winds that funnel through the San Gorgonio Pass from the west through areas of sand deposition from the San Gorgonio and Whitewater Rivers and create an aeolian dune system. Historically, this dune system occupied much of the center of the valley, and is locally known as the Big Dune. Sediments, most importantly sand, is fluvially

deposited during stormwater flows within the floodway and portions of the floodplain of the Whitewater River. The San Andreas Fault zone has created a unique complex of desert fan palm oases stretching along the southern side of the Indio Hills where water is forced near the surface by the damming action of the fault. Mesquite hummocks and mesquite bosques are also associated with the fault in some areas. The Salton Sea also contributes to biological diversity through the creation of marsh, mudflat, and other wetland habitats. The low elevation of the Salton Sea trough creates an arid, hot environment that combined with the salinity of the soils, produces an uncommon desert sink scrub community.

Developed/urban or disturbed land (91,070 acres) and agricultural lands (93,819 acres) together comprise 184,889 acres (15 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 small amount of habitat for some migratory birds and other species. 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 owls and ground squirrels. Agricultural lands can provide connectivity between habitat areas and act as buffers between developed and natural areas.

The most intense urban development in the Plan Area is concentrated within the boundaries of the nine incorporated cities. The urban development pattern in the Coachella Valley has generally evolved from initial settlement in the Palm Springs area and expansion southeast along the coves and foothills of the Santa Rosa Mountains. The center of agricultural development has historically been centered in the Indio/Coachella area and by the mid-20th century extensive date and citrus cultivation extended as far northwest as present-day Cathedral City and Rancho Mirage. As urban development pushed away from the foothills, major roadways were extended north of the Whitewater River and today urban development reaches north to Interstate 10.

The earliest land conversions in the Coachella Valley were associated with the development of agriculture, primarily in the eastern portion of the valley, where access to groundwater was easiest. In some places in the lower valley, artesian wells once flowed. Today the valley is most noted for its prime agricultural lands located in the eastern valley, generally extending from Washington Street southeast to the Salton Sea.

Agriculture in the Plan Area includes the cultivation of dates, grapes, citrus, and other fruit and vegetable crops. Historically, agriculture constituted the largest conversion of wild lands. As land values have increased and with continuing development pressure, owners of agricultural lands have continued to sell marginally productive lands for urban development.

3.2 Natural Communities

The MSHCP Reserve System will be established from lands within 21 Conservation Areas. The 21 Conservation Areas were established based on the 27 Natural Communities (listed in Table 2 below) proposed to be conserved that provide habitat for the proposed Covered Species. The Natural Communities included in the Conservation Areas are listed in Table 3-3 in Section 3 of

the MSHCP and the conservation strategy for each Natural Community is described in Section 10 of the MSHCP. Section 4.3 of the MSHCP described specific Conservation Goals and Objectives for Natural Communities within each Conservation Area. Conservation of the Natural Communities is intended to preserve the biological diversity of the Plan Area on an ecosystem-wide basis, consistent with the NCCP goals provided by CDFG. 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. Section 3.8 of the EIR/EIS and Section 10 of the MSHCP include a description of the Natural Communities and habitats within the Plan Area and are herein incorporated by reference. Table 2 below summarizes the Natural Communities within the Plan Area.

Table 2. Natural Communities within the Action Area

Natural Communities	Total Acres within the MSHCP Plan Area Boundary	Total Acres of Existing Conservation Lands
Active Desert Dunes	561	405
Stabilized & Partially Stabilized Desert Sand Dunes	418	29
Active Desert Sand Fields	5,484	2,665
Ephemeral Desert Sand Fields	5,745	1,748
Stabilized & Partially Stabilized Desert Sand Fields	1,549	223
Stabilized Shielded Desert Sand Fields	13,218	926
Mesquite Hummocks	848	104
Sonoran Creosote Bush Scrub	404,644	221,622
Sonoran Mixed Woody & Succulent Scrub	133,682	72,572
Mojave Mixed Woody Scrub	104,212	68,256
Desert Saltbush Scrub	5,325	0
Desert Sink Scrub	9,535	2,536
Chamise Chaparral	2,741	2,220
Redshank Chaparral	13,282	9,987
Semi-Desert Chaparral	22,572	19,403
Interior Live Oak Chaparral	20,574	7,760
Cismontane Alkali Marsh	321	93
Coastal & Valley Freshwater Marsh	79	4
Southern Arroyo Willow Riparian Forest	117	95
Sonoran Cottonwood-Willow Riparian Forest	636	321
Southern Sycamore-Alder Riparian Woodland	669	498
Arrowweed Scrub	277	143
Desert Fan Palm Oasis Woodland	1,309	660
Mesquite Bosque	482	127
Desert Dry Wash Woodland	40,549	18,203
Mojavean Pinyon-Juniper Woodland	30,666	29,324
Peninsular Juniper Woodland & Scrub	37,544	30,382
TOTAL	857,039	496,302

3.3 Trails

The Plan Area contains about 40 known trails and numerous unnamed routes that have proliferated within the Santa Rosa and San Jacinto Mountains. The higher elevations of the Santa Rosa and San Jacinto Mountains remain relatively pristine, while lower elevations include foothills and alluvial fans where trail use is more common. Known trails (those named and mapped) within the Plan Area comprise a network of approximately 157 miles of trails within bighorn sheep habitat and approximately 195 miles of trails outside bighorn sheep habitat. Trail use has not been accurately monitored, but is estimated to vary between several users per week to over 100 hikers per day (J. Foote, BLM, personal communication). Currently, most of these trails are open year-round and are subject to various levels of activity including, but not limited to, hiking, dog walking, camping, motorized vehicle use, and other recreational uses. Dogs are the only controlled use on some of the trails within the Plan Area; however, human use levels and dog activity are poorly monitored. Section 5 of the EIR/EIS provides additional information on the existing trails within the Plan Area and is herein incorporated by reference.

3.4 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 (paved and unpaved). Roadways are prevalent and a major feature of the landscape within the valley floor, while fewer improved roads are located in the mountain or more rural portions of the Plan Area. The communities of the Coachella Valley are connected by State and interstate highways, most notably Interstate 10 and State Highway 111, and a web of arterial roadways built on a north-south/east-west grid pattern. In many locations, the region's north-south/east-west trending land use patterns and roadway grid conflict with its northwest-southeast trending topography and the combination of these has created an intra-regional transportation challenge.

State Highway 111 provides the greatest connectivity between the communities along the base of the Santa Rosa Mountains. Continuous alternate routes are limited due to disruptions by mountainous topography. As a result, State Highway 111 has absorbed large traffic volumes and is frequently congested. The Coachella Valley's north-south roadway network is less constrained than the east-west roadways. Most north-south trending roads in the urbanized portion of the valley extend north from the Santa Rosa Mountains to Interstate 10. Geomorphic processes in the valley, including flooding and wind hazards, continue to impact the roadway network. Various roads traverse through most of the Conservation Areas within the Plan Area. A description of the roadways within the Plan Area is in Section 3 of the EIR/EIS and is herein incorporated by reference.

3.5 Southern California Edison Easements

Southern California Edison (SCE) and the IID provide electric power services to the Coachella Valley. Electricity is distributed to the Coachella Valley via high-voltage (up to 500 kilovolts) transmission lines, which cross the valley along an east-west trending utility corridor north of

Interstate 10. Portions of these electricity transmission corridors pass directly through or in proximity to the various Conservation Areas. SCE is not a Permittee and does not receive take authorization under the MSHCP. They may request take authorization for activities within the Plan Area pursuant to the Permit as a Participating Special Entity and must comply with all of the MSHCP's requirements.

SCE performs operation and maintenance activities, and conducts emergency repairs in their service area in the San Bernardino and Riverside counties. SCE has established an Endangered Species Alert Program (ESAP). The ESAP requires that SCE operation and maintenance personnel contact SCE Environmental Affairs staff when working in sensitive areas. The ESAP also provides training for personnel to ensure an awareness of sensitive species and methods to avoid impacts. The SCE ESAP Manual (January 1998) identifies sensitive species, throughout the SCE service area and directs company personnel to contact SCE Environmental Affairs if it is suspected that work will be conducted in an area affecting sensitive species.

Most of the SCE easements are located within the Conservation Areas, including Snow Creek/Windy Point, Highway 111/I-10, Santa Rosa and San Jacinto Mountains, Desert Tortoise and Linkage, Willow Hole, Upper Mission Creek/Big Morongo Canyon, Thousand Palms, East Indio Hills, Whitewater Floodplain, and Cabazon. Several easements are located within the Cabazon Conservation Area and traverse almost the entire length of Willow Hole. Within the Thousand Palms Conservation Area, SCE easements bisect the Conservation Area and some of the Existing Conservation Lands that were established by the CVFTL HCP.

3.6 Wind Energy Resource Areas/Facilities

High winds cross the western Coachella Valley in a southeasterly direction from the San Gorgonio Pass. Large areas within and immediately east of the San Gorgonio Pass under the jurisdiction of BLM, Riverside County, Desert Hot Springs, or Palm Springs, have been developed with Wind Energy Conversion Systems wind farms or designated for future energy-related industrial development. According to the California Energy Commission, in 1995, there were approximately 2,898 wind turbines in the San Gorgonio Pass area, which produced 662.6 million kilowatts/hours of electricity. Typical wind turbines being installed in the Coachella Valley are rated at between 750 kilowatts and 1.25 megawatts (EIR/EIS 2007). Most turbines are three-blade, horizontal axis machines with galvanized steel or painted towers, which may be up to 300 feet in overall height.

Within the Plan Area there are about 7,351 acres of land that are used for wind energy. Turbines have been constructed within or in the vicinity of some of the MSHCP Conservation Areas. Wind turbines exist on about 3,465 acres within six of the Conservation Areas. The Conservation Areas include Snow Creek/Windy Point, Highway 111/I-10, Stubbe and Cottonwood Canyons, Whitewater Canyon, Upper Mission Creek/Big Morongo Canyon, and Whitewater Floodplain. The majority of the wind turbines occur within the Upper Mission Creek/Big Morongo Canyon and Whitewater Floodplain Conservation Areas. Within the Whitewater Floodplain Conservation Area, the wind turbines are located on Existing

Conservation Lands that are critical to the conservation of the CVFTL.

3.7 Water Resources

Watercourses account for nearly 4 percent (44,276 acres) of the Plan Area and include natural and man-made bodies of water. They include the Salton Sea, Whitewater River/Coachella Valley Stormwater Channel, Lake Cahuilla in the City of La Quinta, San Gorgonio River, and the Whitewater River recharge ponds in the Windy Point area near the San Gorgonio Pass.

Regional surface waters provide important habitat for a variety of wildlife species within the Plan Area. Natural water bodies, including the Salton Sea, account for approximately 3.8 percent of the MSHCP Plan Area (MSHCP 2007). Washes, seeps, and springs in the Willow Hole-Edom Hill Preserve, Thousand Palms Oasis at the Coachella Valley Preserve, Dos Palmas Preserve/Area of Critical Environmental Concern (ACEC), and Oasis Springs Ecological Preserve provide habitat for a variety of Federal and State-listed species, including Coachella Valley fringe-toed lizard, desert pupfish, and other species. Other water sources, including agricultural drains, canyon streams, desert fan palm oases, and the Coachella Valley Stormwater Channel, offer riparian habitat that supports populations of both common and sensitive wildlife species. Preservation of these water sources and the quality of water they provide is critical to the survival of numerous wildlife species.

Groundwater within the valley supports several natural communities within the Plan Area, including Coastal & Valley Freshwater Marsh, Cismontane Alkali Marsh, Desert Fan Palm Oasis Woodland, Mesquite Hummocks, Riparian Forests and Woodlands among others. Groundwater-dependent ecosystems of the Coachella Valley have been and continue to be adversely affected by falling groundwater levels caused by water well pumping (Stromberg 1993). As groundwater levels drop these ecosystems become degraded or are eliminated (Laity 2003, Pima Association of Governments 2000, Nabhan and Holdsworth 1998, National Park Service 2004).

3.7.1 Groundwater

The Coachella Valley groundwater basin is a northwest-southeast trending sub-surface aquifer, which generally extends from Whitewater in the northwest, to the Salton Sea in the southeast. It is bounded by the non-waterbearing rocks of the San Bernardino and Little San Bernardino Mountains on the north and northeast, and the San Jacinto and Santa Rosa Mountains on the south and southwest. The valley's subsurface aquifer system largely consists of relatively young alluvial deposits underlain by older basement rocks.

Although interflow of groundwater occurs throughout the aquifer, it is limited by fault barriers, constrictions in the basin profile, and areas of low permeability. The U.S. Geological Survey and the California Department of Water Resources have divided the groundwater basin into four distinct subbasins. Subbasin boundaries are generally based upon faults that restrict the lateral movement of groundwater, including the Mission Creek and Banning strands of the San Andreas Fault Zone, and have been determined regardless of water quantity or quality. The subbasins

include Mission Creek, Garnet Hill, Whitewater River, and Desert Hot Springs.

The rapid increase in water demand in the Coachella Valley has resulted in overdraft of the finite groundwater supplies available for production. Overdraft occurs when the amount of groundwater extracted exceeds the amount of groundwater recharging the basin. Overdraft of groundwater within the Coachella Valley has caused groundwater levels to decrease more than 60 feet in portions of the lower valley and has raised concerns about water quality degradation and land subsidence. Groundwater levels in the upper valley have also decreased substantially (EIR/EIS 2007).

3.7.2 Salton Sea

The Salton Basin has been occupied by a body of water intermittently for millennia as a result of natural variation in the direction of flow of the Colorado River. The freshwater marshes and wetlands of the Salton Sea provide important nesting and foraging habitat for migratory waterfowl, as well as numerous species of fish, including endangered and threatened species. The Salton Sea that currently occupies the lower portion of the basin, was created by a failure of an irrigation levee that allowed the entire flow of the Colorado River to fill the basin for 18 months starting in 1905. The Salton Sea has been sustained for the last 100 years largely by irrigation flows from the Imperial, Coachella, and Mexicali Valleys.

The Salton Sea is a terminal lake. Water, salt, and agricultural-related constituents enter the Sea but water only leaves through use and evaporation. Over time this has resulted in a gradual increase in the salinity of the Salton Sea. More recently, demands for water have been increasing in the southern California coastal region and the upper Coachella Valley, resulting in California taking more than its allotted share of Colorado River water. To bring California within its apportionment, IID agreed to conserve and transfer water to San Diego County Water Authority, CVWD, and/or Metropolitan Water District (MWD). The result of this conservation and transfer is the loss of a significant portion of historical inflows to the Salton Sea. This reduction will cause a more rapid rise in salinity of the Salton Sea, a shrinking of the Sea away from its current shoreline, and a change in the flora and fauna of the Salton Sea (in particular the loss of fish and fish-eating birds). As a result of the planned transfer, the salinity of the Salton Sea will exceed 60 parts per thousand salt (an estimated threshold for tilapia, the Sea's primary fish) 4 years sooner than would have occurred without the transfer project.

To help offset this impact and address the ongoing problems at the Salton Sea, the State of California has embarked on a restoration program for the Salton Sea. The Resources Agency identified its preferred alternative in June of 2007. This alternative includes major infrastructure that would divide the Sea into several components: freshwater inflows, a large marine lake, shallow saline ponds, and a brine pool. Because of the magnitude of the possible changes, it is likely that the Coachella Valley Storm Channel and Delta Conservation Area will be affected in some way if a restoration program is implemented.

3.7.3 Water Districts

Water delivery services are provided by several water agencies and municipalities in the Coachella Valley, including the CVWD, Desert Water Agency (DWA), IID, Myoma Dunes Mutual Water Company, Mission Springs Water District (MSWD), MWD, and the cities of Coachella and Indio. Various other surface water stream diversion operations occur throughout the Plan Area. The historical demand for water in the Coachella Valley has been largely focused around agricultural, urban, and golf course irrigation uses. In 1936, total water demand in the valley was approximately 96,300 acre-feet (Coachella Valley Water Management Plan 2002). By 1999, demand had increased to approximately 668,900 acre-feet, which represents nearly a seven-fold increase over 63 years. The greatest increase in water demand since 1936 is the result of golf course development in both the upper and lower portions of the valley (EIR/EIS 2007).

Although there are nearly 36.5 million acre-feet of groundwater in storage in the Coachella Valley in the first 1,000 feet below the ground surface (excludes water contained in the San Gorgonio Pass Subbasin), CVWD 2000 potable water is extracted from only two of the region's subbasins. Significant groundwater extraction occurs from the Whitewater River Subbasin. The water is used for domestic and agricultural purposes and golf course irrigation in the upper (west and north of Point Happy) and lower (east and south of Point Happy) subareas of the Whitewater River Subbasin. Smaller quantities of groundwater are produced from the Mission Creek Subbasin for use in the Desert Hot Springs area and unincorporated communities of Sky Valley and Indio Hills.

3.7.3.1 Metropolitan Water District

MWD owns about 58 acres within the Plan Area. MWD has agreed to exchange an equal quantity of its Colorado River water to the DWA and CVWD to enable them to obtain water equal to their State Water Project (SWP) entitlements. CVWD and DWA are legally entitled to purchase 61,200 acre-feet of SWP water, delivered from northern to southern California by the California Aqueduct, but no facilities exist to bring SWP water to Coachella Valley annually (CVWD 2003). The maximum amount that can be stored under this agreement is 600,000 acre-feet (af), and the maximum annual withdrawal is currently 61,200 af. The exchange agreements terminate in 2035, or earlier if MWD is unable to obtain enough water from the SWP to offset the Colorado River water delivered to the Coachella Valley spreading area. Each agreement contains a 5-year cancellation clause (DWA 2002). MWD releases water from its Colorado Aqueduct into the Whitewater River, where it flows into recharge ponds in the Windy Point area west of Palm Springs (CVWD 2003a).

In 1984, MWD executed an advance delivery agreement with the DWA and the CVWD. The agreement allows MWD to supply the DWA and CVWD with Colorado River water in advance of the time they are entitled to receive water under the exchange contracts. In future years, MWD can recover this water by reducing its deliveries under the exchange contracts. MWD is currently investigating transferring a portion of its SWP water to the DWA and CVWD. This proposal is currently undergoing an environmental impact review. MWD is also exploring an

additional program with these agencies. Under the current Advance Delivery Program, MWD delivers water near the Whitewater Recharge area. This provides water to the upper Coachella Valley groundwater basin underlying the DWA service area. The upper basin is nearing capacity and the lower basin is overdrafted. The technical relationship between the upper and lower basins has yet to be determined. MWD's board has authorized the expenditure of $750,000 for a feasibility study of the conjunctive use program that would store water in the lower basin. This may require the construction of new facilities. Current expectations are that this new program could provide MWD with the right to withdraw 100,000 to 150,000 af per year, over a ten-year cycle. MWD is not a Permit Applicant under the Plan.

3.7.3.2 Coachella Valley Water District

The CVWD was formed in January 1918 under the state water code provisions of the County Water District Act. CVWD owns about 8,400 acres within the Plan Area. Nearly 640,000 acres are within the district boundaries. Most of this land is in Riverside County, but the district also extends into Imperial and San Diego counties. The CVWD is involved in six water-related fields of service-irrigation water, domestic water, stormwater protection, agricultural drainage, wastewater reclamation, and water conservation. Recreation and generation of energy have become by-products of some of these services.

The Coachella Valley Water Management Plan, prepared by the CVWD in November 2000, and adopted in 2002, describes existing and historical water conditions in the Coachella Valley and outlines the CVWD's means of meeting water demands through 2035. The Coachella Valley Water Management Plan evaluates several alternatives for meeting future water needs and recommends a preferred alternative, which incorporates a combination of water conservation, source substitution, groundwater recharge, additional water supplies, and ongoing groundwater monitoring programs.

The CVWD's Water Management Plan sets goals for improving all areas of regional water management, including urban, golf course, overdraft, groundwater replenishment, water quality, and agricultural water, and establishes benchmarks by which progress can be measured. Implementation of CVWD's Water Management Plan would require the participation and cooperation of local residents and public and quasi-public agencies serving the valley.

3.7.3.3 Desert Water Agency

Alvah Hicks acquired the Palm Springs Water Company in the 1920's and obtained the water rights to Snow Creek and Falls Creek Canyons at the foot of Mount San Jacinto. During the 1940's, Hicks sank deep wells and discovered what appeared to be an unlimited supply of pure water. The discovery led to a pattern of groundwater dependency and increased consumption by local residents. By the late 1950's, groundwater levels had dropped by as much as 70 feet in some areas. Voters were concerned about future supply and formed DWA to qualify for participation in the California Water Plan. The California Water Plan shares Northern California Water with contracting California non-profit public water agencies.

The DWA is one of 30 public agencies in California that has signed long-term contracts to purchase SWP entitlements for the Coachella Valley (DWA 2002). DWA owns about 752 acres within the Plan Area. DWA's contract entitlements for SWP for the Coachella Valley are 38,100 acre-feet per year through 2035 (DWA 2002). DWA is not a Permit Applicant under the Plan.

3.7.3.4 Mission Springs Water District

MSWD is the largest purveyor within the Mission Creek Subbasin. The District's boundaries lie north of the Banning Fault. MSWD was incorporated under the California water law as the Desert Hot Springs County Water District. In 1987, the Board of Directors changed the name to MSWD. The MSWD's service area encompasses about 135 square miles and over 9,000 services. In August of 2000, MSWD updated their Water Master Plan. The Water Master Plan identified a series of water system improvements that should be implemented to meet future water demands in the service area based on regional and local growth projections. The Water Master Plan forecast that the MSWD system would experience a water supply shortfall of about 4,321 gallons per minute (gpm) in the year 2005. To overcome this shortfall, MSWD proposed to construct a 2,000 gpm groundwater production well, water storage reservoirs, a booster pump station, and water transmission lines. MSWD is not a Permit Applicant under the Plan.

3.7.3.5 Myoma Dunes Mutual Water Company

The Myoma Dunes Mutual Water Company provides domestic water services to the Bermuda Dunes community, except for development along Washington Street, which is served by CVWD. It has five active wells, drilled to depths of 750 to 800 feet that can produce 1,700 to 3,200 gallons of potable water per minute. Three of the production wells discharge water directly into the water distribution system, which conveys water through distribution water mains ranging in size from 4 to 12 inches in diameter. The two other wells deliver water directly into a water reservoir near the intersection of 41st Avenue and Hermitage Drive. The reservoir has a capacity of one million gallons. Myoma Dunes operates a sixth well, which is used solely by the Bermuda Dunes Airport and is not connected to the water delivery system.

3.7.3.6 Indio Water Authority

Indio Water Authority (IWA) is a joint powers authority owned and operated by the Indio Water Authority. The City's Water Division began when the city incorporated in 1930. As one of the fastest growing municipally owned utility in the Coachella Valley, IWA serves over 14,150 residents and businesses, consuming approximately 6 billion gallons of water per year. Water quality is a major issue, and Indio is fortunate to have pure sources direct from underground wells, drilled far down as 1200 feet. The water system source is derived form 17 ground water wells. The system includes four groundwater production plants that incorporate 3 wells, a 2 million-gallon above ground steel tank reservoir and a booster station that supplies the flow at pressure into the distribution system. Five additional well sites, located in other areas of the city and independent of the reservoir sites, discharge water directly into the distribution system.

3.8 Sand Transport

Several sensitive and listed species inhabit and fully depend upon the blowsand ecosystems of the Coachella Valley for their survival. These blowsand ecosystem exist in a region that is experiencing rapid urbanization and infrastructure development, with observable local degradation of the remaining ecosystems (Lancaster *et al*. 1993). Due to a combination of resultant direct and indirect effects, concern has been expressed that these blowsand ecosystems may not be stable or viable over the long-term as supplies and transport of wind blown sand become restricted or cut off by urban development and water resource/flood damage reduction projects (Lancaster *et al*. 1993). Three main fluvial-aeolian systems are found within the Coachella Valley that geologically, maintain these blowsand ecosystems.

The fluvial portion of the sediment-delivery system that creates the active sand communities within and surrounding the Whitewater and Willow Hole Reserves consists of fluvial depositional areas fed episodically with sediment by ephemeral streams (Griffiths *et al*. 2002b). Differentially, the fluvial portion of the sediment delivery system that creates the active blowsand communities within and surrounding the Coachella Valley Preserve consists mostly of older alluvial fan deposits, whose sediments are episodically dissected and exposed by stormwater flows (Lancaster *et al.* 1993, Simons, Li and Assoc. 1997). After deposition or liberation by flood flows, finer fluvial or alluvial sediments (typically sand size and finer) of these three systems are then eroded and sorted while being carried downwind in a largely unidirectional wind field by strong westerly winds coming through San Gorgonio Pass and the upper Coachella Valley (Griffiths *et al.* 2002b; Lancaster *et al.* 1993; Simons, Li and Assoc. 1997).

Within the Coachella Valley, blowsand habitats for Coachella Valley fringe-toed lizard, Coachella Valley milk-vetch, and the other species are maintained by delivery of sand from upwind sources. Sand delivery to the areas within and surrounding the Whitewater, Willow Hole, and Thousand Palms Reserves has been constrained by human development such that any further appreciable reductions in sand delivery to these Reserves are problematic to long-term maintenance of the blowsand ecosystems these species rely upon. Most of the species' remaining habitat is being indirectly threatened by human activity through degradation of habitat as a result of continuing development within the sand transport corridors that maintain the blowsand ecosystems (Simons, Li and Assoc. 1997). Conservation and enhancement of essential remaining components of this sand delivery/sand transport corridor are essential to the long-term survival of the above-listed species.

3.8.1 Air Quality Management District (PM10)

The Coachella Valley is under Air Quality Management District's (AQMD) jurisdiction and has been designated as a nonattainment area for PM_{10} (particulate matter with an aerodynamic diameter of 10 microns or less). On June 21, 2002, the AQMD adopted the 2002 Coachella Valley PM_{10} State Implementation Plan (CVSIP). The 2002 CVSIP included a request for

extension of the PM_{10} deadline and met all applicable Federal Clean Air Act (CAA), requirements, including a Most Stringent Measures analysis, control measures, and attainment demonstration. The U.S. Environmental Protection Agency (EPA) approved the 2002 CVSIP on April 18, 2003. At the time of adoption, the AQMD committed to revising the 2002 CVSIP with the latest approved mobile source emissions estimates, planning assumptions and fugitive dust source emission estimates, when they became available.

The 2003 CVSIP updates those elements of the 2002 CVSIP; the control strategies and control measure commitments have not been revised and remain the same as in the 2002 CVSIP. The 2003 CVSIP contains updated emissions inventories, emission budgets, and attainment modeling. It requests that EPA replace the approved transportation conformity budgets in the 2002 CVSIP with those in the 2003 CVSIP. EPA approved these budgets on March 25, 2004, with an effective date of April 9, 2004.

Under the CAA, an area can be redesignated as attainment if, among other requirements, the EPA determines that the national ambient air quality standards (NAAQS) have been attained. EPA guidance further states that a determination of compliance with the NAAQS must be based on three complete, consecutive calendar years of quality-assured air quality monitoring data. In applying EPA's recently approved Natural Events Policy (NEP), the Coachella Valley has not violated either the 24-hour or annual average PM_{10} standards from1993 through 1995. Accordingly, the purpose of the Redesignation and Maintenance Plan is to request a redesignation of the Coachella Valley to attainment for PM_{10} and to submit the attendant maintenance plan and other required actions to qualify for such redesignation by the EPA.

3.9 Reserve System

The Reserve System will total about 723,480 acres and includes the 21 Conservation Areas within the Plan Area boundary. The Reserve System will be assembled from Existing Conservation Lands (Federal, State, Non-Profit Organizations, Local Permittee owned land); Complementary Conservation; land acquired by the State and Federal governments; additional Local Permittee lands; acres to be acquired or otherwise conserved by the Local Permittees; non-Permittee pubic and quasi public lands; land to maintain the fluvial sand transport area.

3.9.1 Existing Conservation Lands

Many of the lands within the Reserve System that are classified as Existing Conservation Lands are subject to a wide range of other regulatory plans and programs relevant to the MSHCP. They include, but are not limited to, the adopted Applicant's General Plans, various land use and resource management plans governing State and Federal lands in the Plan Area, species management/recovery plans approved by State and/or Federal agencies, and a habitat conservation plan in adjoining or overlapping areas, and are further addressed in Section 1.6 and Section 4.2.1 of the EIR/EIS for the MSHCP and in Sections 4 and 8 of the MSHCP and are herein incorporated by reference.

Approximately 557,100 acres of Existing Conservation Lands are identified in the Conservation Areas within the Plan Area. It should be noted that additional lands occur within the Plan Area boundary, but outside of the Conservation Areas. Existing Conservation Lands include approximately 529,200 acres of State and Federal lands, 8,800 acres of local lands, and approximately 19,100 acres of non-profit organization lands. An Existing Conservation Area Map is provided in Figure 4-2 in the MSHCP. The lands are in public or private ownership and are managed for conservation and/or open space values. These lands are intended to be managed per the MSHCP Conservation Goals and Objectives. CVCC will use its "best efforts" to enter into an MOU with each entity that is not signatory to the MSHCP either prior to or no later than 3 years after Permit issuance to ensure monitoring and management consistent with the MSHCP. The Existing Conservation Lands have been assigned one of three defined Conservation Levels.

On Conservation Level 1 land, development is precluded in Wilderness Areas and no habitat loss is anticipated. The MSHCP anticipates only minimal habitat loss on Conservation Level 2 lands, in conjunction with trails and trailheads identified in Section 7.3 of the MSHCP, or as necessitated by an Adaptive Management action. Section 7 of the MSHCP addresses Covered Activities including O&M activities for any existing Permittee facilities that may occur on Existing Conservation Lands. New development on Federal Existing Conservation Lands will be subject to a section 7 consultation pursuant to the Act. New development on State Existing Conservation Lands will be subject to appropriate permitting processes with CDFG. New development on Local Permittee or Private Conservation Land, except as specifically authorized in the MSHCP (see Section 7 of the MSHCP), will be permitted only through a MSHCP amendment and must be consistent with the Species Goals and Objectives and the Conservation Goals and Objectives of the affected Conservation Area.

On Conservation Level 3 land, the MSHCP anticipates that habitat will be lost on no more than 1 percent of lands managed by each entity, and that development will be consistent with the Species Goals and Objectives and the Conservation Goals and Objectives for the specific Conservation Area. The California Desert Conservation Area Plan (CDCA 1980), as amended, provides long-range guidance for the management of public lands of the California Desert by the BLM. The BLM 2002 CDCA Plan Amendment for the Coachella Valley specifically commits BLM to conserving at least 99 percent of vegetation community types on the lands it administers in the MSHCP Reserve System. In the portion of the MSHCP Area where the Northern and Eastern Colorado (NECO) Plan applies to Federal land, new surface disturbance is cumulatively limited to 1 percent of the Federal portion of each Desert Wildlife Management Area. The goal of the CDCA is to provide for the use of public lands and resources of the CDCA in a manner that enhances wherever possible and which does not diminish, on balance the environmental, cultural, and aesthetic values of the desert and its productivity. In 1996, the BLM signed an MOU to initiate preparation of the MSHCP. The CDCA Plan Amendment for the Coachella Valley (2002) was developed in tandem with the MSHCP in order to provide the framework for implementation actions on public lands which will support a landscape-level approach to conservation and provide for community needs.

For context, the Existing Conservation Lands are described below in reference to their location

within the MSHCP Conservation Areas. Some of the Existing Conservation Lands have already been protected for species conservation within the Plan Area through the CVFTL HCP or other means. However, not all Existing Conservation Lands within the Plan Area provide equal conservation value to Covered Species and Natural Communities due to alternative uses or existing easements, such as flood control, recreation areas (trails), and other uses.

3.9.1.1 Existing Conservation Lands within Reserve Management Units

Section 8.2.3 of the MSHCP describes Existing Conservation Lands and associated management and is herein incorporated by reference. The MSHCP indicates that management plans for Existing Conservation Lands will serve as the basis for the management programs for Reserve Lands. Management programs and plans on lands administered by State and Federal agencies, Local Permittees, and various non-profit conservation entities are described in Section 8 of the MSHCP in the context of the 6 Reserve Management Units designated by the MSHCP. As part of the MSHCP implementation, land management agencies will adhere to the Species Goals and Objectives and the Conservation Goals and Objectives for Covered Species, natural communities, and Conservation Areas.

Reserve Management Unit 1: This unit consists of Cabazon, Stubbe and Cottonwood Canyons, Whitewater Canyon, Snow Creek/Windy Point, Highway 111/I-10, Whitewater Floodplain, Upper Mission Creek - Big Morongo Canyon, Mission Creek/Morongo Wash, Willow Hole, Long Canyon, Edom Hill, Thousand Palms, West Deception Canyon, Indio Hills/Joshua Tree National Park Linkage, Indio Hills Palms, and East Indio Hills Conservation Areas. This RMU includes all of the aeolian sand Natural Communities.

The Existing Conservation Lands within this RMU include the following: the Oasis de Los Osos Reserve in the Snow Creek/Windy Point Conservation Area that is managed by the University of California Natural Reserve System; Big Morongo Canyon Preserve/ACEC is within the Upper Mission Creek/Big Morongo Canyon Conservation Area and is managed by BLM; Coachella Valley Preserve System that includes the Whitewater Floodplain Reserve (Whitewater Floodplain Conservation Area) and is managed by BLM and the CVWD; Willow Hole/Edom Hill Reserve/ACEC (Willow Hole and Edom Hill Conservation Areas) and is managed by BLM, CNLM, and CVCC; the Coachella Valley Preserve and the Coachella Valley Ecological Reserve (Thousand Palms Conservation Area) that is managed by BLM, CDFG, CNLM, State Parks, TNC, and the Service; Indio Hills Palms State Park (managed as part of Thousand Palms Preserve) within the Indio Hills Palms Conservation Area and managed by State Parks; Mission Creek Preserve within the Upper Mission Creek/Big Morongo Canyon Conservation Area and managed by the Wildlands Conservancy; San Gorgonio Wilderness within the Cabazon, Stubbe and Cottonwood Canyons, Whitewater Canyon, and Upper Mission Creek/Big Morongo Canyon Conservation Areas and managed by BLM and the USFS; Sky Valley Ecological Reserve within the Indio Hills/Joshua Tree National Park Linkage and managed by CDFG; and Whitewater Canyon ACEC within the Whitewater Canyon Conservation Area that is managed by BLM. The RMUC will consist of the Land Manager, BLM, CDFG, Service, USFS, State Parks, TNC, and CNLM.

Reserve Management Unit 2: This unit consists of the Joshua Tree National Park Conservation Area. The Existing Conservation Lands to be managed as part of this unit include the Joshua Tree National Park and are managed by the National Park Service and the Wildlands Conservancy. The RMUC will consist of the National Park Service and the Land Manager.

Reserve Management Unit 3: This unit consists of the Desert Tortoise and Linkage and the Mecca Hills/Orocopia Mountains Conservation Areas in the eastern portion of the Plan Area. The Existing Conservation Lands include the Mecca Hills Wilderness, Orocopia Mountains Wilderness, Chuckwalla Bench ACEC, and BLM Multiple Use Lands (CDCA) and are managed by BLM. The RMUC will consist of the Land Manager and BLM.

Reserve Management Unit 4: This unit consists of the Dos Palmas Conservation Area. The Existing Conservation Lands include the Dos Palmas ACEC that is managed by BLM and CNLM; Oasis Springs Ecological Reserve that is managed by CDFG; and the Salton Sea State Recreation Area that is managed by State Parks. The RMUC will consist of the Land Manager, BLM, CDFG, State Parks, and CNLM.

Reserve Management Unit 5: This unit consists of the Coachella Valley Stormwater Channel and Delta Conservation Area. The only Existing Conservation Lands within this conservation area are BLM lands without a specific management designation. The remaining lands are either owned by CVWD or private lands. The RMUC will consist of the Land Manager and BLM.

Reserve Management Unit 6: This unit consists of the Santa Rosa and San Jacinto Mountains Conservation Area. The Existing Conservation Lands include BLM wilderness areas (Santa Rosa Mountains Wilderness) that are managed by BLM; USFS wilderness areas (San Jacinto Wilderness and Santa Rosa Wilderness) that are managed by USFS; USFS Special Management Areas (Garner Management Area, Pyramid Peak Planning Area, and Pinyon Management Area) that are managed by the USFS; Santa Rosa and San Jacinto Mountains National Monument that is managed by BLM, USFS, and cooperative management involving the Agua Caliente Band of Cahuilla Indians, CDFG, California State Parks, local cities, and CVMC; State Ecological Reserves (Carrizo Canyon Ecological Reserve, Hidden Palms Ecological Reserve, and Magnesia Spring Ecological Reserve) that are managed by CDFG; Santa Rosa Mountains Wildlife Area that is managed by CDFG; Fish and Game District 4D (Game Refuge) that is managed by CDFG; Mount San Jacinto State Park/State Park Wilderness that is managed by State Parks; University of California Philip Boyd Deep Canyon Desert Research Center that is managed by the University of California Natural Reserve System; and Rancho Mirage Conservation Easement that is managed by the City of Rancho Mirage and CVMC. The RMUC will consist of the Land Manager, BLM, CDFG, State Parks, CVMC, UCNRS, USFS, and the Chair of Trails Advisory Subcommittee to the Monument Advisory Committee.

3.9.2 Complementary Conservation

Complementary Conservation consists of land acquisitions that complement the MSHCP, but are

not a Permittee obligation for Permit issuance. To date approximately 36,900 acres of Complementary Conservation has been conserved within the Conservation Areas. The goal of land acquisition is to consolidate public owned land. Other Complementary Conservation includes acquisitions by non-profit organizations and Tribal land outside of the reservations. About 29,990 acres of Complementary Conservation are projected to be acquired during the Permit term. The future Complementary Conservation is anticipated to occur within Joshua Tree National Park, Santa Rosa and San Jacinto Mountains National Monument, and Mecca Hill and Orocopia Mountains Wilderness Areas. The Plan anticipates that the State and Federal agencies will acquire 21,390 acres of new conservation lands through grants, bond, or other means, which will complement the 96,940 acres (inclusive of Caltrans' and the State Parks' obligations) of Permittees' mitigation responsibilities.

3.9.2.1 Tribal Lands Outside of the Reservation

Agua Caliente Band of Cahuilla Indians (Tribe) purchased about 3,800 acres of land outside of the Indian Reservation. The land is the subject of a proposed land exchange between the Tribe and BLM. It is unknown how much of this land will ultimately be exchanged. The land exchange is intended to consolidate the Tribal land inside the external boundaries of the reservation and for BLM to consolidate its land with the Santa Rosa and San Jacinto National Monument. The Tribe's land outside of the Indian Reservation will be taken out of the MSHCP Plan Area boundary and the acreage for the Santa Rosa and San Jacinto Conservation Areas will be reduced accordingly (Figure T1).

3.9.3 Federal Lands

Federal Existing Conservation Lands within the conservation areas contributing to the MSHCP Reserve System include lands administered by the BLM, Bureau of Reclamation (BOR), NPS, Service, and the USFS. Federal lands included in the Existing Conservation Lands total approximately 484,600 acres. A full description of the Federal lands can be found in Section 4.1.1 and 8.2.3 of the MSHCP, and are herein incorporated by reference.

3.9.3.1 Bureau of Land Management

BLM lands constitute about 27 percent of all of the lands within the Plan Area (approximately 296,600 acres) within the proposed Reserve System. BLM-administered lands are within portions of the Santa Rosa and San Jacinto Mountains National Monument, the Santa Rosa Mountains Wilderness (which also is within the National Monument), the Mecca Hills Wilderness, the Orocopia Mountains Wilderness, San Gorgonio Wilderness, Big Morongo Canyon Preserve/ACEC, portions of the Chuckwalla Bench ACEC (portions are outside the Plan Area), portions of the Dos Palmas Preserve/ACEC, the Whitewater Canyon ACEC, the Willow Hole-Edom Hill Preserve/ACEC, and portions of the Coachella Valley Fringe-toed Lizard Coachella Valley Preserve. The above mentioned BLM Lands are within the following Conservation Areas: Santa Rosa and San Jacinto Mountains; Mecca Hills/Orocopia Mountains; Upper Mission Creek/Big Morongo Canyon; Dos Palmas; Whitewater Canyon; Willow Hole,

Edom Hill, Thousand Palms, and Indio Hills/Joshua Tree National Park Linkage. As discussed above, the Secretary of the Interior signed the CDCA (BLM 1980) prescribing land uses on BLM-administered lands in California. The existing network of designated routes is illustrated on BLM's Desert Access Guides. The BLM manages land within the MSHCP Reserve System pursuant to the CDCA Plan, as amended.

3.9.3.2 Bureau of Reclamation

BOR administers 600 acres of land adjacent to the Coachella Canal in the Dos Palmas Conservation Area. The Permits will not provide take authorization for activities on this land.

3.9.3.3 National Park Service

Within the MSHCP Reserve System, NPS manages approximately 146,000 acres within Joshua Tree National Park. The NPS lands are located within the Joshua Tree National Park Conservation Area. The Joshua Tree National Park General Management Plan, the Land Protection Plan for Joshua Tree National Park, and the Backcountry and Wilderness Management Plan are the management plans that govern the management of these lands. CVCC proposes to use its best efforts to enter into an MOU with NPS to ensure monitoring and management consistent with the MSHCP prior to the issuance of the Permits and no later than 3 years after Permit issuance.

3.9.3.4 U.S. Fish and Wildlife Service

The Service manages 3,600 acres in the Coachella Valley National Wildlife Refuge (a portion of the Coachella Valley Preserve) located within the Thousand Palms Conservation Area. The Service will monitor and manage these lands consistent with the Species Goals and Objectives and the Conservation Goals and Objectives of the MSHCP.

3.9.3.5 U.S. Forest Service

USFS lands within the MSHCP Reserve System total about 57,300 acres and include portions of the San Jacinto Wilderness, portions of the San Gorgonio Wilderness Management Area, portions of the Santa Rosa Wilderness, and some non-Wilderness portions of the San Bernardino National Forest. The USFS lands are located within the Santa Rosa and San Jacinto Mountains, Cabazon, Stubbe and Cottonwood Canyons, Upper Mission Creek/Big Morongo Canyon, and Whitewater Canyon Conservation Areas. The 1988 Land and Resource Management Plan provided specific standards and guidelines for the protection of Peninsular bighorn sheep and riparian birds. The Revised Land Management Plans (Angeles National Forest, Cleveland National Forest, Los Padres National Forest, San Bernardino National Forest)(September 2005) established specific standards for the San Bernardino National Forest Land Management Plan that provide for compatible management on the Forest Service lands within the MSHCP Plan Area.

3.9.4 State Lands

State lands identified as Existing Conservation Lands within the MSHCP Reserve System include lands administered by CDFG, State Parks, State Lands Commission, Coachella Valley Mountains Conservancy (CVMC), California Department of Transportation (Caltrans), and Regents of the University of California (Regents). State lands within the Existing Conservation Lands total about 44,600 acres. A full description of the State lands is in Section 4.1.1 in the MSHCP (MSHCP 2007), and incorporated herein by reference.

3.9.4.1 California Department of Fish and Game

CDFG manages approximately 27,700 acres of land within the MSHCP Reserve System that include the Carrizo Canyon Ecological Reserve, Hidden Palms Ecological Reserve, Sky Valley Ecological Reserve, Magnesia Springs Ecological Reserve, Oasis Springs Ecological Reserve, and the Santa Rosa Mountains State Wildlife Area. CDFG also manages lands in the CVFTL Preserve as an Ecological Reserve. The CDFG managed lands are located within the Santa Rosa and San Jacinto Mountains, Dos Palmas, Thousand Palms, and Indio Hills/Joshua Tree National Park Linkage Conservation Areas. CDFG proposes to monitor and manage these lands consistent with the Species Goals and Objectives and the Conservation Goals and Objectives of the MSHCP.

3.9.4.2 State Lands Commission

Of the 4,800 acres of land administered by the State Lands Commission within the Plan Area, 700 acres are managed for conservation purposes in Joshua Tree National Park. The 700 acres are located within the Joshua Tree National Park Conservation Area. The remaining 4,100 acres are managed for revenue generating purposes and are not conserved. The State Lands Commission is not a Permit Applicant under the MSHCP.

3.9.4.3 California Department of Parks and Recreation

State Park lands within the MSHCP Reserve System total about 6,800 acres and include portions of Mt. San Jacinto Wilderness State Park, the Indio Hills Palms unit of the State Park system, and Salton Sea State Recreation Area. The State Park lands are located within the Santa Rosa and San Jacinto Mountains, Indio Hills Palms, and Indio Hills/Joshua Tree National Park Linkage Conservation Areas. The Wilderness designation within Mt. San Jacinto Wilderness State Park provides management that may be consistent with the Conservation Area and Covered Species Goals and Objectives of the MSHCP. The Indio Hills Palms unit is currently managed per an MOU as part of the CVFTL Preserve. The CVFTL Preserve will be incorporated into the MSHCP Reserve System. As a Permittee, monitoring and management of State Parks' lands will be consistent with the Species Goals and Objectives and the Conservation Goals and Objectives of the MSHCP.

3.9.4.4 Coachella Valley Mountains Conservancy

CVMC acquires mountainous lands surrounding the Coachella Valley and acquires natural community conservation lands within the Coachella Valley to hold in perpetual open space and to provide for the protection of wildlife resources on, the public's enjoyment of, and the enhancement of their recreational and educational experiences on those lands in a manner consistent with the protection of the lands and the resource values thereon. CVMC owns or holds a conservation easement on approximately 2,600 acres of land in the Snow Creek/Windy Point, Willow Hole, Thousand Palms, and Santa Rosa and San Jacinto Mountains Conservation Areas. CVMC manages these lands to protect their biological resource values pursuant to Public Resources Code Section 33501. As a Permittee, CVMC will monitor and manage these lands consistent with the Species Goals and Objectives and the Conservation Area Goals and Objectives of the MSHCP.

3.9.4.5 Regents of the University of California

The Regents own and/or manage lands totaling approximately 6,300 acres in two areas of the MSHCP Reserve System as part of its Natural Reserve System. The two areas are Deep Canyon Desert Research Center and Oasis de los Osos, both of which are located in the Santa Rosa and San Jacinto Mountains Conservation Area. The mission of the Natural Reserve System is to protect the biological resources of its sites while providing teaching and research opportunities. CVCC proposes to use its best efforts to enter into an MOU with Regents to ensure monitoring and management consistent with the MSHCP prior to the issuance of the Permits and no later than 3 years after Permit issuance.

3.9.4.6 California Department of Transportation

Caltrans manages approximately 500 acres in the Dos Palmas Conservation Area.

3.9.5 Local Permittee Existing Conservation Lands

The Local Permittees will commit to manage approximately 8,800 acres (1,700 acres is currently conserved through obligations in the CVFTL HCP) of Existing Conservation Lands consistent with the Species Goals and Objectives and the Conservation Goals and Objectives of the MSHCP. Of the 1,700 acres that have been conserved through the CVFTL HCP, 1,200 acres are owned by CVWD and 500 acres by the CNLM (see the section below on the section 10 Permits/Habitat Conservation Plans). The Local Permittee Existing Conservation Lands that were not included in the CVFTL HCP are owned by six of the participating cities and County Parks. The lands are located within the Edom Hill, Santa Rosa and San Jacinto Mountains, Whitewater Floodplain, Upper Mission Creek/Big Morongo Canyon, and Thousand Palms Conservation Areas. The applicable Permittees will surrender the CVFTL incidental take permit. Prior to cancellation of the CVFTL incidental take permit, CVCC will conserve the parcels

through a recorded legal instrument (conservation easements or fee title) guaranteeing protection in perpetuity to the non-State and non-Federal lands in the CVFTL Preserve system acquired with CVFTL mitigation fees, including the Whitewater Floodplain Reserve owned by CVWD. CVCC will enter into MOUs with these jurisdictions assuring management of these lands consistent with the MSHCP. CVCC will assume responsibility for the CVFTL endowment, which will be incorporated into the MSHCP endowment and earmarked for expenditure on Monitoring and Management of the CVFTL and its associated habitat in perpetuity. A full description of the Local Permittee lands are included in Sections 4.1.2 and 6.6.1.3 in the MSHCP, and incorporated herein by reference.

Currently the Local Permittee Existing Conservation Lands either have conservation easement, deed restriction, lease, or are restricted in some manner. Although the Local Permittees Existing Conservation Lands were acquired for conservation purposes and are afforded some level of land use protection, all of the lands are not currently secured in perpetuity by legal mechanisms that assure perpetual conservation for the benefit of the Covered Species. CVCC may obtain either conservation easements on or fee title to the lands owned by the cities and the County Park. CVCC will enter into MOUs with these jurisdictions assuring management of these lands consistent with the MSHCP. Although CVCC intends to pursue a legal instrument with the cities and County Park, not all of the lands are considered perpetually conserved for the benefit of the Covered Species in our analysis. The lands that are not considered perpetually conserved are those listed in Table 4-3 of the MSHCP that are not currently conserved by a legal instrument.

3.9.6 Non-Conserved Permittee Owned Lands

The Permittees own about 7,500 acres within the Conservation Areas that are not currently conserved. The Local Permittees proposed to cooperate with CVCC to conserve these lands in Table 4-6 of the MSHCP as part of their contribution of Additional Conservation Lands. Some of the parcels contain public facilities that are Covered Activities under the Plan as identified in Section 7.3 of the MSHCP. These parcels would be conserved to the extent they are consistent with the Covered Activities and are appropriate for conservation. If Covered Activities occur on any of the 7,500 acres, the Permittees would ensure that sufficient other lands of equivalent or greater ecological function and value to Covered Species are conserved to fulfill all of the Species Goals and Objectives and the Conservation Goals and Objectives. CVCC shall conserve the 7,500 acres through a recorded Legal Instrument and shall enter into an agreement of MOU providing for management consistent with the MSHCP. Within three years of Permit issuance, CVCC will ensure the conservation of the lands controlled by the cities', Riverside County, County Flood Control, County Parks, and County Waste lands within the conservation areas. The CVWD and IID lands (6,700 acres) would be conserved incrementally over time as CVWD and IID mitigate Covered Activities through a recorded legal instrument acceptable to the Wildlife Agencies. The legal instrument may include conveying fee title or conservation easements on these lands to CVCC.

3.9.7 Public/Quasi-Public Lands

Approximately 10,800 acres of Public/Quasi-Public (PQP) Lands are identified within the Plan Area. PQP Lands are owned or controlled by public or quasi-public entities that are not Permittees. For clarity and context, the land owners of the PQP lands could seek take authorization through a Participating Special Entity, and as such, conservation would occur in conjunction with the take authorization. This would likely result in the PQP lands being conserved or remaining undeveloped. However, not all PQP Lands within the Plan Area provide conservation value to Covered Species due to alternative uses, such as existing or future infrastructure, roads and other access uses, flood control, recreation areas, water conservation, utility maintenance, and other potentially conflicting uses. These lands will be analyzed in the future should they ever be proposed for inclusion in the Plan.

3.9.8 Non-Profit Organization Existing Conservation Lands

Non-profit conservation organizations who own land in the MSHCP Reserve System include American Land Conservancy, CNLM, Friends of the Desert Mountains, The Living Desert, The Nature Conservancy, and the Wildlands Conservancy. The lands were acquired for conservation purposes and total approximately 19,100 acres. The non-profit Existing Conservation Lands are currently not encumbered with conservation easements or deed restrictions ensuring their perpetual conservation. Non-profit Existing Conservation Lands are within the San Rosa and San Jacinto Mountains, Dos Palmas, Thousand Palms, Willow Hole, Snow Creek/Windy Point, Indio Hills Palms, Joshua Tree National Park, and Upper Mission Creek/Big Morongo Canyon Conservation Areas.

The MSHCP states that CVCC will use its best efforts to enter into an MOU regarding cooperative management with the non-profit organizations within 3 years of Permit issuance to ensure the permanent conservation by the execution of a legal instrument and management of the lands they own pursuant to the MSHCP. CVCC will also request access to the properties for biological monitoring and management. CNLM controls 1,100 acres in the CVFTL Preserve, that will need to be assured for conservation purposes to enable the CVFTL Permit to be subsumed by the MSHCP. Although the CVFTL HCP lands and the balance of the non-profit organization lands were acquired for conservation purposes, the lands are not currently secured in perpetuity by a legal mechanism, such as a deed restriction or conservation easement. Although CVCC intends to pursue MOU's with the non-profit organizations, the lands are not considered perpetually conserved for our analysis until they are legally conserved.

3.9.9 Agua Caliente Band of Cahuilla Indians Tribal Lands

Within the Plan Area boundary, but outside of the scope of the MSHCP, there are about 69,000 acres of Indian Reservation lands. Between 1996 and 2003, the Agua Caliente Band of Cahuilla Indians purchased approximately 3,800 acres of land outside the Indian Reservation and within the Santa Rosa and San Jacinto Mountains Conservation Area. This land is the subject of a

proposed land exchange between the Agua Caliente Band and BLM. It is not known at this time how much of the 3,800 acres may ultimately be included in the proposed exchange. The purpose of the proposed land exchange is to consolidate Tribal land inside the external boundaries of the reservation, and for BLM to consolidate its land within the Santa Rosa and San Jacinto Mountains National Monument. BLM would obtain some or all of the 3,800 acres of tribal lands outside the reservation. The 3,800 acres of land outside of the Agua Caliente Band of Cahuilla Indians' Reservation is included in their draft Tribal HCP.

3.10 Past Federal Actions/Section 7 Consultations

Table 3 is a summary of past actions within the action area that have been evaluated under section 7 of the Act. Table 3 below outlines previous Federal actions since 1986 that have affected the environmental baseline for the proposed Covered Species that were within the Action Area. Some of the projects have not been implemented to date or were never initiated and other projects were on Tribal lands and are noted accordingly.

Table 3. Section 7 Consultations within the Action Area

Project Name	Tracking Number	Date	Species Addressed
AT&T Telephone Cable Right-Of-Way	1-1-86-F-1	12-12-85	Coachella Valley fringe-toed lizard
Runway Extension at Palm Springs Municipal Airport	1-1-86-F-12	11-12-85	Coachella Valley fringe-toed lizard, flat-tailed horned lizard
Maintenance Activities in Irrigation Facilities Around Salton Sea	1-1-86-F-65	6-18-86	desert pupfish
Southern California Gas Pipeline 5000	1-6-90-F-15	3-26-90	desert tortoise
Public Equestrian Hiking Trail System	1-6-89-F-52	6-29-90	Coachella Valley fringe-toed lizard
Modification to BO for Southern California Gas Company Pipeline 335	1-6-90-F-13	6-14-91	desert tortoise
Amendment Mesa Wind Facility Right-Of-Way Grant	1-6-91-F-36	9-9-91	desert tortoise
Andreas Cove Country Club Project	1-6-91-F-45	10-9-91	least Bell's vireo
1992 Club Racing Program in the California Desert District Open Areas	1-6-92-F-12	12-30-91	desert tortoise
APHIS National Boll Weevil Cooperative Program Section 7 Consultation	1-6-91-F-50	2-7-92	desert pupfish, desert tortoise, Coachella Valley fringe-toed lizard Yuma clapper rail, least Bell's vireo
Small Mining and Exploration Operations in the California Desert	1-6-92-F-28	6-1-92	desert tortoise

Project Name	Tracking Number	Date	Species Addressed
Imperial Irrigation Water District's Powerline Removal Project	1-6-92-FW-13	6-2-93	Coachella Valley fringe-toed lizard
Integrated Pest Management Program at the Salton Sea Refuge	1-6-93-FW-12	7-26-93	Yuma clapper rail, desert pupfish
Cook Street Interchange Project	1-6-94-F-25	6-23-94	Coachella Valley milk-vetch, Coachella Valley fringe-toed lizard
State Route 86 Expressway Project	1-6-94-F-48	10-5-94	desert pupfish
Caltrans State Route111 Project	1-6-95-F-27	5-2-96	Yuma clapper rail, desert pupfish
Extension of Formal Conference on the Coachella Valley Water District's Cahuilla Zone Water Reservoir Right-Of-Way Project	1-6-97-F-49	10-17-97	bighorn sheep
Shadowrock Ventures Project	1-6-96-FC-24 (63)	11-24-97	bighorn sheep
Desert Star Golf Course	1-6-99-F-16	2-25-99	Coachella Valley milk-vetch, Coachella Valley fringe-toed lizard
Mark Technologies Wind Turbines and Photovoltaic Facility	1-6-99-F-51	6-1-99	desert tortoise
Ritz Carlton Golf Course	1-6-99-F-42	6-23-99	bighorn sheep
MCO Properties, Inc. Mirada	1-6-99-F-6	7-7-99	bighorn sheep
Desert Adventures Jeep Eco-Tours	1-6-98-F-14	7-27-99	bighorn sheep
Joshua Tree National Park Road Improvement Project	FWS-ERIV-1024	8-11-99	desert tortoise
Leasing of Federal Land for the Purpose of Wind Farm Development	1-6-99-F-49	9-3-99	Coachella Valley milk-vetch, Coachella Valley fringe-toed lizard, triple-ribbed milk-vetch
Wind Surfing Park	1-6-99-F-67	9-3-99	Coachella Valley milk-vetch, Coachella Valley fringe-toed lizard
Small Disturbance Projects in the Coachella Valley	1-6-00-F-03	12-23-99	Coachella Valley fringe-toed lizard
Questar's Southern Trails Pipeline	FWS-ERIV-732	6-1-00	least Bell's vireo
Whitewater River/Thousand Palms Flood Control Project	1-6-00-F-46	9-12-00	desert tortoise, Coachella Valley milk-vetch, Coachella Valley fringe-toed lizard
Golden Ridge Resort and Spa*	FWS-ERIV-2353.2	4-30-02	Coachella Valley milk-vetch, Coachella Valley fringe-toed lizard, flat-tailed horned lizard
California Desert Conservation Area - Riparian Bird and Arroyo Toad	FWS-ERIV-2600.2	7-31-02	Southwestern willow flycatcher, least Bell's vireo, arroyo toad

Project Name	Tracking Number	Date	Species Addressed
California Desert Conservation Area	FWS-ERIV-2761	7-31-02	Coachella Valley milk-vetch, Coachella Valley fringe-toed lizard, triple-ribbed milk-vetch
Teayawa	FWS-ERIV-938.6	8-30-02	desert tortoise, Coachella Valley fringe-toed lizard
Line 1030 Gas Pipeline Replacement	FWS-ERIV-3162	10-7-02	desert tortoise
The Removal and Relocation of 10 Turbines/Amendment	FWS-ERIV-2057.2/.3	10-23-02	desert tortoise
IID Water Transfer	FWS-ERIV-2628	12-18-02	desert pupfish, Southwestern willow flycatcher, Yuma clapper rail, brown pelican
Union Pacific Railroad Upgrade – Yuma Subdivision Phases II and III	FWS-ERIV-2861	1-29-03	desert tortoise, Coachella Valley milk-vetch, Coachella Valley fringe-toed lizard
Road Rehabilitation: Joshua Tree NP, Pinto Wye to North Entrance	FWS-ERIV-3083.2	2-4-03	desert tortoise
Storage Units in Palm Springs	FWS-ERIV-3299.2	2-11-03	Coachella Valley milk-vetch, Coachella Valley fringe-toed lizard
Crest Golf Course and Residential Development	FWS-ERIV-3080.2	11-7-03	bighorn sheep, desert tortoise
Union Pacific Railroad Track Upgrade	FWS-ERIV-2861.2	11-21-03	desert tortoise, Coachella Valley milk-vetch, Coachella Valley fringe-toed lizard
Small Disturbance Programmatic	FWS-ERIV-762	12-5-03	Coachella Valley fringe-toed lizard
Small Disturbance Programmatic	FWS-ERIV-762	12-6-03	Desert tortoise
Palm Springs International Raceway*	FWS-ERIV-3120.2	12-16-03	Coachella Valley milk-vetch, Coachella Valley fringe-toed lizard
Interstate 10 Coachella Valley Programmatic	FWS-ERIV-3282	9-23-04	Coachella Valley milk-vetch, Coachella Valley fringe-toed lizard
Bond Capital Project*	FWS-ERIV-3983.3	11-2-04	Coachella Valley milk-vetch, Coachella Valley fringe-toed lizard
Destination Ramon Project*	FWS-ERIV-3985.3	11-2-04	Coachella Valley fringe-toed lizard
Travertine Specific Plan	FWS-ERIV-2735	12-XX-05	bighorn sheep

Project Name	Tracking Number	Date	Species Addressed
Parker-Blythe #1 Pole Replacement Project	FWS-ERIV-3067	12-21-05	desert tortoise
Joshua Tree National Park Fire Management Plan	FWS-ERIV-4478.1	9-19-05	desert tortoise
Desert SW Transmission Line	FWS-ERIV-3837.4	8-4-06	desert tortoise, Coachella Valley milk-vetch, Coachella Valley fringe-toed lizard

*Projects on Tribal lands within the Plan Area boundary

3.11 Existing Habitat Conservation Plan/Section 10 Permit

To date, the CVFTL HCP is the only HCP approved within the Coachella Valley. Some of the utility companies and water districts have contemplated preparing HCPs for their actions within the region, but have not yet applied for an incidental take permit. IID, is currently an Applicant under the MSHCP, but is also preparing their own HCP for water conservation, conveyance, and drainage-related activities.

3.11.1 Coachella Valley Fringe-toed Lizard Habitat Conservation Plan

The CVFTL HCP was the second HCP in the nation. The CVFTL HCP authorized incidental take for endangered Coachella Valley fringe-toed lizard and its habitat while providing for the conservation of the species within three reserve areas (see the Species-by-Species Evaluation Section of this Biological Opinion for further detail). The three reserves include the Coachella Valley Preserve in the Thousands Palms Conservation Area; the Willow Hole/Edom Hill Reserve located near the west end of the Indio Hills; and the Whitewater Flood Plain Reserve located east of Indian Avenue in the Whitewater Floodplain Conservation Area (see the Species Evaluation for the CVFTL for further detail). The three reserves consist of BLM, CDFG, Service, State Parks, CVMC, CVWD, TNC, and CNLM lands. Of these lands, about 1,200 acres is owned by CVWD in the Whitewater Floodplain Conservation Area (the 1,200 acres is included within the total acreage for the Local Permittee Existing Conservation Lands.) and 500 acres were acquired by CNLM with local mitigation fees per the CVFTL HCP (the 500 acres is included within the total acreage for the Local Permittee Existing Conservation Lands.) All of the reserve lands are proposed to be included in the MSHCP Reserve System. An endowment account was established for the CVFTL Preserve System. The account will be managed by CVCC and used to support the CVFTL and its habitat as part of the MSHCP Reserve System.

Three amendments have been made to the CVFTL HCP to date: 1) the expansion of the prescribed uses of mitigation fees collected under the CVFTL HCP to include the acquisition of lands outside of the Reserve areas and to provide for protection of sand source and movement corridor lands outside of the Reserves (1998); 2) the transfer of management responsibilities for some Reserve lands from The Nature Conservancy to the Center for Natural Lands Management (1999); and 3) the removal of Section 10 permit coverage for incidental take from lands that are important sand source areas to the Coachella Valley Preserve and the Willow Hole/Edom Hill

Reserve, the reinstatement of the $600 per acre fee to fund acquisition of sand sources areas, and the provision of a means for a determination by CDFG that the Federal permit for the Coachella Valley fringe-toed lizard was consistent with the California Endangered Species Act (2001).

Although the CVFTL HCP lands were acquired for conservation purposes, the lands are not currently secured in perpetuity by any legal instrument such as a deed restriction or conservation easement. As detailed in Section 6.6.1.3 of the MSHCP, CVCC shall obtain an appropriate legal instrument guaranteeing protection in perpetuity of the private lands within the CVFTL Preserve System acquired with CVFTL mitigation fees prior to cancellation of the CVFTL HCP permit. CVWD will conserve the 1,200 acres it owns in the Whitewater Floodplain Preserve (part of the Whitewater Floodplain Conservation Area), at Thousand Palms and Willow Hole Preserves in perpetuity as part of the MSHCP Reserve System by recording an appropriate legal instrument within 6 months of Permit issuance.

4.0 EFFECTS OF THE ACTION

In order to facilitate our analysis for the proposed Covered Species, we included a General Effects section that described effects that are common to several of the proposed Covered Species.

4.1 Evaluation Assumptions

In order to complete our analysis, we relied on the EIR/EIS, the MSHCP, our administrative record, and related scientific literature. The proposed action addresses 27 species within a 1.1 million-acre action area. Due to the scale of the analysis, we have had to make certain assumptions. Because focused survey information does not exist for all Covered Species for the entire action area, and the impacts associated with this action could occur at anytime over the 75-year term of the permit, certain aspects of the MSHCP and IA may be unclear regarding the implementation process. Therefore, we made the following assumptions to evaluate the impacts to Covered Species. These assumptions do not reflect all of the obligations or conditions set forth in the MSHCP.

Biological Opinion Evaluation Assumptions

The following assumptions are made in order to clarify any unclear intent, statements or interpretations in evaluating the impacts to Covered Species:

1) All of the provisions and obligations set forth in the MSHCP, Implementing Agreement, and the Special Permit Terms and Conditions will be fully carried out and implemented by all of the Permittees.

2) Specific natural communities and/or physical environmental features (e.g., soils) are correlated with the habitats 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 the conservation of, Covered Species, the extent of impacts to or conservation of the natural community or environmental feature necessary for a species is expected to result in commensurate impacts to or conservation of the species itself. The species-habitat models were developed using the available vegetation and physiographic features information and represent a reasonable surrogate with which to assess the impacts to and conservation of Covered Species within the action area.

3) The Permittees obligation in reserve assembly under the Plan will include 96,940 acres (inclusive of Caltrans' and the State Parks' obligations) in the Conservation Areas as generally described in Section 4 of the MSHCP. Of this, 7,500 acres are already owned by the Local Permittees and will be conserved through a recorded Legal Instrument as described in the MSHCP. Per the MSHCP, most of the remaining 88,900 acres will be conserved through land acquisition (4,200 acres have been conserved since 1996). The Permittees obligations include conserving the appropriate amount and configuration of natural communities and species populations/occurrences/locations identified in the MSHCP, or from new species/habitat information gathered in association with the Plan, so as to achieve the Conservation Goals and Objectives and Required Measures for the Conservation Areas (Section 4 of the MSHCP) and Covered Species Conservation Goals and Objectives (Section 9 of the MSHCP).

4) In the general effects analysis (not species specific), we assume Covered Species Conservation Goals and Objectives (Section 9 of the MSHCP) will be achieved, in part, by instituting the Joint Project Review Process (Section 6.6.1.1 of the MSHCP) and Monitoring/Adaptive Management programs (as described in Sections 8 and 9 of the MSHCP).

5) The Existing Conservation Lands described in the Plan provide essential habitats that support the long-term conservation of Covered Species, such that the impacts and conservation proposed in the Plan, in the context of the Existing Conservation Lands, meet our minimum findings requirements as described. These lands will be managed consistent with the Conservation Goals and Objectives identified in the MSHCP. The Permittees will obtain: a) either fee title or conservation easements (Legal Instrument) on these lands, and b) enter into MOUs and/or cooperative agreements with the entities having jurisdiction over these lands to ensure monitoring and management consistent with the Plan and to provide for enforcement in the cases of non-compliance with the requirements of the Plan for the State and Federal Existing Conservation Lands, where appropriate.

6) The MSHCP does not conflict with, supersede, or amend the provisions of any completed section 7 consultation. However, this assumption does not preclude the processing and/or

approval of a future amendment to the MSHCP and/or any other adopted habitat conservation plan.

7) No more than 10 percent of the undeveloped private lands in each Conservation Area for each Covered Species will be subject to disturbance. Conservation of private lands within each Conservation Area will total no less than 90 percent of the modeled habitat for each Covered Species on the undeveloped private land as of November 1996. However, several factors, including acquisition, reduced development, and Like Exchanges to a Conservation Area boundary identified in Section 6.12.2 of the Plan may occur, resulting in potentially greater than 90 percent conservation. The maximum acreages of disturbance from Covered Activities, and the minimum acreages of conservation, will be as specified in Table 4-114 of the Plan.

8) Some public utilities and all school districts within the Plan Area are not identified as Permit Applicants under the MSHCP and are typically not subject to the local jurisdictions' discretion. Therefore, these utilities and districts do not receive coverage under the Permit as Permittees, but may receive incidental take authorization independently or under the MSHCP if they are willing to adhere to the MSHCP obligations through the Participating Special Entity provision (Section 7.4 of the Plan) and the execution of a Certificate of Inclusion.

9) Pursuant to Section 7.3.1 of the Plan, the Plan does not authorize take associated with development projects that have legal vested rights. However, a project with legal vested rights could obtain coverage, provided that the appropriate jurisdiction Permittee requires the execution of a Certificate of Inclusion and compliance with Plan requirements. In the rare event that a project within a Conservation Area on private land has incidental "take" exempted through section 7 of the Act or through a separate HCP, consistent with Section 14.8 of the Implementing Agreement, an equivalent acreage to the disturbance allowed/exempted would be deducted from the amount authorized for the Local Permittee jurisdiction within the respective Conservation Area. Ultimately, the decision to approve a project will be made by the applicable Permittee.

10) Language such as "may" or "could" might cause interpretation issues during implementation. Where the words "may" or "could" occur in the MSHCP associated with a potential obligation of Permittees, they will be changed or otherwise interpreted to mean "shall" or "will", indicating a clear obligation of the applicable Permittees, Participating Special Entities, or Third Parties Granted Take Authorization.

11) Conservation Area Goals throughout the MSHCP are interpreted to mean Goals, Objectives, and Required Measures.

12) Unless otherwise noted, all references to general plans throughout the MSHCP refer to general plan land use designations in effect at the time of MSHCP approval by the Permittees (October 2007).

13) In the general effects analysis (not species specific), we assume that despite mutable general plans of Local Permittees, future land uses and development patterns will reflect current land use trends (largely residential and tourist resort-commercial in the upper valley and agricultural and residential uses in the lower valley), thereby eliminating the probability of future land uses such as heavy industry and expansion of agriculture into native habitat (unregulated by County and therefore not a Covered Activity).

14) Operation and maintenance associated with existing uses are not considered Covered Activities, except where explicitly listed in Section 7.3.1.1 of the Plan.

15) In the general effects analysis (not species specific), we assume 99 percent conservation of the vegetation community types for all BLM lands administered within the Reserve System pursuant to the Coachella Valley Amendment to CDCA Plan (BLM 2002). Specifically, the CDCA Plan states "For the 8 vegetation community types (Figure 2-4, BLM 2002), the habitat conservation objectives outlined in Table 2-4 (BLM 2002) would be used to assess compatible uses and to develop appropriate mitigation measures within Conservation Areas on BLM-managed land." Those objectives state that BLM will conserve 99 percent of each vegetation community. BLM defines "conserve" as the use of "all methods and procedures which are necessary to bring any endangered species or threatened species to the points at which the measures provided pursuant to the Endangered Species Act are no longer necessary."

16) The BLM lands containing arroyo toad modeled habitat within the Whitewater Canyon Conservation Area are designated as Conservation Level 1 and 2 lands. It is assumed that habitat loss will occur on no more than one percent of these lands, and will only occur in conjunction with providing reasonable access across public lands to private inholdings within the Wilderness Areas, trails and trailheads, or as necessitated by an Adaptive Management action.

17) The past acquisition of livestock grazing rights will prevent the reintroduction of livestock grazing in the future on the Whitewater Canyon Allotment.

18) Covered Activities described in Section 7 of the MSHCP (in and outside of Conservation Areas) only pertain to the Permittees.

19) CVWD will conserve the 1,200 acres it owns in the CVFTL HCP Whitewater Floodplain Preserve in perpetuity by recording an appropriate Legal Instrument prior to relinquishment of the CVFTL HCP permit.

20) Although project-specific information for some of the proposed Covered Activities is not available at this time, the activities will adhere to the Conservation Goals and Objectives and Required Measures, and Species Conservation Goals and Objectives identified in the MSHCP.

21) This Permit does not authorize the intentional pursuit or killing of Covered Species associated with hunting.

22) Lands within Conservation Areas that are not yet secured through a Legal Instrument nor authorized for disturbance will be maintained in their current natural state and not degraded.

23) An accounting of permitted, authorized, and unauthorized disturbance that has occurred on lands within the Conservation Areas compared to the baseline acreage to date will be prepared. The permitted and authorized disturbance that has occurred since 1996 will be deducted from the total authorized for disturbance within Conservation Areas.

24) The 3 acres of arroyo toad modeled habitat within the Upper Mission Creek/Big Morongo Conservation Area are designated as Conservation Level 2 lands. It is assumed that habitat loss will occur on no more than one percent of these lands and that any development will be consistent with the Conservation Goals and Objectives and Required Measures for this Conservation Area.

25) The Existing Conservation Lands controlled by the Permittees and those controlled by non-profit organizations (The Nature Conservancy, CNLM, etc.), that were set aside or designated for conservation associated with the CVFTL HCP, will be protected by an appropriate Legal Instrument in perpetuity prior to the relinquishment of that permit. The lands will be permanently protected and managed in a natural, ecologically-beneficial, open-space condition.

26) The Existing Conservation Lands controlled by CDFG and CDPR that were set aside or designated for conservation as a result of the CVFTL HCP, will be conserved in perpetuity by the respective agencies, or by any organization/agencies that are given control over these lands from these agencies. The Existing Conservation Lands controlled by BLM and the Service that were set aside or designated for conservation as a result of the CVFTL HCP and/or section 7 consultations or re-initiation of section 7 consultations on BLM actions, will be conserved based on the various agreements in place (i.e., biological opinions, The Coachella Valley Preserve System Management Plan and Decision Record, and Coachella Valley Amendment to the CDCA) by these respective agencies, or by any organization/agencies that are given control over these lands from these agencies. The Existing Conservation Lands will be protected and managed in their entirety in a natural, ecologically-beneficial, open-space condition.

27) BLM will enter into an MOU with the CVCC, either prior to permit issuance and no later than 3 years post Permit issuance, that will ensure BLM's perpetual monitoring and management of the lands they control within the Plan Area is consistent with the Goals and Objectives of the MSHCP.

28) CVCC will execute a MOU (Joint Enforcement Agreement(s), Mutual Aid Agreement, or equivalent mechanism) with the applicable Permittees, BLM, USFS, CDFG, Service, and applicable Non-Profit Organizations which enables cross-jurisdictional capability to provide for enforcement in the cases of non-compliance with the requirements of the Plan. The MOU or equivalent mechanisms approved by the Service will specifically provide for enforcement of the relevant ordinances, resolutions, regulations, or other legal requirements necessary for effective management of the Reserve Lands. The MOUs will specify roles and responsibilities among the parties needed to effectively implement the pertinent requirements of the Plan including the Trails Plan (Section 7 of the MSHCP).

29) BLM will control OHV trespass across BLM lands through implementation of the CDCA Plan Amendment and any associated section 7 consultations, consistent with the Terms and Conditions in any associated Biological Opinions, and re-initiation of consultation on previous BLM actions where necessary.

30) Development activities on the Agua Caliente Indian Reservation within the blowsand Natural Communities will include substantial offsetting mitigation in the form of conservation of important blowsand ecosystem lands in the valley whether proposed projects are authorized through a section 10 permit for the draft Tribal HCP or section 7 of the Act. It is also assumed that the majority of currently undeveloped portion of Section 6, T4S, R5E, on the Agua Caliente Indian Reservation land will be conserved to maintain functional connectivity needed for Coachella Valley MSHCP Conservation Goals and Objectives.

31) Pursuant to the Conservation Objectives and Required Measures identified in the Plan, CVCC or other appropriate Permittees would maintain at least 376 acres of mesquite hummocks, with functional hydrology (groundwater and soil water) to support sustainable populations of mesquite (on the 376 acres) within Reserve Lands in perpetuity.

32) Any flood damage reduction facilities constructed in the future that are related to the planned Whitewater Flood Control Project, which consists of a series of levees to provide flood damage reduction for the Thousand Palms community and I-10 areas, would be developed consistent with the designs, potential impacts, and conservation analyzed in our Biological Opinion on the Whitewater River/Thousand Palms Flood Control Project (1-06-00-F-46). Any related project contracts, approvals, or funding by the Army Corps of Engineers, County of Riverside, and/or CVWD would be consistent with that Biological Opinion (1-06-00-F-46).

33) It is expected that maintenance of fluvial sand transport capacity (Section 4.4 of the MSHCP, Fluvial Sand Transport) is equivalent in meaning to “no net loss” of this capacity compared to current conditions, to maintaining fluvial (and ultimately aeolian) erosion/transport/deposition processes important to the blowsand ecosystems of the action area. As such, fluvial processes within Conservation Areas that are important to

the support of downstream/downwind CVFTL modeled habitat [within Conservation Areas and Section 6, T4S, R5E (adjacent to the Whitewater Floodplain Conservation Area)] are expected to be protected by the MSHCP from adverse changes that could otherwise result from Covered Activities.

34) General plan changes by Local Permittees would not result in an increase in the amount of take and habitat losses beyond those anticipated in our decision documents and contemplated in the MSHCP.

35) Trail closures will be enforced per Element 4 and Element 5 of the Trails Management Program for the Santa Rosa and San Jacinto Mountains Conservation Area to avoid and minimize recreational impacts to bighorn sheep during the summer water stress period and, as needed, to ensure that the research program can be conducted.

36) Upon the acquisition of private land within the Conservation Areas, invasive species are proposed to be removed. Although the wording varies between Section 8 (invasive species) and Section 5.2 in Appendix I (Saharan mustard), we assume that all invasive species will be removed and not a subset of species.

37) As described in Section 19.5 of the IA, it is understood that the lands that are conserved through the MSHCP are obligated in perpetuity and will not be withdrawn from the Reserve System after the 75-year permit term. Likewise, the duties and obligations of the Permittees for the protection, monitoring, management, adaptive management, and administration of the Reserve System will be in perpetuity.

38) With respect to Permittee-owned or controlled lands within the Reserve System, the applicable Permittees or CVCC will:

a. Conserve, in perpetuity, the Local Permittee Existing Conservation Lands within the Reserve System, as identified below pursuant to Section 4.1.2 of the MSHCP. The parcels will be conserved through a recorded Legal Instrument acceptable to the Service. Conservation easements will be established in accordance with California Civil Code Section 815, *et seq*. CVCC will also enter into MOUs with the jurisdictions assuring management of these lands consistent with the Plan.

b. Prior to relinquishment of the CVFTL HCP, the CVCC or appropriate Permittees will conserve through a recorded Legal Instrument, as described above, at least 8,800 acres of the Local Permittee Existing Conservation Lands identified in Table 4-3 of the Plan.

c. The CVCC or appropriate Permittee will conserve through a recorded Legal Instrument, as described above, at least 7,500 acres of Non-Conserved Permittee Owned lands identified in Table 4-6 of the Plan. Of the 7,500 acres, 800 acres will be conserved through a recorded Legal Instrument within 3 years of Permit issuance and

the remaining 6,700 acres owned by CVWD and IID will be conserved through a recorded Legal Instrument within 50 years of Permit issuance.

39) The CVFTL permit will be relinquished after the Permittees demonstrate that the following actions associated with Granite Construction Company's Garnet Mine within T3S R4E Section 26, on the Whitewater Floodplain Reserve mitigation lands have been accomplished: (a) removal of all existing debris piles and levees, and (b) restoration to original (pre-mining activities) elevations/contours of all lands that have been excavated or filled with spoil piles, berms, or levees, consistent with the *Interim Management Plan for the Garnet Mine, dated April 3, 2003,* adopted by the State Mining and Geology Board.

40) Section 4.2.2.2.2 of the Plan describes that undeveloped portions of parcels in Conservation Areas on which Development is approved will count toward meeting the Conservation Objectives when the undeveloped portion of the parcel is legally described and is permanently protected through an appropriate Legal Instrument and monitored and managed pursuant to the MSHCP's Monitoring and Management Programs. Parcels that are not appropriate to meet the Conservation Objective will count towards the allocated losses described under the Plan.

41) The total Peninsular bighorn sheep habitat authorized for disturbance/loss in relevant Conservation Areas includes the acreage of bighorn sheep habitat authorized for disturbance/loss in Special Provision areas under the Plan and the acreage of bighorn sheep habitat authorized for disturbance/loss under the HANS process.

42) Thousand Palms Site Planning Standard 2 requires that portions of parcels not developed shall be permanently conserved through conveyance of fee title or conservation easement, etc. To be consistent with Section 4.2.2.2.2 of the Plan, we understand that the lands referenced in Site Planning Standard 2 will be subject to the same criteria as described in Section 4.2.2.2.2 of the Plan. Thus, the portions of the lands not developed and appropriate for conservation will be permanently protected through a Legal Instrument and provisions made for the land to be monitored and managed pursuant to the Plan.

43) All new trails including perimeter trails on Reserve Lands in the Santa Rosa and San Jacinto Mountains Conservation Area, other than those identified in Element 5 of the Trails Plan (Section 7 of the Plan) will be subject to a Minor Amendment Requiring Wildlife Agencies' Concurrence.

44) Local Permittees will conserve at least 90 percent of the acreage within each/individual biological corridor designated in Section 4.3 of the Plan, in a configuration that provides functional connectivity for all applicable Covered Species within the Conservation Areas at issue. Any potential reduction in acreage below 90 percent of a given corridor will be prohibited unless it is possible to offset the adverse effect by acquiring equivalent functional acreage for that corridor to ensure no reduction in connectivity.

45) The projects listed in Tables 7-1 through 7-11 of the MSHCP are required to adhere to the Avoidance, Minimization, and Mitigation Measures described in Section 4.4 and also the Land Use Adjacency Guidelines described in Section 4.5 of the MSHCP.

46) Per the exchange of letters between the Service and the Coachella Valley Water District regarding activities in the Whitewater Floodplain Conservation Area, the CVWD will pursue the activities identified in the letters. The letters are attached and hereby incorporated by reference.

47) The CVWD and/or applicable Permittees will require that new wind energy development projects, the upgrading of any existing wind energy facilities, or renewal of any existing leases or other entitlements for wind energy projects within the Whitewater Floodplain Conservation Area require through any applicable permits or lease agreements that all such facilities be designed to provide 100-year flood protection and withstand any flow changes that may result from future measures implemented to re-establish more natural patterns of fluvial and aeolian sand transport.

48) Neither Palm Hills nor Shadowrock are vested projects.

49) Covered Activities will be under the direct control of the Permittees in conformance with approvals granted by the Permittees, or carried out in conformity with a Certificate of Inclusion or other written mechanism or instrument, and in compliance with the Implementing Agreement, the Permits and the MSHCP. As set forth in Section 11.1.1 of the Implementing Agreement, Permittees will include as a part of any discretionary or certain City ministerial approvals, a Certificate of Inclusion or other written mechanism, a condition requiring compliance with the Permits, the MSHCP and the Implementing Agreement, that describes the Take Authorization to be granted pursuant to the Permits and Section 17.2 of the Implementing Agreement. Such property owners, developers, and private and public entities will receive Take Authorization provided they are in full compliance with all requirements of the Permits, the Implementing Agreement, the MSHCP, the Implementation Mechanism adopted by Permittees, issued entitlements and all other applicable requirements.

50) The Implementation Manual will be submitted for Service review and concurrence prior to its finalization and distribution to the Permittees. The current draft version of the Implementation Manual is attached (see Appendix B).

4.2 Modeled Habitat Discussion and Evaluation of Methods

The conservation planning methodology outlined for the Plan involved the preparation of maps that indicate the occurrence and distribution of known locations, occupied habitat, and potential habitat for each Covered Species. These species distribution maps are predictions, based on the assumption that a species has a high probability of occurrence in appropriate habitats within its

known range (Csuti 1994). The process of developing a species distribution model is considerably influenced by the available data for a given species. There are inherent limitations in the use of ecological modeling. The species distribution models developed for the Plan can be described as spatially explicit conceptual models (Independent Science Advisors' Review, Noss *et al.* 2001). The models attempt to provide a picture of the connection between landscape patterns and species viability (Ruckelshaus *et al.* 1997). They are simple Geographic Information System (GIS) overlays, based upon known occurrences of the species, literature surveys of habitat variables, and expert knowledge. The various accuracies and scales of the data that were incorporated into each model are also important to recognize.

4.2.1 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 natural communities and vegetation types that support species 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.

The MSHCP characterizes the Plan Area by natural communities. The natural communities described in the Section 3 and 10 of the MSHCP 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 MSHCP. Due to the landscape approach of the vegetation mapping it is not possible to precisely capture the extent of all natural vegetation communities or habitat types.

To facilitate our analysis, we reviewed the individual GIS models for the proposed Covered Species provided to us by CVAG. This enabled us to identify the various vegetation types, soil types, and other data coverage that went into the development of the models. We checked for errors in the models such as determining if the models included development or unsuitable habitat for species. Thus, our assessment of modeled habitat that occurs within the action area, and our analysis of potential impacts to conservation of species, may differ from that reported in the MSHCP. Reasons for any discrepancies include the following: 1) updated land use data; 2) difference in vegetation communities used to refine modeled habitat; 3) interpretation of the written Conservation Goals, Objectives, and Required Measures that may have differed from that of the MSHCP; 4) use of species occurrence data that was more recent than that used in the development of the MSHCP; and 5) scale at which modeled habitat was mapped.

Available information regarding species occurrences or locations in the Plan Area was compiled to assess the locations/occurrences that will be conserved within the proposed Conservation Areas. In addition to the data provided by CVAG, we used our Service's GIS database and the Department's California Natural Diversity Database (CNDDB) for animal and plant occurrences.

4.2.2 Reserve System Evaluation

Implementation of the MSHCP will result in a 715,680 to 723,480-acre Reserve System (depending on how many acres of the 7,800 acres of fluvial sand transport is conserved) comprised of approximately 557,100 acres of Existing Conservation Lands and 96,940 acres (inclusive of Caltrans' and the State Parks' obligations) for the mitigation obligation of the Permittees. Of the 96,940 acres, 7,500 acres are already owned by the Local Permittees and will be conserved through a recorded legal instrument as described in the MSHCP. The MSHCP does not provide a "hard lined" map of the complete Reserve System but rather textual descriptions in the form of Conservation Objectives and Required Measures for each Conservation Area to facilitate the assembly of the Reserve System. For the purposes of our analysis, we interpreted the Conservation Objectives and Required Measures for each of the 21 Conservation Areas and the Species Conservation Goals and Objectives to ensure that Covered Activities within the Conservation Areas would not preclude the ability for us to "cover" the proposed Covered Species.

Although the exact configuration of the Reserve System is not known at this time due to the lack of a hard lined map, we were able to evaluate a general Reserve System configuration with the inclusion of 88,900 acres of Additional Conservation Lands (and other land that the Permittee are obligated to provide) that will be assembled in conjunction with some of the Existing Conservation Lands that we deemed were protected and provided for long-term conservation of the Covered Species. The MSHCP identifies the acres of modeled Covered Species habitat, Natural Communities by jurisdiction within the Conservation Areas. Within the Conservation Areas, no more than 10 percent of modeled habitat and Natural Communities will be lost within each Permittee's jurisdiction. In addition to the Conservation Objectives and Required Measures, our evaluation included an analysis of the Core and Other Conserved Habitat, Natural Communities, Essential Ecological Processes, and Biological Corridors and Linkages within the conservation areas. We also looked at how the Species Conservation Goals and Objectives (Section 9 of the MSHCP) would be met by the interpretation of the Conservation Objectives and Required Measures in Section 4 and Joint Project Review Process in Section 6 of the MSHCP. Lastly, we evaluated the amount of funding proposed to monitor and manage the Covered Species within the Reserve System in perpetuity.

4.2.3 Species Evaluations

To evaluate potential conservation of individual species, point locations and modeled habitat were examined within the Conservation Areas and outside of the Conservation Areas. The species evaluations were made across the Reserve System and included the proposed Additional Conservation Lands and the Existing Conservation Lands that were appropriate to consider in our analysis. Any new species data or point locations were used in our analysis. The species were evaluated based on their known natural history, current status, current baseline, and the effects of the proposed Covered Activities on the species. As with the Reserve System Evaluation discussed above, our analysis considered the Species Goals and Objectives and the

Conservation Objectives and Required Measures, the Core and Other Conserved Habitat, Natural Communities, Essential Ecological Processes, and Biological Corridors and Linkages within the Conservation Areas, and the loss of modeled habitat outside of the Conservation Areas.

4.3 General Effects

This section of the Biological Opinion addresses the general effects that the Covered Activities will have on the proposed Covered Species both within and outside of the Conservation Areas. Some Covered Activities will occur both within and outside of the Conservation Areas (Section 7.2 of the MSHCP). The Species Evaluations will provide species-specific detail regarding the proposed Covered Activities on the individual species.

The Reserve System includes about 557,100 acres of Existing Conservation Lands. The Permittees will acquire 88,900 acres of the Additional Conservation Lands as mitigation for Covered Activities in the Plan Area; permanently conserve 7,500 acres of Permittee-owned, yet not conserved land; and conserve 540 acres of State Parks land. The MSHCP estimates that most of the 88,900 acres will be conserved through land acquisition. Direct impacts to Covered Species and their habitats are anticipated to occur within the Plan Area upon issuance of the incidental take Permit due to land alterations primarily associated with urban development. Based on the proposed design of the Reserve System, a maximum of 156,089 acres of developable land could be lost outside of the 21 Conservation Areas (Table 4-8 in Section 4.8 of the EIR/EIS).

Chapter 7 of the MSHCP identifies various activities (Covered Activities) that will impact Covered Species and their habitats. The Covered Activities will occur within the Plan Area both in and outside of the Conservation Areas. Covered Activities include private and public development projects, roadway construction, road maintenance, flood facilities and maintenance, trails, recreation, waste management facilities, future facilities, and reserve monitoring and management.

In addition to the direct loss of habitat outside the Conservation Areas and to a lesser extent inside the Conservation Areas, effects associated with the issuance of an incidental take permit include habitat fragmentation, increased invasion by exotic plant and animal species, noise effects, increased anthropogenic disturbances, changes in hydrology, and changes to water quality and quantity.

4.3.1 Covered Activities Outside Conservation Areas

As described above in the Project Description, Covered Activities outside of the Conservation Areas include development permitted by Local Permittees approved pursuant to the County's and cities' general plans. The development projects include circulation elements, transportation improvement plans, interchange projects, drainage plans, water and waste management plans, the County's adopted Trails Master Plan, etc., as described in Sections 7.1 and 7.2 of the MSHCP and are herein incorporated by reference. Public facility construction, operation, and

maintenance and safety activities conducted by the Permittees such as publicly maintained roads and rights-of-way, maintenance yards, material pits, landfills, flood control facilities, transfer stations, solid waste facilities, among others, and other public utility facilities providing services essential to health and safety, and welfare of the public are Covered Activities. Lastly, emergency responses by the Permittees required for protection of the public, health, safety, and welfare are also Covered Activities outside of the MSHCP Conservation Areas.

Land outside of the Conservation Areas where the proposed Covered Activities are anticipated to occur will be lost through Plan implementation. Most of the land is privately owned (about 108,000 acres) and will likely become urbanized over the 75-year Permit term. Lands adjacent to the Conservation Areas are subject to the Land Use Adjacency Guidelines described in Section 4.5 of the MSHCP. Although the guidelines will minimize effects to the Reserve System, they do not address all of the indirect effects associated with some of the Covered Activities outside of the Conservation Areas. It is critical that the Land Use Adjacency Guidelines be implemented in all cases where appropriate and not merely considered by the Local Permittees. Our analysis is based on the Land Use Adjacency Guidelines being implemented fully on projects that share a common boundary with the Conservation Areas.

Effects associated with urbanization outside of the Conservation Areas include increased OHV activity, spread of invasive vegetation, trash/debris dumping, introduction of domestic animals, and groundwater depletion (see the Urbanization discussion below for a complete discussion of invasive vegetation, trash/debris dumping, introduction of domestic animals, and groundwater depletion). Aside from lands within the City of Desert Hot Springs, much of the land is outside of the Conservation Areas that could be developed during the 75-year Permit. The effects to Covered Species from the loss of modeled habitat outside of the Conservation Areas are more thoroughly addressed in the individual Species Evaluations. Many of the activities proposed outside of the Conservation Areas are also proposed within the Conservation Areas and are analyzed below.

4.3.2 Covered Activities Inside Conservation Areas

As described in Section 7.3 of the MSHCP, Covered Activities are identified within the Conservation Areas. Tables 7-1 through 7-11 in the MSHCP identify specific projects and activities that are Covered Activities for Permittees in the Conservation Areas (portions of the interchanged and arterials are outside of the Conservation Areas). Covered Activities within Conservation Areas include: 1) Construction and maintenance of trails and public access facilities, except those portions that are on Federal land, as provided for in the MSHCP, consistent with the guidelines for trails and public access in Section 7.3.4.2; 2) Specific projects and operation and maintenance activities listed in Tables 7-1 through 7-11. A list of operation and maintenance activities is in Section 7.3.1.1 of the MSHCP; 3) Development permitted or approved by Local Permittees; 4) Construction, operation, and maintenance of new local roadways (less than 74 feet in width and no more than one through travel lane in each direction) that are either approved as part of a development proposal or dedicated, or offered for dedication, for public use; and 5) Expansion of mining operations on non-Federal land. Expansion of

mining operations holding a valid existing permit as of the date of Permit issuance must be consistent with the Species Goals and Objectives and the Conservation Goals and Objectives for the applicable Conservation Area.

Section 7.3.2 of the MSHCP describes the various types of activities that are Allowable Uses that are not Covered Activities, but compatible with the MSHCP; Section 7.3.3 describes Compatible Activities that are Covered Activities under the MSHCP; and Section 7.3.4 describes Conditionally Compatible Uses within the Conservation Areas.

The projects listed in Tables 7-1 through 7-11 will adhere to the Avoidance, Minimization, and Mitigation Measures described in Section 4.4 and the Land Use Adjacency Guidelines described in Section 4.5 of the MSHCP. In addition to the Avoidance, Minimization, and Mitigation Measures, projects within the Conservation Areas are subject to the Conservation Area Goals and Objectives and Required Measures, and Species Conservation Goals and Objectives described in Section 4.3 and Section 9, respectively. The Implementation Manual is referenced in several places within the MSHCP. The Implementation Manual is intended to provide details on various aspects of the Plan including how to implement projects to minimize impacts to Covered Species within the Conservation Areas. The implementation of the measures described in the above referenced sections and the Implementation Manual will reduce impacts to various Covered Species.

The MSHCP identifies infrastructure facilities, operations, and maintenance of future facilities, however, site specific information has not been provided. 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. As described above, projects will need to be consistent with the Conservation Area Goals and Objectives and Required Measures (Section 4.3 of the MSHCP), and the Species Conservation Goals and Objectives (Section 9 of the MSHCP). Therefore, our analysis is based on the implementation of the applicable sections of the MSHCP and in some cases further detailed in the Implementation Manual to minimize and mitigate the effects associated with proposed Covered Activities.

4.3.3 Urbanization

It is generally understood that urbanization refers to the transformation of natural landscapes, such as deserts, forests, and other natural habitat to built environments. These built environments typically contain large amounts of impervious surfaces such as concrete, asphalt, roofs, lawns, and other materials.

4.3.3.1 Fragmentation

Fragmentation of habitat can have negative effects on the population dynamics of many species (Rosenberg *et al.* 1997). Habitat fragments generally have less conservation value than large habitat blocks because smaller habitat areas usually contain fewer species, have proportionally larger perimeters (making them more vulnerable to edge effects), are more likely to be

biologically isolated from other habitat areas, and tend to be more vulnerable to adverse stochastic events. Smaller reserves are faced with an increased likelihood of extinction of some species because of reduced population sizes and diminished dispersal ability.

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). 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).

Natural landscapes are generally more connected than urban landscapes, and linkages (or corridors) are one strategy to retain or enhance some of that natural connectivity (Noss 1987). Linkages are habitat connections between larger preserve areas which allow for wildlife movement, recruitment, and colonization between different core biological areas. Protecting naturally existing linkages likely promotes ecological processes and may benefit regional and local biological diversity (Rosenberg *et al.* 1997). The Plan contemplates a corridor within the Morongo Wash along with the proposed flood control project (Covered Activity) through lands within the City of Desert Hot Springs and the County within the Upper Mission Creek/Big Morongo Canyon and Willow Hole Conservation Areas. However, the creation of linear patches intended to function as linkages may not fully mitigate for further habitat removal and it is important to evaluate both the effectiveness of biological corridors and the tradeoffs with diminished habitat areas that accompany many habitat conservation plans (Rosenberg *et al.* 1997).

Linkages can be important for allowing some species to move from their natal areas to sites where they reproduce. Linkage habitat can facilitate movement between core population areas in some species, preventing genetic isolation, and may allow for immigration into areas where populations had been locally extirpated. When large blocks of habitat remain intact, the rate of successful dispersal between core populations is higher for some species (Beier and Noss 1998). When the distance between core populations of a species is greater than the dispersal distance for individuals, linkages must provide live-in habitat to remain effective. The Morongo Wash Flood Control project and corridor is intended to provide live-in habitat for species such as the Palm Spring pocket mouse. The proposed flood control project may be located within or adjacent to the 1,200 foot corridor.

The effects of habitat fragmentation can be minimized by maintaining linkages (Soule 1986; Saunders *et al.* 1991; Beier and Noss 1999). 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 Carroll 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. It is important to recognize that the effectiveness of any habitat linkage varies considerably by species.

Some species require corridors to move between habitat patches within the Plan Area. The narrowing of existing corridors of native habitat, increased fragmentation of stepping stone habitat patches, along with increased human density and vehicular traffic, may significantly impede the movements of several taxa. Fragmentation generally adversely affects birds, reptiles, amphibians, mammals, and invertebrates. It can also adversely affect plants due to the need for seed dispersal and pollinator dispersal.

Connectivity between habitats within the Conservation Areas must be provided through wildlife crossings for mammals and reptiles. Traffic speed is thought to be correlated with risk of mortality of animals crossing roads (Jones 2000). The wildlife undercrossings are expected to allow mobile non-flying species to move within or through the Reserve System with a lower risk of traffic-related mortality. However, undercrossings are not expected to reduce the risk of direct traffic-related mortality to some animal species.

4.3.3.2 Edge Effects

The deleterious effects of conversion of natural habitats to other land uses often extend beyond project footprints resulting in "edge effects." Edge effects are also associated with habitat fragmentation. Because the ratio of edge habitat to interior habitat increases as fragment size decreases, it is important to understand how edges affect wildlife (Soule 1991). Among some of the major categories of deleterious edge effects are (1) higher frequency and increased severity of fire; (2) higher rates of hunting or poaching; (3) higher intensities of predation, (5) and higher intensities of browsing and other forms of disturbance that favor weedy species (Soule 1991). 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, and other factors. The severity of these effects depends on distance to land alteration boundaries, source of disturbance, and the affected species.

Undeveloped lands adjacent to developed areas can provide convenient access to natural areas. The use of OHVs within the MSHCP Conservation Areas could result in habitat destruction and degradation (e.g., soil compaction, soil erosion, increase fire potential, increased opportunities for non-native species introduction, and increase access opportunities by creating more trails).

We expect the proposed action to result in the construction of more houses which will result in

increased human population and more people seeking recreational opportunities within the Plan Area. Increased human use of recreational trails in and around the Reserve System is likely to disrupt breeding activities and increase the potential for predation by altering spatial or temporal behavior patterns through alarm or avoidance responses. Miller *et al*. (1998) found that nest predation was significantly greater near recreational trails than away from them, and that birds were less likely to nest near trails, in Colorado grasslands. Miller *et al*. (2001) found that western meadowlarks (*Sturnella neglecta*) and vesper sparrows (*Poocetes gramineus*) flushed in response to pedestrians, dogs, and pedestrians with dogs, on or off trails. Flushing probability was greater when dogs were off leashes because this created two sources of disturbance (human and dog) rather than one (human with dog on leash).

Irrigation practices may contribute to overall wetter soil conditions, thereby, creating more favorable soil conditions for invasive ant species such as the Argentine ant (*Iridomyrmex humilis*), which are known to be abundant in landscaped areas and invade habitat edges (Suarez *et al.* 1998). 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).

4.3.3.2.1 Lighting

Artificial night-time lighting adversely impacts the habitat value of the Reserve System, particularly for nocturnal species through potential modification of predation rates, obscuring of lunar cycles, and/or causing direct habitat avoidance. Artificially lit habitat areas may also be directly avoided by certain species. Illumination of habitat by increased night lighting within the Reserve System has the potential to adversely affect bird species.

Rich and Longcore (2006), describe artificial light that alters the natural patterns of light and dark in ecosystems as “ecological light pollution”. The first atlas of artificial night sky brightness illustrates that astronomical light pollution extends to every inhabited continent (Cinzano *et al*. 2001). Constant artificial night lighting may also disorient organisms accustomed to navigating in a dark environment. Changes in light level may disrupt orientation in nocturnal animals. The range of anatomical adaptations to allow night vision is broad (Park 1940), and rapid increases in light can blind animals. Artificial night-time lighting adversely impacts the habitat value of the Reserve System, particularly for nocturnal species through potential modification of predation rates, obscuring of lunar cycles, and/or causing direct habitat avoidance. This has been termed the “night light niche” for reptiles and seems beneficial for those species that can exploit it, but not for their prey (Schwartz and Henderson 1991). Illumination of foraging habitat by artificial light during surface activity periods of prey likely makes detection by predators easier, potentially increasing the predation rate by owls, coyotes, fox, house cats, etc. The balance between gains from extended foraging time and risk of increased predation is a central topic for research on small mammals, reptiles, and birds (Kotler 1984; Lima 1998). Small rodents forage less at high illumination levels (Lima 1998), a tendency

also exhibited by some lagomorphs (Gilbert and Boutin 1991), marsupials (Laferrier 1997), snakes (Klauber 1939), bats (Rydell 1992), aquatic invertebrates (Moore *et al*. 2000), and other taxa. Unexpected changes in light conditions may disrupt Predator-prey relationships (Rich and Longcore 1997). Artificially lit habitat areas may also be directly avoided by certain species.

Physiological, developmental, and behavioral effects of light intensity, wavelength, and photoperiod on bird species are well-documented. Many usually diurnal birds (Hill 1990) and reptiles (Schwartz and Henderson 1991), for example, forage under artificial lights. In addition to foraging, orientation under artificial illumination may induce other behaviors, such as territorial singing in birds (Bergen and Abs 1997). For frogs, a quick increase in illumination causes a reduction in visual capability from which the recovery time may be minutes to hours (Buchanan 1993). After becoming adjusted to a light, frogs may be attracted to it as well (Jaeger and Hailman 1973).

Birds can be disoriented and entrapped by lights at night (Ogden 1996). Once a bird is within a lighted zone at night, it may become "trapped" and will not leave the lighted area. Large numbers of nocturnally migrating birds are therefore affected when meteorological conditions bring them close to lights, for instance, during inclement weather or late at night when they tend to fly lower. Artificial lighting has attracted birds to smokestacks, lighthouses (Squires and Hanson 1918), broadcast towers (Ogden 1996), boats (Dick and Donaldson 1978), greenhouses, oil platforms (Wiese *et al.* 2001), resulting in mortality and likely interfering with migration routes.

Many groups of insects are attracted to lights (Frank 1988). Other taxa showing the same attraction include lacewings, beetles, bugs, caddisflies, crane flies, midges, hoverflies, wasps, and bush crickets (Eisenbeis and Hassel 2000; Kolligs 2000). Attraction depends on the spectrum of light (insect collectors use ultraviolet light because of its attractive qualities) and the characteristics of other lights in the vicinity (Rich and Longcore 1997).

4.3.3.2.2 Noise

Development adjacent to Conservation Areas is likely to result in higher ambient noise levels within portions of the Reserve System which is likely to adversely affect some Covered Species. The impact of noise on wildlife is likely to differ from species to species and is not only dependent on the source of the noise (e.g., aircraft vs. blasting), but also on the duration and schedule. Organisms that rely on sound to communicate (e.g., birds, frogs, etc.) may be indirectly impacted from noise. Construction activities associated with the development of structures and roads, for example, that are outside of the Conservation Areas may generate noise that impact Covered Species within the Reserve System. For example, noise may alter time-consuming and energetically expensive behaviors (i.e., calling, singing, attack) of birds. Therefore, increased noise levels may have the potential to lower reproductive fitness by affecting territorial defense, mate acquisition, the ability to detect conspecific encroachments, foraging, and predator avoidance.

4.3.3.3 Invasive Species

Native species are often at a disadvantage after exotic species or nonnative predators are introduced. Nonnative plant and animal species have few natural predators or other ecological controls on their population sizes, and they often thrive in disturbed habitats. These species may aggressively out-compete native species or otherwise harm sensitive species. When top predators are absent, intermediate predators multiply and increase predation on native bird species and their nests. Feral and domestic holding areas and golf courses provide resources for increased populations of parasitic cowbirds, which adversely effect native songbird populations. Litter and food waste from migrant worker camps and picnickers can contribute to an increase in Argentine ant populations which out-compete native ants. Invasive plant species such as salt cedar (*Tamarix* sp.) can alter water flow and quantities resulting in adverse effects to water dependent species that are present throughout the Coachella Valley floor.

Several of the Conservation Areas within the Plan Area have an abundance of invasive invasive plants, notably Saharan mustard (*Brassica tournefortii*). Saharan mustard has reportedly been in the Coachella Valley since the 1920's, but since the 1980's it has greatly increased it range and dominance (Brooks 2005; Sanders and Minnich 2000). Some researches expect that it will further expand its dominance within the region it currently occupies (Brooks 2005). Invasive plants stabilize soils and reduce or slow aeolian sand transport. Invasive plants likely compete with and reduce the biological productivity of native plants, and likely affect wildlife by altering the availability of forage plants and the characteristics of the ecosystem structure (Cal-IPC 2005; Brooks 2005). In addition, some of these plants likely increase the potential for fire (Sanders and Minnich 2000; Cal-IPC 2005; Brooks 2005). Dense stands of Saharan mustard in the Coachella Valley appear to suppress native wildflowers; because of its quick growth and flowering following rains, Saharan mustard appears to monopolize available soil moisture as it builds canopy and matures seed well before many native species have begun to flower (Sanders and Minnich 2000). Saharan mustard was estimated to cover 40 percent of sampled sand fields in the Thousand Palms Preserve (C. Barrows, pers. comm., 2006).

Argentine ants may affect terrestrial invertebrates through direct predation and competition. As discussed above, Argentine ants can alter the native arthropod community, thereby significantly reducing their diversity and abundance (Bolger *et al.* 2000). For example, Argentine ants have the potential to impact may affect the food sources for lizards. Reptiles could also be directly depredated by Argentine ants.

The MSHCP currently anticipates that a focused research effort will be initiated once it is determined that invasive weeds are a possible stressor to Covered Species. The MSHCP proposes that cause and effect dynamics, duration of effects, and control methodologies all need further research before management actions can or should occur.

4.3.3.4 Off-Road Vehicles

In 1983, Webb and Wilshire (1983) published a somewhat comprehensive analysis on the impacts and management of OHVs in arid regions. Substantial illegal OHV activity occurs in many areas of the Coachella Valley, but is partially limited by law enforcement, signing, fencing, and public information and education. Most of the desert soils in the action area are susceptible to compaction from vehicles, although sand deposits and sand dunes are less prone to compaction: fine sand is more easily compactable, whereas coarse sand does not compact well (Global Security 2005). Well-sorted soils, such as sand dunes, do not compact significantly, while poorly sorted soils, which typically occur in the desert on alluvial fans, are prone to high levels of compaction from vehicles (USGS 2004). Important factors determining the intensity of compaction are soil moisture, vehicle type, and amount of vehicle activity (Davidson and Fox 1974; Webb *et al.* 1978; Gillette *et al.* 1980). Compaction results in increased water and wind erosion and decreased water infiltration and retention. Important factors in erosion of desert soils are slope, soil particle size, and size of disturbed area (Adams and Endo 1980). Compaction of soils likely negatively affects the burrowing and digging of vertebrates and invertebrates. Changes in soil characteristics may affect the ability of the soil to support vegetation, resulting in decreased density, diversity, and/or biomass of plant cover (Davidson and Fox 1974; Webb *et al.* 1978). These ecological changes are likely most important for the sand dependent species' habitat where sand deposits are typically shallow and interdigitated with more compactable soils, such as within the Whitewater River floodplain outside of the Big Dune and within the Willow Hole area.

OHVs typically impact vegetation by physically damaging roots, stems, or whole plants (Hall 1980). The results of decreased biomass and/or change in species diversity likely results in a reduced or degraded food base for invertebrate prey species and/or modified predator-prey ratios. In addition, decreases in plant cover will generally decrease protection of certain species from predators and shelter from solar heating and wind, and likely reduces sand accumulation and retention under plants. Vehicle use typically crushes individual plants, reduces the reproductive output of those that survive, and changes dune structure. Ongoing vehicle use likely changes the basic properties of nearby soils and adversely affects its stability and ability to support natural vegetation (Webb *et al.* 1978). Vehicle traffic can have a long-lasting impact on the mobile sand dunes that is manifested by a lack of vegetation (BLM 2003). Though some of the effects listed below likely do not relate to sand dune substrates, our review of OHV impact studies indicates that general effects on soils include (1) reduced soil moisture for most soil types, (2) increased surface strength for most soil types but reduced surface strength for sandy soils, (3) increased bulk density of soils to depths of 3 feet or more, (4) reduced infiltration rates; (5) reduced porosity and permeability of soils, (6) changes in the insulating characteristics of soils (extending the diurnal temperature range), (7) reduced organic carbon content, (8) increased runoff, and (9) increased rates of erosion (Webb *et al.* 1978, Adams *et al.* 1982). The extent and degree of impact depends on factors such as type of soil, type of vehicle, amount of use, degree of slope, topography, and vegetation. We expect the most significant effects to dune sands as they pertain to fringe-toed include (1) de-stabilization of slopes and swales, (2) quicker and untimely drying

time as well as reduced soil moisture after rainfall events, and (3) changes in the insulating characteristics of soils.

The biotic and abiotic factors necessary to maintain normal ecological functions and existing population levels have likely been subject to degradation by OHVs in most sandy areas within the valley floor. The adverse effects of OHV damage to plant and animal communities has been documented in the dune environments, where species richness and biomass at several trophic levels (plants, invertebrates, reptiles, and mammals) has apparently experienced substantial losses in moderate to heavy OHV-use areas (Luckenbach and Bury 1983; Carpelan 1995).

4.3.3.5 Small, Declining, and Peripheral Populations; Conservation Implications

Small and declining populations of animals and plants can exacerbate difficult land management situations. Loss of peripheral populations that are a part of small or declining populations may expedite extirpation or extinction events for central/core populations. Small, declining, and peripheral (disjunct or connected) populations are more vulnerable to demographic, genetic, and environmental stochastic events, and natural catastrophes. Genetic stochastic events can further influence population demography via inbreeding depression and genetic drift.

4.3.4 Roads

Section 7 of the MSHCP identifies road maintenance, road widening, road improvement, and new road construction as Covered Activities. Thus, there is the potential to increase the degree of fragmentation within the Conservation Areas 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 Covered Species.

4.3.4.1 New Roads

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, disrupt sand transport, 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 are 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. However, during extreme natural events, such as drought and fire, species may expand their home range into the "road effect zone" (Forman and Deblinger 1998). Forman and Deblinger (2000) argue that the "road effect zone" for each side of a primary road should be calculated as two times the effect distance for most sensitive species. The effect-distance is "the distance from a road at which a population density decrease was detected" (Forman and Alexander 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) in other ecosystems.

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. Many of the proposed roads within the Conservation Areas are required to implement avoidance and minimization measures to maintain fluvial and aeolian sand transport as described in Section 7 of the Plan. Proper implementation of the avoidance and minimization measures is imperative to ensure that the fluvial and aeolian sand transport remains in tact to sustain the habitat for the proposed Covered Species. 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 (Hellawell 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).

4.3.4.2 Road Improvements/Maintenance (existing and future roads)

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.

Section 7.3.1.1 of the MSHCP describes operation, maintenance, and safety activities within existing rights-of-way or easements associated with the activities listed in Tables 7-1 through 7-9. Proposed roadway operation and maintenance activities conducted by the Permittees are anticipated to be confined to existing roadway beds and shoulders. Except as otherwise

identified in the Section 4.3 subsections within individual Conservation Areas, operation and maintenance activities by Permittees within Conservation Areas that are Covered Activities include, but are not limited to: 1) Installation and maintenance of signs, including overhead signs, traffic control devices, such as traffic signals, guardrails and fences for vehicle and pedestrian safety; 2) Routine repair, resurfacing, and reconstruction of pavement; 3) Repair of natural disaster damage and restoration of emergency access; 4) Grading of shoulders up to 12 feet from the edge of paved or unpaved roadways and existing dirt roadways; 5) Construction, replacement, and repair of curbs, gutters, sidewalks, and berms; 6) Minor widening and realignment for safety purposes that does not add through travel lanes, but may include turn lanes; 7) Slope maintenance and slope protection such as rip-rap; 8) Dust stabilization, including application of soil stabilizers and paving of dirt roads; 9) Construction, repair, replacement, and cleaning out of culverts, drop structures, and down drains; 10) Bridge maintenance, including deck and railing replacement, column replacement, and reconstruction/placement of check dams; 11) Ditch clearing and lining; 12) Tree trimming and weed control by non-chemical means; 13) Landscape maintenance; 14) Utility relocation incidental to above activities; and 15) Sand removal.

Because the footprint of these types of activities will occur within already disturbed areas, that typically support limited habitat and the MSHCP provides measures 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.

4.3.5 Transportation Projects

Interchanges and Associated Arterials, Regional Transportation Projects, Caltrans, and County of Riverside County Transportation Department

Transportation projects identified in Tables 7-1 through 7-3 of the MSHCP are Covered Activities both within and outside of Conservation Areas. Table 7-1 identifies all of the interchanges and associated arterials within the Plan Area. Portions of some of these related arterials are within Conservation Areas. Widening of the local arterials associated with these interchange projects are also Covered Activities. The interchange projects and associated arterials are depicted in Figure 7-1 of the MSHCP. The mitigation obligation for the interchange projects and associated arterials is described in Section 6.6.1 of the MSHCP. Caltrans' projects are identified in Table 7-2 and include road widening and interchanges. Figure 7-3 in the MSHCP illustrates the Caltrans projects within the Plan Area. The mitigation obligation for Caltrans' projects and operation and maintenance activities are identified in Section 6.6.2 of the MSHCP. Table 7-3 lists the regional transportation projects throughout the Plan Area. The lead jurisdiction or agencies for the regional road projects includes the cities of Palm Springs, Cathedral City, Rancho Mirage, Palm Desert, Indian Wells, Indio, La Quinta, and Coachella, the County of Riverside, and Caltrans. Incidental take resulting from a projects and/or operation and maintenance activities listed in Tables 7-1 through 7-9, and for the operation and maintenance activities listed in Section 7.3.1.1, does not count against the acres of loss anticipated within the Conservation Areas, if they are constructed as anticipated in the Plan.

Caltrans' projects will affect several of the Conservation Areas within the Reserve System. They include Cabazon, Stubbe/Cottonwood Canyons, Snow Creek/Windy Point, Whitewater Canyon, Hwy 111/I-10, Willow Hole, Whitewater Floodplain, Desert Tortoise and Linkage, Upper Mission Creek/Big Morongo Canyon, Coachella Valley Stormwater Channel and Delta, and Santa Rosa and San Jacinto Mountains Conservation Areas. Specifically, Caltrans is required to avoid and minimize affects to the fluvial sand transport system, Biological Corridors, desert tortoise, desert pupfish, and Peninsular bighorn sheep essential habitat. 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, Caltrans is obligated to adhere to the overall Conservation Goals and Objectives and Required Measures for each Conservation Area including Species Conservation Goals and Objectives by applying the Avoidance, Minimization, and Mitigation Measures (Section 4.4 of the MSHCP) as well as the Land Use Agency Guidelines (Section 4.5 of the MSHCP).

Other transportation projects within the Conservation Areas proposed as Covered Activities are under the jurisdiction of Cathedral City (Table 7-4), City of Palm Springs (Table 7-5), and Riverside County Transportation Department (Table 7-9). Where applicable, each proposed transportation project has required avoidance and minimization measures that will be implemented to avoid impacts associated with the transportation project within the Conservation Areas.

Avoidance and minimization measures that the County Transportation Department is required to implement include maintaining fluvial sand transport and installing wildlife undercrossings if roads are widened to four lanes. The Riverside County Transportation Department shall also develop a worker education program to avoid impacts to desert tortoise.

In addition to the proposed transportation projects conducted by Riverside County Transportation Department, an 11-acre borrow pit from which materials may be periodically taken for use in road construction is a Covered Activity. The borrow pit is located in the Willow Hole Conservation Area. No sensitive species or other ecological processes will be affected by the borrow pit.

Generally, the proposed transportation projects within the Plan Area will have little direct effects to the Reserve System outside of the Conservation Areas. However indirect effects from roads on the Reserve System could occur from roads adjacent or in close proximity to the Conservation Areas. The indirect effects from roads include watershed impacts, water quality, OHV access, road kills, and lighting impacts, as discussed above. Transportation projects within the Conservation Areas will have direct impacts to Covered Species and their habitat. Many of the same effects from roads outside of the Conservation Area will occur from Covered Activities within the Conservation Areas. Direct effects such as these include road kills, habitat fragmentation, water quality, OHV access, lighting, and noise.

Roadways other than those identified and described in Section 7 of the MSHCP are not Covered

Activities without an amendment to the MSHCP. Roadway projects are subject to the avoidance and minimization measures described in Section 7 and in the applicable Sections of the MSHCP (Sections 4.3, 4.4, and 4.5). Implementation of avoidance measures and design features to maintain linkages and corridors will minimize the effects of fragmentation. Implementation of the MSHCP Conservation Goals and Objectives and Required Measures and Species Conservation Goals are anticipated to avoid and minimize impacts to Covered Species and their habitats. Incorporating appropriate wildlife crossing and implementing the avoidance and minimization measures into roadway project designs will minimize the effects of habitat fragmentation. Culverts and undercrossing implemented in association with roadway projects will provide some of the terrestrial Covered Species with the ability to pass under the roadways safely. While avoidance and minimization measures are proposed, mortality for certain species will likely occur. However, we anticipate that the affects to Covered Species will not be appreciable.

4.3.5.1 Effects from Roads on Specific Taxa

Roads have varying effects to different flora and fauna. Below is a summary of the effects of roads on various groups of species.

4.3.5.1.1 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 speeds are significantly increased. 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.

4.3.5.1.2 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. The MSHCP addresses one species of fish (desert pupfish), and due to proximity of the proposed roads and associated activities, the roads contemplated as Covered Activities will not have a significant affect to the species.

4.3.5.1.3 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.

In addition to fragmenting habitat, highways and other roads may be a significant source of mortality for other reptiles such as the desert tortoise. Boarman *et al.* (1997) found 39 dead tortoises in 2.5 years on a stretch of highway in California. No instances of mortality are known, but Interstate 10 and State Highway 62 pose a high risk to desert tortoises in the action area.

4.3.5.1.4 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 1,600-1,800 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). 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).

4.3.5.1.5 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.

4.3.6 Flood Control and Water Conservation District's Facilities and Maintenance Activities

Tables 7-8 of the MHSCP identifies the Riverside County Flood Control and Water Conservation District's existing facilities and Table 7-8a of the MSHCP identifies the proposed facilities within the Conservation Areas as Covered Activities. We are providing a generalized analysis of the effects of these types of activities to wildlife species. Generally, the channels, ALERT stations, levees, dams, reservoir, flood control facility, and washes occur in the Cabazon, Upper Mission Creek/Big Morongo Canyon, Willow Hole, Whitewater Floodplain, and Santa Rosa and San Jacinto Conservation Areas. The applicable avoidance, minimization, and mitigation measures are described in Section 4.3 under the specific Conservation Areas, and in Section 4.4 and 4.5 of the MSHCP. The measures include maintaining the fluvial sand transport, minimizing

impacts to bighorn sheep, and avoidance and minimization measures to the Palm Springs pocket mouse and Little San Bernardino Mountains linanthus. The various Riverside County Flood Control and Water Conservation District projects described in Section 7.3.1 are mitigated through the Local Permittees' mitigation obligations described in Section 6.6.1 of the MSHCP.

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 MSHCP as Covered Activities that are "subject to an MOU or agreement with CDFG for such activities would be covered pursuant to those MOUs or agreements." However, the maintenance of existing flood control facilities will be subject to compliance with the Conservation Goals and Objectives, Required Measures, and Species Goals and Objectives identified in the MSHCP.

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. The washes in the valley rely on the natural flood regimes that create the habitat necessary to support some of the proposed Covered Species by depositing fresh sand through the wash system. Flood control activities inhibiting the natural flood regime would likely reduce available habitat for species such as the Little San Bernardino Mountains linanthus (see Species Specific Evaluation for the Little San Bernardino Mountains linanthus).

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. Maintenance activities will likely result in loss of various plant and animal species that currently occupy the areas that are to be disturbed to maintain the function of the facility or structure. 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.

4.3.6.1 Effects From Flood Control/Water Conservation/Maintenance Activities on Specific Taxa

Flood Control/Water Conservation/Maintenance Activities have varying effects to different flora and fauna. Below is a summary of the effects of these on various groups of species.

4.3.6.1.1 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). The Plan Area supports a few narrow endemic plant species that are vulnerable to fluvial changes likely to occur from the proposed Covered Activities (i.e., flood control projects and maintenance). 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.

4.3.6.1.2 Invertebrates

Channelization activities disrupt invertebrate communities (Wene and Wickfliff 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 (Crisp and Glendhill 1970; Duvel *et al.* 1976;; 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.

4.3.6.1.3 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.

4.3.6.1.4 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 amphibian 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 also may 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.

4.3.6.1.5 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. The 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.

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.

4.3.6.1.6 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 were 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 giant reed (*Arundo donax*) to proliferate. Although some riparian birds have been documented nesting in salt cedar and giant reed, 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).

4.3.6.1.7 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 that impacts from stream channelization on small mammals were 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).

4.3.7 CVWD

Section 7 of the MSHCP identifies CVWD's facilities (MSHCP Table 7-6) as Covered Activities. We are providing a generalized analysis of the effects of these types of activities to wildlife species. The channels, debris basins, dikes, ALERT stations, levees, dams, reservoir, washes, and proposed increased flow resulting from the Water Management Plan, etc. occur in the Santa Rosa and San Jacinto Mountains, Whitewater Canyon, Whitewater Floodplain, Thousand Palms, Coachella Valley Stormwater Channel and Delta, Desert Tortoise Critical Habitat and Linkage, Dos Palmas, Mecca Hills/Orocopia Mountains, East Indio Hills, and West Deception Canyon Conservation Areas.

CVWD's Covered Activities for operation and maintenance and safety activities within existing rights-of-way or easements facilities include the removal of sand, silt, sediment, debris, rubbish, woody, and herbaceous vegetation in existing flood control facilities in order to maintain design capacity of the facility and or compliance with local fire regulations; control of weeds and vegetation by non-chemical means, and control of debris on all access roads and CVWD rights-of-way, repair or replacement of constructed channels, basins, drop structures, and levees as necessary to maintain the structural integrity and hydraulic capacity of the facility; annual inspection visit; emergency maintenance to replace batteries or make repairs on transmitters, solar panels, tipping buckets, etc. for ALERT stations. Emergency access may occur at any time of year via the Dunn Road, notwithstanding bighorn sheep avoidance measures.

CVWD water storage and transmission facilities include maintaining reservoirs by removing interior and exterior coating, caulking joints as needed, repainting exterior roof, shell, and appurtenances, and recoating interior with an approved epoxy system; boosters by providing routine oil changes and obtaining samples, remove, repair, replace, or add booster pump as needed; landscaping around reservoirs (where applicable) by maintaining. irrigation pumps, performing routine repairs on irrigation system, trimming trees and shrubs as needed, and clearing brush from site; hydroelectric generating facility turbine by inspecting, repairing, or replacing turbine components, changing oil, and obtaining samples for analysis, inspect, test, and certify the associated crane; altitude valves by checking water level with valve operation, check function of valves, and rebuild or replace as needed; pipelines by inspecting, repairing, or replacing as needed; and sediment basin by inspecting, removing sediment as needed, and making any necessary repairs.

The applicable avoidance, minimization, and mitigation measures are described in Section 4.3 under the specific conservation areas, and in Section 4.5 and 4.5 of the MSHCP. The measures include provisions for replacement of habitat; avoidance and minimization measures for burrowing owl, desert pupfish, Yuma clapper rail, California black rail, bighorn sheep; tamarisk removal; mesquite restoration; sediment removal and placement in deposition area; maintain fluvial sand transport; and subject to the terms and conditions of the biological opinion for the Whitewater River flood control levees in Thousand Palms. Dike No. 4 recharge facility and the Martinez Canyon recharge facility may be Covered Activities through a Minor Amendment if

certain criteria are met. CVWD's water management activities proposed by Water Management Plan will result in the increases in flows in the drains that flow directly to the Salton Sea that will impact the desert pupfish. Specific effects of this Covered Activity as well as the others listed in Table 7-6 on Covered Species are addressed in the respective Species Accounts. The CVWD projects listed in Table 7-6 of the MSHCP are mitigated through the Local Permittees' mitigation obligations described in Section 6.6.1. CVWD's mitigation obligations include a contribution of $3,583,400 to the endowment fund and addressing their 7,000 acres within the Reserve System by conserving portions of the land as mitigation their projects or paying the Local Development Mitigation Fee. Although CVWD's Covered Activities within the Conservation Areas will likely affect Covered Species, the mitigation and minimization measures proposed will likely offset these effects (except as described below in Section 4.6 Mesquite).

4.3.8 IID

Table 7-7 of the MSHCP details the specific overhead power lines and the Sky Valley Substation that are proposed Covered Activities under the Plan. The Covered Activities will occur within the Coachella Valley Stormwater Channel and Delta, Desert Tortoise and Linkage, Dos Palmas, East Indio Hills, Indio Hills/Joshua Tree National Park Linkage, Mecca Hills/Orocopia Mountains, Thousand Palms, and West Deception Canyon Conservation Areas. Table 7-7 of the MSHCP includes one new construction project: the Overhead Power Line "N50" Circuit Relocation in the Thousand Palms Conservation Area. Specifically, the project involves the relocation of an existing line through desert fan palm oasis woodland on the Thousand Palms Preserve. The new alignment will avoid the sensitive habitat and follow Thousand Palms Canyon Road between Avenue 28 and Avenue 24 at which point it will follow Avenue 24 to the west to the Sky Valley Substation.

IID's operation, maintenance, and safety activities within existing rights-of-way or easements involve communication sites, substation facilities, overhead/underground power and communication line facilities. Over the life of the Permit, IID's Covered Activities could include: refueling of standby generators as needed; site inspections and maintenance as needed; Preventive maintenance, including electric test of high voltage equipment, electric test of protection relays and communication system; corrective maintenance in case of an unscheduled event, shut down, or emergency; repairs as necessary involving cranes, service trucks, pick-up trucks, etc.; routine operational activities and temperature readings; patrol on existing access roads; maintenance of existing access roads; and corrective maintenance/repair of transmission facilities as needed, using existing access road.

Applicable avoidance, minimization, and mitigation measures for the above projects are described in Section 4.3 under the relevant Conservation Areas, and in Section 4.4 of the MSHCP. Monitoring and Adaptive Management provision for bird kills, desert tortoise, burrowing owl, anti-bird perching Monitoring and Adaptive Management are required measures that will be implemented by the Permittees. An element of the Monitoring Program will address the potential for impacts to bird species as a result of overhead power lines approved as Covered Activities. Through monitoring and associated Adaptive Management, the impacts will be

assessed and necessary actions will be implemented. This may include actions to reduce or eliminate bird perching on overhead power lines. Within one year of Plan adoption, IID shall develop a maintenance plan approved by the Wildlife Agencies, for its facilities in Conservation Areas that will minimize impacts to Covered Species and Natural Communities.

IID's mitigation obligations are detailed in Section 6.6.1 of the MSHCP and include a contribution of $525,000 to the endowment fund and addressing their 900 acres within the Reserve System by conserving portions of the land as mitigation their projects or paying the Local Development Mitigation Fee. IID's activities would affect several proposed Covered Species such as the rails, burrowing owls, desert tortoise, and lizards. Lizards could be affected by the maintenance of overhead power lines and poles that could act as bird perches thereby enhancing the ability for birds to prey on lizards. Although IID's Covered Activities within the Conservation Areas will likely affect Covered Species, the mitigation and minimization measures proposed will likely offset these effects.

4.3.9 Riverside County Waste Management Department's Facilities

Waste Management Facilities, including Landfills, Transfer Stations, and Other Solid Waste Related Facilities are Covered Activities under the Plan. The Covered Activities include clean up of waste illegally dumped on parcels in the Conservation Area proximate to a landfill. Clean up activities will occur in a manner consistent with the Species Conservation Goals and Objectives for the affected Conservation Area. This may include publicly sponsored activities related to the removal and cleanup of waste on illegal dumpsites. We do not have site specific information on other Waste Management Facilities under the Plan to determine if previously disturbed areas within these facilities supports habitat for Covered Species; however, the Riverside County Waste Management Department (County Waste) will adhere to the applicable avoidance and minimization measures described in Section 4.4 of the MSHCP.

The Riverside County Waste Management Department is proposing a well on the Edom Hill Landfill (APN 659-130-004) within the Edom Hill Conservation Area as a Covered Activity as well as activities associated with the Edom Hill Landfill closure. The well is proposed to be situated on a 10-acre parcel within this Conservation Area. The Covered Activities will also include access to, operation and maintenance of the existing well and appurtenant facilities, and any related construction activities, including but not limited to, testing, drilling, operating and maintaining an additional well and water pipelines. County Waste will ensure that fluvial sand transport is maintained along the wash that crosses the parcel and will not prevent wildlife movement by construction a fence across the parcel. Therefore, impacts associated with the well on Covered Species and Ecological Processes will be mitigated appropriately to reduce potential effects to Covered Species and Natural Communities.

4.3.10 State Park's Facilities

State Park's lands within the MSHCP Reserve System include portions of Mt. San Jacinto Wilderness State Park, the Indio Hills Palms unit of the State Parks system, and the Salton Sea

Recreation Area. Covered Activities outside of the Conservation Areas associated with developed facilities within the Mt San Jacinto Wilderness State Park and Salton Sea Recreation Area include campgrounds, ranger stations, structures, and developed day use areas. Within the Conservation Areas Covered Activities include maintenance and trail use; aerial tramway (Santa Rosa and San Jacinto Mountains and Dos Palmas Conservation Areas); recreation activities associated with Covered Wagon Tours, trails, signs, and interpretive displays (Thousand Palms and Indio Hill Palms Conservation Areas), and development and operation and maintenance of campgrounds facilities, trails, and trailheads within the Indio Hills/Joshua Tree National Park Linkage Conservation Area not to exceed 100 acres. Although the MSHCP identifies these State Park recreational facilities and maintenance activities, 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 Covered species.

The Wilderness designation of the Mt. San Jacinto Wilderness State Park is anticipated to be consistent with the Species Goals and Objectives and the Conservation Goals and Objectives of the Plan. The Indio Hills Palms is currently managed per an MOU as part of the CVFTL Preserve System and will continue to be managed consistent with the Species Goals and Objectives and the Conservation Goals and Objectives of the Plan. Prior to construction of campgrounds, trailheads, and trails as a Covered Activity in the Indio Hills/Joshua Tree National Park Linkage Conservation Area, a minimum of 640 acres in the conservation area, of which a maximum of 100 acres may be developed as the Covered Activity. Development of the camping and trailhead facility must be consistent with the Species Goals and Objectives and the Conservation Goals and Objectives of the Plan. Take Authorization for the Covered Activity is contingent on the preparation of a RMUP which will reflect the scope of work and obligation of State Parks to manage and monitor State Parks land in the conservation area pursuant to the RMUP. With the requirement of State Park's to monitor and manage about 6,800 acres pursuant to the Plan and prepare a RMUP that details their obligations, the Covered Activities associated with the State Park's facilities will not significantly effect Covered Species.

4.3.11 Allowable Uses

Allowable Uses are activities that may occur on non-Federal Reserve Lands in and outside the conservation areas that are not Covered Activities as described in Section 7.3.2.1 of the MSHCP. Such non-recreational, Allowable Uses in Conservation Areas include emergency, safety, and police services and emergency response activities by Permittees required for the protection of the public health, safety, and welfare. Allowable Uses in and outside of the Conservation Areas include pesticide use. However, pesticide use is a non-Covered Activity and the Plan does not provide any take coverage for animal species affected by the pesticide application. It is anticipated that these activities will be compatible with the Species Goals and Objectives and the Conservation Goals and Objectives of the MSHCP.

4.3.12 Compatible Activities in the Conservation Areas

Compatible Uses are activities that may occur on non-Federal Reserve Lands in the Conservation

Areas that are Covered Activities. As described in 7.3.3 of the MSHCP, Compatible Uses include: 1) emergency repairs by Permittees of public infrastructure facilities and activities associated with Reserve Management and Monitoring; and 2) Public Use and Trails on Reserve System Lands within the Santa Rosa and San Jacinto Mountains Conservation Area.

4.3.12.1 Emergency Repairs by Permittees of Public Infrastructure Facilities and Activities Associated with Reserve Management and Monitoring

4.3.12.1.1 Emergency Repairs by Permittees of Public Infrastructure Facilities

Public infrastructure facilities and utilities are currently located within the Reserve System and future facilities may be proposed in accordance with the Covered Activities described in Section 7.3.3.1 of the MSHCP. Emergency repairs for these facilities may be necessary for the health, safety, and welfare of the public. The Plan includes the following procedures for emergency repairs to public infrastructure facilities to minimize the effects to Covered Species associated with the actions: 1) notification of CVCC staff that a repair is necessary; after-the-fact notification will occur for emergency repairs that must be carried out immediately for the protection of public health and safety; 2) CVCC staff or the Land Manager will conduct a site visit with emergency repair staff to assess the situation and determine if the repair may affect MSHCP resources; recommendations will be made regarding methods for implementing the emergency repair while minimizing environmental impacts, including post-repair restoration efforts; sensitive areas may be flagged in the field to assist in providing direction for repair crews; 3) CVCC staff or the Land Manager will conduct onsite monitoring during the repair, if necessary; 4) CVCC staff will assess and document onsite conditions and include such documentation in the administrative record of the MSHCP; revegetation plans will be prepared, if warranted and CVCC staff or the Land Manager will oversee the implementation of the plans.

4.3.12.1.2 Reserve Management and Monitoring

Section 7.3.3.1 of the MSHCP describes instances where incidental take of Covered Species could occur during management activities on Reserve System. Proposed take of Covered Species from management activities will be limited to those actions specifically described in the Management Program or Annual Work Plans approved by the RMOC. In addition, these actions will be conducted by agents or employees of the Service, CDFG, CVCC, 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 fuel modification, fire management, weed control, and habitat enhancement. In addition to management actions, monitoring and scientific research conducted by the Permittees through the implementation of the Monitoring Annual Work Plans prepared by the Monitoring Program Administrator 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. 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 MPA and approved by the Wildlife Agencies. Person's undertaking monitoring actions will carry out their duties in conformance with the protocols and procedures specified in the training. Activities undertaken will be consistent with the Monitoring Program. Monitoring activities that may result in impacts to Covered Species include capture, relocation to prevent injury or death, trapping, handling, enhancement, etc. For activities involving desert tortoise and Peninsular bighorn sheep, regional consistency and specialized training and handling are required beyond compliance with the Plan.

Management and monitoring activities overseen by the MPA on non-Party or non-Permittees lands will be considered a Covered Activity if the land owners or managers have entered into a management agreement with the CVCC for cooperation of habitat conservation and management and monitoring as identified in Section 18 the IA.

4.3.12.2 Public Use and Trails on Reserve System Lands within the Santa Rosa and San Jacinto Mountains Conservation Area

The Reserve Lands in the Santa Rosa and San Jacinto Mountains Conservation Area involves trails that cross both Federal and non-Federal land. The MSHCP has been prepared to provide take authorization for Covered Species associated Covered Activities that include Compatible Activities on non-Federal lands identified in the Plan. Compliance with section 7 of the Act is required for Federal lands within the Plan Area and BLM is pursuing a section 7 consultation for the Federal lands. The USFS will determine whether public use and trails management will require consultation with the Service pursuant to section 7 of the Act. The Permit would authorize take associated only with the existing trails listed in Section 7.3.3.2.1, Elements 1 and 2 of the Plan.

4.3.12.2.1 Trails Management Program

Public Use and Trails Management is proposed on Reserve Lands within the Santa Rosa and San Jacinto Mountains Conservation Area. As described in the Project Description, the Santa Rosa and San Jacinto Mountains Conservation Area includes trails that cross both Federal and non-Federal land. The trails management program is composed of eight elements that are summarized above in the Project Description. The MSHCP addresses impacts to Covered Species for the construction of specified trails and for the use of identified trails on non-Federal land as described in Section 7 of the MSHCP. A detailed analysis for the Trails Plan and associated recreation is in the Peninsular bighorn sheep Species Evaluation and will not be further discussed in this section of the Biological Opinion.

4.3.12.2.2 Other Public Access Issues and uses on Reserve Lands in the Santa Rosa and San

Jacinto Mountains Conservation Area

Recreational activities are proposed on non-Federal lands that support Peninsular bighorn sheep in the Santa Rosa and San Jacinto Mountains Conservation Area. The Plan addresses recreational activities and requires various restrictions as detailed in Section 7.3.3.2.2 of the MSHCP and is herein incorporated by reference. The recreational activities contemplated in the Plan are cross-country travel, camping, dogs, bicycle restrictions, pack stock, noncommercial, noncompetitive organized group activities, non-motorized commercial recreation activities, competitive recreation events, and motorized-vehicle use of trails. A detailed analysis for the Trails Plan and associated recreation is in the Peninsular bighorn sheep Species Evaluation and will not be further discussed in this section of the Biological Opinion.

4.3.12.2.3 Existing Trails Outside of the Santa Rosa and San Jacinto Mountains Conservation Area

Trails currently exist on Reserve Lands outside the Santa Rosa and San Jacinto Mountains Conservation Area. The existing trails were established primarily in association with parks, preserves, and wilderness areas and include: 1) a system of trails on the Thousand Palms Preserve; 2) the Pacific Crest National Scenic Trail traversing Reserve Lands in the Snow Creek/Windy Point and Stubbe and Cottonwood Canyons Conservation Areas; and 3) trails on non-Federal lands within Dos Palmas Preserve/ACEC. We anticipate the existing trails outside of the Santa Rosa and San Jacinto Mountains will be limited to their existing footprint and not encroach into the proposed Covered Species' habitat. Therefore, considering the few existing trails and with the implementation of the Reserve System monitoring, no additional effects to Covered Species are expected.

4.3.13 Conditionally Compatible Uses

Covered public access activities on Reserve Lands described in the Section 7.3.4.1 of the MSHCP consist of trails, facilities, and passive recreational activities. As described in the Project Description above, the primary public access component on Reserve Lands will be trails. Section 7.3.4.2 of the MSHCP describes guidelines for public access and recreation on Reserve Lands to provide sufficient protection for natural and biological resources.

Conditionally Compatible Uses are considered compatible with the Species Conservation Goals and Objectives and the Conservation Area Conservation Goals and Objectives and Required Measures subject to specific guidelines and criteria described in Section 7.3.4.2 of the Plan. In addition to protecting biological resources, another primary objective of the Plan is to provide recreational and educational opportunities, while providing adequate protection for the biological resources. The Plan proposes public access to the Reserve System to provide the public with opportunity to experience and appreciate the natural environment.

4.3.13.1 Covered Public Access Activities

The Conditionally Compatible Covered Public Access Activities on Reserve Lands consist of trails, facilities, and passive recreational activities with the primary public access component on Reserve Lands will be trails. Passive recreation includes hiking, bird watching, photography, and under specified locations identified in the following guidelines, mountain biking, horseback riding, picnicking, scientific research, and hunting. Other activities associated with public access and recreation that will be Allowable Uses include signs and barriers.

The MSHCP proposes the construction and maintenance of trails and passive recreation as Covered Activities. 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). If trails are constructed and recreational activities occur within the Reserve System, it could also result in increased sedimentation of aquatic habitats, increase in noise, and dust accumulation from trail use. Maintenance of trails could result in loss of habitat due to vegetation removal that has grown along the trail. Added sedimentation could result from hand or mechanized maintenance work and individual plants and animals could be trampled by worker foot traffic. Effects due to the construction and operations and maintenance of trails would be minor. Similarly, minor effects are likely due to passive recreational uses. However, illegal OHV use could result in further detrimental effects to this species that could be promoted by the installation of trails and recreational uses within the Reserve System.

In addition to trail construction/maintenance, the Plan would include hiking, mountain biking, and equestrian use as Covered Activities. Human use of recreation sites in Covered Species habitat could result in direct and indirect effects. Direct loss and mortality of adults and other life stages could result from trampling in and around habitat. The potential impacts of people walking along stream banks could be especially high on juvenile and adult arroyo toads, which burrow into sandy banks during daylight hours.

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.

Harassment of various species could result from individuals needing to constantly move away from human traffic. Individual animals moving away from an activity area may be driven into areas where they would be more susceptible to injury or mortality due to predation, vehicular traffic, or foot or equine traffic. The extent to which this form of harassment occurs would be difficult to determine.

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 (Service 1998a) and southwestern willow flycatcher (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).

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.

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, the adverse effects are greater. We anticipate that the MPA, Land Managers, and managers for the 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 *Criteria for the Siting and Design of Trails and Facilities* and *Guidelines for Public Use and Maintenance*. 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 OHV use within the conservation areas, and prohibiting motorized vehicle access by the public.

4.3.13.2 Guidelines for Public Access and Recreation on Reserve Lands

Section 7.3.4.2 of the MSHCP proposes *Guidelines for Public Access and Recreation on Reserve Lands* to avoid and minimize potential adverse effects of the Trails Plan and recreation activities. As discussed above, the Plan specifically includes criteria for siting and design of the trails and facilities and guidelines for public use and maintenance.

4.3.13.3 Criteria for the Siting and Design of Trails and Facilities

Trails and facilities will be sited and designed to be consistent with the Species Goals and Objectives and the Conservation Goals and Objectives of the Plan; will be located in the least sensitive areas to avoid and minimize impacts to habitat occupied by Covered Species; and will be designed to discourage and prevent instruction into adjacent environmentally sensitive areas. Implementation of the criteria described in Section 7.3.4.2 of the MSHCP will minimize habitat degradation by using existing dirt road; drainage management; water breaks; discouraging and preventing intrusion into environmentally sensitive areas; and avoiding traversing sensitive areas.

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. Trail access points to Reserve Lands that are consistent with the Species Goals and Objectives and the Conservation Area Goals and Objectives will be identified and entry controls and signage at trailhead sites will be used to encourage proper use. Trailheads will be sited to be consistent with resource protection goals and at the edge of the resource areas.

4.3.13.4 Guidelines for Public Use and Maintenance

To minimize the impacts associated with public use and maintenance within the Reserve System, only passive uses (i.e., bird watching, hiking, equestrian use, biking, photography, picknicking, scientific research, and hunting) 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 on Reserve Lands will be prohibited. Access to the Reserve Lands will be controlled through properly maintained fencing and signs. The Reserve Lands 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. Hikers must stay on designated trails and not stray into adjacent areas to prevent trampling of vegetation and erosion.

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. Equestrian use will be limited to designated trails. 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. Mountain bikes trails will be constructed on grades no greater than 25 percent. At the discretion of the RMUC, public access may be restricted within and adjacent to wetlands, riparian areas, restoration areas, and sensitive wildlife habitat. Where implemented, these restrictions will minimize potential degradation of these areas. When required, fencing or other barriers will be used to restrict access to protect biologically sensitive resources. Trails, facilities, signs and barriers will be maintained to discourage and prevent intrusion into environmentally sensitive areas. Litter and trash will be controlled on a regular basis to minimize attraction of predatory species. Closed garbage cans will be provided at trailheads and access points.

4.4 Management/Monitoring and Adaptive Management Program

The MSHCP proposes general Management actions that will be implemented to address the processes, threats, and disturbances that currently affect natural ecosystems. Management

actions for the Reserve Lands will integrate management of Existing Conservation Lands with Additional Conservation Lands. Management actions are subject to the Adaptive Management approach in that they will be evaluated and modified based on feedback from the Monitoring Program. Management actions necessary to maintain ecosystems and the Covered Species will be conducted and included in the Reserve Management Unit Plans. Ongoing management actions are described below and in Section 8.2.4.1 of the MSHCP and are herein incorporated by reference. They include, but are not limited to: control unauthorized OHV use or vehicle trespass by installation of signage, fencing, and gates; patrolling; law enforcement; installation of barriers; install barriers, gates, and fences; control of disturbance from sand and gravel mining, road widening, illegal berming, and drainage diversions; control of non-native or invasive species; and maintain and manage wetland habitats.

An initial baseline assessment of newly acquired lands will be undertaken within the first three years of their addition to the MSHCP Reserve System. The baseline assessment will include a general characterization of existing habitat conditions, species presence and diversity, presence of threats, and general identification of management issues. The assessment will be included in the Monitoring Program database and provided to the RMOC. Existing baseline data will be used for the Existing Conservation Lands and will be augmented by new data collected in the Monitoring Program.

In addition to these Management actions described above, Species Specific Management actions described in Section 9 of the MSHCP are intended to address the known threats to individual species. The Management and Monitoring Programs propose to control activities that degrade Covered Species, control of invasive species where necessary, and restore and enhance degraded habitat as necessary according to monitoring results. The Management and Monitoring Programs include a provision to develop and test models to address the distribution, abundance, and ecological requirements of Covered Species.

The Management actions generally provide guidance for avoidance, minimization, and habitat maintenance and restoration where Covered Species are known to be present and will be implemented in addition to general ongoing management actions.

As described in the Description of the Proposed Action and in Section 8 of the MSHCP, the Management Program will include ongoing management responsibilities and Adaptive Management. This framework is adaptive and subject to modification as system stressors change and as new information on how better to manage the Reserve System to achieve the species and habitat goals becomes available. The Monitoring Program will be implemented in phases starting with the collection of baseline data that will be used to evaluate conceptual monitoring strategies followed by implementation of long-term species and Natural Communities monitoring. The Monitoring Program will thereafter be adaptive to incorporate new protocols and techniques as appropriate. The goals in making future modifications to the Monitoring Program will be to improve efficiency and increase the reliability of the data. The Monitoring Program data will be used to both determine if the Plan is meeting its Species Goals and Objectives and the Conservation Goals and Objectives and identify the need for and the success

of Adaptive Management of the Reserve Lands. The Monitoring and Management Programs are designed to: 1) determine if the Plan is achieving its Species Goals and Objectives and the Conservation Goals and Objectives for the Covered Species and conserved natural communities; 2) specify the primary components of MSHCP Reserve System management; and 3) determine how Adaptive Management strategies will be used and how effective they are to address changes in habitat condition, Natural Communities, and/or species status.

Responsibilities for specific activities associated with reserve management are divided amongst the Reserve Management Oversight Committee (Section 6.1.3 of the MSHCP), the Land Manager (Section 6.1.5 of the MSHCP), and the RMUC (Section 6.1.4 of the MSHCP). The specific responsibilities of each of these entities are detailed in the Section 8 of the MSHCP. Their responsibilities include facilitating consistent and continuing exchange of information among all individuals and committees involved in reserve management and monitoring. The Land Manager has the responsibility to facilitate the exchange of information regarding all completed and proposed management and Adaptive Management actions. Annual reports are prepared by the Land Manager and MPA and require review by the CVCC, RMOC, and appropriate RMUCs.

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.

Section 8 of the MSHCP details the monitoring framework for the Covered Species and Natural Communities, as well as management approaches including Adaptive Management. Section 8 of the MSHCP is designed to be adaptive, and holds its Scientific Principles (Section 8.3.2 of the MSHCP) as the guiding principles of monitoring to be accomplished under the Plan. Aspects of the Trails Monitoring Plan (Sections 8.4.7.1, 8.5.1, 8.8.3, and elsewhere in the MSHCP) are the subject of Permit Terms and Conditions as described in the Species Specific Evaluation Section of this Biological Opinion under the Peninsular bighorn sheep species account. We also have developed Permit Terms and Conditions to address concerns related to specific monitoring and management needs relative to the sand-dependent species (Section 8.4.1 and Section 9). Management actions aside from identified prescriptive actions are to be undertaken according to an Adaptive Management framework (Section 8.2.4.3 of the MSHCP). Assuming that monitoring and Adaptive Management actions adhere to the Scientific Principles, we find that Section 8 of the MSHCP meets the requirements of the Five Point Policy Guidance (65 FR 35242).

4.4.1 Management Contingency Fund

The Management Contingency Fund (Section 8.2.4.2 of the MSHCP) is one of our main sources of concern, necessitating Permit Terms and Conditions as described in Section 4.10. Our specific concerns regarding the Management Contingency Fund are addressed below.

The process for determining specific expenditures from the Management Contingency Fund will involve identification of needs, a work plan with actions necessary to address them, and a budget by the Land Manager and the appropriate RMUC(s). Recommendations are proposed to be reviewed by the RMOC and recommendations would be made to the CVCC. A decision is proposed to be made by the CVCC with concurrence from the Wildlife Agencies. Under the MSHCP, either an unknown entity or the Land Manager (a position with no prerequisites of scientific training; Section 8.8.1 of the MSHCP) proposes an Adaptive Management need, the Land Manager determines the budget; ultimately CVCC determines (with concurrence from the Wildlife Agencies) whether to fund the management activity. The concern is that no timeline is presented; therefore, it is unknown to what degree immediate problems requiring management are able to be addressed in a timely manner. Moreover, no specifications are made as to which entities are allowed to propose management needs. If the sources of input are restricted, necessary management needs may not receive due attention. Most importantly, no independent review is made available by which to judge the scientific merits of individual management needs. If management needs are not independently reviewed, the Plan risks misevaluating these needs and subjecting species, particularly the sand-dependent species, to unnecessary risk (see the Effects of the Actions Sections for the Coachella Valley fringe-toed lizard and the Coachella Valley round-tailed ground squirrel).

4.4.1.1 Coachella Valley Fringe-toed Lizard

In the Whitewater River Floodplain Conservation Area, management action is needed to improve ecological conditions. This management action is expected to be accomplished through: enhancement and restoration of more natural patterns of fluvial sediment deposition to provide an enhanced and longer-term sediment source for aeolian sand transport within the Conservation Area, and enhancement of aeolian sand deposition and retention to improve blowsand ecosystem function in the downwind portions of the Conservation Area.

Currently discussions are underway with CVWD that will facilitate this management action by capitalizing on the next major flood event and any flood event that causes the reconstruction of existing facilities. Facilities will be redesigned to enhance and restore more natural patterns of fluvial sediment deposition to provide an enhanced and longer-term sediment source for aeolian sand transport within the conservation area, and enhance aeolian sand deposition and retention to improve blowsand ecosystem function in the downwind portions of the conservation area. This action would likely include the reorientation of the recharge basins and possible elimination of some of the recharge basins. No permanent structures will be developed without Wildlife Agency concurrence in the conservation area.

In the Thousand Palms Conservation Area, management action is needed to restore and maintain self-sustaining numbers of Coachella Valley fringe-toed lizards in the conservation area in the long-term, considering that an overall period of reduced aeolian sand input/transport in the future is predicted for the Thousand Palms blowsand ecosystem. This is expected to be accomplished through enhancement of aeolian deposition and sand retention in the downwind portions of the

conservation area, to improve blowsand ecosystem function.

4.4.1.2 Coachella Valley round-tailed ground squirrel

Management action is needed to restore and maintain ecological conditions to a level where self-sustaining numbers of Coachella Valley round-tailed ground squirrels will be maintained in each conservation area with Core Habitat (Snow Creek/Windy Point, Whitewater Floodplain, Willow Hole, and Thousand Palms Conservation Areas). The following actions need to be initiated within respective Core Habitat areas within 5 years of Permit issuance, if monitoring indicates that estimated population levels are likely to decline to (or are already) less than 5,000 individuals within any Core Habitat area in the foreseeable future.

Habitat for the Coachella Valley round-tailed ground squirrel will be increased through the creation or enhancement of native mesquite hummocks in areas that currently or historically have supported mesquite hummocks. Habitat enhancement will be done in an ecologically sustainable manner will be located and designed, in part, to also enhance retention of blowsand (and significantly improve blowsand and mesquite hummocks ecosystem function) within the respective conservation areas. The location, distribution, and specifications of this enhancement/creation will be developed and implemented consistent with achieving the Species Conservation Goals and Objectives of the other Covered Species in the Conservation Areas.

Within the Willow Hole Conservation Area, mesquite hummocks habitat for the Coachella Valley round-tailed ground squirrel shall be enhanced/restored. Tamarisk removal will be the focus of this task with replacement of appropriate tamarisk areas with mesquite.

Within the Snow Creek/Windy Point Conservation Area, tamarisk windbreaks controlled by Permittees (along the north side of the San Gorgonio River, south side of Highway 111) shall be experimentally replaced with mesquite hummocks. Assuming successful replacement of tamarisk with mesquite hummocks, Coachella Valley round-tailed ground squirrels will likely be re-established within these created mesquite hummocks, if natural colonization is not sufficient to establish a population.

At Dos Palmas Conservation Area, mesquite restoration in desert riparian woodlands will continue.

4.4.2 Funding of the Management and Monitoring Program

The Monitoring Program, Management Program, and Adaptive Management are described in Section 8 of the MSHCP. The cost estimates for implementation of the Management and Monitoring Programs are found in Tables 8-10 and 8-11, respectively and within Section 8.8.3 of the MSHCP and are herein incorporated by reference. During the 75-year term of the Permits, the total cost of the Monitoring Program is projected to be approximately $254,294,000; the total expended for the Management Program is projected to be approximately $221,252,000; and the total set aside for Adaptive Management is projected to be $14,903,000. In addition, as

described in Section 8.2.4.2 of the MSHCP, a one-time $5,000,000 Management Contingency Fund would be established within the first 10 years after Permit issuance. The Monitoring Program includes, but is not limited to, establishing baseline conditions, and monitoring threats and habitat and species status at the landscape, natural community, and species levels. The Management Program includes, but is not limited to, patrol, law enforcement, habitat restoration, maintaining fencing, and signage. Further, the Monitoring Program budget includes the CVCC's share of funding for trails and bighorn sheep monitoring and the research program to evaluate the effect of trail use on bighorn sheep, as described in Section 7.3.3.2.1 of the MSHCP. Adaptive Management costs could include pilot projects to evaluate management tools, studies in response to results of the Monitoring Program, and Changed Circumstances. The Plan assumes that Federal and State agencies would contribute to monitoring and land management by committing staff time and other available resources to participate with the Permittees in a coordinated Monitoring Program and to manage the State and Federal lands in the Conservation Areas.

In the first year of Plan implementation, the Monitoring Program budget is $1,033,000; the Management Program budget is $653,000; the Adaptive Management budget is $100,000; and the Management Contingency Fund contribution is $500,000. In the 75th year of the Plan with a 3.29 percent annual increase in costs for inflation, the annual cost for the Monitoring Program is $8,804,000, the annual cost for the Management Program is $7,648,000, and the annual set aside for Adaptive Management is $413,000. It is anticipated that expenditure of the Adaptive Management funds will not be required every year and any unspent funds will be carried over and be available in subsequent years.

Section 8 of the MSHCP discusses the monitoring framework for the Covered Species and Natural Communities, as well as management approaches including Adaptive Management. Management actions aside from identified prescriptive actions are to be undertaken according to an Adaptive Management framework (Section 8.2.4.3). As noted in Section 8.3.2 on Scientific Principles, the Monitoring and Adaptive Management actions will adhere to these principles, to ensure a program that is scientifically rigorous, question-based, and with the strongest inference possible. Therefore, we find that Section 8 meets the requirements of the Five Point Policy Guidance (FR 65, 106, page 35242, June 1, 2000) to provide robust information to all parties.

Several specific elements of the Monitoring and Management Programs have been designed to address concerns with the funding assurances and adequacy. These elements are the Management Contingency Fund, aspects of the Trails Monitoring Plan, and Monitoring and Management funding levels which are discussed below.

An Adaptive Management Program is also incorporated into the Plan's budget. The Adaptive Management funding is $100,000 annually to deal with uncertainties relating to Management and Monitoring of proposed Covered Species. This funding allocation will accumulate overtime as funds are not expended annually. The Plan assumes that funding level estimates are largely in addition to existing management funds (i.e., current funds available to manage the existing Dos Palmas Preserve/ACEC. Ultimately, only additional costs relating to the adoption of the MSHCP are included in the budget. The Plan also assumes that existing staff from the Service,

BLM, CDPR, CDFG, and CNLM will continue to manage portions of the Plan Area within their control, thus, the cost estimates are based on management costs in addition to what is currently being provided.

The monitoring of trail use and the research on recreational impacts to bighorn sheep will be shared between CVCC and BLM. The Monitoring Program budget includes funding for the Trails Plan related research program on wild bighorn sheep. Based on estimates provided by the Service, the budget provides for $900,000 for the five to ten year research program. The initial trails research will be carried out during an approximate five year period. According to the Plan, monitoring of bighorn sheep would be a cooperative effort involving BLM, Service, and CDFG. If other agencies are not able to provide funds, it appears that the CVCC Monitoring Program includes the necessary funding to augment this program. However, the CVCC's ability to pay for bighorn sheep monitoring is not described well in the Plan. CDFG has notified CVAG and Service that it cannot provide any funding for bighorn sheep monitoring, nor can it be depended on to continue monitoring at the current low level. One problem with relying on CDFG to monitor Peninsular bighorn sheep, is that CDFG's funding for monitoring is primarily dependent upon mitigation endowment funds from development projects in sheep habitat. Under the Plan, the individual project mitigation funds will no longer be available to CDFG to support monitoring. It remains unclear as to how bighorn sheep monitoring will be funded through the life of the Plan and beyond.

The Trails Plan also identifies potential research on captive bighorn sheep related to the Palm Desert to La Quinta Connector Trail. However, funding for research on captive bighorn sheep is not included in the Monitoring Program budget or Trails Plan research program evaluating the effects of trail recreation on wild bighorn sheep. If the Palm Desert to La Quinta trail is proposed to be constructed, then a research program evaluating the effects of the Connector Trail on captive bighorn sheep located at the Bighorn Institute is required. The Trails Plan research shall be accomplished through a two-phase process with study of the effects of trail recreation on wild bighorn sheep being completed first, and a second study evaluating the effects of the Connector Trail on captive bighorn sheep occurring once the first phase is completed, and funding becomes available and the full cooperation of the Bighorn Institute is obtained.

The Monitoring Program budget also ensures that monitoring of bighorn sheep populations will be fully funded even if State and Federal partners are not able to provide funds. There is $115,000 per year provided by CVCC with the expectation that if CDFG and the Service are not able to provide funds for monitoring, they will be able to provide in-kind staff support to the extent Feasible. The funding identified in the MSHCP for bighorn sheep monitoring was based on estimates provided by the Service.

4.4.2.1 Summary of the Budget

Funding Levels for Management and Monitoring: The Management Program budget is designed to ensure that ongoing management needs are adequately funded. The breakdown of the Management Program budget is as follows:

Management program budget (Year 1):	$ 653, 274	100%
Personnel subtotal	$ 394,795	60%
Equipment and Supplies subtotal	$ 149,600	23%
Site protection & maintenance	*$ 25,000*	*4%*
Habitat maintenance and restoration:	*$ 9,700*	*1%*
Field equipment:	*$ 61,300*	*9%*
Office equipment:	*$ 44,600*	*7%*
Education services:	*$ 9,000*	*1%*
Contingency:	$ 54,440	10%
Administrative overhead:	$ 54,400	10%

This budget includes funds for specific management tasks as well as personnel to implement these tasks. The personnel budget includes funding for contract labor field crews to perform management tasks including fence repair and invasive species control. There is also a 10 percent contingency which could be used to address unexpected management needs; in the first five years the contingency would provide at least $50,000 per year.

In addition to the Management Program budget, an inflation-adjusted $182,000 will be available annually for land improvement, including fencing, signage, trash, and invasive species/Saharan mustard removal on acquired lands. These funds will be used to remove trash and invasive species on acquired lands to improve their conservation value and to provide for fencing and signage to ensure protection of habitat values. The estimate of fencing costs for the land improvement fund was made by estimating the linear distance for all areas within the Reserve System where a need for fencing was identified. A similar estimate was made to identify the funding for invasive species removal; a GIS-based estimate of the acres subject to impacts from Saharan mustard was made and costs estimates for removal programs in other areas were used for the estimate. The expectation is that newly acquired lands will be enhanced using the land improvement fund. This will reduce the need for funding from the Management Program budget. The funds identified in the budget for fencing under site protection and maintenance will primarily be used for ongoing maintenance and replacement of fences and gates. Similarly, the Management Program budget provides funds for ongoing removal of invasive species.

Another source of funding to address management needs is the Adaptive Management fund. While these funds are not intended to be used for ongoing management costs, they can be used to evaluate management issues such as how to control invasive species, restoration options for habitat areas, and as yet unknown impacts to a Covered Species. The Adaptive Management fund together with monies available for land improvement provides $282,000 annually for land management needs. The budgeted costs for Monitoring and Management during the 75-year Permit term are summarized as follows:

$ 254,294,000	Monitoring Program
$ 221,252,000	Management Program
$ 14,903,000	Adaptive Management
$ 5,000,000	Management Contingency Fund
$ 495,449,000	Total

The funding sources for the Monitoring and Management, Adaptive Management, and the Management Contingency Fund are also the funding sources for Plan Administration described above and Establishment of the Endowment described below.

4.4.2.2 Fencing and invasive species removal

In addition to the Management Program budget, an inflation-adjusted $182,000 will be available annually for habitat improvement (fencing, signage, trash, and removal of invasive species) associated with acquisition of lands, as described in Section 5.1.2.2 of the MSHCP with a cost breakdown in Appendix I (A5.2).

4.4.2.3 Adaptive Management

This fund will provide $100,000 annually to cover the uncertainties of Adaptive Management. The potential uses of the Adaptive Management Funds are described in Section 8.8.3 of the MSHCP. The Adaptive Management Funds may be expended on 1) evaluation of invasive species impact and methods of control; 2) evaluation of the impact of hydrological changes; 3) riparian zone restoration; and 4) address unexpected impact to a Covered Species.

4.4.2.4 Additional Conservation Lands (Mitigation Lands)

Within two years of purchase, Additional Conservation Lands that are included within the conservation areas as mitigation for development projects will be subject to trash removal, fencing, and invasive species (i.e., Saharan mustard) removal. A land improvement funding source will be used to finance these activities. Following the initial land improvement, these lands will be subject to the Monitoring and Management Program.

4.4.2.5 General Evaluation of the Funding for the Management and Monitoring Programs

Habitat improvement is largely to be funded as a one-time investment. As land is added to the Reserve System, trash and invasive species are removed. After this initial improvement, the Additional Conservation Lands are included under land to be managed as part of the Reserve System. However, it is likely that additional management needs will arise (i.e., invasive weeds) that required periodic management.

Upon the acquisition of private land within the Conservation Areas, invasive species are to be removed. However, if lands are purchased during a low-rainfall period, many invasive plant species may remain unexpressed, lying dormant in the seed bank. The timing of sufficient rainfall to trigger invasive species emergence may occur after the time period in which the habitat improvement funding is available. The habitat improvement fund ($182,000 per year) is a much larger financial resource than the management budget ($4,000 per year after year 1 for

invasive species control).

All Conservation Area land purchased under the Plan may be subject to future outbreaks of invasive species not currently in the Plan area or in the Plan area at low densities. Management of invasive species or ongoing management of established invasive species would require substantial financial expenditure. In addition, it is probable that other management actions such as plant reintroduction efforts; mesquite and sand fencing establishment in dune areas; mechanical or hand weeding; and possibly mechanically ripping compacted soils may be necessary.

An even distribution of funding over time would likely prove ineffective for adequately addressing management needs. The habitat improvement budget is evenly distributed over either a 30-year land acquisition period or the life of the plan. One problem with this financial distribution is that private lands have already been purchased for inclusion in conservation areas yet have not been managed with funds from the habitat improvement funds. The Plan does not specify whether these lands are subject to the habitat improvement funding, as ownership of the lands has been greater than two years, the time period in which habitat improvement is to occur. Assuming that previously purchased lands are subject to the habitat improvement funds, due to the structure of the improvement funding budget it is likely that these initial acres would receive less funding for improvement than future acquired acres. The reason for this is that more habitat acres would be subject to the funding at the onset of acquisition than during later years. In sum, the distribution of habitat improvement funds appears to be constrained by time ($182,000 per year) rather than by acres (e.g., $3,000 per acre of private land added to conservation areas). Thus, acreage added during years in which few acres are purchased would likely receive a greater level of funding per acre for habitat improvement than acres added during years of greater habitat acquisition levels. To be equitable, funding should be provided based on acreage, not by year.

Funding levels for habitat maintenance and restoration appear inadequate. It is unlikely that sufficient funding would exist to conduct large-scale projects, especially after the first year of implementation when considering site restoration and site protection/maintenance costs combined ($42,900 annually after year 1, or $0.39 an acre for the 110,440 acres of mitigation lands anticipated to be managed within the conservation areas). Refer to Table 8-10 of the MSHCP. The Plan is allocating a similar amount as above ($39,000), annually for office equipment. The budget for office supplies appears reasonable and includes expenditures for utilities, telephone charges, and building insurance that are proposed to consume approximately 85 percent of the allocated funds. However, we are concerned that habitat management is insufficiently funded. Table 8-12 of the MSHCP describes the proposed allocation of funding. Site protection and maintenance ($25,000 annually) consists entirely of providing fencing and trash removal. Habitat maintenance and restoration ($9,000 in year 1 post Permit issuance, thereafter $4,000 annually) will purchase 40 gallons of herbicide, 10 cowbird traps, and one trap to remove invasive animals. There is no indication that 40 gallons of herbicide would be sufficient to control large invasive species outbreaks on the scale of thousands such as the outbreak that occurred during the spring of 2005. Cowbird control may be achievable with the

number of traps to be purchased. For comparison, the Western Riverside Multiple Species Habitat Conservation Plan, a Plan of similar size, budgeted $1/acre/year for herbicide, and estimated that 100,000 acres of land would need to be fenced resulting in 20,000 linear feet of fencing annually ($2 per linear foot). The CVAG MSHCP did not appear to budget for hand and power tools (aside from chainsaws) or ongoing management actions other than herbicide application and cowbird trapping.

The assessment of invasive species impacts and methods of control are relegated to Adaptive Management which is also limited annually. However, once invasive species impacts have been assessed and Managers know how to control the invasive species, it does not appear that funding is sufficient to continually provide for the control of invasive species (e.g., $9,700 for Habitat Management, to be reduced after year 1 to $4,000 annually). It is inappropriate for Adaptive Management funds to be relied upon for a potentially continual management issue. Therefore, we conclude that the Plan will be unable to provide meaningful habitat maintenance and management in perpetuity to sustain habitat to support all of the Covered Species.

4.5 Sand Transport

The floor of Coachella Valley historically contained extensive areas of blowsand, comprising a unique ecosystem dependent upon fluvial and aeolian processes (Sharp 1964, Proctor 1969, Lancaster et al. 1993, Barrows 1996, Simons, Li, & Assoc. 1997, Griffiths *et al.* 2002b, CVAG 2007). The historic (pre-European settlement) extent of blowsand deposits is estimated to have been 130,000 (45 FR 63812) to 170,000 acres (The Nature Conservancy 1985). This blowsand ecosystem had its greatest expression in an area called "The Big Dune" that covered much of the Valley-floor from Palm Springs to Indian Wells (Lancaster et al. 1993, Simons, Li, & Assoc. 1997, Barrows 1996, Barrows 1997, Griffiths *et al.* 2002b, CVAG 2007). The blowsand ecosystems in the Coachella Valley are now quite limited in acreage (USFWS 1980, The Nature Conservancy 1985, Barrows 1996, Barrows 1997, CVAG 2007). In 2000 the Service noted that only about 12,000 acres of the Valley-floor blowsand ecosystem continued to receive the naturally occurring blowsand (USFWS 2000), and others subsequently reported that less than 3,200 acres of sand dunes in the Coachella Valley remain "…in viable condition" (CNLM 2004). These blowsand areas continue to be reduced in size and ecological function, both directly and indirectly by ongoing development in the Valley (The Nature Conservancy 1985, Barrows 1996, CVAG 2007).

Four main areas that contain blowsand ecosystem remnants of the valley are expected to be conserved in the future: Thousand Palms, Whitewater River floodplain, Snow Creek, and Willow Hole (CVAG 2007). No other areas with significant blowsand habitats in the Valley are expected to remain with ecosystem processes intact in the future (CVAG 2007, Agua Caliente Tribe 2006, USFWS 2006). The Big Dune, for example, has been extensively developed. Prior to development in the Valley, The Big Dune covered about 24,010 acres (Service GIS analysis of historic photos). Our review of 2005 aerial photos of the Valley indicated a total of approximately 4,929 acres of The Big Dune remained undeveloped, or about 21 percent of its original extent (Service GIS analysis of historic and recent aerial photos). The remaining

undeveloped areas of blowsand on The Big Dune are not expected to be protected or conserved in the foreseeable future (Agua Caliente Tribe 2006, USFWS 2006, CVAG 2007).

Several sensitive or listed species are endemic to these blowsand ecosystems of the Valley (CVAG 2007). The long-term survival of these species likely will depend on the conservation of blowsand ecosystems (including sand source and transport areas) within the Thousand Palms, Whitewater River floodplain, Snow Creek, and Willow Hole areas (CVAG 2007, USFWS 2006). For example, the Coachella Valley fringe-toed lizard is endemic to blowsand habitats in the valley (CVAG 2007, USFWS 2006).

Conservation of these four areas of blowsand habitats not only depends on protection of the parcels where suitable and potential habitat exists, but also depends on protection of the physical ecological processes that occur offsite from these parcels that maintain the habitats (Lancaster *et al.* 1993, Simons, Li, & Assoc. 1997, Griffiths *et al.* 2002b, CVAG 2007, USFWS 2006). For maintaining blowsand habitats for sensitive species, the most important offsite ecological processes involve fluvial and aeolian erosion, transport, and deposition (Lancaster *et al.* 1993, Griffiths *et al.* 2002b, USFWS 2006, CVAG 2007).

Four main fluvial-aeolian systems are found within the valley that geologically maintain these blowsand ecosystems: the Snow Creek, Whitewater, Willow Hole, and Thousand Palms systems. Much of the blowsand habitats supported by these systems are found within and surrounding the existing Whitewater, Willow Hole, and Thousand Palms reserves (these three existing reserves make up the Coachella Valley Preserve System. The Snow Creek, Whitewater, Willow Hole, and Thousand Palms systems provide the majority of the remaining primary habitats for Coachella Valley fringe-toed lizard, Coachella Valley giant sand-treader cricket, Jerusalem cricket, Coachella Valley round-tailed ground squirrel, and Coachella Valley milk-vetch in the CVAG Plan Area (Griffiths *et al.* 2002b, USFWS 2003, CVAG 2007).
For the blowsand biotic communities within the Snow Creek, Whitewater Floodplain, Willow Hole, and Thousand Palms Conservation Areas, fluvial deposition areas are the main source of aeolian sand (Simons, Li, and Assoc. 1997, Griffiths *et al*. 2002b, CVAG 2007). The fluvial depositional areas that supply the blowsand areas within and surrounding the Whitewater Reserve and the Whitewater Floodplain Conservation Area are primarily associated with floodplain of the Whitewater River downstream of Windy Point (Griffiths *et al*. 2002b). The aeolian deposits within and surrounding the Whitewater Floodplain Conservation Area are largely transitory as a result of unidirectional sand movement from the fluvial depositional areas, which are recharged with fine-grained sediment only during episodic floods that typically occur during El Niño years or intense summer storm events (Lancaster *et al*. 1993, Griffiths *et al.* 2002b). The fluvial/aeolian processes that are essential to the continued functioning of the blowsand biotic communities of the Whitewater Floodplain Conservation Area are likely threatened by water-development-related activities in the area (Griffiths *et al*. 2002b).
The blowsand deposits of the Snow Creek Conservation Area receive fluvial sand input from the San Gorgonio and Whitewater river floodplains upstream of Windy Point (Griffiths *et al*. 2002b, CVAG 2007). The fluvial depositional areas that supply the lands within and surrounding the Willow Hole Reserve (and the Willow Hole Conservation Area) are primarily associated with

floodplains of Mission Creek and Morongo Wash downstream of the Banning Fault (Lancaster *et al*. 1993, Griffiths *et al.* 2002b). Other small drainages also contribute fluvial sediment to the aeolian system of the Whitewater Floodplain and Willow Hole Conservation Areas (Griffiths *et al.* 2002b).

Whitewater Floodplain System: The immediate sand source for the Whitewater Floodplain Conservation Area is the active and relatively open flood plain of Whitewater River; the river is intermittent on the valley floor and emanates from the San Bernardino Mountains with tributaries in the San Jacinto Mountains (Griffiths *et al.* 2002a). Finer sediments are entrained in a largely unidirectional wind field created by the westerly winds and deposited downwind in unstable coppice dunes/hummocks (Griffiths *et al.* 2002a). These dunes/hummocks are transitory and decrease in size as the supply of alluvial sand is depleted (Griffiths *et al.* 2002a). Wind energy in the Coachella Valley is abundant, and aeolian sand transport is limited solely by the supply of suitable fluvially-deposited sediment (Griffiths *et al.* 2002a). The data analyzed by Griffiths *et al*. (2002b) suggest that changes in fluvial sediment supply significantly influence rates of aeolian sediment transport in the Whitewater Floodplain; the highest aeolian sand transport rates follow periods of high discharge in the river, and low rates either preceded or coincided with high runoff.

Before the construction of percolation ponds, retention dikes, a railroad, and major highways (the pre-development period for the Valley), the areal extent of the Whitewater depositional area strongly reflected the amount of annual sediment deposited. In the modern era, the extent of the Whitewater depositional area has been reduced by alteration of channels and floodplains (Griffiths *et al.* 2002b). The construction of the percolation ponds in the Whitewater River floodplain has reduced the amount of sand available for aeolian transport in the Whitewater Floodplain Conservation Area by reducing the total area of sand exposed to the wind and reducing the area of floodplain sediment deposition (Griffiths *et al.* 2002b). These ponds also trap some fluvial sediment (CVAG 2007), which is then unavailable for aeolian transport owing to the geometric arrangement of the ponds perpendicular to wind direction combined with the high slope angles on the dikes (Griffiths *et al.* 2002b).

Effects: The Plan allows for development of less than 10 percent of the private lands within the Whitewater Floodplain Conservation Area. The Plan rovides for unspecified management measures, including potential utilization of the Management Contingency Fund identified in the Plan. The Plan commits the Coachella Valley Water District to "deposit sand removed from the groundwater recharge basins [percolation ponds] during maintenance operations in the fluvial and aeolian sand transport area on available Reserve lands in a manner that downwind habitat would receive appreciable inputs of aeolian sand from deposits…" While this action is expected to benefit the Covered Species, the extent of the benefit to be derived from this action has not been determined in terms of enhancements of the quality or the areal extent of habitat available in this Conservation Area. Significant reconfiguration of the percolation ponds may be necessary to achieve the needed expansion of habitat in this Conservation Area to ensure the long-term viability of some Covered Species. The Coachella Valley Water District signed a letter of commitment to consider and plan for such a reconfiguration in response to a major flood

event. This approach affords an opportunity to address this important habitat issue.

Willow Hole System: The sand supply for the aeolian system for the Willow Hole system comes from ephemeral washes, most of which have headwaters in either the San Bernardino or Little San Bernardino Mountains (Griffiths *et al.* 2002b). These sand sources are predominantly the major watercourses, particularly Mission Creek and Morongo Wash (Griffiths *et al.* 2002b).

Aeolian sand is entrained from the Mission Creek-Morongo Wash depositional area in the same manner as from the Whitewater depositional area (Griffiths *et al.* 2002b). The Mission Creek-Morongo Wash depositional area is south (downstream) of the Banning Fault and north of Interestate-10 (Griffiths *et al.* 2002b). The prevailing wind direction is westerly and sand is transported into the Willow Hole Conservation Area and to another deposit known as Stebbins Dune (Griffiths *et al.* 2002b). During very intense windstorms, and presumably when fluvial sediment is not limiting, some aeolian sediment is swept through the Willow Hole Conservation Area and is transported onto the hillslopes of the Indio Hills drainage to the north of Edom Hill (Griffiths *et al.* 2002b). Urbanization and the introduction of windbreaks – particularly *Tamarix* trees – have reduced the amount of aeolian sand transported by an unknown amount (Griffiths *et al.* 2002b). Almost all sand delivered to the Willow Hole Conservation Area in the modern setting comes from the Mission Creek–Morongo Wash depositional area (Griffiths *et al.* 2002b) and Long Canyon Wash (CVAG 2007).

The sand accumulations in the Willow Hole Conservation Area are dominated by relatively extensive mesquite hummocks (CVAG 2007). The growth of mesquite in this area is dependent on shallow groundwater along the Banning Fault, and the mesquite plants trap sand that has been transported by wind from the adjacent alluvial fans, especially the Mission Creek and Morongo Washes (Lancaster *et al*. 1993, City of Cathedral City 2002). These hummocks consist of a series of elongate patches of sand up to 30 feet (10 meters) high that have accumulated around locally dense thickets of mesquite (Lancaster *et al.* 1993). Because the blowsands in the Willow Hole area are trapped by mesquite plants that are dependent on groundwater, the dynamics of the dunes/hummocks of this area are not controlled by the variations in precipitation and sand mobility that affect both the Thousand Palms and Whitewater floodplain systems (Lancaster *et al.* 1993). Please see below for information regarding the importance of these mesquite stands.

Effects: The Plan allows for development of less than 10 percent of the private lands within the Willow Hole and Edom Hill Conservation Areas. The Plan provides for maintaining fluvial sand transport along Mission Creek. The Plan provides for protecting 98 acres that contain mesquite hummocks from development.

Thousand Palms: For the blowsand biotic communities within and surrounding the Thousand Palms Reserve and Thousand Palm Conservation Area, the West Indio Hills are the main source of fluvial sand, and the Thousand Palms alluvial fans the main aeolian source (Lancaster *et al.* 1993, Simons, Li and Assoc. 1997). The alluvial fans that supply the area within and surrounding Thousand Palms Reserve are north and east of the community of Thousand Palms. The drainages of the Indio Hills (to the north of the Thousand Palms alluvial fans) provide

essential flood flows and fluvial sediment to the aeolian system of the Conservation Area. The aeolian dunes of the Thousand Palms Reserve and Thousand Palm Conservation Area are transitory as a result of unidirectional sand movement from the upwind alluvial fans; these alluvial fans have their sand surficially exposed to the winds after being dissected during episodic floods (Lancaster *et al.* 1993, Simons, Li and Assoc. 1997). The fluvial/aeolian processes that are essential to the continued functioning of the blowsand biotic communities of the Thousand Palms Conservation Area are likely threatened by existing and new development activities in the area (Simons, Li and Assoc. 1997, USFWS 1998).

Aeolian erosion of sands exposed or deposited on alluvial fans along the base of the Indio Hills is the proximate source of sand to the Reserve (Lancaster *et al.* 1993). Aeolian sand movement to the Reserve is not limited by wind duration or velocity (Lancaster *et al.* 1993; Simons, Li and Assoc. 1997). Sediments on the surface of these alluvial fans become "armored" relatively quickly as dust and sand are eroded by winds, leaving behind a veneer of coarser matrix materials at the ground surface that are immovable to typical winds until further disturbance occurs. Thus, the amount of sand moved by the wind is closely related to the area and frequency of fluvial deposition on these alluvial fans from flood flows.

Effects: Further sand source/transport losses in the sand transport corridor, especially in Sections 7 and 8 and the 9:1 areas of the Thousand Palms Conservation Area, are problematic. Further urban development in these areas would exacerbate the current aeolian deposition deficiency within the Reserve. Fewer structures and "hardscape" within the sand transport corridor will extend the long-term ecological function and biological integrity of the Thousand Palms Reserve/Thousand Palms Conservation Area blowsand habitats. A permit condition has been created to address this specific issue.

4.6 Mesquite

Mesquite hummocks are areas where large clumps of low-growing mesquite form hummocks within sand dunes (USFWS 2004). The hummocks are created by the mesquite, which reduces the wind velocity occurring across and near the ground, thus causing sediment (mostly sand) to fall from the wind and collect near the plant (USFWS 2004). Mesquite is normally long-lived and adapted to grow relatively rapidly to avoid being buried by the incursion of blowsand (The Nature Conservancy 1985). The enlarging mass of the plant in turn creates a larger sand-trapping surface. The relationship between the large volume of sand and rapid rate of growth explains the large size of the mesquite dunes compared to sand hummocks (The Nature Conservancy 1985).

Mesquite woodland biotic communities in arid environments are dependent on shallow water tables (Jarrell and Virginia 1990, Nabhan 2001), and are threatened by groundwater pumping and other types of water development (Stromberg *et al.* 1993). Biologists have noted that mesquite plants in the mesquite dune/hummock areas of the Valley appear to be dying, possibly as a result of water table decline (The Nature Conservancy 1985, Lancaster *et al.* 1993, CVAG 2007). From 1936 to 1973, declines of as much as 60 feet (18 meters) have been measured in the

Thousand Palms sub-area, and as much as 90-100 feet (27- 30 meters) in the Palm Springs sub-area (The Nature Conservancy 1985).

Sosebee and Wan (1989) indicate that the deep taproot of honey mesquite plays a significant role in water uptake only during extended droughts, not for normal transpiration functioning of the plant. The greatest influence of severe water stress conditions on individual plants in the short-term (such as during a natural drought) is reduced photosynthesis and reduced or precluded carbohydrate translocation (Sosebee and Wan 1989). Compared to willow (*Salix* sp.) or cottonwood (*Populus* sp.), mesquite is less critically tied to groundwater that is close to the soil surface (Snyder *et al*. 1998). Mesquite can survive in upland environments in some more mesic (wetter) regions than the Coachella Valley (Snyder *et al*. 1998, Reed 1988), but in the Sonoran desert rainfall is insufficient to provide adequate surface soil moisture for honey mesquite to survive (Sosebee and Wan 1989, MSWD 2004). Under these conditions (including in the Coachella Valley), honey mesquite is a phreatophyte occupying areas where adult plants have access to permanent underground water (Sosobee and Wan 1989, Bainbridge and Virginia 1990).

Studies on the effects of groundwater decreases on velvet mesquite found that an artificial reduction in groundwater levels to greater than 49 feet (15 meters) below the soil surface resulted in substantial water stress and death of the plant (Stromberg *et al.* 1992). Taproots of adult mesquite can reach down to 39 to 43 feet (12 to 13 meters) when subsurface water is available (Fisher *et al.* 1959). Stromberg *et al.* (1993) indicated that stands of structurally diverse velvet mesquite individuals required groundwater depths of about 20 feet (6 meters) or less, or continual and quantifiable reduction in tree stature resulted.

In the Mojave Desert of southern California, mesquite plants were found to show stress if the water table fell below 15 feet (4.5 meters), and mesquite plants were not observed to grow where the depth to water was more than 24 to 29 feet (7.5 to 9 meters) (Laity 2003). Groundwater pumping in the later 20th century dropped the water table to as much as 98 feet (30 meters) below ground level in the study area, and Laity (2003) opined that this groundwater decline caused the death of mesquite in the area. Laity (2003) found that water table declines along the Mojave River of up to 79 feet (24 meters) over a period of 8 decades prevented the establishment of mesquite seedlings. Similarly, Lines (1999) opined that reproduction of floodplain honey mesquite would occur mainly by root sprouting from mature trees where the water table depth during spring is less than 8 feet (3 meters) and where there are no seasonal or long-term water-table declines caused by pumping.

It is estimated that mesquite hummocks occupied about 8,300 acres (3,360 hectares) of the Coachella Valley floor in 1939, but were reduced to approximately 870 acres (350 hectares) by 1998, a decline of almost 90 percent (Coachella Mountains Conservancy 2003). Remaining mesquite hummocks in the Valley are highly fragmented and often senescent (CVAG 2004).

Threats to mesquite hummocks biotic community in the Coachella Valley include depletion of the groundwater and fragmentation (CVAG 2007). Depletion of groundwater reduces water available to individual mesquite plants, and lack of available water is evident in various mesquite

hummock areas in the Coachella Valley by decadent and declining mesquite (CVAG 2007). Decreasing groundwater levels primarily affects mesquite communities through a reduction of (1) the shallow water table necessary for mesquite recruitment, and (2) the long-term maintenance of established adult woody vegetation (Stromberg 1992).

Willow Hole: Sand accumulations in the Willow Hole area consist of a series of mesquite-anchored hummocks/dunes and sand sheets up to 0.3-mile wide (0.5 kilometer) and 3 miles (5 kilometers) long along the trace of the Banning Fault (Lancaster *et al.* 1993, The Nature Conservancy 1985, Meek and Wasklewicz 1993, Simons, Li, and Assoc. 1997, City of Cathedral City 2002). The largest remaining concentration of mesquite hummocks in the CVAG Plan Area occur in the Willow Hole Conservation Area (CVAG 2007). The growth of this mesquite is dependent on groundwater that is close to the surface along portions of the fault (Lancaster *et al.* 1993). The mesquite plants trap sand that has been transported by wind from adjacent alluvial fans, especially the Mission Creek and Morongo washes (Lancaster *et al.* 1993). The dunes and hummocks consist of elongate patches of sand that have accumulated around the locally dense thickets of mesquite (Lancaster *et al.* 1993).

The Plan proposes to monitor and adaptively manage the mesquite community in the Willowhole Conservation Area. The Plan acknowledges that the degradation of mesquite west of Palm Avenue is likely the result of groundwater depletion and that further lowering is likely to increase the extent of the degradation. The commitment is made to maintain the specified acreage within the Conservation Area (125 acres, including the no net loss requirement) and address threats to the viability of this natural community through adaptive management actions.

Thousand Palms: Historically (e.g., 1950's), mesquite hummocks occurred in what is now the Thousand Palms Preserve (Lancaster *et al*. 1993, CVAG 2007, USFWS 1998). These mesquite hummocks have largely disappeared (Lancaster *et al*. 1993, CVAG 2007, USFWS 1998). Data from a well just south of the Thousand Palms dune field indicated an increase in the depth to groundwater of 53.1 feet (16.2 meters) during the period of 1952 to 1992, a change of 1.3 feet (0.40 meters) per year (Lancaster *et al.* 1993).

Extensive areas of mesquite communities throughout the southwestern U.S. have been eliminated by lowering of water tables (Phillips and Comus 1999). The citations above indicate that mesquite communities in the Coachella Valley occur where groundwater is relatively close to the surface, rely on groundwater, and they do not effectively adapt to groundwater levels artificially lowered to more than 49 feet (15 meters) of the ground surface. As such, groundwater levels at or above these levels are likely essential to maintaining the existing mesquite communities in the Valley. Relatively moderate groundwater decreases have occurred and are anticipated to continue in the aquifers of Coachella Valley (e.g., MSWD 2004, MSWD 2000, CVWD 2000).

Although the Thousand Palms Subarea is not addressed specifically in the CVWD Water Management Plan, the Indio Groundwater Subbasin, of which the Thousand Palms Subarea is a part, is the focus of the Upper Valley portion of that Water Management Plan. The projections

provided for that subbasin indicate an overall increase in storage. The Water Management Plan identifies a suite of approaches that together appear to provide for feasible mitigation of the existing overdraft condition. Through this combination of sources and conservation, adequate resources appear to be available to address the natural community requirements for this Conservation Area as part of the adaptive management approach identified in the Plan such that the stated commitments in the Plan can and should be met.

4.7 MSHCP Implementation, Conservation Objectives, and Required Measures

The overall Plan implementation and organizational structure are identified in Section 6 of the MSHCP and are applicable to all Covered Activities and Permittees. This includes compliance with the Conservation Objectives and Required Measures (Section 4.3 of the MSHCP), the Avoidance, Minimization, and Mitigation Measures (Section 4.4 of the MSHCP), and Land Use Adjacency Guidelines (Section 4.5 of the MSHCP) within and adjacent to the Conservation Areas. Species Conservation Goals and Objectives are identified in Section 9 of the MSHCP for each of the proposed Covered Species within each of the Conservation Areas. All of the above referenced sections of the MSHCP are herein incorporated by reference.

The Permittees are obligated to adhere and implement the above reference sections of the MSHCP, when applicable. Generally our analysis is based on our interpretation of the written Conservation Objectives and Required Measures (Section 4.3 of the MSHCP) and the Species Conservation Goals and Objectives (Section 9 of the MSHCP) within the MSHCP Reserve System; the pertinent sections of the Implementation Manual; and the Permit Terms and Conditions above. Detailed analysis of the Conservation Objectives, Required Measures, and Species Conservation Goals and Objectives can be found in the Species Accounts of this Biological Opinion (Appendix A).

4.7.1 No Net Loss Conservation Objectives for Riparian and Marsh Vegetation Communities

Marsh and riparian vegetation communities shall be subject to a no net loss Conservation Objective such that disturbance of a given number of acres may occur, but an equal number of equal or better habitat value acres would be replaced to ensure that no net loss of that vegetation community occurs. Section 4.3 and Section 10 of the MSHCP addresses specifically the Conservation Areas where the no net loss Conservation Objective will be applied. The no net loss Conservation Objective is further detailed in the Permit Terms and Conditions (Implementation Manual) and includes specific parameters such as the timing of restoration in relation to the proposed losses and a clear definition of what constitutes functional habitat for Covered Species.

Riparian habitat refers to the following Natural Communities identified in the MSHCP: southern arroyo willow riparian forest, Sonoran cottonwood-willow riparian forest, desert fan palm oasis woodland, and southern sycamore-alder riparian woodland in the Cabazon, Stubbe and Cottonwood Canyons, Whitewater Canyon, Upper Mission Creek/Big Morongo Canyon,

Thousand Palms, Indio Hills Palms, Joshua Tree National Park, Mecca Hills and Orocopia Mountains, Dos Palmas, Coachella Valley Stormwater Channel and Delta, and Santa Rosa and San Jacinto Mountains Conservation Areas. Implementation of the no net loss Conservation Objective in conjunction with the Permit Terms and Conditions is anticipated to provide long-term conservation to riparian and marsh vegetation communities and the species that inhabit them.

4.7.2 Fluvial Sand Transport

Covered Activities in fluvial sand transport areas in the Cabazon, Stubbe and Cottonwood Canyons, Snow Creek/Windy Point, Whitewater Canyon, Whitewater Floodplain, Upper Mission Creek/Big Morongo Canyon, Mission Creek/Morongo Wash, Willow Hole, Long Canyon, Edom Hill, Thousand Palms, West Deception Canyon, and Indio Hills/Joshua Tree National Park Linkage Conservation Areas will be conducted in a manner to maintain the fluvial sand transport capacity of the system. The MSHCP requires the Local Permittees to protect the fluvial sand transport Essential Ecological Process in the Cabazon, Long Canyon, and West Deception Canyon Conservation Areas to ensure no net reduction in fluvial sand transport in these Conservation Areas. The fluvial sand transport processes occur on a total of 7,800 acres in these three Conservation Areas and the only Conservation Objective within these three Conservation Areas is to maintain the fluvial sand transport processes. The Essential Ecological Process of fluvial sand transport is to be maintained throughout the Plan Area through flood control standards and general plan land use regulations.

Our analysis expects that maintenance of fluvial sand transport capacity (Section 4.4 of the MSHCP, Fluvial Sand Transport) is equivalent in meaning to "no net loss" of this capacity compared to current conditions to maintaining fluvial (and ultimately aeolian) erosion/transport/deposition processes important to the blowsand ecosystems of the action area. As such, fluvial processes in areas that are important to maintaining habitat Covered Species within Conservation Areas are expected to be protected by the proposed Plan from adverse changes that could otherwise result from Covered Activities.

The Permittees will require that natural flows onto parcels in the fluvial sand transport areas shall be conveyed offsite in the natural pre-disturbance direction of flow. Development will not impede water-borne sand transport across the parcel in its natural direction of flow and water-borne sediments and flood waters shall not be artificially retained onsite. Concentration of flows and increase in flow velocity offsite will be minimized to avoid downstream erosion and scour. Alternatively, a flood control structure for the area that is designed to ensure no net reduction of sediment transport from the sand source area to the sand deposition area where aeolian sand transport processes are active may be used to achieve the Conservation Objective of fluvial sand transport. Construction of such flood control structures requires a Minor Amendment to the Plan with Wildlife Agencies' concurrence, as set forth in Section 6.12.3 of the Plan.

We anticipate that the general plan that is in place at the time of the Permit issuance will govern the land use regulations pertaining to MSHCP Conservation Objectives and Required Measures.

Although habitat conservation is not a Conservation Objective for the three Conservation Areas mentioned above, we believe in order to maintain Essential Ecological Processes that some amount of habitat will need to be maintained to ensure that fluvial sand transport is maintained. Implementation of the Fluvial Sand Transport measure will likely ensure that sand transport associated with fluvial processes are maintained thereby enabling sand to be replenished within the various Conservation Areas.

4.7.3 Biological Corridors and Linkages

The Plan proposes to maintain Biological Corridors and Linkages between the Conservation Areas to support species movement and to connect the Conservation Areas. As discussed in more detail above, a Biological Corridor is a wildlife movement area that is constrained by existing development, freeways, or other impediments and a Linkage is habitat that provides for the occupancy of Covered Species and their movement between larger blocks of habitat over time. Specific roads identified in Section 4.3 subsections under the Required Measures and Section 7 of the MSHCP will be required to install culverts, undercrossings, overcrossings or bridges to maintain Biological Corridors. To minimize edge effects, Biological Corridors shall expand to one mile in width except where Existing Uses or freeway culverts preclude the ability for the Permittees to create a Biological Corridor of this size. The Permittees will ensure that new culverts, undercrossings or overcrossings constructed as a result of road projects are of adequate size and design to maintain ecosystem function for Covered Species. Road widening projects will undergo the Joint Project Review Process set forth in Section 6.6.1.1 to determine the dimensions of the culverts, undercrossings or overcrossings based on site specific conditions and best available science.

The Local Permittees shall conserve at least 90 percent of the acreage within each/individual Biological Corridor (not the sum total acreages of each Biological Corridor in each Conservation Area) designated in Section 4.3 of the Plan (i.e., Whitewater River at Interstate 10, Mission Creek, and Willow Wash Biological Corridors) in a configuration that provides functional connectivity for all applicable Covered Species within the Conservation Areas at issue. Any potential reduction in acreage below 90 percent of a given Biological Corridor shall be prohibited unless it is possible to offset the adverse effect by acquiring equivalent functional acreage for that corridor to ensure no reduction connectivity potential. It is expected that the measures identified above will maintain gene flow between populations and dispersal corridors throughout the Reserve System.

4.7.4 Mesquite Hummocks and Mesquite Bosque Natural Communities

Construction activities in the Cabazon, Willow Hole, Thousand Palms, Indio Hills Palms, East Indio Hills, Dos Palmas, Coachella Valley Stormwater Channel and Delta, and Santa Rosa and San Jacinto Mountains Conservation Areas will avoid mesquite hummocks and mesquite bosque to the "maximum extent Feasible" (Section 4.4 of the MSHCP). Feasible is defined by the Plan as: capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, legal, social, and technological factors. Of the 848

acres of mesquite hummocks in the Plan Area, 545 acres (64 percent) are anticipated to be lost by Plan implementation. Of these 545 acres, 28 acres will be lost within the Conservation Areas, while the balance is outside of the Conservation Areas. One acre of mesquite hummock within the Cabazon Conservation Area will be subject to no net loss (one acre would be replaced) as described in the Plan and Permit Terms and Conditions. Whereas, only 36 acres of the 482 acres of mapped mesquite bosque will be lost.

4.7.5 Riparian Bird Species

Covered Activities, in riparian habitat (as described above and in Section 4.4 of the MSHCP) will be conducted to the maximum extent Feasible outside of the March 15 through September 15 nesting season for least Bell's vireo, and the May 1 through September 15 nesting season for southwestern willow flycatcher, summer tanager, yellow warbler, and yellow-breasted chat. Surveys will be conducted to determine if any active nests are present if Covered Activities must occur during the nesting season. Covered Activities will not be conducted within 200 feet of an active nest. As discussed previously, the term Feasible, as defined by the MSHCP, does not provide the assurance that avoidance will occur or that a certain feasibility threshold will be met. Therefore, we can only conclude that minimization measures such as Covered Activities occurring 200 feet away from active nests will be implemented. While this limits direct impacts to active nest, effects due to noise may interfere with bird communication which may be detrimental to individual birds (see Noise under the Edge Effects Section above).

4.7.6 Covered Species

The Plan includes avoidance, minimization, and mitigation measures for Proposed Covered Species such as the crissal thrasher, Le Conte's thrasher, Peninsular bighorn sheep, burrowing owl, desert tortoise, triple-ribbed milk-vetch, Palm Spring pocket mouse, and Little San Bernardino Mountains linanthus. An analysis of the species-specific measures can be found in the Species Specific Evaluation Section of this Biological Opinion and discussed in species accounts in Appendix A.

4.7.6.1 Crissal and Le Conte's Thrashers

In modeled crissal and Le Conte's thrasher habitat throughout the Conservation Areas, surveys will be conducted by an acceptable biologist prior to the start of construction activities during the nesting season, January 15 through June 15, to determine if active nest sites for this species occur on the construction site and/or within 500 feet of the construction site, or to the edge of the property boundary if less than 500 feet. A 500-foot buffer or a buffer to the edge of the property boundary (if less than 500 feet) will be established around the nest site and the buffer will be staked and flagged. Construction activities will not be permitted within the buffer during the breeding season of January 15 through June 15 or until the young have fledged. Implementation of this measure will minimize direct effects to nesting thrashers within the conservation areas.

4.7.6.2 Burrowing Owl

As stated in the Project Description, the Permittees will require surveys in the Conservation Areas using an accepted protocol (as determined by the CVCC in coordination with the Permittees and Wildlife Agencies). If the burrow is unoccupied, the burrow will be made inaccessible to owls, and the Covered Activity may proceed. If either a nesting or escape burrow is occupied, owls shall be relocated pursuant to accepted Wildlife Agency protocols. A burrow is assumed occupied if records indicate that, based on surveys conducted following protocol, as least one burrowing owls has been observed occupying the burrow on site during the past three years. If there are not records for the site, surveys must be conducted to determine, prior to construction, if burrowing owls are present. Determination of the appropriate method of relocation such as eviction/passive relocation or active relocation shall be based on the specific site conditions (e.g., distance to nearest suitable habitat and presence of burrows within that habitat) with concurrence with the Wildlife Agencies. Active relocation and eviction/passive relocation require the preservation and maintenance of suitable burrowing owl habitat determined through coordination with the Wildlife Agencies.

Within one year of Permit issuance, CVCC will cooperate with County Flood, CVWD, and IID to conduct an inventory of levees, berms, dikes, and similar features in the Plan Area maintained by those Permittees. Burrowing owl burrow locations will be mapped and each of these Permittees will incorporate the information into its O&M practices to avoid impacts to the burrowing owl to the maximum extent Feasible. In conjunction with the Monitoring Program, the maps of the burrowing owl locations along the above-described levees, berms, dikes, and similar features will be periodically updated.

To mitigate the take of burrowing owl, the Permittees will protect and manage in perpetuity, 41 of the 74 (55 percent) known occurrences within the MSHCP Reserve System as identified in the Plan. It is important to note that the Plan only evaluated 74 occurrences and not 136 occurrences including the Service and the CNDDB data. The analysis also does not include the 87 occurrences that were found by Hutchinson (pers. comm., 2008). At the time of printing the final Plan, agreement had not been reached regarding specific protocols for burrowing owls. These will be developed in the early years of the Plan and will be consistent with State and Federal guidelines and laws.

The Required Avoidance, Minimization, and Mitigation Measures described in Section 4.4 of the Plan, will likely reduce effects of the Covered Activities on the burrowing owl. Surveys for the burrowing owl will determine the status of the species in the Conservation Areas and on various projects sites and will identify measures to be implemented by projects under the Permittees jurisdictions or conducted by the Permittees. Proper implementation of these measures will reduce direct harm to the species and minimization disturbance (see the Species Specific Evaluation for burrowing owl). Because the existing avoidance and minimization measures only require surveys within the Conservation Areas, and because our analysis indicates that 38 percent of the total known locations are outside the Conservation Areas, a Permit Term and Condition is provided that will require each Permittee to provide information to affected landowners regarding their responsibilities under the Migratory Bird Treaty Act.

4.7.6.3 Triple-ribbed milk-vetch

Surveys will be conducted by an acceptable biologist during the growing and flowering period for the triple-ribbed milk-vetch (February 1 through May 15) for Covered Activities that occur within modeled habitat in the Whitewater Canyon, Whitewater Floodplain, Upper Mission Creek/Big Morongo Canyon, and Santa Rosa and San Jacinto Mountains Conservation Areas. Occurrences of the species will be flagged and public infrastructure projects shall avoid impacts to the plants to the maximum extent Feasible. CVCC will maintain a map of all known occurrences and known occurrences will not be disturbed. Although avoidance likely will occur due to this measure, the term Feasible makes the commitment tenuous. While it is likely that projects affecting the triple-ribbed milk-vetch will be public infrastructure projects, rural residential projects may result in losses of the plants where avoidance if not required.

4.7.6.4 Peninsular Bighorn Sheep Habitat

Completion of Covered Activities in Peninsular bighorn sheep habitat in the Cabazon, Snow Creek/Windy Point, and Santa Rosa and San Jacinto Mountains Conservation Areas will be conducted outside of the January 1 through June 30 lambing season unless otherwise authorized through a Minor Amendment to the Plan with concurrence from the Wildlife Agencies. O&M of Covered Activities, including but not limited to refinishing the inside of water storage tanks, shall be scheduled to avoid the lambing season, but may extend into the January 1 through June 30 period if necessary to complete the activity, upon concurrence with the Wildlife Agencies.

For new projects in the above listed Conservation Areas, no toxic or invasive plant species may be used for landscaping. For existing public infrastructure facilities which have landscaping in Peninsular bighorn sheep habitat in the Cabazon, Snow Creek/Windy Point, and Santa Rosa and San Jacinto Mountains Conservation Areas, the Permittees who have such facilities will, with respect to those facilities, develop and implement a plan and schedule to remove or prevent access to oleander and any other plants known to be toxic to Peninsular bighorn sheep. The plan and schedule will be prepared within one (1) year of Permit issuance.

Implementation of the measure identified above to avoid activities during the lambing season will minimize effects to the species. Public infrastructure projects will avoid the use of toxic plant species and develop a plan to remove toxic plants that have already been established. Implementation of this measure will also result in the Plan reducing and eliminating potential threats to the species.

4.7.7 Land Use Adjacency Guidelines

The Land Use Adjacency Guidelines described in Section 4.5 of the MSHCP are intended to avoid or minimize indirect effects from development adjacent to or within the Conservation Areas. The Plan described adjacent to mean sharing a common boundary with any parcel in a Conservation Area. Edge effects from development adjacent to Conservation Areas may include

noise, lighting, drainage, intrusion of people, and the introduction of non-native plants and non-native predators such as dogs and cats. Edge effects will also be addressed through reserve management activities such as fencing. Minimization of lighting and noise is further detailed in Implementation Manual (see Project Description above) to assist the Local Permittees with proper implementation of these guidelines.

Implementation of the measures identified in Section 4.5 of the MSHCP are 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, and potentially unauthorized access into the Conservation Areas. Pursuant to the Plan and the Permit Terms and Conditions, we anticipate that the Permittees will require development projects to adhere to the measures and that they are non-discretionary. The applicable Permittee shall not only consider, but also fully implement the measures described in the Land Use Adjacency Guidelines in Section 4.5 of the Plan, where applicable. Application of the Land Use Adjacency Guidelines shall be monitored by the Permittees, and applicable results of this monitoring will be included in annual reports to the Service. Although the Plan requires that project outside of the Conservation Areas to implement the Land Use Adjacency Guidelines, it does not require these projects to go through the Joint Project Review Processes. Therefore, compliance with the requirements to minimize edge effects associated with development will likely not be overseen on an individual project basis. However, we do anticipate that information regarding the effectiveness of these minimization measures be provided to the Wildlife Agencies in the annual report.

Permittees shall incorporate plans to ensure that the quantity and quality of runoff discharged to the adjacent conservation areas is not altered in an adverse way when compared with existing conditions. Proposed stormwater systems will be designed to prevent the release of toxins, chemicals, petroleum products, invasive plant materials or other elements that might degrade or harm biological resources or ecosystem processes within the adjacent Conservation Areas. Land uses proposed adjacent to or within a Conservation Area that use chemicals or generate bioproducts such as manure that are potentially toxic or may adversely affect wildlife and plant species, habitat, or water quality will incorporate measures to ensure that application of such chemicals does not result in any discharge to the adjacent Conservation Area.

Lighting will be directed away or shielded from the Conservation Areas to avoid night lighting and increased ambient lighting. Proposed Development that generates noise above 75 dBA Leq adjacent to or within Conservation Areas will incorporate setbacks, berms, or walls to minimize the effects of noise on the Conservation Areas. Barriers will be required to be incorporated into individual project designs to minimize unauthorized access, domestic animal predation, illegal trespass, or dumping within the Conservation Areas. Such barriers may include native landscaping, rocks/boulders, fencing, walls and/or signage. Manufactured slopes associated with land development will not be permitted to extend into the conservation areas, thereby avoiding intrusion into areas conserved for Covered Species.

To minimize the invasion of non-native plant species into the Conservation Areas, Permittees will not incorporate non-native plant species (Table 4-113) in the landscape for land uses

adjacent to or within a Conservation Area. Landscape treatments within or adjacent to a Conservation Area should incorporate native plant materials to the maximum extent Feasible. The recommended native species are listed in Table 4-112 of the MSHCP. This list may be amended from time to time through a Minor Amendment with Wildlife Agency concurrence.

4.8 MSHCP Conservation Area Analysis

Within the 1.2 million-acre Plan Area, the MSHCP proposes to assemble a Reserve System that protects and manages at least 715,680 acres of habitat for the proposed Covered Species and Natural Communities. The Reserve System includes about 557,100 acres of Existing Conservation Lands. An additional 158,580 acres in the Conservation Areas will be included in the Reserve System, comprised of 29,990 acres of Complementary Conservation; 21,390 acres expected to be acquired by State and Federal agencies as a contribution to MSHCP implementation; 10,800 acres of other non-Permittee public and quasi-public lands which will be conserved by those non-Permittees or remain undeveloped; 7,500 acres of non-conserved Local Permittee owned land; 88,900 to be acquired or otherwise conserved by the Local Permittees as mitigation; and 7,800 acres that are subject to the Conservation Objective to maintain fluvial sand transport. To analyze the extent and configuration of the Natural Communities and proposed Covered Species that will be conserved in the Conservation Area, we used the Existing Conservation Lands (to the extent that they are secured); our interpretation of the written Conservation Objectives and Required Measures (Section 4.3 of the MSHCP) and the Species Conservation Goals and Objectives (Section 9 of the MSHCP) within the MSHCP Reserve System; and the Permit Terms and Conditions identified above.

The Existing Conservation Lands provide the foundation for the 21 Conservation Areas and are expected to be managed consistent with the MSHCP to contribute to the conservation of Covered Species. Because land use authority of Existing Conservation Lands may not reside with the Permittees, CVCC proposes to enter into MOUs with many of the Existing Conservation Land owners and/or managers to ensure the lands are monitored, managed, and conserved, however, the timeline and certainty that this will occur is not definite. We anticipate that the MOUs establishing that monitoring and management will be consistent with the MSHCP will be signed either prior to the Permit issuance or not later than 3 years post Permit issuance. Perpetual conservation is not assured on the Existing Conservation Land that is not encumbered by a legal instrument (i.e., conservation easement or deed restriction) or legal designation in the case of Federal or State lands, therefore may not be contribute to the Reserve System long-term. To the extent that the management structure and present conservation value contribute to the overall Reserve System, the Existing Conservation Lands are taken into account. Moreover, Existing Conservation Land that are needed to support Covered Species in the Plan Area require a legal instrument as described in the Plan and/or a MOU to ensure that management of these lands are consistent with the MSHCP and our associated Permit Terms and Conditions. Because many of the Covered Species are unlisted, the Service may lack regulatory discretion regarding alteration of non-Permittee Existing Conservation Lands. Hence, the potential exists for changes in land use on the various non-Permittee Existing Conservation Lands to occur that may impact the conservation value of the MSHCP Reserve System. However, we anticipate that CVCC will

work toward getting MOUs signed and lands permanently conserved by the execution of a legal instrument within three years of Permit issuance.

Section 4.1 and 4.2 of the MSHCP depicts the Existing Conservation Lands anticipated to contribute to the Reserve System and provides a breakdown of Federal, State, and Local Permittee owned land. The MSHCP does not address the land uses that may be inconsistent with the conservation of Covered Species such as active use areas, detention basins, flood control/utility maintenance, roads, or campgrounds. We anticipate that the Existing Conservation Lands where long-term conservation of Covered Species is assured and management is in conformance with the MSHCP will be evaluated for long-term benefits for Covered Species within the Reserve System.

Aside from the Existing Conservation Lands, the balance of the Reserve System lands will be comprised of Complementary Conservation; lands acquired by State and Federal agencies as a contribution to MSHCP implementation; other non-Permittee public and quasi-public lands that will be conserved by those non-Permittees or remain undeveloped; non-conserved Local Permittee owned land; and land necessary to maintain fluvial sand transport. An addition 88,900 acres will be acquired or otherwise conserved by the Local Permittees as mitigation for the MSHCP within the 21 Conservation Areas.

The following are the Conservation Goals of the MSHCP Reserve System: 1) represent native ecosystem types or Natural Communities across their natural range of variation in a system of conserved areas; 2) maintain or restore self-sustaining populations or metapopulations of the species included in the Plan to ensure permanent conservation so that take authorization can be obtained for currently listed species and non-listed species can be covered in case they are listed in the future; 3) sustain ecological and evolutionary processes necessary to maintain the functionality of the conserved natural communities and habitats for the species included in the Plan; 4) maximize connectivity among populations and avoid habitat fragmentation within conservation areas to conserve biological diversity, ecological balance, and connected populations of Covered Species; 5) minimize adverse impacts from OHV use, illegal dumping, edge effects, exotic species, and other disturbances in accordance with the Management and Monitoring Programs; and 6) manage the conservation areas adaptively to be responsive to short-term and long-term environmental change and new science.

Within the 21 Conservation Areas, 10 percent of the private land within each Conservation Area is anticipated to be lost. Specifically, within each Conservation Area, no more than 10 percent of each Natural Community and Covered Species modeled habitat per jurisdiction will be lost. This calculates to about 22,420 acres within the Conservation Areas and between 140,000 and 156,089 acres outside of the Conservation Areas that are anticipated to be lost.

4.8.1 Project Review within Conservation Areas

Because the entire MSHCP Reserve System is not “hard-lined”, the implementation of the Plan will rely on the stated Conservation Objectives, Required Measures, and the Species

Conservation Goals and Objectives along with other avoidance and minimization measures. Thus, the configuration of the mitigation lands (Additional Conservation Lands) is not definitive. To ensure the requirements of the MSHCP, a Joint Project Review Process will be instituted whereby projects within Conservation Areas will be reviewed jointly by the CVCC and Permittees for consistency with the MSHCP. The Permittees will submit relevant project information to the CVCC or a project applicant may request a pre-application review with CVCC. CVCC will then use spatial data to prepare comments that address compliance with all aspects of the MSHCP (see Section 6.6.1.1 of the MSHCP). CVCC comments and the project application will be forwarded to the Permittee, private project applicant, and the Wildlife Agencies. The Wildlife Agencies will submit comments in response to the CVCC's submittal 30 days of receipt. Based on CVCC analysis and Wildlife Agency comments, if the project is consistent with the MSHCP, the Local Permittee and the Wildlife Agencies will be notified. Likewise, based on the CVCC analysis and Wildlife Agency comments, if the project is inconsistent with the MSHCP, CVCC and the Local Permittee will meet with the project applicant to identify requirements necessary to achieve Plan compliance. Alternatively, CVCC may propose to acquire the property. If project inconsistencies are resolved or remain unresolved, the CVCC will notify the Wildlife Agency and the Local Permittee within 14 days. We anticipate that comments provided by the Wildlife Agencies will be addressed and incorporated into proposed project revisions to meet the stated Conservation Objectives, Required Measures, Species Conservation Goals and Objectives, and requirements under both Section 4.4 (Required Avoidance, Minimization, and Mitigation Measures) and 4.5 (Land Use Adjacency Guidelines) of the MSHCP.

The Local Permittees are obligated under the Plan and in the IA (Section 13.2) to take all necessary and appropriate actions, following applicable land use permit enforcement procedures and practices, to enforce the terms of project approvals for public and private projects, including compliance with the MSHCP, the Permits, and the IA. Failure to comply with the Plan will result in various remedies identified in the IA (Section 23.5 of the IA). The Wildlife Agencies shall have the right to revoke or suspend all or portions of the Permits, in accordance with the laws and regulations in force at the time of such revocation or suspension. Such action may also be triggered by: 1) failure of a Permittee to implement the Implementation Mechanisms adopted by that agency; 2) approval of a proposed development or public project that significantly compromises the viability of the MSHCP Reserve System; 3) failure to comply with Rough Step requirements set forth in Section 6.5 of the MSHCP; and/or 4) withdrawal of a Permittee. Such suspension or revocation may apply to the entire applicable Permit, or only to a portion such as specified Conservation Area, specified Covered Species, or specified Covered Activities. Such action may also be triggered if the Wildlife Agencies determine that land within the Conservation Areas is annexed to a non-participating public agency and thus, development of such land could significantly compromise the viability of the MSHCP Reserve System.

The Wildlife Agencies and the State Permittees will jointly review proposed State Permittee projects that are Covered Activities within the Conservation Areas. State Permittees will submit project information to the Wildlife Agencies and the CVCC consistent with Section 6.6.2.1 of the MSHCP. The Wildlife Agencies or State Permittee may schedule a meeting to discuss a

proposed project and CVCC shall be invited to participate in any such meeting.

4.8.1.1 Like Exchanges

The Plan allows for Like Exchanges to modify the boundary of one or more conservation areas in exchange for reducing or modifying the boundary of a Conservation Area. A Like Exchange must result in equal or greater conservation to Covered Species and Natural Communities as compared to those proposed and analyzed in the Plan. Resulting incidental take of proposed Covered Species (animal species) or reduction of conservation value must be no greater than that analyzed in the Plan.

A Permittee proposing a Like Exchange will be required to meet and confer with the Wildlife Agencies prior to submittal of a Like Exchange equivalency analysis to the CVCC. Upon submittal of a completed equivalency analysis, the Wildlife Agencies will respond in writing as to their concurrence with the Like Exchange. If the Wildlife Agencies do not concur with the Like Exchange the action shall require an amendment to the MSHCP. Section 6.12.2 of the MSHCP describes the necessary project information and equivalency analysis that will need to be included in the submittal. Implementation of the Like Exchanges equivalency analysis that ensures equal or greater conservation value to proposed Covered Species or Natural Communities will not result in a substantial change in conservation. Thus, our analysis for proposed Covered Species will not differ substantially.

4.8.1.2 Minor Amendments

Minor Amendments are amendments to the MSHCP of a minor or technical nature where the effect on Covered Species and level of incidental take are not significantly different than those described in the MSHCP. Minor Amendments are described in Section 6.12.4 of the MSHCP and include amendments that do not require Wildlife Agency Concurrence and those that do require Wildlife Agency concurrence. Any Permittee or other Party (signatories to the IA) may propose a Minor Amendment by providing written notice to all affected Parties. Such notice shall include a description of the proposed Minor Amendment, an explanation of the reason for the proposed Minor Amendment, an analysis of its environmental effects including any impacts to the conservation of Covered Species, and a description of why that Party believes the effects of the proposed Minor Amendment: 1) are not significantly different from, and are biologically equivalent to, the terms in the MSHCP as originally adopted; 2) substantially conform to the terms in the MSHCP as originally adopted; and 3) will not significantly reduce the ability to acquire the Additional Conservation Lands. The Wildlife Agencies and affected Parties shall submit any comments on the proposed Minor Amendments. Any Party can institute the informal meet and confer process set forth in Section 20.4.4 of the IA to resolve disagreements concerning Minor Amendments. The Wildlife Agencies' concurrence is expected within 60 days. Although the Plan contemplates that failure of the Wildlife Agencies to concur or to respond within the 60-day period may result in the Minor Amendment being approved, this is not appropriate. Local Permittees who propose to approve a Minor Amendment without the Wildlife Agency's concurrence will need to contact the Wildlife Agencies one week before the Minor Amendment

is approved to ensure that the Wildlife Agencies concur with the Minor Amendment.

4.8.2 Existing Uses

Within the Plan Area there are parcels that have been mapped as having "Existing Uses". Existing Uses within the Plan Area total at least 3,763 acres and consist of residential structures and ancillary structures, sand and gravel mining sites, water tanks, wind turbines, transmission towers, well sites, commercial structures, tailings pile, man made ski pond, farm houses, cultivated lands, and other structures. The acreage of Existing Uses has been deducted from the total acres of modeled habitat with the Conservation Areas.

4.8.3 Single-Family Homes

Except as described in our Permit Terms and Conditions above, the Required Avoidance, Minimization, Mitigation Measures (Section 4.4 of the Plan) do not apply to single-family residences and any non-commercial accessory uses and structures including but not limited to second units on an existing legal lot, or to O&M of Covered Activities.

Because configuration of single-family homes on smaller lots is problematic with respect to fluvial and aeolian processes within the Willow Hole and Thousand Palms Conservation Areas, it is important that single-family homes be subject to Site Planning Standards (described for Section 7 and 8 in the Thousand Palms Conservation Area) or an equivalent process. Criteria developed in the Implementation Manual for portions of Sections 19 T3S R5E; 20 T3S R5E; 24 T3S R4E; 28 T3S R5E; and 29 T3S R5E in the Willow Hole Conservation and Section 21 T4S R6E; 7 T4S R6E; and 8 T4S R6E in the Thousand Palms Conservation Area will be important in maintaining the processes necessary to support the sand dependant species where even limited development could impede attainment of fluvial and/or aeolian Conservation Objectives.

The Implementation Manual along with our Permit Terms and Conditions should ensure that all new development be constructed to minimize obstruction of fluvial and aeolian sand transport through appropriate design and orientation of all structures, landscaping, fencing, and juxtaposition of said features relative to any sand transport impediments on neighboring parcels. It also requires that development in the 9:1 Conservation to Development areas is configured such that fluvial and aeolian sand transport is not occluded, consistent with the Implementation Criteria discussed above in the Implementation Manual Section of this Biological Opinion.

Since single-family homes are not subject to the Required Avoidance, Minimization, Mitigation Measures (Section 4.4 of the Plan), it is likely that resources will be entirely lost to development. Several hundred lots within the sections described above are less than 5 acres. Single-family homes, non-commercial accessory uses, and structures including but not limited to second units on an existing legal lot, could result in some habitat fragmentation.

Although single-family residential projects and O&M activities associated with Covered Activities are not required to implement avoidance and minimization measures, it is assumed that

with the implementation of the Criteria in Implementation Manual and our Permit Terms and Conditions that these activities will not result in a substantial amount of habitat loss or a reduced amount of Essential Ecological Processes necessary for functioning habitat.

4.8.4 Natural Communities

The Plan identifies 27 Natural Communities that provide habitat for the Covered Species were the focal point for establishment of the Conservation Areas. The Natural Communities recognized by the Plan provide biological diversity on an ecosystem-wide basis, consistent with the NCCP goals provided by CDFG. Other Natural Communities either were not included within the Conservation Areas established by the Plan or were determined to be adequately protected in the Plan Area on public lands by the MSHCP. The three exceptions that are either not currently protected or proposed for protection under this Plan are active shielded desert dunes, Riversidean desert scrub, and tamarisk scrub. Only a fragment of the active shielded desert dunes, surrounded by urbanization and shielded from Essential Ecological Processes, occurs in the Plan Area. Riversidean desert scrub is restricted to the San Gorgonio Pass in the Plan Area, where it occurs primarily on the Morongo Indian Reservation, which is not part of the Plan. How well the MSHCP Reserve System conserves proposed Covered Species and their individual habitat requirements is addressed in the Species Specific Evaluations (Appendix A) of this Biological Opinion.

Of the Natural Communities described in Section 10 of the MSHCP, losses are expected to range from 0 to no greater than 28 percent for all of the Natural Communities except mesquite hummocks, stabilized shielded desert sand fields, and desert saltbush scrub. These three Natural Communities as described by the Plan are the least represented natural vegetation categories, receiving conservation of less than one-third of the remaining acreage in the Plan Area.

Currently, about 848 acres of mesquite hummocks occurs within the Plan Area and the Plan proposes to conserve 348 acres, resulting in the loss of about 64 percent. As discussed in more detail in the Species Specific Evaluations, mesquite hummocks are important for the sand dependent species such as the CVFTL and the Coachella Valley round-tailed ground squirrel survival. Mesquite hummocks serve as anchors for the sandy/dunes habitat and are essential for deposition and stabilization of blowsands within and surrounding these hummocks. The Plan currently proposed to conserve the 348 acres of mesquite hummocks. We anticipate that 348 acres will be conserved by some means pursuant to our Evaluation Assumptions.

Of the approximately 5,325 acres of desert saltbush scrub within the Plan Area, only 801 acres are proposed to be conserved, resulting in the expected loss of 85 percent of this natural community. Similar to desert saltbush scrub, stabilized shielded desert sand fields are expected to incur losses of 83 percent, resulting in 10,912 acres being impacted while only 1,995 acres will remain within the Plan Area. Desert saltbush scrub occurs in a relatively patchy distribution predominately in the southern end of the valley floor. Although the losses are great, few Covered Species appear to be dependent upon this Natural Community. Thus, the 4,524 acres expected to be lost would not have substantial impacts to many of the Covered Species, except

potentially burrowing owls. Section 8.5.2 of the MSHCP proposes to conserve burrowing owls by implementing an interim management strategy that will adaptively manage the species by gathering data through the monitoring program for six years post Permit issuance. While burrowing owl habitat may be conserved incidentally through other species Conservation Objectives, the MSHCP did not develop species specific Conservation Objectives, Required Measures, and Species Goal and Objectives. The Plan proposes to employ avoidance and minimization measures as well as develop a protocol to determine the distribution and abundance of burrowing owls with the Conservation Areas (see Species Specific Evaluation). These measures are anticipated to address the effects to the burrowing owl and address the actions necessary to maintain the species within the valley.

The loss of 83 percent of the stabilized shielded desert sand fields that occur on the valley floor would have a greater effect on more of the Covered Species. As discussed in more detail within the Species Evaluations, the losses of the habitat within the "Big Dune" would further limit the amount of habitat available for many of the sand dependent species such as the CVFTL and Coachella Valley milk-vetch. The Big Dune supports the largest population currently known of the Coachella Valley milk-vetch. Although the sand supply to the Big Dune has been cut off by urban development, the remaining undeveloped portions of the Big Dune still contain deep sand supplies.

In contrast to the Natural Communities discussed above, the Plan proposes moderate conservation (83 percent to 42 percent) in the Plan Area are Stabilized and Partially Stabilized Desert Sand Dunes and Sand Fields, Active Desert Sand Fields; Sonoran Creosote Bush Scrub and Sonoran Mixed Woody and Succulent Scrub; Desert Sink Scrub; Interior Live Oak Chaparral; Coastal and Valley Freshwater Marsh; and Desert Dry Wash Woodland. Receiving the greatest level of conservation (86 percent or greater) on the following categories of natural communities in the Plan Area: Active Desert Dunes; Ephemeral Desert Sand Fields; Majove Mixed Woody Scrub; Chamise, Redshank, and Semi-Desert Chaparral; Cistmontane Alkali Marsh; Southern Arroyo Willow and Sonoran Cottonwood-Willow Riparian Forest; Southern Sycamore-Alder Riparian Woodland; Arrowweed Scrub; Desert Fan Palm Oasis Woodland; Mesquite Bosque; Mojavean Pinyon-Juniper Woodland; and Peninsular Juniper Woodland and Scrub.

Two other categories of land occur within the Conservation Areas and include wind energy and quarries. As described in the Environmental Baseline section of this Biological Opinion above, wind energy structures or facilities total about 1,600 acres within the Conservation Areas. Modeled habitat for many of the proposed sand-dependent Covered Species occurs on the wind energy lands. While lands that contain wind energy support some of the proposed Covered Species, ongoing use and maintenance by the wind energy companies could affect the species that inhabitat the land. In contrast to land that support wind energy, several quarries occur throughout several of the Conservation Areas. About 233 acres of quarries occur within the Whitewater Floodplain, Thousand Palms, Upper Mission Creek/Big Morongo Canyon, East Indio Hills, and Desert Tortoise Linkage Conservation Areas. Land where quarries have been established within the conservation areas do not provide habitat for the proposed Covered

Species.

Finally, of the 93,818 acres of agricultural lands within the Plan Area, about 1,723 acres (2 percent) are within Conservation Areas. About 3,769 acres or 30 percent of rural lands and 1,363 acres or 2 percent of urban lands in the Plan Area are within the proposed Conservation Areas. As expected, agricultural lands and urban or rural lands are not well represented in the MSHCP Reserve System. Agricultural and urban or rural lands captured within the Reserve System may be necessary to complete important linkages or other elements of the reserve design configuration. We anticipate that project-specific reviews (Joint Project Review Process) during the implementation phase of the MSHCP will be used to exclude agricultural or urban and rural acreage from the Additional Reserve Lands unless such lands are needed to minimize edge conditions, complete linkages, or otherwise optimize the configuration of the Reserve System.

Water categorized by the Plan is typically human created habitat, comprised of lakes, reservoirs, and ponds. About 828 acres of water is proposed to remain within Reserve System. While about 43,575 acres of water occurs outside of the Reserve System, but within the Plan Area boundary. The majority of open water occurs in the Coachella Valley Stormwater Channel and Delta, Dos Palmas, and to a lesser extent, Whitewater Floodplain Conservation Areas. Approximately 180 acres of water is identified in the Dos Palmas Conservation Areas consists of land primarily controlled by BLM or privately owned. The Coachella Valley Stormwater Channel and Delta Conservation Area consist of 644 acres of water within the Reserve System that is controlled by IID or privately owned. The water and drains within the Conservation Areas provide Core Habitat for the desert pupfish and both species of rails and should continue to support these species irrespective of the Plan.

In summary, most of the Natural Communities within the Reserve System occur on Existing Conservation Lands. The conservation of the Natural Communities is dependent upon the conservation afforded by the Existing Conservation Lands since about 75 percent of the Reserve System is considered Existing Conservation Lands. Thus, conservation of Natural Communities within the entire Plan Area will rely upon the participation of the Existing Conservation Lands owners or managers as well as the assembly of Additional Conservation Lands.

Table 4. General Effects of the Natural Communities within the Action Area

Natural Communities	Total Acres in MSHCP	Total Existing Conservation Lands	%	Total Additional Conserved Lands	%	Total MSHCP Conservation Area	%	Total Lands Subject to Impact	%
Active Desert Dunes	561	405	72	131	23	536	96	25	4
Stabilized & Partially Stabilized Desert Sand Dunes	418	29	7	319	76	348	83	72	17
Active Desert Sand Fields	5,484	2,665	49	1,325	24	3,990	73	1,493	27
Ephemeral Desert Sand Fields	5,745	1,748	30	3,176	55	4,924	86	784	14
Stabilized & Partially Stabilized Desert Sand Fields	1,549	223	14	1,003	65	1,226	79	277	18
Stabilized Shielded Desert Sand Fields	13,218	926	7	1,069	8	1,995	15	10,912	83
Mesquite Hummocks	848	104	12	244	29	348	41	545	64
Sonoran Creosote Bush Scrub	404,644	221,622	55	101,881	25	323,503	80	54,938	14
Sonoran Mixed Woody & Succulent Scrub	133,682	75,572	57	34,193	26	106,765	80	24,012	18
Mojave Mixed Woody Scrub	104,212	68,256	65	24,779	24	93,035	89	5,864	6
Desert Saltbush Scrub	5,325	0	0	801	15	801	15	4,524	85
Desert Sink Scrub	9,535	2,536	27	5,278	55	7,814	82	1,664	17
Chamise Chaparral	2,741	2,220	81	462	17	2,688	98	52	2
Redshank Chaparral	13,282	9,987	75	2,274	17	12,261	92	977	7

Natural Communities	Total Acres in MSHCP	Total Existing Conservation Lands	%	Total Additional Conserved Lands	%	Total MSHCP Conservation Area	%	Total Lands Subject to Impact	%
Semi-Desert Chaparral	22,572	19,403	86	2,837	13	22,240	99	305	1
Interior Live Oak Chaparral	20,574	7,760	38	822	4	8,582	42	3,858	19
Cismontane Alkali Marsh	321	93	29	228	71	321	100	23	7
Coastal & Valley Freshwater Marsh	79	4	5	51	65	55	70	22	28
Southern Arroyo Willow Riparian Forest	117	95	81	15	13	110	94	4	3
Sonoran Cottonwood-Willow Riparian Forest	636	321	50	282	44	603	95	57	9
Southern Sycamore-Alder Riparian Woodland	669	498	74	163	24	661	99	23	3
Arrowweed Scrub	277	143	52	134	48	227	100	13	5
Desert Fan Palm Oasis Woodland	1,309	660	50	572	44	1,232	94	79	6
Mesquite Bosque	482	127	26	319	66	446	93	36	7
Desert Dry Wash Woodland	40,549	18,203	45	12,513	31	30,716	76	8,510	21
Mojavean Pinyon-Juniper Woodland	30,666	29,324	96	1,208	4	30,532	100	134	0.4
Peninsular Juniper Woodland & Scrub	37,544	30,382	81	6,076	16	36,458	97	1,079	3

4.8.5 Configuration

The MSHCP relies upon Existing Conservation Lands to provide the framework for the Reserve System. In addition to the Existing Conservation Lands, the Reserve System will be assembled

through Complementary Conservation Lands and Additional Conservation Lands, as described in Section 4.1 and 4.2 of the MSHCP. The Conservation Areas were designed to include Core Habitat for many species and provide Biological Corridors and Linkages. The Core Habitat areas are intended to protect large habitat blocks that support large populations of Covered Species, their habitat, and the natural processes on which they depend. The core areas ideally are large enough to buffer species populations from adjoining land uses that degrade habitat integrity. 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.

In addition to the Core Habitat areas, the MSHCP also proposes to conserve Other Conserved Habitats which do not provide Core Habitat for species, but still have conservation value. The conservation values may include Essential Ecological Processes, Biological Corridors, Linkages, buffering from edge effects, enhanced species persistence probability in proximate Core Habitat, genetic diversity, recolonization potential, and flexibility in the event of long-term habitat change. The areas may be vulnerable to loss of biodiversity over time due to their small size, high edge to interior ratio, and isolation. Other Conserved Habitat areas may also contribute to overall reserve design by operating as stepping stones or connections for species dispersal between Core Habitat areas. Due to their relative isolation and vulnerability to edge influences, active management will be necessary within Other Conserved Habitat blocks to maintain their species populations and/or habitat integrity.

Connectivity among the Conservation Areas that provide Core and Other Conserved Habitat is proposed to be maintained through Biological Corridors and Linkages. The MSHCP proposes to assemble Biological Corridors that may provide physical connections for a species moving through them but may be incapable of supporting the habitat preferences or life history requirements that a Linkage could provide. The Plan defines a Biological Corridor as a wildlife movement area that is constrained by existing development, freeways, or other impediments and a Linkage as habitat that provides for the occupancy of Covered Species and their movement between larger blocks of habitat over time, potentially over a period of generations. In general, linkages are large enough to include adequate habitat to support small populations of the species and, thus, do not require that an individual of the species transit the entire linkage to maintain gene flow between populations. What functions as a linkage for one species may provide only a Biological Corridor or no value for other species.

Bottlenecks within Linkages or Biological Corridors, 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 connections 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).

The MSHCP proposed Biological Corridors and Linkages within many of the Conservation Areas. Specific roads in conservation areas, where culverts or undercrossings are required to maintain Biological Corridors, are delineated in the Section 4.3 of the MSHCP within each of the individual subsections and are herein incorporated by reference. Aside from the freeway culverts and any Existing Use areas, which are unavoidably narrow segments, Biological Corridors shall expand to one mile wide to minimize edge effects. Some of the Biological Corridors are narrow due to Existing Uses, highways, and roadways as are some Linkages. Many of the proposed Linkages and Biological Corridors contain high edge to interior ratios. The constraints that many of them face such as Existing Uses and roads will require that projects do not preclude movement to ensure functional connectivity between habitat areas. Large Linkage distances between conservation areas will necessitate conservation of suitable and diverse live-in habitat in order to preserve functional connectivity within the Reserve System for Covered Species. Apprlication of the Land Use Agency Guidelines (Section 4.5 of the MSHCP) avoids or minimizes indirect effects from development adjacent to or within the Conservation Areas will be important to the maintenance of functional connectivity within Linkages and Biological Corridors. Such indirect effects are commonly referred to as edge effects, and may include noise, lighting, drainage, intrusion of people, and the introduction of non-native plants and non-native predators such as dogs and cats. Edge effects will also be addressed through reserve management activities such as fencing.

The largest blocks of contiguous habitat within the MSHCP Plan Area include the Santa Rosa and San Jacinto, Joshua Tree National Park, and Mecca Hill/Orocopia Mountains Conservation Areas. All of these Conservation Areas include substantial Existing Conservation Lands such as BLM, USFS, and State Parks. The 21 Conservations Areas are connected to a certain extent by large blocks of habitat or minimally by a Biological Corridor or Linkage. The Conservation Areas are habitat blocks and together they comprise a substantial portion of the MSHCP Reserve System. In total, three of the Conservation Areas exceed 112,480 acres in size. As stated above, the Land Use Agency Guidelines (Section 4.5 of the MSHCP) are intended to avoid or minimize indirect effects from development adjacent to or within the Conservation Areas will be important for Covered Species within the Reserve System that occur within the smaller and more disjunct Conservation Areas.

Largest among the proposed Conservations Areas is the Santa Rosa and San Jacinto Mountains and Joshua Tree National Park Conservation Areas (212,100 and 161,290 acres, respectively). The two conservation areas flank the Plan Area on the west and east. The Santa Rosa and San Jacinto Mountains and Joshua Tree National Park Conservation Areas combined with the

adjacent conservation areas such as the Desert Tortoise Linkage, Indio Hills/Joshua Tree National Park Linkage, West Deception Canyon, Upper Mission Creek/Big Morongo Canyon and the Snow Creek/Windy Point, Cabazon, Highway 111, and the Whitewater Floodplain connect much of the habitat on the west and east side of the valley, creating large interconnected core networks that maintain connectivity without narrow linkages. Thus, the effective conserved habitat within the mountainous areas on the west and east side of the valley should maintain viable populations of the Covered Species and conserve ecological processes necessary to maintain the habitat. However, the Existing Conservation Lands will need to be monitored and managed consistent with the Plan to ensure that Covered Species will benefit from the inclusion of these lands within the Reserve System. Llandowners such as BLM and USFS have commited to sign MOUs assuring management and monitoring consistent with the Plan, MOUs have not been completed to date.

In contrast, the conservation areas on the valley floor such as the Whitewater Floodplain, Willow Hole, Edom Hill, Long Canyon, Thousand Palms, Indio Hills Palms, and East Indio Hills among others are more disjunct due to configuration or current Existing Uses such as development or roadways and rely upon Biological Corridors and Linkages to maintain connectivity among them. Most notable among these conservation areas is the Whitewater Floodplain, Willow Hole, and Long Canyon along with Upper Mission Creek/Big Morongo Canyon (along the northern portion of the Plan Area). Some of the connection for these Conservation Areas include habitat under freeways and along washes or channels.

Table 5. Total Conserved Land within the Conservation Areas

Conservation Area	Total Acres	Total Existing Conservation Lands	%	Total Additional Conserved Lands	%
Cabazon	12,470	5,910	47	2,340	19
Stubbe and Cottonwood Canyons	9,840	7,140	73	2,430	25
Snow Creek/Windy Point	2,940	360	12	2,340	80
Whitewater Canyon	14,170	12,630	89	1,440	10
Highway 111/I-10	390	0	0	350	90
Whitewater Floodplain	7,400	2,930	40	4,140	56
Upper Mission Creek/Big Morongo Canyon	29,440	17,710	60	10,810	37
Willow Hole	5,600	750	13	4,920	89
Long Canyon	810	100	12	0	0
Edom Hill	4,090	700	17	3,060	75
Thousand Palms	25,900	16,810	65	8,040	31
West Deception Canyon	4,150	130	3	1,063	26
Indio Hills/Joshua Tree National Park Linkage	13,410	1,720	13	10,530	79
Indio Hills Palms	6,230	3,660	59	2,290	37
East Indio Hills	4,060	1,030	25	2,790	69
Joshua Tree National Park	161,290	138,560	86	35,600	22
Desert Tortoise and Linkage	89,900	38,720	43	46,350	52
Mecca Hills/Orocopia Mountains	112,780	86,460	77	23,670	21
Dos Palmas	25,380	10,070	40	12,870	51
Coachella Valley Stormwater Channel and Delta	4,390	240	5	3,870	88
Santa Rosa and San Jacinto Mountains	211,070	151,210	72	55,890	26
TOTAL	745,710	496,840	66	234,793	31

4.9 Conclusion

The MSHCP Reserve System relies on the Existing Conservation Lands, Complementary Conservation, and the Additional Conservation Lands that will be assembled through the implementation of the Conservation Objectives and Required Measures for each of the 21 conservation areas for the conservation of Natural Communities and Covered Species in perpetuity. In analyzing the configuration of the Reserve System, many of the non-profit organization Existing Conservation Lands will be necessary for the long-term conservation of Covered Species within the Plan Area. Hence, conservation and management of critical parcels will need to be assured to provide the conservation benefits to some of the Covered Species. Covered Activities within the conservation areas such as roadways will likely compete with Conservation Goals and Objectives of maintaining functional Biological Corridors and Linkages within the Plan Area. Effects of increased fragmentation and edge effect within the Plan Area are dependent upon the Avoidance, Minimization, and Mitigation Measures and the Land Use Agency Guidelines in Sections 4.5 and 4.5 of the MSHCP, respectively. A functional Reserve System with viable Biological Corridors and Linkages are dependent upon the Permittees implementing the Conservation Goals and Required Measures along with assuring the Species Conservation Goals and Objectives are met throughout the Plan Area. The MSHCP will provide meaningful conservation by establishing large, relatively interconnected blocks of natural areas and providing a comprehensive management strategy for to sustain species and their habitats. While the MSHCP Reserve Lands will provide varying levels of benefit to individual species, the MSHCP will build on Existing Conservation Lands by adding new core habitat areas and minimizing habitat fragmentation.

4.10 Permit Terms and Conditions

The following Permit Terms and Conditions along with the Conservation Area Goals and Objectives and Required Measures, and the Species Conservation Goals and Objectives in the MSHCP will result in the Proposed Action not jeopardizing the continued existence of the proposed Covered Species and meeting the issuance criteria pursuant section 10(a)(1)(B) of the Act.

1. All sections of Title 50 C.F.R., parts 13, 17.22 and 17.32 and any future amendments thereto, are conditions of this Permit. The current version of these regulations is provided in Attachment 1 of the Permit Conditions.

2. The authorization granted by this Permit is subject to compliance with, and implementation of, the Final Recirculated Coachella Valley Multiple Species Habitat Conservation Plan/ Natural Community Conservation Plan (Plan/MSHCP), dated September 2007, and the executed Implementing Agreement (IA), all of which are hereby incorporated into this Permit. In the event of a discrepancy, the conditions and authorizations of this Permit are controlled by the Plan documents in the following order: (1) the Special Terms and Conditions of this Permit included herein; (2) the executed IA; and (3) the Plan, including its associated volumes (exclusive of the IA).

3. The Permittees, their authorized agents, Third Parties Granted Take Authorization under the direct control of the Permittees, and Participating Special Entities that have obtained a Certificate of Inclusion, are authorized to take the animal species in Attachment 2 to this Permit as Covered Species, subject to the conditions therein, to the extent that take of these species would otherwise be prohibited under section 9 of the Endangered Species Act of 1973, as amended (Act) and its implementing regulations, or pursuant to a special rule promulgated under section 4(d) of the Act. Take of Covered Species (animal) must be incidental to otherwise lawful Covered Activities within the Plan Area as defined in the IA and further described and depicted in the Plan. Per Attachment 2, twenty-seven (27) taxa are Covered Species subject to compliance with and implementation of the Permit Terms and Conditions described herein, the Plan, IA, and associated documents, and where appropriate, the species-specific Permit Terms and Conditions described herein.

4. Take authorization is effective at Permit issuance, subject to the other terms and conditions herein, for those animal species listed as "Covered" in Attachment 2 that are currently listed under the Act. For the 14 animal species in Attachment 2 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 their listing under the Act, subject to the conditions herein, should they be listed during the Permit term, to the extent that their take is prohibited by the Act. Take must be incidental to otherwise lawful Covered Activities within the Plan Area as defined in the IA and described in the Plan, and as further conditioned herein. The amount and nature of the take is described in our Biological Opinion and the Plan for these species. The 14 unlisted animal species are: Coachella Valley giant sand-treader cricket (*Macrobaenetes valgum*), Coachella Valley Jerusalem cricket (*Stenopelmatus cahuilaensis*), flat-tailed horned lizard (*Phrynosoma mcalli*), burrowing owl (*Athene cunicularia*), crissal thrasher (*Toxostoma crissale*), Le Conte's thrasher (*Toxostoma lecontei*), gray vireo (*Vireo vicinior*), yellow warbler (*Dendroica petechia brewsteri*), yellow-breasted chat (*Icteria virens*), summer tanager (*Piranga rubra*), California black rail (*Laterallus jamaicensis*), southern yellow bat (*Lasiurus ega xanthinus*), Coachella Valley round-tailed ground squirrel (*Spermophilus tereticaudus chlorus*), and Palm Springs pocket mouse (*Perognathus longimembris bangsi*).

5. Because take of plants is not prohibited under the Act, incidental take for plants cannot be authorized under this Permit. No take is authorized for the federally listed Coachella Valley milk-vetch (*Astragalus lentiginosus* var. *coachellae*) and triple-ribbed milk-vetch (*Astragalus tricarinatus*). Plant species included in 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 Plan and IA, and receive those assurances identified in the Plan and IA.

6. Fully Protected Species under California Fish and Game Code may not be taken (as that term is defined in the California Fish and Game Code) or possessed at any time except under limited circumstances, as provided in the Fish and Game Code. The following species are Fully Protected Species: California black rail (*Laterallus jamaicensis*), Yuma clapper rail (*Rallus longirostris yumanensis*), and Peninsular bighorn sheep (*Ovis canadensis cremnobates*).

7. This section 10(a)(1)(B) Permit shall constitute a Special Purpose Permit under 50 Code of Federal Regulations section 21.27, for the take of Covered Species listed under the Act and which are also listed under the Migratory Bird Treaty Act (MBTA; 16 U.S.C. §§ 703-712), in the amount and/or number specified in the Plan, subject to the terms and conditions specified in the Section 10(a) Permit. Any such Take will not be in violation of the MBTA. The MBTA Special Purpose Permit will extend to Covered Species listed under the Act and also under the MBTA after the Effective Date of the Section 10(a) Permit. This Special Purpose Permit shall be valid for a period of three (3) years from its effective date, provided the section 10(a) Permit remains in effect for such period. The Special Purpose Permit shall be renewed upon written request to the U.S. Fish and Wildlife Service (Service) or as otherwise applicable pursuant to the requirements of the MBTA, provided the Permittees remain in compliance with the terms of the Plan, the Implementing Agreement and the Section 10(a) Permit. Each such renewal shall be valid for a period of three (3) years, provided that the Section 10(a) Permit remains in effect for such period. Take, as defined by 50 C.F.R. 10.12, associated with habitat loss for bird species on the list of Covered Species is avoided or minimized within Conservation Areas by the restrictions provided in Section 4.4 of the Plan. For other birds protected by the Migratory Bird Treaty Act (MBTA) and not listed under the Act no take is authorized under the MBTA (including killing and wounding of any such birds, or take of eggs and active nests). Prior to authorized ground disturbing activities, Permittees shall provide information to affected landowners regarding their responsibilities under the Migratory Bird Treaty Act.

8. Permittees, as applicable, shall contact the Service's Carlsbad Fish and Wildlife Office (6010 Hidden Valley Road, Carlsbad, California 92011) within 1 business day after they become aware of any violations or potential violations of the Act or MBTA at (760) 431-9440.

9. Within 1 business day of finding dead, injured, or sick endangered or threatened wildlife species, the appropriate Permittee or its designated agent shall orally notify the Service's Carlsbad Fish and Wildlife Office at (760) 431-9440. Written notification to the Carlsbad Fish and Wildlife Office (6010 Hidden Valley Road, Carlsbad, California 92011) and the Division of Law Enforcement (185 West F Street, Suite 440, San Diego, California 92101-5063) shall be made within 5 business days and shall include the date, time, and location of the specimen and any other pertinent information.

10. Where Covered Activities result in the incidental take of Covered Species within the U.S. Army Corps of Engineers' (Corps) 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. Pursuant to and consistent with Section 14.8 of the IA, where Covered Activities require section 7 consultation under the Act, exemption for any associated incidental take by the applicable Federal agency shall be provided through future consultation, while authorization for any associated incidental take of Covered Species by the Permittees, Third Parties Granted Take Authorization, and/or Participating Species Entities shall be provided through this Permit.

11. A copy of this Permit must be on file with each of the Permittees. 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 92011, telephone (760) 431-9440.

12. Notwithstanding anything to the contrary in the Plan and IA, the Service retains statutory authority, under both sections 7 and 10 of the Act, to revoke incidental take Permits that are found likely to jeopardize the continued existence of a listed species.

13. In order for Covered Activities carried out by third parties to receive take coverage under the Permit, the regulatory requirements for extending incidental take to third parties must be met (see 50 C.F.R. § 13.25(d) and (e)). Specifically, the third party must be under the direct control of a Permittee, such that the Permittee has the ability to enforce the terms and conditions of the Permit against the third party. A third party is under the direct control of a Permittee if 1) the third party is employed by or under contract to a Permittee for purposes authorized by the Permit; or 2) the third party Covered Activity is under the jurisdiction of a Permittee through an ordinance, or equivalent; or 3) the third party has been issued a permit by, or has executed a Certificate of Inclusion with, a Permittee. Vested projects within the Plan Area may receive take authorization under the Permit as follows: any proponent that has received all necessary approvals from a Permittee for a project within the Plan Area, such that the project is considered vested under appropriate California law, may request Third Party Take Authorization for its activities pursuant to the Permit as a Vested Project Developer. Such activities must comply with all applicable Plan, IA and Permit requirements. A project with legal vested rights (as of the date of Permit issuance) may obtain take coverage provided that the project applicant executes a Certificate of Inclusion with the applicable Permittee that requires compliance with all applicable Plan, IA, and Permit requirements, and that expressly confirms the consent of the third party to enforcement of the Plan, IA, and Permit against the Vested Project Developer by the Permittee.

14. Any take authorized (under Section 10) or exempted (under Section 7) for a Covered Activity which is approved by a Permittee in a Conservation Area shall be counted against the take authorization of the affected Permittee. Take authorization associated with public projects identified in Section 7 of the Plan shall not be counted against the take authorization of the affected Permittees.

15. New development that requires a discretionary permit from a Permittee which expands an Existing Use and results in new disturbance shall be subject to MSHCP requirements. Any authorized disturbance of Natural Communities and Covered Species modeled habitat shall count toward the amount of disturbance authorized under the Plan since the Covered Species habitat and Natural Communities on these lands were not addressed or included in the amount of anticipated disturbance authorized under the Plan.

16. CVCC shall conduct an accounting of authorized disturbance approved by the Permittees since November 1996. As may be determined by said accounting, any authorized disturbance acreage shall be deducted from the anticipated 10 percent disturbance allowed within the Conservation Areas as part of the Year 1 Annual Report under the Plan.

17. When a project is analyzed under the Joint Project Review Process, the authorized disturbance shall be calculated upon completion of the Joint Project Review Process and shall be deducted from the acreage of disturbance authorized for each Permittee at the time the Permittee issues a grading or building permit. Disturbance associated with public projects identified in Section 7 of the Plan shall not be counted against the disturbance authorization of the affected Permittee. Undeveloped portions of parcels in Conservation Areas on which development is approved shall count towards meeting the Conservation Objectives only when the undeveloped portion of the parcel is legally described and is permanently protected through an appropriate Legal Instrument that allows long-term monitoring and management in perpetuity. When these requirements are met, the conserved part of the parcel shall be counted in the rough-step calculations. Review of development projects and accounting shall occur in accordance with the Joint Project Review Process and the Implementation Manual and shall be included in the Annual Report.

18. The Agua Caliente Band of Cahuilla Indians owns properties outside the boundaries of the Reservation but within the MSHCP Plan Area. These properties (see Figure T-1 and Tables T-1, T-2 and T-3 attached) are proposed to be covered by the Tribal HCP (THCP) now in preparation. If the THCP is approved by the Service, the CVCC will coordinate with the Agua Caliente Band of Cahuilla Indians regarding an amendment to remove the appropriate parcels from the MSHCP Plan Area and to adjust land ownership, acres to be conserved and acres of disturbance authorized within the MSHCP. Figure T-1 and Tables T-1, T-2 and T-3 include the USGS section numbers, assessor parcels numbers, and estimated acres for the parcels and habitats affected.

19. If any Federal lands within the MSHCP Plan Area are transferred to private entities or Permittees otherwise covered under the MSHCP, any Covered Activities proposed on those lands shall be subject to all pertinent conservation requirements under the MSHCP. Within Conservation Areas there shall be no net loss of conservation. This means that to the extent those lands were counted as Existing Conservation Lands in the MSHCP (and all assumptions associated with that status), an equal number of acres shall be conserved within the same Conservation Area by the private entity or by the Permittee that requested the transfer.

20. CVCC and/or Coachella Valley Association of Governments shall ensure that a Final MSHCP document that incorporates the Special Permit Terms and Conditions and clerical changes consistent with Section 6.12.1 is printed within 12 months of Permit issuance. Specific changes, including adjustments to acres to be conserved and acres of disturbance authorized within the MSHCP, shall include:

a. With respect to the parcels owned by Century Crowell Communities (APNs 669-290-007, 669-290-010, 669-310-002, and 669-320-007) corrections to the MSHCP will be made within three months of Permit issuance:
   i. Under the MSHCP, the Special Provisions Parcels (APNs 669-290-007, 669-310-002, and 669-320-007) contain 92 acres of habitat for desert tortoise below toe-of-slope. Table 4-111f of the MSHCP indicates that 59 acres of disturbance are authorized for desert tortoise below toe-of-slope. Consistent with the take authorization for other species, 92 acres of disturbance is the correct amount of take authorization for desert tortoise within the Special Provisions Area below toe-of-slope. The amount of take authorization will be corrected through a clerical change pursuant to Section 6.12.1 of the MSHCP. Development of below toe-of-slope portions of the Special Provisions Parcels is consistent with the MSHCP and no additional take coverage is required for impacts to desert tortoise, provided that Century conserves the above toe-of-slope portions of the Special Provisions Parcels in perpetuity.
   ii. Under the MSHCP, a portion of the Century Crowell property identified as Assessor's Parcel No. 669-290-010 ("APN 669-290-010") south of Highway 111 is included within the Santa Rosa and San Jacinto Mountains Conservation Area. It is presently unresolved whether the legal boundary of APN 669-290-010 extends south of Highway 111. The parcel contains 4 acres of habitat for both Peninsular bighorn sheep and desert tortoise and 4.5 acres of habitat for Le Conte's thrasher. The MSHCP does not allocate or prevent disturbance of habitat for any other species on that portion of APN 669-290-010 within the Conservation Area. If it is determined that a parcel boundary correction is necessary, this parcel boundary correction would result in the removal of a portion of the parcel, including the 4 acres of bighorn sheep and desert tortoise habitat and 4.5 acres of Le Conte's thrasher habitat, from the Santa Rosa and San Jacinto Mountains Conservation Area. The removal of that portion of APN 669-290-010 south of Highway 111 within the Conservation Area shall be corrected through a clerical change pursuant to 6.12.1 of the MSHCP.

b. Natural Community Tables 10-8 for mesquite hummocks and 10-19 for coastal and valley freshwater marsh shall be adjusted to reflect the acres subject to "no net loss" as described in the Plan such that the acreage listed for Total Acres of Natural Community in the Conservation Areas is the same as the acreage listed for Total Acres to be Conserved in the MSHCP Reserve System.

21. Development proposed by non-profit organizations within Conservation Areas is subject to the take authorization and conservation requirements through the rough step calculation identified for each Conservation Area in the Plan.

22. A Conservation to Development ratio of 9:1 within the Willow Hole Conservation Area shall be maintained within each of the following areas: 1) the east half of the southwest quarter, and the east half of the east half of the west half of the southwest quarter, and east half of the west half of the southwest quarter, of Section 12, T3S R4E; 2) the east half of the east half of the southeast quarter, and the west half of the west half of the southeast quarter, and the west half of the east half of the west half of the southeast quarter of Section12, T3S R4E as shown in Figure 4-13f of the Plan; 3) the northwest quarter of Section 19, T3S R5E; 4) the portion of the northeast quarter of Section 19, T3S R5E that is in the Conservation Area; 5) the portion of the northern half of Section 20, T3S R5E as depicted in Figure 4-13f of the Plan; 6) the portion of the north half of Section 24, T3S R4E that is in the Willow Hole Conservation Area; 7) the portion of the southern quarter of Section 28, T3S R5E as depicted in Figure 4-13f; and 8) the east half of the northwest quarter within the Willow Hole Conservation Area, and the west half of the west half of the northeast quarter, and the east half of the west half of the northeast quarter (except those portions north of Varner road) of Section 29, T3S R5E. (See Figure __.)

23. Certain measures are identified in the Plan as obligations to be performed to the "maximum extent Feasible". If the applicable Permittee determines that performing an obligation to the fullest extent is not Feasible, the meet and confer process as described in 23.6 A-D of the Implementing Agreement shall be followed.

CVCC MONITORING AND MANAGEMENT

24. Prioritization of the Monitoring Program shall include a focus on the development of scientifically valid, repeatable survey techniques that will support population estimation and determination of distribution for the Coachella Valley giant sand-treader cricket, Coachella Valley Jerusalem cricket, desert pupfish, Coachella Valley fringe-toed lizard, flat-tailed horned lizard, Coachella Valley round-tailed ground squirrel, and Palm Springs pocket mouse in the Plan Area (particularly in the Core Habitats) over the term of the Permit. These techniques shall be developed in coordination with the Wildlife Agencies prior to their implementation. The CVCC shall ensure that any monitoring and management of these species that are implemented through joint funding by multiple Permittees are coordinated to allow for comparison across the Plan Area and through time in support of the effectiveness monitoring and adaptive management requirements of the Plan.

25. Use of the Management Contingency Fund under Section 8 of the Plan shall include addressing the following sand-dependent species priorities: 1) funding of activities addressed in Special Permit Term and Condition #26; 2) development and implementation of an invasive species management plan that assesses the status of and threats from invasive species, identifies knowledge gaps, and addresses control of invasive plant species (e.g, Saharan mustard) in Snow Creek/Windy Point, Thousand Palms, Whitewater Floodplain, and Willow Hole Conservation Areas; and, 3) funding of other sand-dependent species/habitat related Special Permit Terms and Conditions. The invasive species management plan shall be developed within 3 years of Permit issuance in coordination with the Wildlife Agencies; this management plan shall be implemented

beginning in year 4 post-Permit issuance. The Management Contingency Fund may supplement, but not replace, the Monitoring and Management Program budget.

26. For Coachella Valley Fringe-toed Lizard, Coachella Valley Round-tailed Ground Squirrel, Palm Springs Pocket Mouse, and Coachella Valley Milkvetch, to ensure that a minimum of three (3) viable populations (long-term persistence of self-sustaining populations) within Core Habitat for these species is maintained, or if necessary re-established and maintained, the following measures shall be implemented:

a. The CVCC shall manage and enhance modeled Core Habitats for these species to provide for persistent and sustainable populations and essential ecological processes, including broader patterns of sand transport and deposition in the Whitewater Floodplain and maintenance of sand transport and deposition in all Core Habitats to the maximum extent practicable (e.g., sand fencing as appropriate in any of the Conservation Areas and restoring mesquite in Thousand Palms Conservation Area) to achieve the Conservation Objectives for these species in the Plan.

b. The CVCC shall assess the animal species identified above to determine the presence of persistent and sustainable populations and essential ecological processes within the Core Habitats. This assessment shall be completed within 3 years of Permit issuance using methods developed jointly by the CVCC and Wildlife Agencies.

c. Specific studies shall be conducted as part of the baseline monitoring for the Coachella Valley milkvetch to assess: viability of seed bank, substrate affinities, micro-habitat requirements, seed dispersal, pollination ecology, and impacts of invasive species within the Core Habitat areas to ensure that the appropriate measures to support long-term conservation of this species are identified. These studies shall be completed within 5 years of Permit issuance using methods developed jointly by the CVCC and Wildlife Agencies.

d. The CVCC shall develop long-term management strategies for each of these species that identify specific monitoring approaches (e.g., the use of probabilistic population estimates, relativistic population indices, and/or assessments of effective population size) and management actions (including actions to address habitat as described in a) above) that will be implemented and a specific time line for implementation to ensure a minimum of 3 viable populations including adequate distribution to support long-term viability of the populations within Core Habitat areas. These management strategies shall be completed and provided to the Wildlife Agencies for their concurrence within 5 years of Permit issuance for the animal species and 7 years for the CV milkvetch.

e. Within 6 months of their completion, implementation of the measures associated with the management strategies shall begin through incorporation into the applicable Reserve Management Unit Plan(s) and Adaptive Management Program. Any changes to the Covered Species and Natural Communities Conservation Goals and Objectives and Required Measures for the Conservation Areas that include Core Habitat for each of the species identified above shall be submitted to the Wildlife Agencies for review and approval within 8 years of permit issuance and incorporated into the Joint Project Review process as appropriate.

27. Within 3 years of permit issuance a translocation policy for sand dependent species shall be developed by the CVCC that complies with State and Federal laws, policies and regulations. This policy will address the potential need for translocation (e.g. to maintain genetic diversity). Known areas of high concentrations of species that are disturbed or developed could be targeted for possible salvage or for use in scientific studies.

28. Within all areas of the Morongo Wash Biological Corridor (discussed in Plan Sections 4.3.7 and 7.3.1), the CVCC through the Reserve Monitoring and Management Program, including the Reserve Management Plan, shall provide for appropriate habitat requirements based on best available information including the CDFG-funded 2008 study for Palm Springs Pocket Mouse.

29. CVCC and the Land Manager, through the land management program, shall identify and document implementation compliance with the Land Use Adjacency Guidelines and work with the landowners and appropriate jurisdictions to address these concerns. This information shall be included in the Annual Report to the Wildlife Agencies and the Permittees.

30. The CVCC shall ensure that the mesquite hummocks Natural Community will be subject to a "no net loss" requirement within Conservation Areas as described in Section 8.2.4.1 of the Plan. The CVCC shall ensure that all no net loss requirements are implemented within 10 years of impacts, including providing suitable or potential habitat for Covered Species if such habitat is affected or lost due to Covered Activities.

31. CVCC shall conduct a Joint Project Review for proposed single family homes in the 9:1 areas to identify applicable measures needed to meet Conservation Area and Covered Species Goals and Objectives of the Plan. If a Conservation Easement is offered over a parcel or a portion of a parcel in the 9:1 areas identified in Condition number 22, CVCC shall condition the acceptance of any easement to meet the Site Planning Standards described under Required Measure 3 in Section 4.3.11 of the Plan (with the exception of the first four sentences of Site Planning Standard 2).

32. The CVCC, after coordination with its Implementation Manual Subcommittee, shall provide the Implementation Manual for review and concurrence by the Wildlife Agencies prior to its finalization and distribution to the Permittees.

33. The CVCC shall work with the appropriate Permittees to implement the Trails Plan and the conditionally compatible uses identified in Section 7.3.4 of the Plan, consistent with Section 13.2 (A) of the IA.

34. Should CDFG, Service, or BLM be unable to provide funds or personnel to the bighorn sheep monitoring program as described in the Plan, the CVCC shall ensure that the population level monitoring identified as necessary in Section 7.3.3.2.1 Element 3, including the hiring of qualified personnel, is conducted and is consistent with the budget as described in Section 8.8.3

of the Plan. Any changes in the scope, extent or frequency of this monitoring shall be developed jointly among the CVCC and the Wildlife Agencies.

35. In coordination with the Wildlife Agencies, all capture and handling of bighorn sheep shall be conducted in accordance with State of California regulations and applicable Federal permit requirements. This Permit does not authorize the Permittees or their agents to capture or handle bighorn sheep.

36. Consistent with section 7.3.3.2, if a ewe group or subgroup of bighorn sheep (as identified in Tables 7-12 and 7-13 of the Plan), drops below 15, the CVCC shall convene a meeting of the Trails Management Subcommittee, RMUC, and appropriate researchers within 30 days of notification by CDFG or Service of the population estimate. The group shall review data and develop management actions to address further declines in adult female abundance. The RMOC shall forward a recommendation within 30 days of the initial meeting to the CVCC for a decision so that implementation of appropriate management actions can commence within the following 30 days consistent with State and Federal regulations. If the population estimate indicates that a ewe group has 5 or fewer adult females, immediate management action (including but not limited to trail rerouting, adjustments in use levels, enforcement actions, and/or trail closures) to address the decline and/or reduce potential stress to the sheep population as described in Section 7.3.3.2 of the Plan shall be taken within 3 days. Concurrent with any action taken, CVCC shall initiate the process described above to identify long-term management action to address this condition.

37. Development of the Request for Proposals (RFP) for trails research and selection of contractors shall be by qualified representatives from the Wildlife Agencies, CVCC, BLM, and outside objective reviewers. The Service, CDFG, CVCC, and BLM shall be limited to one member each, and three outside reviewers shall be chosen by the consensus of the agency representatives. The seven-member group must reach agreement on the selection of the research design and contractor(s) to conduct research on the effects of recreational trail use on bighorn sheep. The above group shall (1) oversee implementation of the research program in coordination with the RMUC for the Santa Rosa and San Jacinto Mountains Conservation Area and the Trails Management Subcommittee, (2) provide advice and guidance on issues that arise during the field phase of the research, and (3) provide review of draft reports and articles. The selected researcher shall provide the review panel with semi-annual oral/written reports.

38. If the portion of the proposed Palm Desert to La Quinta Connector Trail between the Visitor Center and the Living Desert is pursued, it shall be reviewed jointly by the CVCC and Wildlife Agencies after the trails research program on the effects of recreational trail use on wild sheep and additional research evaluating the effects of the Connector Trail on captive sheep located at the Bighorn Institute are completed. Research evaluating the effects of the Connector Trail on captive sheep located at the Bighorn Institute is required for construction of the Connector Trail to be considered a Covered Activity. The research program evaluating the effects of the Connector Trail on captive bighorn sheep shall be conducted subsequent to the

research program involving wild sheep. Research on the captive sheep is contingent upon obtaining the full cooperation of the Bighorn Institute.

39. Following completion of the trails research program, construction of the proposed perimeter trails listed under the Trails Plan could occur if research results demonstrate that expected future recreational use of these proposed trails is not likely to adversely impact the health, demography, population sustainability, and population connectivity of Peninsular bighorn sheep.

40. Any new trail within the perimeter trail corridor running along the east side of the Santa Rosa Wilderness from Coral Mountain Regional Park to Martinez Canyon shall be limited to the identified trail corridor. Any new trail branching from this identified corridor that would enter bighorn sheep habitat would require a Minor Amendment requiring Wildlife Agency concurrence as described in Section 6.12.3 of the Plan.

41. The Trails Management Subcommittee shall evaluate and prioritize for decommissioning, all trails, paths, routes, or ways on Reserve Lands within the Santa Rosa and San Jacinto Mountains Conservation Area not specifically authorized in the Trails Plan within 5 years of Permit issuance. State and Federal regulatory processes must be completed and a final decision about trails to be decommissioned will be made by year 10 as part of the Trails Plan. Trails not currently authorized that are being considered for inclusion in the Trails Plan shall be treated the same as proposed new trails requiring the Minor Amendment process for authorization. All trails, paths, routes, or ways not given authorization under the Minor Amendment process shall be decommissioned and removed by the CVCC or appropriate Permittee in coordination with the land owner and the affected state and federal land management agencies no later than Plan Year 15. All unauthorized trails, routes, paths, or ways on lands acquired post Permit issuance shall be decommissioned within 3 years of parcel acquisition or detection of any unauthorized trails/paths/routes/ways. Should these timeframes not be met, the CVCC and the Wildlife Agencies shall meet to determine appropriate actions. Should any trails be illegally created between permit issuance and the decommissioning of trails, the CVCC shall coordinate with the Permittees and the appropriate state and federal land management agencies to assure removal of the trail.

42. Upon completion of the trails research program described in Element 2 of the proposed Trails Plan (Section 7.3.3.2), the Trails Management Subcommittee, RMUC, and RMOC shall develop a trails management plan to be implemented by Plan Year 10. Should these timeframes not be met, the CVCC and the Wildlife Agencies shall meet to determine appropriate actions. The revised public use and trails management plan shall be based on results from the research program (Element 2 of the Trails Plan), abundance levels of bighorn sheep, and the best available science, in addition to professional judgment and wildlife conservation principles where study results are less than definitive. Implementation of the public use and trails management plan for the portions of trails on non-federal land, shall be subject to the review and approval by the RMOC, of which the Wildlife Agencies are members. The resolution process related to the development and implementation of the Trails Plan through the RMOC shall not

limit the Wildlife Agencies ability to ensure the Trails Management Plan is in compliance with the Plan, IA, and Permits.

43. For the parcels shown in Figure 4-26e (1, 2, 3, and 4) of the Plan, the HANS process shall be applied prior to Joint Project Review Process. Criteria for the HANS Process shall be developed by the Wildlife Agencies and CVCC in consultations with the affected Permittees within 6 months of Permit issuance incorporating an analysis regarding known core use areas, home ranges, water sources, escape terrain, lambing and rearing habitat, seasonally important foraging areas, or movement/dispersal zones that shall be completed to minimize adverse effects to these resources. These criteria shall be included in the Implementation Manual. In the interim, prior to the adoption of these criteria, CVCC shall jointly analyze projects with the affected Permittees and the Wildlife Agencies.

44. In Peninsular bighorn sheep habitat, the CVCC shall assist Permittees to identify adopted policies or other options to locate and/or consolidate future development within Conservation Areas adjacent to existing development areas. Options identified shall be considered during the HANS and Joint Project Review Process. These options may include but are not limited to Transfers of Development Rights, Purchases of Development Rights, and Conservation Easements in order to provide for consolidation of development to ensure large intact blocks of bighorn sheep habitat. CVCC shall facilitate efforts across jurisdictions to maximize conservation of sheep habitat. This shall be an ongoing effort by the CVCC and the affected Permittees to meet the species conservation goals and objectives for bighorn sheep. Analysis to be used for these options shall include the following: bighorn sheep home ranges, core use areas, movement and dispersal zones, changing environmental conditions, and essential resources, including escape terrain, foraging areas, lambing and rearing habitat, habitat connectivity, water sources, and space for population expansion.

45. The Service shall participate fully in the RMUC for the Santa Rosa and San Jacinto Mountains, Snow Creek/Windy Point, and Cabazon Conservation Areas regarding discussions and recommendations that could affect bighorn sheep.

46. All monitoring and reporting for this Permit shall be in compliance with the Plan, IA, and the Special Permit Terms and Conditions. Annual reports are due no later than March 30, beginning in 2009 and ending in 2084. Copies of all reports shall be submitted to the Service's Field Supervisor, Carlsbad Fish and Wildlife Office, 6010 Hidden Valley Road, Carlsbad, California 92011, and to the Regional Director, Region 8, 2800 Cottage Way, Room W2606, Sacramento, California 95825-1846.

47. In T4S R6E Section 8 in the Thousand Palms Conservation Area, the Site Planning Standards described under Required Measure 3 of the Plan, also shall apply to lands with a Light Industrial general plan land use designation (with the exception of the first two sentences of Site Planning Standard 2).

48. Any future project that occurs in the Palm Hills Special Provisions area, including access from East Palm Canyon Drive and internal circulation, shall comply with the Plan, IA, Permit and Special Permit Terms and Conditions and will be considered a Covered Activity. All mitigation identified in the Plan regarding the Palm Hills project is retained as part of the conservation commitment in the Plan. The applicable Permittee shall ensure that all portions of the project, including any golf course or portions of the golf course, will be located north of Eagle Canyon and no closer than one quarter mile to the water source located in Eagle Canyon (Section 31 T4S R4E). The extension of any road across or south of Eagle Canyon and any improvements to and/or the maintenance of the Dunn Road are not Covered Activities under the Plan and shall not be considered as a Minor Amendment.

49. To be a Covered Activity under the Plan, development in Chino Canyon [Special Provision 2 (g)]) shall include the following measures:

a. The overall footprint of the Project shall not exceed 288 acres and shall conform to the "development area" depicted in Figure 4-26(e)(1)(A) including all on-site and off-site utility and street infrastructure improvements necessary to serve the Project.
b. Establish conservation easements in form substantially similar to the Model Conservation Easement, (as that form may be amended) over specific lands identified on Figure [#TBD Reference BO Figure 1] to create a PBS wildlife corridor across Chino Canyon. Corridor will include constructed escape terrain to facilitate PBS movement as described in [s] below. Easements must be implemented before grading permits may be issued for the Project. If easements not obtained in time, line demarcating take authorization will revert to original reasonable and prudent alternative location from the 1998 Conference Biological Opinion.
c. Prior to issuance of grading permits for the Project, all land in Sections 5, 8, and 9 owned by the City of Palm Springs and/or the City of Palm Springs' Parks, Open Space, and Trails (POST) fund as of October 22, 2005, including the land in the Mountain Falls area lease, must be permanently protected for PBS conservation purposes through a conservation easement to the CVCC, in a form substantially similar to the Model Conservation Easement, as that form may be amended, that guarantees conservation in perpetuity and precludes the possibility of constructing golf courses, new trails, or other facilities.
d. At the north and south ends of the wildlife corridor, the Project Proponent shall install artificial water sources for the PBS, with the design to be reviewed and approved by the Permittee who shall provide the Wildlife Agencies an opportunity to comment.
e. The Project proponent shall work with the appropriate entities to design and implement a transportation plan that establishes a shuttle service for the Tramway. The transportation plan shall be reviewed and approved by the Permittee, who shall provide the Service an opportunity to comment. The Project shall have the ongoing obligation to minimize traffic on Tramway Road for the life of the Project.

f. The security gates for the proposed Project on Tramway Road shall be installed outside and downslope of the Wildlife Corridor. Currently, the Winter Park Authority closes the existing security gate to the Palm Springs Aerial Tramway facility (tram) near Highway 111 at 10 p.m. each night to prevent unauthorized use of Tramway Road. The Project proponent has agreed with the Winter Park Authority that the guard at the Project site entry gate shall move down to the tram gate at 10 p.m. to control road access. The guard shall return to the Project gate when the Tramway Road reopens at 6 a.m. daily. The Project proponent shall build a gatehouse to provide shelter for the guard at that location. No other gates are contemplated.

g. A vegetation management plan for the riparian area in the wildlife movement corridor, depicted in Figure 4-26e(1)A [*Add location per Figure 2 of the BO*] on Shadowrock land and on the land described in (1)c must be developed by the Project proponent, in cooperation with the City of Palm Springs, and approved by the Wildlife Agencies prior to issuance of grading permits. The vegetation management plan shall include the modification of riparian habitat, necessary to facilitate the wildlife corridor, off-setting measures to ensure no-net loss as described in the Plan, and any modifications to the small cliff along the edge of the riparian area to facilitate sheep movement across the corridor.

h. The planting of toxic plants, such as oleander, nightshade species, and various *Prunus* sp., shall be prohibited within the proposed Project boundaries in perpetuity. Landscaping crews shall be trained in identifying these plants and shall remove them upon sighting.

i. Any artificial water features associated with the proposed Project shall be designed to preclude shallow, vegetated edges that provide breeding habitat for Culicoides midges, an invertebrate disease vector for the bluetongue virus, a disease of bighorn sheep. This requirement applies for the life of the Project.

j. The entire developed portion of the Project site shall be fenced and maintained in perpetuity to preclude PBS access to the development area. The fence shall be 8 feet high from its footings and shall not contain gaps larger than 4 inches so as to prevent entanglement of bighorn sheep. In addition, berms, vegetative hedges, or such other design features as the Permittee may require shall be established along the entire length of the Wildlife Corridor to preclude the visibility of activities on the project site to PBS and to encourage the PBS use of the wildlife corridor. The final fence plan, and any exceptions to the specified installation or location, shall be reviewed by the Service.

k. The Project proponent shall deposit into a fund of a 501 (c)(3) as designated by the Service the amount of $500,000 at the commencement of project vertical construction to be used for listed species conservation purposes to be determined by the Service.

l. The Project proponent shall ensure that 1 percent of the gross proceeds from the sale of all retail goods within the hotel stores at the Project be deposited annually into an interest-bearing account, with an entity to be determined by the Service, for the life of the Project; these funds shall be used for listed species conservation purposes at the sole discretion of the Service. The Service will have sole discretion over these funds and a written legal instrument shall be provided to assure this. In the event a hotel is not built, one percent of the total building valuation (computed using the latest building valuation determined in the manner provided in PSMC Sec. 3.37.070(d) as may be amended from time to time) of the Project shall be deposited in an interest bearing account for the purposes described above prior to the issuance of occupancy for each phase of the Project as approved by the Permittee.

m. The Project Proponent shall collect and deposit into an escrow fund of a 501 (c)(3) as designated by the Service and shall disperse at the direction of the Service all funds generated from all project-related sources from the Project for listed species conservation purposes. The contract shall require that the Project Proponent, and any successors and assigns, provide the specified services herein in perpetuity. The Project Proponent shall bear any of the administrative costs of this condition.

n. No mass grading shall occur within 100 feet of the Chino Creek riparian area from March 15 through September 15 within the Project site. For any construction work performed within the area specified in this paragraph during the period of March 15 through September 15 of a given year, the Project proponent shall install sound attenuation devices or implement measures, so as to minimize noise impacts on the Least Bell's Vireo by reducing sound levels below 60 dBA.

o. Any Project fill material to be imported shall only come from off-site borrow areas permitted by local, State and Federal governmental agencies. The Project proponent shall notify the Service as to where and when fill material will be obtained prior to importation, so that the Service can determine whether listed species could be adversely affected and any incidental take has been properly authorized.

p. If new water wells are developed by the Project proponent on the site, they shall comply with the restrictions established by the Permittee. The restrictions require that wells, if any, be located at least 5,000 feet downhill from the cienega west of the Project site.

q. No vertical construction activities or facilities shall occur within a minimum 100-foot setback from the Chino Creek riparian corridor within the Project site.

r. No rock crushing shall take place within 500 feet of the Chino Creek riparian area on the Project site.

s. A biological resources monitor shall be onsite during construction of the Project. The duties of the biological resources monitor shall include, but are not limited to: conducting desert tortoise clearance surveys per the Service's protocol; directing where to install temporary fencing that avoids sensitive areas such as the riparian habitat; and conducting an education program for the construction crew regarding sensitive habitat and listed species. The monitor shall have the authority to stop construction activities, if necessary, to ensure compliance with any of the conservation measures discussed herein.

t. A special lighting system shall be installed within the Project site to ensure to the extent feasible, that light does not "spill over" into the Chino Creek riparian area, PBS habitat, and other natural habitats surrounding the site. The lighting system shall include low-set lighting and shields that prevent artificial light sources from shining directly into natural habitat areas to minimize disturbance to and vulnerability of listed species to increased predation. Any golf driving range shall be limited to use during daytime hours only with no lights installed for night-time usage.

u. No construction-related activities, involving blasting and/or use of equipment that produces noises or sounds louder than 90 dbA at the source shall occur between January 1 through June 30 of any year, to address, in part, the adverse impacts of construction during the PBS lambing season.

v. The Permittee shall work with the Mt. San Jacinto Winter Park Authority and the Service to reduce potential sheep mortality due to collisions with vehicles along Tramway Road and to enhance the currently reduced movement corridor for PBS across Chino Canyon, which is restricted due to current and Project-related traffic levels. To the extent that a hotel is constructed on site, the Project proponent shall establish a shuttle service that ferries people from the Project site to the tram for the life of the Project. The speed of the traffic on the road shall be limited to 25 miles per hour and signs shall be posted reminding drivers of the presence of PBS in the area for the life of the Project. Within the wildlife corridor, traffic speeds shall be limited to 5 mph for the life of the Project.

In addition, the area where people are picked up and dropped off shall be consolidated in the immediate vicinity of the tram. The Project proponent shall enter into a legally enforceable agreement with the Desert Water Agency, Mount San Jacinto Winter Park Authority, Service, and any other necessary parties, which includes construction and operation of a gate system that effectively prohibits all human access along Tramway Road within the designated movement corridor, other than for operation and maintenance of the Palm Springs Aerial Tramway and Tramway Road, and for access to all landowners within and uphill of the designated movement corridor that require access to their properties, including the California Department of Parks and Recreation, California Department of Fish and Game, U.S. Forest Service, and BLM. The Project proponent shall also enter into an agreement with the Tram Authority, and any other affected parties to establish a coordinated shuttle system for all recreational visitors to the tramway that minimizes traffic

through the wildlife corridor.

w. An education program, to be reviewed and approved by the Service, shall be developed and implemented for clients and residents of the Project for the life of the Project that provides information on the status, sensitivity, and conservation needs of the bighorn sheep.
x. The Project proponent shall not object to actions that the Permittee or CVCC may require to facilitate the use of the wildlife corridor. Such actions may include the construction of road improvements to avoid and minimize adverse effects on PBS caused by traffic, a crossing for sheep usage, or sheep augmentation within the San Jacinto Mountain range.
y. The need for escape terrain will be evaluated in conjunction with the environmental analysis to be conducted with any project entitlement. If improvements to facilitate escape terrain are identified as needed pursuant to the environmental analysis, the Project proponent shall be responsible for such improvements.
z. In the event the Permittee or CVCC determine that sheep do not use the designated wildlife corridor, the Permittee may require Project Proponent to implement additional measures to facilitate sheep movement through or around the project to ensure continued connectivity.
aa. The development of the Project shall be located solely within the Development Area depicted on Figure 4-26e(1)(A) (excluding required access and off-site infrastructure improvements) or such smaller area therein as the Permittee requires pursuant to the Permittee's adopted plans and policies or as the Permittee determines is necessary or appropriate to accommodate sheep movement as provided in Item z above. The construction of all on-site and off-site utility and street infrastructure improvements below and east of the Project site necessary to serve the Project shall be consistent with the other requirements of this condition and of the CV MSHCP.

4.11 SPECIES ACCOUNTS

Due to their length, the complete species accounts are provided in Appendix A to this Opinion. Provided here are the conclusions for each of the Covered Species.

4.11.1 Coachella Valley Milk-vetch

The MSHCP proposes to conserve modeled Core and Other Conserved Habitat for the Coachella Valley milk-vetch across 15 Conservation Areas. The MSHCP identifies likely extant habitat within the model for Coachella Valley milk-vetch.

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 with the addition of the Permit Terms and Conditions, is not

likely to jeopardize the continued existence of the Coachella Valley milk-vetch. We reached this conclusion because 11,650 of the modeled habitat for the Coachella Valley milk-vetch will be conserved and managed in perpetuity 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 Reserve System as offered by the Plan and required by the Permit Terms and Conditions, are not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range that are not adequately offset by the increased security and management of the conserved populations.

4.11.2 Triple-ribbed Milk-vetch

The proposed action would result in the loss of no more than 5 percent of modeled habitat in the Plan Area, including Federal and non-Federal lands. Nearly 90 percent (1,334 acres) of Lands Subject to the Permit that are modeled habitat would be conserved as a result of MSHCP implementation, totaling 2,986 acres in the Reserve System.

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 survival of the triple-ribbed milk-vetch. We reached this conclusion because 1,334 (43%) of the triple-ribbed milk-vetch modeled habitat within the Plan Area would be conserved and managed in perpetuity. Another 1,504 acres (49 percent) of habitat is anticipated to be managed consistently with the MSHCP as per BLM's Coachella Valley Amendment to the CDCA and pending MOUs or other legal instruments on Existing Conservation Lands within the Reserve System with all current managers of conserved land (Federal and NGO). Impacts to this species and its modeled habitat, when viewed in conjunction with the protection and management, including adaptive management, of the proposed MSHCP Reserve System are not likely to reduce the overall numbers, distribution, or reproduction of the species.

4.11.3 Mecca Aster

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 Mecca aster. We reached this conclusion because a large amount of habitat is expected to be preserved for this species: 12,231 acres in addition to the 42,436 acres on Existing Conservation Lands. Three of 20 or 21 occurrences of this species would be on land authorized for impact under the Plan, however many more populations likely exist in areas that haven't been surveyed. The expected loss of 6,328 acres of modeled habitat should not appreciably affect the viability of the populations conserved by the proposed Plan.

4.11.4 Orocopia Sage

We anticipate the proposed action would affect Orocopia, including the loss of approximately 9

percent (6,933 acres) of modeled habitat within the Plan Area. In addition to the 50,664 acres of Existing Conservation Lands, at least 18,286 acres of Additional Conservation Lands that are modeled habitat would be conserved through the MSHCP implementation for a total of 68,950 acres in the Reserve System. The Reserve System includes Federal lands and other Existing Conservation Lands that are anticipated to be managed consistent with the MSHCP Conservation Goals and Objectives in the future. Implementation of the conservation measures; species-specific measures such as management to minimize impacts in Orocopia sage habitat, monitoring to better understand the distribution and ecology of this species, and long-term protection, management, and enhancement of Orocopia sage habitat is expected to further reduce impacts to this species. With the additional measures described in the analysis above, this species is anticipated to persist within the action area through the conservation and management of Core and Other Conserved Habitat within the Plan Area. We anticipate that Orocopia sage populations and habitat would be monitored and managed in perpetuity.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, the proposed permit condition, 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 Orocopia sage. Critical habitat has not been designated for this species; therefore, the proposed action would not destroy or adversely modify critical habitat. We reached this conclusion because a minimum of 90 percent of Orocopia sage modeled habitat within the Plan Area would be conserved and managed in perpetuity. Thus, impacts to this species and its modeled habitat, when viewed in conjunction with the protection and management of the MSHCP Conservation Areas, are not anticipated to result in an appreciable reduction in the numbers, potential for reproduction, or distribution of this species throughout its range.

4.11.5 Little San Bernardino Mountains Linanthus

After reviewing the current status of this species, the environmental baseline for the Action Area, the effects of the proposed action (the Plan), and the cumulative effects, it is the Service's biological opinion that the proposed Plan in combination with our described Permit Conditions are not likely to jeopardize the continued existence of this species range-wide. We reached this conclusion because even though most of the range-wide habitat and occurrences of this plant occur in Action Area, about 97 percent of known occurrences and 87 percent of modeled habitat in the Action Area are proposed to be conserved under the Plan. Also, the Required Measures, Conservation Objectives, and our Permit Conditions provide substantial protection to the habitat and essential fluvial processes for the species.

4.11.6 Coachella Valley Giant Sand-treader Cricket

Implementation of the avoidance, minimization, and mitigation measures identified in the MSHCP and the recommended changes would further reduce impacts to this species. With the additional measures described in the analysis above, this species is anticipated to persist within the Action Area through the conservation and management of Core and Other Conserved Habitat

within the Plan Area. We anticipate that sand treader cricket populations and habitat would be monitored and managed in perpetuity.

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 sand treader cricket. Critical habitat has not been designated for this species; therefore, the proposed action would not destroy or adversely modify critical habitat. We reached this conclusion because a minimum of 95 percent of sand treader cricket Core Habitat and 91 percent of Other Conserved Habitat within the Plan Area would be conserved and managed in perpetuity. 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, potential for reproduction, or distribution of this species throughout its range.

4.11.7 Coachella Valley Jerusalem Cricket

We anticipate the proposed action would affect the Jerusalem cricket as described in the analysis above. Implementation of the avoidance, minimization, and mitigation measures identified in the MSHCP and the recommended changes would further reduce impacts to this species. With the additional measures described in the analysis above, this species is anticipated to persist within the Action Area through the conservation and management of Core and Other Conserved Habitat within the Plan Area. We anticipate that Jerusalem cricket populations and habitat would be monitored and managed in perpetuity.

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 Jerusalem cricket. Critical habitat has not been designated for this species; therefore, the proposed action would not destroy or adversely modify critical habitat. We reached this conclusion because a minimum of 91 percent of Jerusalem cricket Core Habitat and 93 percent of Other Conserved Habitat within the Plan Area would be conserved and managed in perpetuity. 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, potential for reproduction, or distribution of this species throughout its range.

4.11.8 Desert Pupfish

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 Desert pupfish. There is no designated critical habitat for the pupfish. Therefore, no critical habitat would be adversely modified as a result of the implementation of the Plan. CVWD has

committed to the creation and maintenance of 25 acres of desert pupfish habitat to offset the impacts associated with potential increases in selenium concentrations in the drains with implementation of the WMP. This habitat will be supported with low-selenium water, so pupfish in this habitat will not be harmed by the selenium-related impacts described above for the drains. Habitat degradation associated with flow increases (greater depths and higher velocities) are to be offset by widening the drain mouths and/or constructing sandbars to form shoreline pool habitat near the mouths of the drains. The combination of these actions should provide for the long-term survival of the desert pupfish population in the Coachella Valley Storm Channel and Delta Conservation Area.

4.11.9 Arroyo Toad

The Whitewater Canyon Conservation Area contains the only known population of arroyo toads within the Plan Area. The Whitewater Canyon population is a small isolated population on the easternmost extent of the species range that may provide important genetic diversity for the long-term survival and full recovery of the species. Arroyo toads in the Whitewater Canyon Conservation Area are heavily impacted by habitat degradation from water diversion, as well as other human influences described above, making this population especially vulnerable to additional adverse impacts from natural or anthropogenic causes.

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 a total of 2,082 acres of Core Habitat in Whitewater Canyon Conservation Area and three acres of modeled habitat in Upper Mission Creek/Big Morongo Canyon Conservation Area would be conserved through the MSHCP implementation, for a total of 2,007 acres (96 percent) conserved in the Reserve System. The Reserve System includes Federal lands and other Existing Conservation Lands that are anticipated to be managed consistent with the MSHCP conservation goals and objectives in the future. Approximately 1,301 acres (62 percent) of Core Habitat are anticipated to be managed pending an MOU with BLM. We anticipate that the arroyo toad populations and habitat would be monitored and managed in perpetuity. Thus, impacts to this species and its modeled habitat, when viewed in conjunction with the protection and management of the MSHCP Reserve System, are not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

4.11.10 Desert Tortoise

After reviewing its current status, 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 Coachella Valley MSHCP is not likely to jeopardize the continued existence of the desert tortoise.

We reached this conclusion for several reasons. First, although we have detected declines in the number of the desert tortoise in various portions of its range, the general guidance provided by the Plan and the specific actions contained in the Plan will ensure that actions the Permittees takes, funds, and authorizes are not likely to reduce appreciably, either directly or indirectly, the likelihood of both the survival and recovery of the desert tortoise in the wild by reducing its reproduction, numbers, or distribution. Secondly, during the course of this consultation, we did not detect any cumulative effects that we would expect to reduce appreciably, either directly or indirectly, the likelihood of both the survival and recovery of the desert tortoise in the wild by reducing its reproduction, numbers, or distribution.

4.11.11 Coachella Valley Fringe-toed Lizard

Substantial portions of the Plan Area are essential to continued existence of the Coachella Valley fringe-toed lizard. The Plan would provide protection of some of the non-habitat areas that provide fluvial and aeolian processes that support remaining blowsand habitat. Considering the conservation that would be provided by the Plan and others (noted above), combined with the implementation of the permit conditions described, all areas essential to the continued existence of the species that provide important fluvial and aeolian processes (to the remaining fringe-toed lizard habitat likely to be conserved in the future) would be protected or managed during and beyond the permit term.

We expect that with implementation of the Plan and the permit conditions described above providing for the conservation and management of habitat and maintenance of sand transport corridors in proposed Conservation Areas, the survival of the species range-wide would be likely for the permit term. Implementation of the avoidance, minimization, and mitigation measures identified in the Plan combined with the noted permit conditions will extensively reduce impacts to this species that likely would otherwise occur. We anticipate that the Coachella Valley fringe-toed lizard populations and habitat will be monitored and managed in perpetuity pursuant to the Plan.

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 with permit conditions, is not likely to jeopardize the continued existence of the Coachella Valley fringe-toed lizard, and it is not likely to result in the destruction or adverse modification of critical habitat for the Coachella Valley fringe-toed lizard. We reached this conclusion because habitat areas and ecosystem processes essential to the continued existence of the species in the Plan Area are likely to be conserved and managed for the Coachella Valley fringe-toed lizard in perpetuity; this, combined with other actions likely to occur in the action area, would result in habitat areas and ecosystem processes essential to the species' continued existence range-wide being adequately conserved and managed. Thus, impacts to this species and its modeled habitat, when viewed in conjunction with the protection and management within the MSHCP Conservation Areas, are not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

4.11.12 Flat-tailed Horned Lizard

The proposed MSHCP would provide for the continued existence of the flat-tailed horned lizard in the Coachella Valley. The area is already highly modified so it is questionable whether the species will persist in the valley, but the likelihood for their future persistence is enhanced by the added protection of 9,597 acres afforded by the Plan. A total of 17,111 acres (46 percent of the modeled flat-tailed horned lizard habitat within the Plan area) would benefit from ongoing and future protection and management. Populations in the Coachella Valley appear to be declining for reasons that are not completely understood and current monitoring is not adequate for detecting population trends. The full potential of the adaptive management process and the most powerful monitoring and analytical methods would be needed to ensure the persistence of the flat-tailed horned lizard in the plan area. The plan would provide the best possible opportunity to implement the needed monitoring and management.

After reviewing the current status of this species, environmental baseline for the action area, effects of the proposed action, and cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the flat-tailed horned lizard. Loss of the Coachella Valley population would have a negligible on the status of the species as a whole, since it makes up approximately 1 percent of the current range of the flat-tailed horned lizard. Persistence of the species in the Plan area is likely only with effective Plan implementation.

4.11.13 Yuma Clapper Rail

A relatively small proportion of the species' range-wide population occurs in the areas subject to Plan covered activities. The majority of the population in the Salton Sea area occurs on lands managed by the Service and the CDFG. The limited potential loss of Yuma clapper rail reproduction associated with increases in selenium, harm resulting from loss of habitat associated with operation and maintenance activities, harassment associated with surveys, and potential harm associated with marsh management, are not likely to jeopardize the survival and recovery of 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 Yuma Clapper Rail.

4.11.14 Southwestern Willow Flycatcher

After reviewing the current status of the southwestern willow flycatcher, the environmental baseline for the action area, effects of the proposed action, the cumulative effects, and proposed permit conditions, it is our biological opinion that the proposed action is not likely to jeopardize the continued existence of the southwestern willow flycatcher.

4.11.15 Least Bell's Vireo

After reviewing the current status of the least Bell's vireo, the environmental baseline for the action area, effects of the proposed action, the cumulative effects, and the proposed permit conditions, it is our biological opinion that the proposed action is not likely to jeopardize the continued existence of the least Bell's vireo.

4.11.16 California Black Rail

After reviewing the current status of the least Bell's vireo, the environmental baseline for the action area, effects of the proposed action, the cumulative effects, and the proposed permit conditions, it is our biological opinion that the proposed action is not likely to jeopardize the continued existence of the California Black Rail.

4.11.17 Burrowing Owl

After reviewing the current status, environmental baseline, effects of the proposed action, and cumulative effects, it is our opinion that the issuance of an Incidental Take Permit to the Permittees under the Coachella Valley MSHCP is not likely to jeopardize the continued existence of the burrowing owl because of the anticipated continued presence of burrowing owls in other locations, including the Imperial Valley, in North America. The proposed permit condition, while not reducing the areal extent of Covered Activities under the Plan, ameliorates the direct effects of the take of the species. This condition in combination with compliane with the Migratory Bird Treaty Act, implementation of the MSHCP, including all conservation measures, land use adjacency guidelines, monitoring and adaptive management identified therein, is expected to provide for the conservation of the species in the Plan Area over the permit term.

4.11.18 Crissal Thrasher

After reviewing the current status of the crissal thrasher, the environmental baseline for the action area, effects of the proposed action, the cumulative effects, the proposed permit conditions, and the issuance of the Take Permits that would occur with the implementation of the MSHCP, it is our biological opinion that with the management, restoration efforts, and mitigation and minimization measures proposed in the action, the plan is not likely to jeopardize the continued existence of the crissal thrasher.

4.11.19 Le Conte's Thrasher

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 Le Conte's thrasher.

The Le Conte's thrasher will benefit from the establishment of the MSHCP Reserve System which will include conservation of habitat from the western to the eastern limits of the Plan Area. Implementation of the Plan is expected to provide for conservation of the Le Conte's thrasher within the Plan Area, as currently unprotected portions of its habitat and potential habitat areas will be conserved. The combination of the overall conservation measures; species-specific measures such as management to minimize impacts to thrashers and their habitat, monitoring to better understand the distribution and population status of this species in the Plan Area, and long term protection, management, and enhancement of Le Conte's thrasher habitat is expected to effectively compensate for potential adverse effects to this bird species.

4.11.20 Gray Vireo

After reviewing the current status of the gray vireo, the environmental baseline for the action area, effects of the proposed action, and the cumulative effects, it is our biological opinion that the proposed action is not likely to jeopardize the continued existence of the gray vireo.

4.11.21 Yellow Warbler

After reviewing the current status of the yellow warbler, the environmental baseline for the action area, effects of the proposed action, the cumulative effects, and proposed permit conditions, it is our biological opinion that the proposed action is not likely to jeopardize the continued existence of the yellow warbler.

The proposed action likely will not induce considerable indirect effects to the yellow warbler resulting from implementation of the proposed Covered Activities. Although the proposed Covered Activities will contribute to the fragmentation and disturbance of yellow warbler breeding and migration habitat in the Plan Area and potentially subject the species to increased depredation, parasitism, and the certain impacts associated with the proliferation of invasive plants, the proposed monitoring and management of the Plan Area likely will provide secure habitats and environments for individuals displaced or otherwise indirectly impacted by Covered Activities.

4.11.22 Yellow-breasted Chat

After reviewing the current status of the yellow-breasted chat, the environmental baseline for the action area, effects of the proposed action, the cumulative effects, and proposed permit conditions, it is our biological opinion that the proposed action is not likely to jeopardize the continued existence of the yellow-breasted chat.

The proposed action likely would not induce significant indirect effects to the yellow-breasted chat resulting from implementation of the proposed Covered Activities. Although the proposed Covered Activities would contribute to the fragmentation and disturbance of yellow-breasted chat breeding and migration habitat in the Plan Area and potentially subject the species to increased human pressures, depredation, parasitism, and the certain impacts associated with the proliferation of invasive plants, the proposed monitoring and management of the Reserve System

would likely provide secure habitats and environments for individuals displaced or otherwise indirectly impacted by Covered Activities

4.11.23 Summer Tanager

After reviewing the current status of the summer tanager, the environmental baseline for the action area, effects of the proposed action, the cumulative effects, and proposed permit conditions, it is our biological opinion that the proposed action is not likely to jeopardize the continued existence of the summer tanager.

4.11.24 Peninsular Bighorn Sheep

After reviewing the current status, environmental baseline, effects of the proposed action, and cumulative effects, it is our opinion that the issuance of an Incidental Take Permit to the Permittees under the Coachella Valley MSHCP is not likely to jeopardize the continued existence of the Peninsular bighorn sheep nor will it adversely modify designated or proposed critical habitat. Several proposed permit conditions strengthen wording in the Plan and clarify triggers and management actions needed to ensure this conclusion. The proposed permit conditions, in combination with the implementation of the MSHCP, including all conservation measures, land use adjacency guidelines, monitoring and adaptive management identified therein, is expected to provide for the conservation of the species in the Plan Area over the permit term. The number of terms and conditions is extensive and will ensure that the sheep are adequately conserved. The research program will provide guidance towards future decisions regarding sheep and habitat management.

4.11.25 Coachella Valley Round-tailed Ground Squirrel

The Plan Area is essential to continued existence of the Coachella Valley round-tailed ground squirrel because this species is endemic to the Plan Area and surrounding tribal lands. Implementation of the avoidance, minimization, and mitigation measures identified in the MSHCP will reduce impacts to this species that would otherwise occur. We anticipate that the Coachella Valley round-tailed ground squirrel populations and habitat will be monitored and managed in perpetuity.

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 with permit conditions, is not likely to jeopardize the continued existence of the Coachella Valley round-tailed ground squirrel. We reached this conclusion because habitat areas and ecosystem processes essential to the continued existence of the species in the Plan Area are likely to be conserved and managed for the Coachella Valley round-tailed ground squirrel in perpetuity; this, combined with other actions likely to occur in the action area, would result in habitat areas and ecosystem processes essential to the species' continued existence range-wide being adequately conserved and managed. Thus, impacts to this species and its modeled habitat, when viewed in conjunction with the protection and

management within the MSHCP Conservation Areas and associated permit conditions, are not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

4.11.26 Southern Yellow Bat

The Reserve System includes Federal lands and other Existing Conservation Lands that are anticipated to be managed consistently with the MSHCP Conservation Goals and Objectives in the future, but not assured. Implementation of the avoidance, minimization, and mitigation measures identified in the MSHCP would further reduce impacts to this species. With all of these measures described in the analysis above, this species is anticipated to persist within the Action Area through the conservation and management of Other Conserved Habitat within the Plan Area and the conservation and management of modeled habitat within the Agua Caliente Tribal HCP. We anticipate that the western yellow bat populations and habitat would be monitored and managed in perpetuity.

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 bat. Critical habitat has not been designated for this species; therefore, the proposed action would not destroy or adversely modify critical habitat. We reached this conclusion because over 90 percent of the western yellow bat modeled habitat within the Plan Area would be conserved and managed in perpetuity.

4.11.27 Palm Springs Pocket Mouse

The Plan Area is essential to continued existence of the Palm Springs pocket mouse because the majority of this species range is within the Plan Area and surrounding tribal lands, and all recent occurrence data is from the Plan Area. Implementation of the avoidance, minimization, and mitigation measures identified in the MSHCP will reduce impacts to this species that would otherwise be expected to occur. We anticipate that the Palm Springs pocket mouse populations and habitat will be monitored and managed in perpetuity

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, with permit conditions, would not jeopardize the continued existence of the Palm Springs pocket mouse. We reached this conclusion because, the Permit Terms and Conditions adequately provide for the conservation of viable populations of the species in the Plan Area and a functional biological corridor and refugia in Morongo Wash, a key corridor for this species. However, if the corridor is lost and the Permittees offset this loss with expanded conservation as proposed that will ensure at least three viable populations within Conservation Areas as required by the Permit Term and Condition, the species is still likely to persist within the Plan Area and throughout its range. We reached this conclusion because habitat areas and ecosystem processes essential to the continued existence of the species in the Plan Area are

likely to be conserved and managed for the Palm Springs pocket mouse in perpetuity; this, combined with other actions likely to occur in the Action Area, would result in habitat areas and ecosystem processes essential to the species' continued existence range-wide being adequately conserved and managed. Thus, impacts to this species and its modeled habitat, when viewed in conjunction with the protection and management within the MSHCP Conservation Areas and associated Permit Terms and Conditions, are not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range.

5.0 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 Plan Area during the Permit term will fall under the purview of the proposed Permit, and are therefore, considered as effects of the proposed action rather than cumulative effects. Unauthorized activities in the future also would be considered cumulative effects. We anticipate that development of Tribal lands without a Federal nexus would be considered cumulative and subject to take authorization under section 10 of the Act. Other actions by non-Federal and non-Permittees are likely to occur over the life of the Permit, however, the scope and effects of such activities are difficult to determine. Below are a summary of some of the effects that may occur within the Plan Area.

We anticipate that there may be conversion or degradation of habitat within the Action Area (which extends beyond the Permittee's jurisdictional authority) resulting from agricultural and grazing use, OHV, and illegal dumping. Furthermore, non-native grass and weed growth may also degrade existing habitat and affect Covered Species. It is likely that some non-native plants already introduced into the Plan Area will increase in area/density and ecological impact, partially as a result of human activities such as disturbance from OHVs, construction, maintenance, agricultural equipment, and road use. Native plants may be out-competed by non-native plants, especially if weed growth is disproportionately facilitated (as compared to native vegetation) by the deposition of nitrogen compound fertilizers that have their origins as atmospheric pollutants. Non-native grasses and weeds are typically annual species, which, when they die, can provide additional fuel and may increases the frequency or severity of wildfires. Weeds typically respond more quickly to fire or other disturbance and thereby convert one habitat type to another. If dead annual weeds build up, the resulting thatch may change microsite characteristics further effecting seed germination or plant growth. Impacts such as these have

the potential to be substantial but are difficult to quantify. However, the Plan proposes to monitor and potentially manage the weeds within the Reserve System. The management is anticipated to reduce or otherwise mitigate these potential effects. Additional impacts may result from human-induced changes in the climate; however, the actual affects that may occur from such changes are, at this point, speculative and unforeseeable.

The level of illegal dumping and OHV use (and impacts) in the Plan Area is expected to decrease over time (compared to existing) as a portion of the remaining open lands are developed, and as greater control is gained over trespass and dumping by land managers (through presence and reporting, as well as fencing and blockading of access routes) and local law enforcement.

Future activities by non-Permittees also would be considered cumulative effects. Incidental take of listed species by non-Permittee actions in the future could be authorized separately under sections 7 or 10 of the Act, or through the proposed Plan if the entity qualifies as a Participating Special Entity or Third Party Granted Take Authorization. It is expected that an undetermined amount of habitat within the Plan Area, on non-Federal lands and outside of any proposed Conservation Areas, would be subject to impacts by parties that are not under the control of the Permittees, or parties without Certificates of Inclusions; these parties would likely seek separate authorization under the Act. School Districts, Metropolitan Water District, Mission Springs Water District, and Southern California Edison among others are not Applicants under the MSHCP. All of these entities are actively planning projects within the MSHCP Plan Area boundaries that may significantly affect Covered Species. Water districts continue to propose and implement projects within the Plan Area. Projects range from installing new sewer lines to maintaining water supply pipelines and can have significant adverse effects on Covered Species. To the extent that these actions do not seek authorization under the Act, the impacts would remain cumulative to the effects of action proposed herein.

Artificially enhanced predator populations, such as pets and meso-predators (raccoons, etc.) associated with developments, will likely result in appreciable cumulative effects to Covered Species where suitable habitat remains adjacent or nearby. It is expected over time that increased animal control activities in the valley, combined and partially associated with likely conversion of many adjacent neighborhoods from rural to a more suburban characteristics, will reduce the potential influence of feral animals on the lizards, mammals, etc. but the expected continued fragmentation of remaining habitat in the action area will likely reduce the normal effectiveness of coyotes controlling pet (domestic cats) and meso-predator numbers (Crooks and Soule 1999) in some areas.

New and existing above-ground power and communication lines that are not Covered Activities under the proposed Plan, likely will provide artificial perches for birds of prey within the Plan Area. It is expected that these perches likely will result in predation of Covered Species such as lizards, squirrel, and pocket mouse. We expect that operations and maintenance of all power and communication lines in the Coachella Valley will eventually be subject to permitting or consultation (after which their effects would no longer be cumulative to the subject action considered herein). We also expect that many power and communication lines within and

adjacent to occupied habitat areas may eventually be underground, with the subsequent elimination of the associated artificial perches.

Unauthorized activities in the future are considered cumulative effects and likely will continue to occur throughout the Plan Area. Past unauthorized work that may likely continue into the future may include pre-emptive site grading under the guise of predevelopment seismic exploration, which recently has been documented on certain parcels in the Valley. Another potential example of unauthorized activities includes fencing of private property to exclude various Covered Species. In addition, recreation activities that are outside of the bounds of what is authorized within the Reserve System is anticipated to occur in the future. Though we can not predict the extent to which such potentially unauthorized activity may occur in the future, additional regulation by Local Permittees to what is contemplated in the Plan may prove necessary if adverse effects become significant or interfere with attainment of the Conservation Area Goals and Objectives and the Species Specific Goals and Objectives.

We do not anticipate that the various cumulative effects that may occur over the 75-year Permit term would alter the conclusion of this Biological Opinion. Many activities that would result in affects listed species would require separate take authorization by non-Permittees. If this assumption proves false, we anticipate that the Permittees would cooperate with the Service to amend the Plan or otherwise devise regulatory mechanisms that would ensure achievement of the Species Goals and Objectives and the Conservation Goals and Objectives of the Plan.

Based on the preceding general analysis and the following analysis of each species' current status and environmental baseline, the anticipated direct, indirect, and cumulative impacts, the following summarizes the Service's Biological Opinion regarding effects of the proposed issuance of a section 10(a)(1)(B) incidental take permit to the Permittees pursuant to the MSHCP (and all associated documents), IA, and Permit Terms and Conditions.

5.1 Recovery

The MSHCP was developed to meet the NCCP goals of providing for high likelihood of persistence of target species and providing for no net loss of habitat value from the present. The NCCP Conservation Guidelines define no net loss of habitat value as ". . . no net reduction in the ability of the subregion to maintain viable populations of target species over the long-term." The guidelines clarify that "the goal of no net loss of habitat value may be attainable even if there is a net loss of habitat acreage, provided that the preserve design is adequate and techniques are employed to manage and restore the preserved habitat." The MSHCP Reserve System is consistent with the seven basic tenets of preserve design outlined in the Conservation Guidelines, and preserve management will be provided through species-specific and site-specific land-use and management guidelines to ensure that the preserve's biological values are maintained in perpetuity. The permanent protection and management provided under the plan will allow for the recovery of covered species by: a) supporting the persistence of narrowly ranging covered plant and wildlife species within the planning area whose survival is dependent upon persistence in this area; b) contributing to the long-term habitat viability of vegetation communities for

species dependent on these communities; and c) contributing to the overall conservation of wide-ranging species through the protection of large, interconnected blocks of habitat rather than the small patches that will result from project-by-project mitigation. The Species Accounts below provide additional information regarding the MSHCP's contributions to the species' recovery. Proposed Covered Species that have a recovery plan were analyzed to ensure that the MSHCP would not preclude recovery of the species.

6.0 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 fish and wildlife species 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. Harass is defined as actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, 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 identify anticipated impacts to affected species likely to result from the proposed taking and the measures included in the MSHCP to minimize and mitigate those impacts. All conservation measures described in the proposed MSHCP and the associated IA, and the Permit Terms and Conditions in the section 10(a)(1)(B) Permit, are hereby incorporated by reference as reasonable and prudent measures and terms and conditions within this Incidental Take Statement pursuant to 50 CFR 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 Permit Terms and Conditions, the protective coverage of the section 10(a)(1)(B) permit and section 7(o)(2) may lapse.

The "Amount or Extent of Take" for each animal species is included in the Species Accounts (Appendix A). However, 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 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 Service must determine that the permit would not "jeopardize the continued existence" of any listed plant. In the interest of conserving listed and other plant Covered Species, the MSHCP includes measures to protect and enhance listed and

non-listed plant species within the MSHCP Plan Area.

7.0 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.

The Service recommends that the following conservation measures be implemented:

1. The Service should provide technical assistance and advice to the Applicants throughout the term of the Permit including monitoring, management, and other biological issues associated with implementation of the MSHCP (salvage policy, translocation policy, and implementation of the Migratory Bird Treaty Act).

2. Due the occurrence of flat-tailed horned lizards within the Dos Palmas Conservation Area, the Service should work with CVCC to focus one of the two populations proposed to be established within Conservation Areas in and around flat-tailed lizard modeled habitat in T8S R11E Sections 24 and 25. Surveys should be conducted to determine the extent of the population in the Dos Palmas Conservation Area, and a Core Habitat area shall be designated, based on the survey results. The designated Core Habitat shall be managed with the goal of maintaining a self-sustaining population through Monitoring and Adaptive Management.

3. Fire regimes have likely changed, as they have throughout most of the West, due to fire suppression efforts. A fire history of the area, along with recommendations regarding bringing the fire regime back to natural conditions, should be implemented. This could improve habitat for many species, most notably, the Peninsular bighorn sheep.

4. The Service should proactively work with the US Army Corps of Engineers, CVWD, the City of Palm Springs, BLM and others to obtain permits for the redesign of the percolation ponds and implementation of that new design as soon as possible.

5. The Service should continue to work with the Agua Caliente Band of Cahuilla Indians to complete the Tribal HCP.

6. The Service should process a Major Amendment as soon as possible to include Desert Hot Springs into the Plan.

7. Any potential deficiencies discovered in the Plan implementation should be corrected as opportunities arise with the addition of Special Participating Entities and Minor or Major Amendments.

8.0 REINITIATION NOTICE

This concludes formal consultation and conference on the proposed issuance of an incidental take permit to the Permittees. As provided in 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. If you have any questions concerning this Opinion, please contact the Field Supervisor of the Service's Carlsbad Fish and Wildlife Office at (760) 431-9440.

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APPENDIX A. SPECIES ACCOUNTS

APPENDIX A: SPECIES ACCOUNTS

PLANTS

Mecca aster (*Xylorhiza cognata*)

STATUS OF THE SPECIES

Legal/Listing Status

Mecca aster currently is not a Federally or State listed species, but it is on the California Native Plant Society (CNPS) List 1B.2, which includes taxa that are rare or endangered in California.

Species Description

Mecca aster is a shrub less than 5 feet tall, with the main stems to 0.4 inches in diameter. It flowers from January to June with lavender or light blue ray-flowers and yellow disc-flowers. Flower heads are solitary at the end of branches and 0.8-1.6 inches wide. There are usually 20-29 ray flowers and 40-83 disc flowers per flower head. Leaves are 0.4-2 inches long and not reduced on the upper stem.

Distribution

Mecca aster is found primarily in the Mecca Hills and Indio Hills of the Coachella Valley. Its known range is almost exclusively within the Plan Area. Two collections reported in the California Natural Diversity Database (CNDDB) occurred in Imperial County in 1979 and 2004 (CNPS 2005). The 1979 collection was shown to be *Xylorhiza orcuttii* (McGlaughlin 2005), but the 2004 collection appears to be valid. The 2004 collection is from the north end of the Chocolate Mountains. In the Indio Hills, Mecca aster occurs from Macomber Palms and Biskra Palms on the Coachella Valley Preserve southeast along the base of the Indio Hills. The easternmost location in the Indio Hills is in the vicinity of Curtis Palms, east of the Granite Construction facility. In the Mecca Hills, it occurs in Painted Canyon, Box Canyon along Highway 195, and Hidden Spring Canyon, as well as in other suitable habitat in this area. The largest population appears to be in the Mecca Hills. Only one location in the Coachella Valley was known outside the Mecca and Indio Hills, on the Palms to Pines Highway, but this location was developed into housing, and McGlaughlin (2005) observed no suitable remaining habitat.

Most of the known occurrences are along roads or well-traveled hiking routes, suggesting a wider distribution throughout the Mecca Hills (Stewart 1991). It may be that the observation of this species in proximity to major roads has given the false impression that the plants are very common. While the species may be numerous in places, its limited geographic distribution and restricted soil preferences suggest that it is only very locally common.

Information on population size and density is not available. Table 9-3 of the MSHCP summarizes the number of plants observed at 17 occurrences, as reported in the CNDDB (California Department of Fish and Game; CDFG 1997) and is herein incorporated by reference.

Jon Stewart, a botanist familiar with the species, suggested that occurrences of the Mecca aster are associated with two intergraded geologic formations, the Palm Springs formation and the Canebrake formation (Stewart 1991), which are limited in distribution in the Plan Area. These

formations are similar in age and are both fluvial deposits; the Palm Springs formation is composed of sandstones and clays while the Canebrake formation includes granitic conglomerates of larger materials. Stewart noted a strong correlation between the known occurrences of this species and the Palm Springs and Canebrake geologic formations. These two formations are not restricted to the Coachella Valley. The original CVAG model for this species incorporated the mapped distribution of the Palm Springs formation. However, this formation includes a large area in the Indio Hills west of the Thousand Palms Preserve where this species has never been observed. Conversely, the Palm Springs formation is not mapped in an area in the East Indio Hills, between Macomber Palms and Biskra Palms, where many known occurrences of Mecca aster have been recorded. Thus, these formations do not fully explain the distribution of this species. Consequently, the CVAG model for this species was refined in 2002.

Habitat Affinities
Mecca aster typically occurs in fluvial mud hills in washes and along the lower slopes. It is often found on steep, exposed cliffs along washes, though sometimes it is found in the wash itself. However, current maps of these formations do not exactly correspond with the distribution of this plant, so this relationship is unclear and would require further study. In the Mecca Hills, McGlaughlin (2005) always found this plant associated with the Canebrake Formation. In the Indio Hills, however, this plant is not always associated with the Canebrake or Palm Springs formations.

Life History
Typical of the family Asteraceae, the seed has a pappus that aids in wind or animal-mediated dispersal. Asteraceae taxa are typically pollinated by insects. Germination of seeds of Mecca aster in the laboratory was less than one percent in one study (Watson 1977). Watson (1977) also reported that he saw few seedlings or younger plants in the wild, indicating that reproduction and recruitment to adult sizes may be low. However, populations visited by McGlaughlin (2005) in the Indio Hills and Mecca Hills did include seedlings wherever there were 30 or greater plants. Reproduction may be strongly correlated with yearly rainfall, as in many desert plants.

Population Trends
Thirteen historical records of Mecca aster occur on public land. All thirteen locations were visited from 2002 to 2005 by the Center for Conservation Biology (CCB 2005). Mecca aster was still present at 12 of the 13 locations. The number of plants at a location varied from 6 to 377 (CCB 2005). McGlaughlin (2005) found plants to be relatively dense in the canyons of the Mecca Hills. He found from 15 to 220 plants in each of 5 canyons along Box Canyon Road, including juvenile and seedling plants at most locations. These data indicate that Mecca aster persists and is reproducing in most locations, contrary to the implications made by Watson (1977) that the species may not be reproducing.

Threats
Habitat loss, degradation, and edge effects from OHV activity, illegal dumping, sand and gravel mining (J. Dice, pers. comm.) are the major threats to this species. OHV activity once threatened populations in the Mecca Hills but has now been better controlled with its designation as a

Wilderness Area. OHV activity in the Indio Hills threatens several populations. Isolation of the two significant populations in the Indio Hills and Mecca Hills may reduce genetic diversity. However, these two populations appear to be naturally isolated in these two habitat islands.

Synopsis of Status
The Mecca aster appears to be locally abundant in some localities, though restricted to a very small distribution. This species has suffered relatively little habitat loss and appears to be maintaining stable numbers, though no monitoring has been conducted.

ENVIRONMENTAL BASELINE
Status of the Species in the Action Area
Approximately 63,163 acres of habitat are modeled in the action area for this species. Of these, 21,070 acres are not Federal lands and thus are subject to the permit. Of the lands subject to the permit, 18,559 acres are currently not protected (we arrived at this number by summing the acres authorized for impact under the Plan (6,328 acres) and the remaining acres to be preserved (12,231 acres)). Apparently, approximately 2,511 acres are subject to the permit but currently under protection at some level (we arrived at this number by calculating the difference between the lands subject to the permit (21,070 acres) and the acres currently not protected (18,559 acres)).

Approximately 42,436 acres of modeled habitat is in Existing Conservation Lands, including the Mecca Hills Wilderness Area and the Coachella Valley Preserve, and have some level of protection. The Plan classifies Existing Conservation Lands as Level 1, 2, or 3 (see Section 2.4 of the Plan for definitions). Approximately 25,861 acres of Mecca aster modeled habitat are Level 1 Existing Conservation Lands in the Mecca Hills Wilderness Area managed by the BLM. Approximately 10,331 acres are Level 2 Existing Conservation Lands primarily in the Coachella Valley Preserve owned by BLM (7,838 acres), California Department of Parks and Recreation (2,092 acres), The Nature Conservancy (392 acres), or the U.S. Fish and Wildlife Service (10 acres). Approximately 8,383 acres of modeled habitat is BLM multiple-use land (Level 3). The remaining acres are Level 4 lands which are owned largely by private entities and are currently not subject to any protections.

Modeled habitat occurs in two regions, the Mecca Hills and Indio Hills. These populations appear to be naturally isolated from one another. Twenty or twenty-one occurrences of this species are known from the action area (the Plan states that there are 21 occurrences, however, CVAG's GIS files only show 20 occurrences). Thirteen occurrences are known from the Mecca Hills area; nine of these occurrences are in or very near the Mecca Hills Wilderness Area, primarily in Box Canyon and Painted Canyon. Two occurrences are 2-3 miles south-southeast of Hidden Spring on BLM multiple-use land (Conservation Level 3). Two occurrences are south of Thermal Canyon, on private land east of the Granite Construction Thermal Mine Site. Seven occurrences are known from the Indio Hills, all on the southwest facing side. One occurrence is in atypical habitat outside the boundaries of the habitat model. This occurrence is on private lands on the slope leading up to the Indio hills, not in the hills themselves. Four other occurrences in modeled habitat are on private land in the Indio Hills. The two occurrences at Biskra and Macomber Palms are on California Department of Parks and Recreation Land (Indio

Hills State Park).

Factors Affecting the Species' Environment within the Action Area
Off-highway vehicle activity in the Indio Hills threatens this species. Off-highway vehicles were a large threat in the Mecca Hills until the Mecca Hills Wilderness Area was designated by the BLM. The possibility of illegal OHV activity may still remain, however. Box Canyon Road splits the Mecca Hills Wilderness Area into northern and southern sections and potentially allows access to protected areas. The lower half of Painted Canyon is not designated wilderness and some plants in this area may not be protected. An unpaved road allows access to Painted Canyon. OHV activity would be especially harmful to individual plants in the wash, though plants on the sides of the wash would be safer from OHVs.

Invasive plants such as Saharan mustard or red brome may compete with this species. However, the somewhat specialized niche this species occupies may make it less susceptible than other species to competition with invasive plants. There are no studies or observations to suggest that invasive plants are currently a threat.

EFFECTS OF THE ACTION
Mitigation and Minimization Measures
Of the 21,070 acres of modeled habitat subject to the permit, 12,231 acres (58 percent) would be preserved in perpetuity under the Plan.

Approximately 55,816 acres are designated as Core Habitat for this species. Core habitat is land in which the goal of the Plan would be to maintain viable populations in perpetuity. Two percent of Core Habitat (1,339 acres) would be authorized for take, leaving a total of 54,477 acres of Core Habitat conserved under the Plan (including Existing Conservation). Altogether, 12,047 acres of Core Habitat would receive new protection under the Plan. About 184 acres of Other Conserved Habitat also would be conserved, with a total of 190 acres of Other Conserved Habitat within the Conservation Areas. The total modeled habitat anticipated to be conserved in the Reserve System is 54,667 acres.

Urban Development
Direct Effects
Approximately 6,328 acres of all modeled habitat would be authorized for impact, which is 10 percent of the total modeled habitat. Approximately 4,968 acres outside of proposed Conservation Areas would be authorized for impact. Approximately 1,360 acres within proposed Conservation Areas would be authorized for take. Five occurrences of 20 or 21 occurrences (the draft Plan states that there are 21 occurrences, however, the CVAG GIS files only show 20 occurrences) of this species are outside of the Conservation Areas. Two of these five occurrences are on BLM land southeast of the Mecca Hills wilderness in the largest area of modeled habitat outside of the Conservation Areas. One is on private land just outside the southern boundary of the Mecca Hills Wilderness Area; another is outside modeled habitat southwest of the Indio Hills. This occurrence is not in typical habitat and probably doesn't represent a reproducing population. Another occurrence is mapped near the road outside the proposed Mecca Hills/Orocopia Mountains Conservation Area, however, the occurrence was

from 1936 and the location information is very vague. This occurrence may be farther from the road. The population represented by this occurrence is probably primarily in the Conservation Area and Mecca Hills Wilderness Area.

Inside of the Conservation Areas

Within the proposed Mecca Hills/Orocopia Mountains Conservation Area, 4,646 acres of habitat are not currently conserved, of which 4,181 acres (90 percent) would be preserved as Core Habitat under the Plan. Another 17 acres of habitat are not currently conserved, of which 15 acres (88 percent) would be preserved as Other Conserved Habitat under the Plan. Approximately 465 acres of Core Habitat and 2 acres of Other Conserved Habitat are authorized for impact under the Plan.

Within the proposed Desert Tortoise and Linkage Conservation Area, 2,061 acres of habitat is not currently conserved, of which 1,855 acres (90 percent) would be conserved as Core Habitat under the Plan. Approximately 206 acres of modeled habitat would be authorized for impact under the Plan.

Within the proposed East Indio Hills Conservation Area, 1,161 acres of habitat is not currently conserved, of which 1,045 acres (90 percent) would be conserved as Core Habitat under the Plan. Approximately 116 acres of modeled habitat would be authorized for impact under the Plan.

Within the proposed Indio Hills Palms Conservation Area, 2,545 acres of habitat is not currently conserved, of which 2,290 acres (90 percent) would be conserved as Core Habitat under the Plan. Under the Plan, after cessation of mining activity currently taking place on the western edge of the Indio Hills by Granite Construction Corporation, Granite would convey a conservation easement to CVCC. This land could potentially become habitat for the Mecca aster, though no requirements are made in the Plan for specific restoration goals. Within the proposed Indio Hills Palms Conservation Area, 255 acres of modeled habitat would be authorized for impact under the Plan.

Within the proposed Thousand Palms Conservation Area, 2,973 acres of habitat is not currently conserved, of which 2,676 acres (90 percent) would be conserved as Core Habitat under the Plan. Approximately 297 acres of modeled habitat would be authorized for impact under the Plan.

Within the proposed Indio Hills/Joshua Tree National Park Conservation Area, 162 acres of habitat is not currently conserved, of which 146 acres (90 percent) would be conserved as Other Conserved Habitat under the Plan. Approximately 16 acres of modeled habitat would be authorized for impact under the Plan.

Within the proposed Edom Hill Conservation Area, 26 acres of habitat is not currently conserved, of which 23 acres (88 percent) would be conserved as Other Conserved Habitat under the Plan. Approximately 3 acres of modeled habitat would be authorized for impact under the Plan.

The Plan would allow public access to Conservation Areas through a trails system. Rules will be

posted to protect species, but illegal trampling of vegetation and picking flowers may affect the Mecca aster.

Indirect Effects

As a result of an increasing human population, OHV pressure may increase in the Indio Hills. Illegal OHV activity may also increase. To counteract these pressures, the proposed Plan would provide funding to BLM to support four new Ranger positions dedicated to improved management of the Reserve System.

Monitoring and Adaptive Management

Monitoring and Adaptive Management of this species would be enacted as described in Sections 8 and 9 of the Plan. Two goals of monitoring this species would be to detect the effects of OHV use and invasive weeds, and implement adaptive management measures if needed. Weed control would be enacted "if feasible." It is unclear at what level invasive species or OHV activity would be considered an impact. There are no designated trigger levels in the Plan and no provisional management actions, such as closing the Indio Hills to OHV activity. Another goal of monitoring would be to test models of the distribution, abundance and ecological requirements of the Mecca aster.

Trails Management

The Plan would allow development of trails in Conservation Areas. These trails would be situated to have the least impact on the biological resources as possible. Hikers would be confined to the trail to avoid trampling vegetation such as the Mecca aster.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

The Agua Caliente Band of Cahuilla Indians is undertaking a Habitat Management Plan for all of their Tribal lands. The draft Plan and associated documents have been reviewed publicly. It is anticipated that the final Plan and associated environmental analysis will be complete in mid-2008 with permit issuance scheduled for late 2008. Although there will be habitat loss associated with that Plan, the overall net benefit to the species is positive. Because issuance of that permit is a Federal action, an analysis of the impacts of that Plan will be completed in the required section 7 process.

As described in the general section of this biological opinion, climate change may have unpredictable effects on species, perhaps resulting in a change in distribution.

CONCLUSION

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

Mecca aster. We reached this conclusion because a large amount of habitat is expected to be preserved for this species: 12,231 acres in addition to the 42,436 acres on Existing Conservation Lands. Three of 20 or 21 occurrences of this species would be on land authorized for impact under the Plan, however many more populations likely exist in areas that haven't been surveyed. The expected loss of 6,328 acres of modeled habitat should not appreciably affect the viability of the populations conserved by the proposed Plan.

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Coachella Valley milk-vetch (*Astragalus lentiginosus var. coachellae*)

STATUS OF THE SPECIES

Legal/Listing Status
The Coachella Valley milk-vetch was listed as endangered on October 6, 1998. Refer to the final rule (63 FR 53596) for a detailed discussion on the taxonomic history and description of this taxon. The taxon was afforded protection under the Act in recognition of the plant's imperiled status from habitat losses caused by urban development and human modifications to the sand transport system that maintains the unique ecosystem the species relies upon. The taxon is on the California Native Plant Society List 1B and has no State status.

Critical habitat for the taxon was not designated at the time of listing. On July 1, 2002, the Court ordered the Service to reconsider its "not prudent" determination and publish a proposed critical habitat designation, if prudent, for Coachella Valley milk-vetch on or before November 30, 2004, and to publish a final critical habitat designation on or before November 30, 2005. Pursuant to this order, critical habitat for this species was proposed on December 14, 2004, on 3,583 acres (1,450 hectares) in three units in Riverside and San Bernardino counties, California (69 FR 74468). The three units proposed for designation as critical habitat were in the Whitewater River System, Mission Creek and Morongo Wash System, and Thousand Palms System (69 FR 74468). A final rule was published on December 14, 2005 (70 FR 74112) that determined critical habitat would not be designated for the Coachella Valley milk-vetch.

As stated in the final critical habitat rule, the Service identified 17,746 acres (7,182 hectares) of local, County, State, Federal, and private lands containing features essential to the conservation of Coachella Valley milk-vetch in Riverside County. However, all habitat with essential features (described below) is located within areas proposed to be conserved and managed by the MSHCP or within areas conserved under the CVFTL HCP, and therefore was excluded from the critical habitat designation under section 4(b)(2) or 3(5)(A) of the Act. The primary constituent elements for the identified 17,746 acres (7,182 hectares) of essential critical habitat for the Coachella Valley milk-vetch (69 FR 74468) included:

1. Unconsolidated sands stored within rivers and tributaries in the San Bernardino, Little San Bernardino, and San Jacinto Mountains and Indio Hills. The unconsolidated sands stored in these rivers and tributaries are not occupied by Coachella Valley milk-vetch, but represent the original source of the loose sand that forms the sand dunes and flats that are occupied by this plant.

2. Unconsolidated sands deposited on the alluvial fans of the San Bernardino, Little San Bernardino, and San Jacinto Mountains and Indio Hills. The unconsolidated sands deposited on these alluvial fans are not occupied by Coachella Valley milk-vetch; instead, these sands are transported by wind and water to form the fluvial and aeolian sand dunes and flats that are occupied by this plant.

3. Suitable flooding regimes to transport unconsolidated sands from rivers and tributaries to the alluvial fans of the San Bernardino, Little San Bernardino, and San Jacinto Mountains and Indio Hills.

4. Suitable wind and flooding regimes to transport unconsolidated sands deposited on the alluvial fans of the San Bernardino, Little San Bernardino, and San Jacinto Mountains and Indio Hills to the fluvial and aeolian depositional areas, including areas west of Edom Hill/Willow Hole reserve, areas west of Coachella Valley Preserve, and the Whitewater Floodplain area that are occupied by Coachella Valley milk-vetch.

5. Aeolian sands on active, stabilized, and shielded sand dunes or fields, and sandy alluvial sites in washes within the San Gorgonio/Whitewater River aeolian sand transport system, Mission Creek/Morongo Wash aeolian sand transport system, and the Thousand Palms aeolian sand transport system that are occupied by Coachella Valley milk-vetch.

Species Description

The Coachella Valley milk-vetch was described by Rupert C. Barneby (1964) based on a specimen collected in 1913 by Alice Eastwood in Palm Springs, California. Coachella Valley milk-vetch, a member of the pea family (Fabaceae), is an annual or short-lived perennial with ascending stems 4-12 inches (10-30 centimeters) tall. The leaves, stems, and fruits are densely covered with short, appressed (pressed flat), white hairs. The pink-purple flowers are arranged in 11 to 25-flowered racemes (a simple, elongated inflorescence) and the two-chambered fruits are strongly inflated. The Coachella Valley milk-vetch is one of 19 varieties of *A. lentiginosus* found in California (Spellenberg 1993), none of which occur in the same region or habitat types. However, *A. aridus* and *A. crotalariae* may be found within the geographical and ecological range of *A. lentiginosus* var. *coachellae*. Both of these taxa, in contrast to the Coachella Valley milk-vetch, have fruits with a single chamber.

Distribution

This species historically and currently has a limited distribution and is endemic to the southern California portion of the western Sonoran desert. Barneby (1964) initially described this taxon as apparently confined to the Coachella Valley. However, specimens collected in 1973 from the valley floor near Desert Center [approximately 50 miles (80 kilometers) to the southeast of the Plan Area] were identified as *A. l.* var. *coachellae* and attributed to Barneby. These specimens were apparently misidentified and have since been determined to be *A. l.* var. *variabilis* (Knaus 2006). Barneby (1964) notes *A. l.* var. *variabilis* from the Desert Center area, and reports *A. l.* var. *coachellae* only from the Coachella Valley.

The majority of historic and existing occurrences are found in the northern Coachella Valley (within the Plan Area); generally from just east of Cabazon to the dunes off Washington Avenue, north and west of Indio (Service 2004). The taxon currently is found mostly in and around the Snow Creek area, Whitewater River, Mission and Morongo Creeks, Willow Hole, Big Dune, and the Coachella Valley Preserve at Thousand Palms.

Habitat Affinities
Many taxa in the genus *Astragalus*, including *A. lentiginosus* var. *coachellae*, are endemic to habitats with specific substrate or hydrologic conditions and are, therefore, naturally limited in distribution by the combination of various physical factors (Service 1998). The Coachella Valley milk-vetch is found on loose wind-blown or alluvial sands on dunes/flats, along disturbed margins of sandy washes largely within the Coachella Valley of Riverside County. Coachella Valley milk-vetch populations in the Coachella Valley are strongly affiliated with active, stabilized, and shielded sandy substrates (Sanders and Thomas Olsen Associates 1996, White 2004). This taxon is primarily found on loose aeolian (wind transported) or alluvial (water transported) sands that are located on dunes or flats, and along disturbed margins of sandy washes (Service 2004). This biotic community type has been categorized by Holland (1986) as stabilized and partially-stabilized desert sand fields.

Most of the suitable sandy habitat for the species in the Coachella Valley is generated from sand derived from alluvial fans and floodplains of several drainages of the Indio Hills and San Bernardino, Little San Bernardino, and San Jacinto Mountains (Griffiths *et al*. 2002, Lancaster 1997). Sediment is entrained from slopes and channels in the headwaters and drainage mid-reaches, and is transported downstream in channels during infrequent flood events (Griffiths *et al*. 2002). Fluvial transport is the dominant mechanism that moves sediment into fluvial depositional areas in the Coachella Valley (Griffiths *et al*. 2002). Some sediment is stored on terraces within the channels, whereas during larger flood events, sediment is stored on the surface of large coalescing alluvial fans as floodplain deposits, or is transported through these fans in channelized washes and deposited over broad depositional areas on the valley floor. For sufficient fine-grained sands to reach the aeolian system in the valley floor and ultimately support suitable habitat for the taxon, it is necessary to protect major fluvial channels that transport source sand from the surrounding drainage basins, as well as alluvial fans and depositional areas.

Active sand dunes are an important habitat for the Coachella Valley milk-vetch. The highest densities of Coachella Valley milk-vetch have been found in locations containing large areas of aeolian sand, including Snow Creek (Sanders and Thomas Olsen Associates 1996), Big Dune, and Willow Hole area (Service files, BLM, unpublished data 2001a). Within active and stabilized sand fields and dunes, the species tends to occur in coarser sands in the margins of dunes, but not in most active blow sand areas (White 2004). Active dunes are generally characterized as barren expanses of moving sand where perennial shrub species are sparse. The dunes may intergrade with stabilized or partially stabilized dunes, which have similar sand accumulations and formations but are stabilized by evergreen or deciduous shrubs, scattered low annuals, and perennial grasses. Active sand fields are similar to active dunes, but are characterized as smaller sand accumulations that are not of sufficient depth to form dune formations. They may be characterized as hummocks forming behind individual shrubs or clumps of vegetation.

Stabilized sand fields are similar to active sand fields but contain sand accumulations that are stabilized by vegetation or are armored (Service 2004). Armoring is the process where the wind picks up and moves small sand grains, and leaves behind larger sand grains forming an “armor”

that prevents wind from moving additional smaller particles trapped below (Sharp and Saunders 1978). The stabilized sand fields in the latter case are temporary, becoming active when the armor is disturbed over large areas, or new blow sand is deposited from upwind fluvial depositional areas (Service 2004).

Coachella Valley milk-vetch is also found in shielded sand dunes and fields (Service 2004). Shielded sand dunes and fields have similar sand formations as compared to active and stabilized sand dunes and fields, except that sand source and transport systems that would normally replenish these areas have been interrupted or shielded by human development (Service 2004).

Coachella Valley milk-vetch also occurs in localized patches of aeolian sand or in active washes that are, in some cases, fairly distant from large dunes or sand field areas (White 2004). Some of these localized patches of aeolian sands are characterized as ephemeral sand accumulations lacking dune formation (Service 2004). This type of habitat generally occurs at the western end of the Coachella Valley where wind velocities are highest (Sharp and Saunders 1978).

The sandy substrates that provide suitable habitat for Coachella Valley milk-vetch are extremely dynamic in terms of spatial mobility and tendency to change back and forth from active to stabilized (Lancaster 1995). This has significant consequences for Coachella Valley milk-vetch because their population densities vary with different types of sandy substrates (Service 2004). Because suitable habitat is transitory in some portions of the valley, currently unoccupied areas can also become suitable following fluvial and aeolian events. For instance, the greatest densities of plants have been recorded on dune and hummock habitats, such as Big Dune, Snow Creek, and Willow Hole, whereas smaller densities of plants have been recorded on stabilized sand fields (Service files, BLM, unpublished GIS data 2001a). Conserving a wide variety of sandy substrate types is important for the conservation of Coachella Valley milk-vetch because of the dynamics of the aeolian sand transport processes (Service 2004).

Species often found in association with the Coachella Valley milk-vetch include creosote bush (*Larrea tridentata*), burro-weed (*Ambrosia dumosa*), indigo bush (*Psorothamnus emoryi*), fourwing saltbush (*Atriplex canescens*), sand verbena (*Abronia villosa*), dicoria (*Dicoria canescens*), Indian ricegrass (*Achnatherum hymenoides*), croton (*Croton californicus*), sandmat (*Chamaesyce polycarpa*), sandpaper plant (*Petalonyx thurberi*), annual desert rattleweed (*Astragalus aridus*), salton milk-vetch (*A. crotalariae*), and devil's lantern (*Oenothera deltoides*).

Life History

Coachella Valley milk-vetch seeds germinate in response to winter rains (White 2004). Likewise, seasonally dormant root crowns (the point at which the root and stem of a plant meet) sprout new shoots in response to winter rains. The date of first flowering may be as early as December and continues into May, though most flowering specimens have been collected in March and especially in April (White 2004). The first date of fruit may be as early as February, but most specimens of fruits have been collected in April and May. The Coachella Valley milk-vetch fruiting bodies are inflated, an apparent adaptation for being dispersed by wind. As such, wind transport corridors between populations facilitate gene flow and population growth. At

maturity, the pods dry and fall to the ground, where they are dispersed by wind. As summer progresses, the vegetation dies above the root mass, with an unknown proportion of plants persisting into the following summer and fall as dormant root crowns (White 2004). Coachella Valley milk-vetch populations can and typically do survive drought periods as dormant seeds (seed bank), and the numbers of above ground plants at any given time is only a limited temporal indication of population size (White 2004). It is not known how long seeds may remain viable, but studies on *A. lentiginosus* var. *micans* demonstrate that buried seeds may remain viable for at least 8 years (Pavlik and Barbour 1986). Therefore, suitable habitat that does not currently contain above-ground individuals may be likely important because of the undetectable seed bank and dormant root crowns necessary for the long-term survival of this taxon.

Population Trends

Historical abundance of the taxon in the Coachella Valley is unknown. Twenty to twenty-five occurrences have been recorded within the past decade (CDFG/CNDDB 2001); and 90 percent are found within 3.1 miles (5 kilometers) of Interstate 10 (Barrows 1987, CNDDB 2001). Approximately 20 to 25 percent of the documented plant occurrences are protected on the three fringe-toed lizard preserves in the Coachella Valley Preserve System. An estimated 75 to 80 percent of the known Coachella Valley milk-vetch occurrences are found on unprotected lands. Of these, approximately 7 percent exist on Southern California Edison lands, 7 percent occur on lands owned by the Agua Caliente Band of Cahuilla Indian Reservation (within the Coachella Valley, but outside of the Plan Area boundary), and the remainder are situated on other private parcels.

Overall, populations of Coachella Valley milk-vetch vary widely in size from year to year, depending on the environmental conditions, making assessments of total individual numbers difficult. At locations where the Coachella Valley milk-vetch was monitored in 1995, densities varied from 3.1 to 148 plants per acre (1.3 to 60 plants per hectare) (Sanders and Thomas Olsen Associates 1995).

Threats

The primary threat to Coachella Valley milk-vetch is the extensive urban development in the Coachella Valley (63 FR 53596). Urbanization has direct and indirect effects on Coachella Valley milk-vetch. Urbanization can destroy plants and suitable habitat on-site, and indirectly degrade suitable habitat by blocking sand transport downwind of the development; these blow sands maintain the sand ecosystems of the Coachella Valley (Service 1998). Large housing and golf course developments without the appropriate design considerations may also affect the localized wind and flooding regimes by reducing wind movement and changing the flooding and drainage patterns. Occupied habitat downstream and downwind of these developments that depend on the continuous supply of loose unconsolidated sands for their long-term existence, may be degraded by the alteration, blockage, and reduction in their supply of sand.

Another threat includes habitat degradation and loss by the spread of invasive plants, such as Saharan mustard (*Brassica tournefortii*) and Mediterranean grass (*Schismus barbatus*) (69 FR 74468). Invasive plant species can potentially displace Coachella Valley milk-vetch by stabilizing loose sediments, reducing transport of sediment to downwind habitats occupied by

this species, and competing for limited resources, such as water. Dense populations of Saharan mustard have invaded most suitable habitat areas in the valley.

On private and public lands, unauthorized OHV use has increased in recent years and can destroy plants and occupied habitats directly. A lack of enforcement capability has contributed to the proliferation of this problem.

On private and public lands, the construction and operation of sand and gravel mines, debris dams, and percolation ponds directly and indirectly impact plants and occupied habitat and decrease the amount of fluvial sediments to depositional areas in downstream occupied habitats. For example, the percolation ponds constructed on BLM and Coachella Valley Water District (CVWD) lands in the Whitewater Floodplain Conservation Area resulted in the direct loss of plants and occupied habitat and have altered the transport of sand to downstream occupied habitats.

Conservation
The Serviced issued a Biological Opinion on the California Desert Conservation Area Plan Amendment for the Coachella Valley (CDCA Plan Amendment) in December 2002. Pursuant to a Record of Decision (ROD) by BLM under the CDCA Plan Amendment signed in December 2002, BLM is obligated to manage BLM lands consistent with the herein proposed MSHCP. The ROD states: "To facilitate consistency with the goals and objectives of the CVMSHCP, the BLM established habitat conservation objectives for protecting sensitive species and their habitats…These habitat objectives apply to all BLM-administered public lands that fall within the conservation area boundary established through the CVMSHCP. Future activities on public lands within the conservation area must achieve the habitat objectives either through avoidance or application of appropriate mitigation measures to be in conformance with the Coachella Valley Plan and consistent with the CVMSHCP" (BLM 2002b). Specifically, the CDCA Plan Amendment states: "For the 8 vegetation community types (Figure 2-4), the habitat conservation objectives outlined in Table 2-4 would be used to assess compatible uses and to develop appropriate mitigation measures within Conservation Areas on BLM-managed land" (BLM 2002a). The objectives in Table 2-4 state that BLM will "Conserve 99 percent of…" each vegetation community within Conservation Areas on BLM-managed land; these eight general "vegetation communities" are: sand dunes and sand fields, desert scrub communities, chaparral communities, desert alkali scrub, marsh communities, dry wash woodland and mesquite communities, riparian communities, and woodland and forest communities; these communities include all Coachella Valley milk-vetch habitat in Conservation Areas. In the CDCA Plan Amendment BLM defines "conserve" as the use of "all methods and procedures which are necessary to bring any endangered species or threatened species to the points at which the measures provided pursuant to the Endangered Species Act are no longer necessary" (BLM 2002a).

Synopsis of Status
The Coachella Valley milk-vetch is currently persisting in the Coachella Valley but population estimates are unknown. Increased urbanization has reduced available habitat and the sand transport system necessary to maintain this species. Habitat for the species is becoming

increasingly fragmented by urban development and more vulnerable to adverse effects of OHV activities, road construction, and invasive plant species. The continued loss and degradation of habitat, disturbance, fragmentation of populations and loss or degradation of sand sources and sand transport corridors necessary to sustain remaining habitat makes this species survival tenuous in the long-term.

ENVIRONMENTAL BASELINE

Status of the Species in the Action Area

The Coachella Valley milk-vetch is largely restricted to the Coachella Valley. Within the Action Area, the current Coachella Valley milk-vetch distribution in the Coachella Valley roughly extends from just east of Cabazon to the vicinity of Indio north of Interstate 10. The Action Area supports almost all of the known Coachella Valley milk-vetch occurrences. Table 9-5 in the MSHCP summarizes many of the known occurrences throughout the Plan Area and is herein incorporated by reference. Population estimates throughout the Action Area are not currently available because insufficient monitoring data are available. As described above, we determined that approximately 17,746 acres (7,182 hectares) of essential habitat existed for Coachella Valley milk-vetch in San Bernardino and Riverside counties. The Coachella Valley Associated of Governments (CVAG) modeled 36,398 acres Coachella Valley milk-vetch habitat within the Plan Area. Additional Coachella Valley milk-vetch habitat occurs on Agua Caliente Band of Cahuilla Indian lands (Tribe) outside the Plan Area boundary. Most of these lands occur on the Big Dune in the central part of the valley. Within the Plan Area, most of the lands where Coachella Valley milk-vetch has been observed are privately owned.

Surveys conducted by James Cornett for Michael Brandman Associates in 2002 found 1,491 individuals of Coachella Valley milk-vetch south of Interstate 10 between Date Palm Drive and Bob Hope Drive (Sections 10, 14, 22, and 24; T4S, R5E) (MBA 2002). Surveys conducted in 2004 by Mr. Cornett, near Palm Vista and Los Alamos Roads and on adjacent Tribal lands, detected more than 500 individuals within the boundaries of proposed residential development parcels (Cornett 2004). Mr. Cornett reportedly stopped counting after 500 and believed there were thousands more plants present (J. Cornett, pers. comm). On June 30, 2005, Service personnel visited the same site to collect milk-vetch seeds. During the site visit, Service personnel observed more than 2,000 individuals scattered across the site and extending outside the proposed project boundaries (USFWS unpublished data). Based on available data, Sections 10, 14, 22, and 24 together support the largest known population of Coachella Valley milk-vetch.

In April 2005, surveys conducted for the Desert Southwest Transmission Project and Devers to Palo Verde II Project identified 38 occurrences of the Coachella Valley milk-vetch between North Palm Springs and Indio. The surveys located 98 individual Coachella Valley milk-vetch associated with these occurrences (Greystone Environmental Consultants, Inc. 2005).

While the overall range of this species may not be significantly reduced from the historical distribution, the number of extant occurrences has declined dramatically (K. Barrows 1987, Service 1996). The majority of historical habitat has been eliminated or degraded because of the direct and indirect effects of development. The historical habitat has been directly converted to urban or agricultural development, and most of the remaining habitat has been substantially

degraded by reduced/eliminated sand sources, OHV use, and/or invasive plant species.

The elimination of habitat for Coachella Valley milk-vetch likely began with the introduction of agriculture over a century ago, but urbanization has accelerated these losses in the past 40 years. Significant dune habitat for the species once occurred along much of the length of the Coachella Valley floor. Increased urbanization has reduced available habitat through direct conversion of land and alterations in the sand transport system responsible for the creation/maintenance of sandy ecosystems (Barrows 1987). Structures, percolation ponds, utility substations, spoil piles and levees, road fill, and/or windrows have been constructed/planted within most of the remaining sand transport corridors, stabilizing, confining, or blocking much of the historically free moving sand down the valley, preventing or reducing the continued sand replenishment of the blowsand habitat. As habitat for the species becomes increasingly fragmented by urban development, remaining populations become more vulnerable to adverse effects of OHV activities, roadside maintenance, paving/landscaping, and non-native plant invasions. Fragmentation increases the potential for stochastic events that detrimentally affect long-term survival probability. Similarly, fragmentation also decreases the species' resilience to rebound from such events. Wind energy construction and OHV activities have contributed to reductions/alterations in the Coachella Valley milk-vetch populations. Populations of Coachella Valley milk-vetch have been altered by development of wind energy parks and degraded by OHV use (K. Barrows, pers. comm. 1996).

Inside Conservation Areas

The designated Core Habitat areas of the proposed MSHCP Reserve System for the Coachella Valley milk-vetch encompasses 15,814 acres and occur in portions of the Snow Creek/Windy Point, Whitewater Floodplain, Willow Hole, and Thousand Palms Conservation Areas. Areas designated as Other Conserved Habitat occur within the Cabazon, Stubbe and Cottonwood Canyons, Snow Creek/Windy Point, Whitewater Canyon, Highway 111/I-10, Whitewater Floodplain, Upper Mission Creek/Big Morongo Canyon, Willow Hole, Long Canyon, Edom Hill, Thousands Palms, West Deception, Indio Hills/Joshua Tree National Park Linkage, Joshua Tree National Park, and Santa Rosa and San Jacinto Mountains Conservation Areas. Other Conserved Habitat modeled for the Coachella Valley milk-vetch totals 5,966 acres. Of this total, 1,117 acres would not be conserved by habitat acquisition, but only through the Conservation Objective to maintain fluvial sand transport. Few records of the Coachella Valley milk-vetch have been recorded within many of the Conservation Areas that contain Other Conserved Habitat.

Snow Creek/Windy Point Conservation Area

The Snow Creek/Windy Point Conservation Area consists of 2,700 acres of modeled Core Habitat and Other Conserved Habitat. Of this total, 359 acres of modeled habitat occur on Existing Conservation Land controlled by BLM. The sand sources for this area include primarily the Whitewater and San Gorgonio Rivers and their tributaries, originating in the San Jacinto and San Bernardino Mountains. The fluvial sand supply to this Conservation Area has probably been considerably reduced by past and ongoing sand and gravel mining upstream on the San Gorgonio River floodplain, but the blowsand ecosystem within the Conservation Area likely remains functional in the long-term even with the reduced sand input.

Snow Creek/Windy Point Conservation Area currently has an abundance of invasive plants, notably Saharan mustard. Invasive plants have partially stabilized soils within the Conservation Area and reduced or slowed aeolian sand transport. The invasive plants likely compete with and reduce the biological productivity of native plants, and likely affect wildlife by altering the availability of forage plants and the characteristics of the ecosystem structure (Cal-IPC 2005; Brooks 2005). In addition, some of these plants likely increase the potential for fire (Sanders and Minnich 2000, Cal-IPC 2005, Brooks 2005). Dense stands of Saharan mustard in the Coachella Valley appear to suppress native wildflowers; because of its quick growth and flowering following rains, Saharan mustard appears to monopolize available soil moisture as it builds canopy and matures seed well before many native species have begun to flower (Sanders and Minnich 2000). In addition to the seed bank existing within this Conservation Area, the wind likely blows additional invasive plant seeds into the Conservation Area, further exacerbating the problem and reducing the amount of suitable habitat available for the Coachella Valley milk-vetch.

In addition to the presence of invasive plants, Snow Creek/Windy Point Conservation Area has been and continues to be subject to substantial illegal OHV activity that has resulted in the alteration and degradation of much of the habitat. The OHV routes (trails) within the sloped portions of the blowsand ecosystem within the Conservation Area are currently visible from miles away. One major OHV access point into the Snow Creek/Windy Point Conservation Area is through BLM lands near Windy Point (Section 24, T3S, R3E). While the OHV activity continues on BLM land, access is also currently being provided to land proposed for the Reserve System. Although it was the intention of BLM's CDCA Plan Amendment (and the Terms and Conditions in our associated Biological Opinion for BLM's action) to manage this and other areas, including specific management and enforcement activities of patrolling and blocking OHV access, these efforts to date have been unsuccessful in stemming these activities. Unless actions are taken and the terms of the BO are fully implemented, the Snow Creek/Windy Point Conservation Area portion of the proposed Reserve System continues to be compromised by these activities.

Whitewater Floodplain Conservation Area

The Whitewater Floodplain Conservation Area consists of 5,712 acres of modeled habitat for the Coachella Valley milk-vetch (both Core and Other Conserved Habitat). Of this total, 2,535 acres are designated as Existing Conservation Lands and are controlled by BLM and CVWD. Within the Whitewater Floodplain Conservation Area, about 1,230 acres of modeled habitat occur within the existing Whitewater Floodplain Reserve, established by the CVFTL HCP. To the northwest of the Whitewater Floodplain Conservation Area is the Whitewater Canyon Conservation Area and to the west is the Highway 111/I-10 Conservation Area. The Whitewater Floodplain Conservation Area connects to the Snow Creek/Windy Point Conservation Area near Windy Point, where the San Gorgonio River joins the Whitewater River.

The estimate of suitable habitat that has been identified through modeling and designated as Existing Conservation Lands or habitat that is proposed to be conserved is an overestimate of suitable or potential habitat. Our estimates, based on field reviews over the past three years and

aerial photos, indicate that there is currently much less suitable habitat for the Coachella Valley milk-vetch in the Whitewater Floodplain Conservation Area than what had been estimated by the Plan before the recent drought; large areas of modeled habitat were found to be devoid of substantial blowsand deposits and were unsuitable. Some of these areas are expected to become suitable with the input of new aeolian sand in the months/years following the stormflow-generated fluvial deposits upwind during the winter of 2004/2005. Other large areas of modeled habitat are not expected to become suitable habitat as these areas are not downwind of expected fluvial deposition areas, based on mapping by Griffiths *et al.* 2002.

Sediments that supply sand to the historic and remaining Whitewater floodplain blows and ecosystems are fluvially deposited "downstream from the confluence of the San Gorgonio and Whitewater Rivers in the Whitewater depositional area, which extends from Windy Point to the east and from the railroad south" (Griffiths *et al*. 2002). The construction of dikes on the Whitewater River downstream from Windy Point has both trapped fluvial sediments upstream from the Whitewater River depositional area and blocked westerly aeolian sand transport from crossing much of the depositional area. Based on Griffiths *et al*. (2002), the percolation ponds affect the Whitewater River depositional area by depositing aeolian sand downstream out of the desired depositional areas, resulting in less sand being deposited into the Whitewater Floodplain Reserve and in the Whitewater Floodplain Conservation Area as a whole.

Much of the Whitewater Floodplain west of Indian Avenue is owned, in a checkerboard pattern, by CVWD or BLM. As discussed above, CVWD controls the percolation ponds that affect the down stream portion of this Conservation Area. BLM currently leases some of its lands within this area to wind farm operators and other potential users. The Whitewater Floodplain Conservation Area is subject to fragmentation from roads, including Indian Avenue and Gene Autry Trail that run north/south and bisect the floodplain. OHV activity also affects the ability of this area to provide habitat for the Coachella Valley milk-vetch.

Willow Hole Conservation Area

The Willow Hole Conservation Area consists of 3,334 acres of modeled habitat for the Coachella Valley milk-vetch (both Core and Other Conserved Habitat). Of this total, 388 acres are designated as Existing Conservation Lands and are controlled by CVWD and CVMC. Habitat for the Coachella Valley milk-vetch within this Conservation Area occurs in the sandy flats and dunes from west of Palm Drive along the San Andreas Fault where sandy deposits from Mission Creek and Big Morongo Wash provide suitable habitat, along Varner Road east of Palm Drive, on Flattop Mountain, along the power line corridor, and on the Willow Hole/Edom Hill Preserve/ACEC. The Coachella Valley milk-vetch also has been observed along the Mission Creek and Big Morongo Wash sand transport channels north of the fault dunes.

The predominant watercourses that provide the sand source for the existing Willow Hole Reserve are Mission Creek and Morongo Wash. The westerly wind transports sands along the fault dunes and over the Flattop Mountain and into the Willow Hole Reserve and Stebbins Dune. Recent storms have entrenched the channel through Willow Hole with the result that much of the fluvial sediment is now deposited just outside of the Reserve (Griffiths *et al.* 2002). This material has the potential to be carried back into the Reserve by aeolian processes only if

sufficient winds occur. In addition, during intense storm events, the aeolian deposits on Edom Hill are recycled as fluvial sediment into Willow Hole.

The Willow Hole Conservation Area is fragmented by roads, including Palm Drive, Mountain View Drive, and Varner Road, though the Plan assumes only four-lane roads without properly designed wildlife undercrossings are a barrier to movement of Covered Species. The Willow Hole Conservation Area is subject to illegal OHV activity. OHV activity continues to modify BLM land, while providing access to the adjacent Existing Conservation Lands and the proposed MSHCP Reserve Lands. Although it is the intention of BLM's CDCA Plan Amendment (and the Terms and Conditions in the associated Biological Opinion) to manage these areas, to date those management and enforcement activities such as patrolling and blocking access have not been entirely successful. Service and BLM staff members have been working to address the substantial OHV use on BLM lands within the Willow Hole and Snow Creek/Windy Point Conservation Areas.

Thousand Palms Conservation Area
The Thousand Palms Conservation Area consists of 5,085 acres of Coachella Valley milk-vetch modeled habitat (both Core and Other Conserved Habitat). Of this total, 3,596 acres are designated as Existing Conservation Lands that are controlled by BLM, CDFG, Service, State Parks, TNC, and CNLM. The Coachella Valley Preserve established by the Coachella Valley fringe-toed lizard HCP totals about 17,651 acres and is located south of the central portion of the Indio Hills.

The Coachella Valley Preserve includes habitat for the Coachella Valley milk-vetch in the sand fields, main dune system, on the smaller dunes in Thousand Palms Canyon, and to a limited extent, north of Ramon Road in the sand source area. There are two disjunct Core Habitat areas described for this Conservation Area that are separated by about three miles; a relatively small area in Thousand Palms Canyon and the much larger Core Habitat area mostly south of Ramon Road. As with the other Conservation Areas, population estimates are not available. Generally, Coachella Valley milk-vetch numbers within this Conservation Area appear to be lower than at more western locations, such as the Snow Creek/Windy Point Conservation Area (Cal-IPC 2005, Barrows *et al.* 2005).

Geological process areas were identified as sand source and transport corridors for wind-blown sand habitat occurring on the Preserve. Absent an adequate sand supply, the strong, unidirectional winds erode and deplete sand accumulations. The Thousand Palms Canyon and western Indio Hills were thought to contribute equally to accretion of wind-blown sand on the Preserve; however, further investigation (Lancaster *et al.* 1993, Meek and Wasklewicz 1993, and Simons, Li, and Associates 1997) found that the western Indio Hills contributed a majority of the sand. These studies concluded Thousand Palms Canyon was only a minor contributor of blow-sand to the Preserve.

A Saharan mustard infestation on the Coachella Valley Preserve recurred in 2005. Saharan mustard was estimated to cover 40 percent of sampled sand fields in the Thousand Palms Preserve (C. Barrows, pers. comm. 2005). Active dunes had much less cover of Saharan mustard

(5 percent) (C. Barrows, pers. comm. 2005). The effects of this invasive vegetation on Covered Species is under study, however, it likely results in less suitable habitat available for the Coachella Valley milk-vetch.

Outside of Conservation Areas

Of the 36,398 acres of modeled Coachella Valley milk-vetch habitat within the entire Plan Area, 6,188 acres are Federal lands that are not subject to the Permit. It is anticipated that 14,086 acres of modeled habitat outside of the Conservations Areas will be lost through MSHCP implementation. The majority of the modeled habitat outside the Conservation Areas occurs in the following areas: 1) northwest of the Highway 111/I-10 Conservation Area; 2) several small habitat patches occur in and around Upper Mission Creek/Big Morongo Canyon and Long Canyon Conservation Areas; 3) large continuous blocks north of the Willow Hole Conservation Area; 4) large blocks of habitat in the just outside of the eastern portion of Whitewater Floodplain Conservation Area; 5) outside the western edge of the Thousand Palms Conservation Area; and 6) large blocks of habitat along the valley floor in the area known as the Big Dune.

The Big Dune, historically and as late as the 1990's, contained the largest contiguous area of blowsand ecosystem in the Coachella Valley. In the late 1970's the sand sources and transport processes that contributed sand to much of the remaining portions of Big Dune were still somewhat intact, but by the approval of the CVFTL in 1986 urban development had cut off almost all of the sand supply to remaining portions of the Big Dune. The Big Dune historically contained the deepest and most extensive sand deposits in the Coachella Valley; remaining undeveloped portions of the Big Dune still contain those sand supplies.

Prior to development in the valley, the Big Dune covered about 24,000 acres, based on a review of aerial photos. Our review of 2003 aerial photos of the Coachella Valley indicated approximately 6,620 acres of remaining suitable habitat in the Big Dune, of which approximately 4,810 acres are within Plan Area. The 6,620 acres of remaining suitable habitat on the Big Dune is about 28 percent of its original 24,000-acre extent. Of the approximately 3,410 acres of Tribal Reservation land within the Big Dune, about 1,810 acres are suitable habitat based on our review of current aerial photographs and MSHCP mapping.

The remaining (approximately 4,810 acres) suitable habitat within the Big Dune under the jurisdiction of the Local Permittees is anticipated to be lost during MSHCP implementation. The Big Dune was determined to be highly fragmented by the MSHCP and subject to edge effects due to major roadways and surrounding development within the area. Although the Big Dune continues to support sand dependant species such as the Coachella Valley milk-vetch, the MSHCP Planning Team determined that Essential Ecological Processes, including sand transport, were no longer intact.

Management

Reserve Management Unit 1 consists of 15 Conservation Areas from Cabazon to the East Indio Hills and includes all the aeolian sand Natural Communities. Coachella Valley milk-vetch occurs within 13 Conservation Areas in Reserve Management Unit 1. Other Conserved Habitat for the Coachella Valley milk-vetch occurs within the Joshua Tree National Park and Santa Rosa

and San Jacinto Mountains Conservation Areas within Reserve Management Unit 2 and 6, respectively (see the Environmental Baseline for a description of the Existing Conservation Lands within Reserve Management Unit 1 and Section 8 of the MSHCP). Management actions that have affected the milk-vetch have been done in association with the Coachella Valley fringe-toed lizard HCP, and range from control of invasive species and limiting public access to compatible scientific, educational, and recreational uses. A successful tamarisk eradication program has been completed. Within the Willow Hole-Edom Hill Reserve, the BLM lands are designated as an ACEC. The BLM ACEC lands are classified as Class "Limited" in the CDCA Plan. Management objectives include control of deleterious activities such as OHV use and perimeter fencing to limit OHV activity. OHV activity continues to be a problem though BLM and ranger patrols have helped address the problem.

Monitoring
A study was conducted by U.C. Riverside's Center for Conservation Biology and the CNLM in which Saharan mustard was removed from treatment plots within the Coachella Valley where milk-vetch occurs. Study plots were sampled between 2003 and 2005. Two and a half months after dense Saharan mustard stands were removed, milk-vetch plants averaged more than 40 seed pods per plant (n = 52) whereas those that remained beneath the mustard canopy averaged less than five pods (n = 29). Native annual plant species richness was unaffected by mustard presence within the same growing season. Native annual plant density and especially percent cover were negatively impacted by the mustard. In many situations the mustard formed a thick, inter-meshed canopy between 0.3 meter and 1 meter from the ground. Native annuals under the mustard canopy were often taller, and were etiolated, apparently due to directing their energy toward pushing through that canopy, at the expense of producing branches, flowers and fruits. For those species measured, the result was an 80-90 percent reduction in flower and seed production for native annuals growing beneath the mustard canopy compared to those released from mustard competition. If persistent, the long-term impacts to native annual plants could be significant due to an incremental reduction of their contribution to the seed bank (Cal-IPC 2005, Barrows *et al.* 2005).

Coachella Valley milk-vetch was found in increasing numbers from east to west, where annual precipitation is generally nearly twice that recorded in the eastern portions of the valley. The milk-vetch also appeared to occur most commonly on the sites with the most active sand movement, but even on the most active sites on the Coachella Valley Preserve less than one plant per transect were found. On the more mesic western sites near Windy Point and Snow Creek Road the milk-vetch numbers were greater (10-20 plants per transect) (Cal-IPC 2005, Barrows *et al.* 2005).

Factors Affecting the Species' Environment within the Action Area
The primary factors affecting the Coachella Valley milk-vetch are the loss of habitat to urban development, conversion of habitat to incompatible uses, altered fluvial and aeolian sand sources/processes, OHV activity, invasive species, armoring of soils, and obstructions within the sand movement corridors. These combined factors have resulted in substantial direct and indirect losses, such that only a small fraction of historically available habitat remains.

BLM

Modeled Coachella Valley milk-vetch habitat on BLM lands within the Plan Area total about 3,612 acres of which only 532 acres are outside of the Conservation Areas. The BLM lands occur within three Conservation Levels established in the Plan (Section 2.4 of the Plan). Generally, the Conservation Levels include: Conservation Level 1 which is designated as BLM Wilderness, totaling about 9 acres; Conservation Level 2 includes ACECs and totals about 777 acres; and Conservation Level 3 includes multiple use land on about 2,826 acres.

BLM lands within the Plan Area (and environs) are subject to the California Desert Conservation Area (CDCA) Coachella Valley Amendment (BLM 2002a and 2002 b) as referenced above. On BLM lands within the Plan Area, BLM has committed within the CDCA to a series of protections that benefit the conservation of Coachella Valley milk-vetch; within the biotic communities of sand dunes and sand fields, BLM will manage their lands under the following conservation objectives summarized below:

1. Conserve at least 99 percent of extant sand dunes and sand fields (see the General Environmental Baseline and Effects of the Action Sections of the Biological Opinion).
2. Avoid stabilization of sand dunes due to adjacent development and spread of non-native species.
3. Maintain, and enhance where feasible, aeolian (wind blown) and fluvial (water borne) sand transport systems.
4. Minimize sand compaction to protect Jerusalem cricket and giant sand treader habitat and to minimize crushing of fringe-toed lizards.
5. Minimize roads within flat-tailed horned lizard habitat which are prone to crushing by vehicles.
6. Avoid disturbance and compaction of sandy habitats associated with Coachella Valley milk-vetch and avoid crushing of Coachella Valley milk-vetch plants.
7. Reduce/control spread of non-native plants like Russian thistle and Saharan mustard, and exotic animals such as non-native ants.
8. Minimize loss of native vegetation, minimize habitat fragmentation, and maintain habitat patch connectivity.

Tribal Lands

As described in the general Environmental Baseline Section of this Biological Opinion, there are about 69,000 acres of Indian Reservation lands within the outer Plan Area boundary that are not subject to the MSHCP or part of the Plan Area. The Agua Caliente Band of Cahuilla Indians has been preparing a Tribal Habitat Conservation Plan (Tribal HCP). The Tribal lands are largely distributed in a checkerboard pattern of landholdings, including Tribal Trust Land, Allotted Trust land, and Fee Land. Between 1996 and 2003, the Agua Caliente Band of Cahuilla Indians purchased approximately 3,800 acres of land outside the Indian Reservation and within the Santa Rosa and San Jacinto Mountains Conservation Area. This land is the subject of a proposed land exchange between the Agua Caliente Band of Cahuilla Indians and BLM. It is not known at this time how much of the 3,800 acres may ultimately be included in the exchange.

During surveys on suitable habitat within the Reservation in February and May 2001, Coachella

Valley milk-vetch populations were found in 11 of 20 sections surveyed with populations ranging in size from one individual to an estimated 5,000 individuals (Tribal HCP 2003). The heaviest concentrations of plants were found in the Big Dune area in Sections 10, 14, 22, and 24 of the Reservation (Tribal HCP 2007). Under the draft Tribal HCP, much of the suitable habitat for Coachella Valley milk-vetch would be lost, although conservation of habitat in Section 6 of the Reservation is expected, where only a few scattered individuals were found just northwest of the Big Dune area (Agua Caliente Tribal HCP 2007).

EFFECTS OF THE ACTION

Evaluation Assumptions

In addition to the assumptions made in the Effects of the Action Section of this Biological Opinion, the following specific assumptions were made to evaluate the impacts to the Coachella Valley milk-vetch:

1. The Existing Conservation Lands described in the Plan provide essential habitats that support the long-term conservation of Covered Species, such that the impacts and conservation proposed in the Plan, in the context of the Existing Conservation Lands, meet our minimum findings requirements. These lands will be managed consistent with the Conservation Goals and Objectives identified in the MSHCP. The Permittees shall obtain: a) either fee title or conservation easements (Legal Instrument) on these lands, and b) enter into MOUs and/or cooperative agreements with the entities having jurisdiction over these lands to ensure monitoring and management consistent with the Plan and to provide for enforcement in the cases of non-compliance with the requirements of the Plan for the State and Federal Existing Conservation Lands where appropriate.

2. The Existing Conservation Lands controlled by the Permittees and those controlled by non-profit organizations (The Nature Conservancy, CNLM, etc.), that were set aside or designated for conservation associated with the CVFTL HCP, will be protected by an appropriate Legal Instrument in perpetuity prior to the relinquishment of that permit. The lands will be permanently protected and managed in a natural, ecologically beneficial, open-space condition.

3. The Existing Conservation Lands controlled by BLM, Service, CDFG, and CDPR that were set aside or designated for conservation as a result of the CVFTL HCP and/or section 7 consultations on BLM actions, will be conserved in perpetuity by these respective agencies, or by any organization/agencies that are given control over these lands from these agencies. The Existing Conservation Lands would be protected and managed in their entirety in a natural, ecologically beneficial, open-space condition.

4. BLM will enter into an MOU with the CVCC, either prior to permit issuance and no later than 3 years post Permit issuance, that will ensure BLM's perpetual monitoring and management of the lands they control within the Plan Area is consistent with the Goals and Objectives of the MSHCP.

5. BLM will control OHV trespass across BLM lands through implementation of the CDCA Plan Amendment and any associated section 7 consultations, consistent with the Terms and Conditions in any associated Biological Opinions, and re-initiation of consultation on previous BLM actions where necessary.

6. In the general effects analysis (not species specific), we assume 99 percent conservation of the vegetation community types for all BLM lands administered within the Reserve System pursuant to the Coachella Valley Amendment to CDCA Plan (BLM 2002). Specifically, the CDCA Plan states "For the 8 vegetation community types (Figure 2-4, BLM 2002 a and 2002b), the habitat conservation objectives outlines in Table 2-4 (BLM 2002a and 2002b) would be used to assess compatible uses and to develop appropriate mitigation measures within Conservation Areas on BLM-managed land." Those objectives state that BLM will conserve 99 percent of each vegetation community. BLM defines "conserve" as the use of "all methods and procedures which are necessary to bring any endangered species or threatened species to the points at which the measures provided pursuant to the Endangered Species Act are no longer necessary."

7. CVCC will execute a MOU (Joint Enforcement Agreement(s), Mutual Aid Agreement, or equivalent mechanism) with the applicable Permittees, BLM, USFS, CDFG, and applicable Non-Profit Organizations which enables cross-jurisdictional capability to provide for enforcement in the cases of non-compliance with the requirements of the Plan. The MOU or equivalent mechanisms approved by the Service shall specifically provide for enforcement of the relevant ordinances, resolutions, regulations, or other legal requirements necessary for effective management of the Reserve Lands. The MOUs shall specify roles and responsibilities among the parties needed to effectively implement the pertinent requirements of the Plan including the Trails Plan (Section 7 of the MSHCP).

8. Development activities on Tribal Reservation lands within the blowsand natural communities shall include substantial offsetting mitigation in the form of conservation of important blowsand ecosystem lands in the valley consistent with the Interim Tribal HCP whether or not a section 10 permit for the draft Tribal HCP is approved. It is also assumed that the vast majority of currently undeveloped portion of Section 6, T3S, R4E, on the Agua Caliente Indian Reservation will be conserved to maintain functional connectivity needed for Coachella Valley MSHCP Conservation Goals and Objectives.

9. It is expected that maintenance of fluvial sand transport capacity (Section 4.4 of the MSHCP, Fluvial Sand Transport) is equivalent in meaning to "no net loss" of this capacity compared to current conditions, to maintaining fluvial (and ultimately aeolian) erosion/transport/deposition processes important to the blowsand ecosystems of the action area. As such, fluvial processes in areas that are important to CVFTL modeled habitat within Conservation Areas and Section 6, T3S R4E, are expected to be protected by the proposed Plan from adverse changes that could otherwise result from Covered Activities.

10. CVWD would deposit sand removed from the groundwater recharge basins in the Whitewater Floodplain Conservation Area (see Required Measure 3 for this Conservation Area) during maintenance operations in locations on proposed Reserve lands, and in a manner, that downwind habitat would receive appreciable inputs of aeolian sand from the deposits.

11. CVWD shall conserve the 1,200 acres it owns in the CVFTL HCP Whitewater Floodplain Preserve in perpetuity by recording an appropriate Legal Instrument prior to relinquishment of the CVFTL HCP permit.

12. Per the Conservation Objectives and Required Measures identified in the Plan, CVCC or other appropriate Permittees would maintain at least 234 acres of mesquite hummocks (with alive, functional, and sustainably reproducing mesquite plants) within Reserve Lands in perpetuity.

Based on modeling, the Plan estimates there are 36,398 acres (14,730 hectares) of habitat for Coachella Valley milk-vetch in the MSHCP Plan Area. The MSHCP (Table 4-114) proposes to conserve 19,354 acres (53 percent) of modeled Coachella Valley milk-vetch habitat as part of the Reserve System, including large areas of Core Habitat and Other Conserved Habitat within 15 Conservation Areas (see below). The 53 percent of modeled habitat within the Reserve System also includes sand sources, sand transport corridors, and Existing Conservation Lands. Other stated goals of the MSHCP (Section 9.2.2) include: 1) protecting other important Conservation Areas to allow for population fluctuation and promote genetic diversity; 2) protecting Essential Ecological Processes, such as sand transport systems, necessary to maintain Core Habitat and Other Conserved Habitat areas; 3) maintaining Biological Corridors and Linkages among all conserved populations to the maximum extent feasible; and 4) ensuring conservation of habitat function through biological monitoring and adaptive management actions.

About 42 percent of modeled Coachella Valley milk-vetch habitat would be lost to development under the MSHCP. The actual reduction in habitat value is expected to be considerably less severe to the species than indicated by raw acreage numbers because: 1) conserved habitat areas are large enough to maintain self-sustaining populations of Coachella Valley milk-vetch and incorporate key habitat elements for the species; 2) potential adverse effects within Conservation Areas would not eliminate or significantly impact any modeled core populations; 3) potential development would not adversely impact the Essential Ecological Processes (e.g., sand source and transport system) needed to maintain currently viable habitat; 4) lands in the MSHCP Reserve System would be managed and monitored; and 5) much of the existing occupied acreage on The Big Dune has been cut off from the Essential Ecological Processes that are required to sustain it in the long-term.

Mitigation and Minimization Measures

The mitigation measures proposed in the MSHCP are intended to conserve large blocks of viable habitat that support the Coachella Valley milk-vetch. A total of 11,650 acres of modeled Coachella Valley milk-vetch habitat are proposed to be brought into conservation throughout the Plan Area. Additionally, 1,117 acres of habitat within the fluvial transport corridor are proposed

to be protected by ensuring no reduction in the fluvial transport processes. The 1,117 acres of land will be protected by a Conservation Objective to maintain fluvial sand transport and not necessarily by land being conserved. Specifically, the MSHCP proposes to protect four Core Habitat areas within Snow Creek/Windy Point (2,610 acres), Whitewater Floodplain (5,635 acres), Willow Hole (3,166 acres), and Thousand Palms (4,403 acres) Conservation Areas. The MSHCP also proposes to protect Other Conserved Habitat in 15 Conservation Areas (including the 4 mentioned previously): Cabazon, Stubbe and Cottonwood Canyons, Whitewater Canyon, Highway 111/I-10, Upper Mission Creek/Big Morongo Canyon, Long Canyon, Edom Hill, West Deception Canyon, Santa Rosa and San Jacinto Mountains, Indio Hills/Joshua Tree National Park Linkage, and Joshua Tree National Park, totaling 5,966 acres. Please refer to Table 9-4 of the MSHCP for summary of the Core and Other Conserved Habitat within the 15 Conservation Areas.

We anticipate that approximately 90 percent of private land that has been modeled as Coachella Valley milk-vetch habitat will be conserved within each Conservation Area. Thus, approximately 10 percent of habitat within each Conservation Area would be subject to loss. Although the majority of the private lands will be conserved within a given Conservation Area, the ultimate configuration of the Reserve System is unknown at this time. Reserve System configuration will be subject to the Conservation Goals, Objectives, and Required Measures established in Section 4 of the MSHCP for each Conservation Area. Specific species Goals and Objectives are detailed in Section 9 of the MSHCP. We anticipate that the Joint Project Review Process established in Section 6.6.1.1 of the Plan will ensure that both the Conservation Area and Species Conservation Goals and Objectives are addressed on a project-by-project basis. Annual reports will also track and report the losses and conservation for each Conservation Area, Covered Species, and Natural Communities.

Minimization measures also have been developed to reduce impacts to this species. The measures include Required Avoidance, Minimization Measures, and Mitigation Measures such as maintaining fluvial sand transport (Section 4.4 of the MSHCP) and Land Use Agency Guidelines (Section 4.5 of the MSHCP) such as avoiding invasive plant species in landscaping adjacent to or within Conservation Areas. Currently, some of the language in Section 4.5 of the MSHCP appears to be discretionary or optional, and, if interpreted as such, it would not fully minimize or mitigate the impacts of the taking. In our analysis we have assumed that the Land Use Adjacency Guidelines are implemented as appropriate to minimize and mitigate the effects to covered species. A Permit Term and Condition has been included in the Permit to track implementation of the Land Use Adjacency Guidelines in project planning and monitor the Conservation Areas to ensure compliance. The measures proposed in the Land Use Adjacency Guidelines would ensure that the Permittees are minimizing and mitigating to the maximum extent practicable.

The MSHCP proposes that the following management actions would be implemented if biological monitoring indicates that such actions are warranted: 1) Control and manage activities that degrade Coachella Valley milk-vetch habitat, particularly control and manage activities that result in sand compaction and vegetation destruction (i.e., OHV use, vegetation manipulation or clearing; and other human disturbance); 2) Control invasive species; 3) Maintain the aeolian sand

transport system through the Monitoring and Management Programs; and 4) Develop and test models through the Management and Monitoring Programs to address the distribution, abundance, and ecological requirements of the Coachella Valley milk-vetch.

Direct Effects

The entire Plan Area includes approximately 36,398 acres of modeled habitat for the Coachella Valley milk-vetch. Of this acreage, 30,210 acres are subject to the Permit (i.e., non-Federal lands)(see Table 4-114 of the MSHCP). Approximately 14,086 acres of the modeled habitat outside the MSHCP Conservation Areas is anticipated to be lost due to MSHCP implementation. Although the MSHCP states that 33 of the 122 occurrence records would be lost outside of the Conservation Areas by Covered Activities, new data reveal that many more individual plants and likely seeds would be lost in The Big Dune area alone (see Environmental Baseline section above). An additional 1,306 acres of modeled habitat would be subject to loss inside the Conservation Areas (Table 9-4 of the MSHCP). Specifically, the MSHCP anticipates that 225 acres of modeled Core Habitat and 9 acres of Other Conserved Habitat would be lost within the Snow Creek/Windy Point Conservation Area; 310 acres of modeled Core habitat and 8 acres of Other Conserved Habitat would be lost within the Whitewater Floodplain Conservation Area; 282 acres of modeled Core Habitat and 13 acres of Other Conserved Habitat would be lost within the Willow Hole Conservation Area; and 111 acres of Core Habitat and 38 acres of Other Conserved Habitat would be lost within the Thousand Palms Conservation Area. In addition, a total of 310 acres of Other Conservation Habitat would be lost in the following Conservation Areas: Stubbe and Cottonwood Canyons (15 acres), Whitewater Canyon (13 acres), Highway 111/I-10 (37 acres), Upper Mission Creek/Big Morongo Canyon (57 acres), Edom Hill (149 acres), West Deception Canyon (6 acres), Indio Hills/Joshua Tree Nation Park Linkage (1 acre), Joshua Tree National Park (1 acre), and Santa Rosa and San Jacinto Mountains (31 acres). The exact location and configuration of the areas to be lost is not known. However, the acres proposed to be lost would be subject to the limits established in the Conservation Goals, Objectives, and Required Measures for each Conservation Area as described in Section 4 of the MSHCP and the Conservation Goals and Objectives for each Covered Species as described in Section 9 of the MSHCP. We anticipate that the projects would adhere to Section 4.4 (Required Avoidance, Minimization Measures, and Mitigation Measures) and 4.5 (Land Use Agency Guidelines) of the MSHCP as well.

The direct effects of the proposed action would be a result of the Covered Activities as described in Section 7 of the MSHCP and is herein incorporated by reference (refer to the Description of the Proposed Action/Covered Activities Section of the Biological Opinion). Many of the proposed Covered Activities, such as construction for development, would crush and remove Coachella Valley milk-vetch plants. The proposed Covered Activities would destroy, eliminate, or alter the species habitat making it unable to sustain individuals or populations of this species. Urban development would result in substantial losses of habitat, as well as habitat degradation caused by a variety of associated human activities.

In addition to removing individual Coachella Valley milk-vetch plants, implementation of the MSHCP would result in the destruction of habitat and ultimate loss of the seed bank. The extent of the effects to the species is difficult to quantify because population estimates are not available for

the Plan Area and the extent of the seed bank throughout Plan Area is unknown.

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. 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). Dust could be a factor within the Conservation Areas associated with roads, trails, or OHV use and on lands within and adjacent to the Conservation Areas.

OHV impacts can be variable. Although sand deposits and sand dunes are less prone to compaction, fine sand is more easily compactable, whereas coarse sand does not compact well (Global Security 2005). Well-sorted soils, such as sand dunes, do not compact significantly, while poorly sorted soils, which typically occur in the desert on alluvial fans, are prone to high levels of compaction from vehicles (USGS 2004). Important factors determining the intensity of compaction are soil moisture, vehicle type, and amount of vehicle activity (Davidson and Fox 1974, Adams and Endo 1980a). Compaction results in increased water and wind erosion and decreased water infiltration and retention. Important factors in erosion of desert soils are slope, soil particle size, and size of disturbed area (Adams and Endo 1980b). Changes in soil characteristics may affect the ability of the soil to support vegetation, resulting in decreased density, diversity, and/or biomass of plant cover (Davidson and Fox 1974). OHVs typically impact vegetation by physically damaging roots, stems, or whole plants (Hall 1980).

Vehicle use typically crushes individual plants, reduces the reproductive output of those that survive, and changes dune structure. Ongoing vehicle use likely changes the basic properties of soils and adversely affects their stability and ability to support natural vegetation. Vehicle traffic can have a long-lasting impact on mobile sand dunes that is manifested by a lack of vegetation (Service files, BLM 2003). Though some of the effects listed below likely do not relate to sand dune substrates, OHV impact studies indicate that general effects on soils include: 1) reduced soil moisture for most soil types; 2) increased surface strength for most soil types but reduced surface strength for sandy soils; 3) increased bulk density of soils to depths of 3 feet or more; 4) reduced infiltration rates; 5) reduced porosity and permeability of soils; 6) changes in the insulating characteristics of soils (extending the diurnal temperature range); 7) reduced organic carbon content; 8) increased runoff; and 9) increased rates of erosion (Adams *et al.* 1982). The extent and degree of impact depends on factors such as type of soil, type of vehicle, amount of use, degree of slope, topography, and vegetation. We expect the effects to the Coachella Valley milk-vetch to include: 1) de-stabilization of slopes and swales; 2) quicker and untimely drying time as well as reduced soil moisture after rainfall events; and 3) changes in the insulating characteristics of soils.

As discussed in the Environmental Baseline Section above, substantial illegal OHV activity occurs in many areas of the Coachella Valley, but is partially limited by law enforcement, signing, fencing, and public information and education. Although OHV use is not a Covered Activity the effects associated with this activity could increase with urban development.

The biotic and abiotic factors necessary to maintain normal ecological functions and existing population levels have been subject to degradation by OHVs in many Core Habitat areas within the proposed Reserve System, including the Thousand Palms, Willow Hole, and Snow Creek/Windy Pointe Conservation Areas. The adverse effects documented to plant and animal communities' species richness and biomass at several trophic levels (plants, invertebrates, reptiles, and mammals) from OHV damage in other dune environments undoubtedly have occurred in moderate to heavily disturbed areas in the Coachella Valley as well (Luckenbach and Bury 1983, Carpelan 1995).

Outside of Conservation Areas
All 14,086 acres (33 of the 122 known occurrences) of the modeled habitat outside of the Conservation Areas is anticipated to be lost through MSHCP implementation. That translates to nearly 47 percent of the modeled Coachella Valley milk-vetch habitat subject to the Permit being lost outside of the Conservation Areas. The proposed loss of Coachella Valley milk-vetch habitat outside of the Conservation Areas would predominately result from Covered Activities, construction of infrastructure associated with development, etc. (see Sections 7.1 and 7.2 of the MSHCP for a complete list of Covered Activities). The Coachella Valley milk-vetch would be affected by individual plants being crushed, conversion of habitat to development, and precluding fluvial and aeolian processes necessary to maintain habitat.

The species is entirely endemic to the Plan Area, so a loss of this magnitude is considerable. However, much of the habitat outside of the Conservation Areas consists of relative disjunct, small patches of suitable habitat (except for the Big Dune) where the sand source/transport system has been compromised. Much of this land is fragmented and has a limited ability to provide for long-term conservation of the plant. The fragmented blocks of habitat are more susceptible to edge effects, including crushing by OHV activity.

As described above, The Big Dune represents the largest habitat patch outside of the Conservation Areas anticipated to be lost during MSHCP implementation. About 4,810 acres of habitat in this area would be lost through the implementation of the MSHCP.
The Big Dune was determined to be highly fragmented by the MSHCP and subject to edge effects due to development and major roadways within the area. The MSHCP Planning Team did not propose conservation of the Big Dune because they concluded that Essential Ecological Processes, including sand transport, were no longer intact. Nonetheless, portions of the Big Dune continue to support some of the largest Coachella Valley milk-vetch populations ever recorded (see Environmental Baseline Section). Surveys conducted by Michael Brandman Associates in 2002 found 1,491 individuals of Coachella Valley milk-vetch south of Interstate 10 between Date Palm Drive and Bob Hope Drive (MBA 2002). On June 30, 2005, Service personnel visited the same site and observed more than 2,000 individuals scattered across the site and extending outside the proposed project boundaries (Service, unpublished data). These large population sizes, which dwarf those proposed for protection in the Conservation Areas, indicate that the Big Dune contains the largest seed bank in the Coachella Valley. The Big Dune formed at the downwind end of the largest sand transport system in the valley, where fluvial sediments from the San Gorgonio and Whitewater Rivers were sorted and deposited by the strong northwesterly winds blowing through the San Gorgonio Pass. Historically, strong winds from

the west-northwest transported sand across the Whitewater Floodplain and deposited these sands in the Big Dune where wind velocity declined away from the San Gorgonio Pass. Presently, the Big Dune is shielded from the Whitewater River sand transport system by development near Palm Springs and the region is undergoing a slow process of stabilization.

The Independent Science Advisors (ISA) (Noss *et al.* 2001) noted that the Coachella Valley milk-vetch occurs on stabilized as well as active dunes, and would likely survive on the Big Dune even though the geomorphic processes of dune building are no longer active. The ISA report also stated that the Coachella Valley milk-vetch distribution is extensive enough elsewhere that it likely would survive even without protection of Big Dune. The Big Dune supports the largest population estimates known and would likely persist long-term due to the size and depth of the dune. Therefore, eventual loss of this area will result in a major effect to the species, but not one that is expected to preclude maintaining the species in the Plan Area.

Inside of the Conservation Areas
Within the Conservation Areas 11,650 acres are proposed to be conserved and 1,306 acres of modeled habitat would be subject to loss (Table 9-4 of the MSHCP). Conserving a wide variety of sandy substrate types is important for the conservation of Coachella Valley milk-vetch because of the dynamics of the aeolian sand transport processes. The Conservation Areas proposed for the Coachella Valley milk-vetch were based on the delineation of Core Habitat that: 1) is large enough to support a self-sustaining population independent of other Core Habitat areas and the presence of this species in sufficient numbers to constitute a persistent population has been confirmed; 2) is not fragmented by development and typically without roads that may isolate populations and contribute to edge effects; 3) has intact Essential Ecological Processes, including sand source and sand delivery systems; and 4) has effective connections to other Core Habitat via Biological Corridors and/or Linkages, to allow gene flow among populations.

Within the Plan Area, Other Conserved Habitat modeled habitat for the Coachella Valley milk-vetch totals 5,966 acres. Of this total, 1,117 acres would not be conserved by habitat acquisition, but through the Conservation Objective to maintain fluvial sand transport. Through MSHCP implementation, 378 acres of Other Conserved Habitat will be lost and an additional 3,300 acres is proposed to be conserved within the 15 Conservation Areas. The amount of Other Conserved Habitat within the Conservation Areas ranges from 4 to 1,788 acres. Several Conservation Areas, including the Joshua Tree National Park (4 acres), Indio Hills/Joshua Tree National Park Linkage (17 acres), West Deception Canyon (115 acres), Long Canyon (113 acres), and Whitewater Canyon (202 acres) contain small amounts of Other Conserved Habitat that are relatively disjunct from any Core Habitat areas and the sand transport processes that originate from the Whitewater River, Mission/Morongo Creek, and Indio Hills systems that support them. Further degradation of existing populations of the Coachella Valley milk-vetch is likely given the isolation from fluvial and aeolian processes, isolation that could, over time, type convert the habitat making it less suitable for the milk-vetch.

Protecting wind transport corridors between Coachella Valley milk-vetch populations from obstruction is important for facilitating adequate gene flow and maintaining areas that may serve as ephemeral habitat. Barriers associated with urban development upwind of each of the

respective Conservation Areas, such as windrows, buildings, certain types of fences, percolation ponds, utility substations, or houses in sand source areas and sand transport corridors, interfere with the aeolian transport systems responsible for maintaining blowsand habitat within the proposed Conservation Areas. Interference with this system results in the erosion and armoring of blowsands and the consequent loss of suitable habitat (Weaver 1981, Simons, Li and Associates 1997).

Erosion of dunes and sand habitat occurs when more sand exits the system than is transported in from upwind sources. Armoring is created when smaller particles are blown or washed away, and larger particles left behind shield underlying sediments from the wind transport. Interference can result from: 1) obstructing upwind sand sources; 2) reducing aeolian transport capacity by increasing surface resistance and obstruction within the wind corridor; 3) trapping, paving, building, and landscaping over sediments; and 4) encouraging surface armoring by reducing fluvial and blowsand surface disturbance. Erosion is enhanced by reducing plant growth and its anchoring effect in sand accumulation areas through lowering the groundwater availability by groundwater pumping (Simons, Li and Associates 1997).

The MSHCP proposes to address the losses of Coachella Valley milk-vetch habitat by conserving large blocks of Core Habitat, maintaining sand source and transport systems, and managing and monitoring the lands to address edge and other stressors to the milk-vetch. While these approaches are reasonable to protect the species, the language in the Conservation Goals, Objectives, and Required Measures; Species Conservation Goals and Objectives; and the Avoidance, Minimization, and Mitigation Measures in the MSHCP will likely not result in implementation of management actions being assured. We have identified gaps in the management commitments below.

Although the Conservation Areas were delineated from Core Habitat based on the above objectives, not all of the objectives can be met within the current design and management limitations within the Reserve System. Below is a general analysis of the Conservation Areas followed by the Permit Conditions needed to meet the MSHCP Goals and Objectives and issuance criteria for the extension of No Surprises assurances to the Coachella Valley milk-vetch.

Although the Coachella Valley milk-vetch has been observed throughout many of the Conservation Areas within the valley floor, population estimates have not been attempted, except for biological surveys on individual parcels proposed for development. The largest occurrence records occur on the Big Dune, which is located outside of the Conservation Areas and would be lost with Plan implementation. Plant surveys in the Core Habitat areas within the Conservation Areas generally have not been conducted. Thus, it is difficult to determine if the remaining 11,650 acres would provide the amount of habitat, in a configuration that supports the Coachella Valley milk-vetch in perpetuity. Hence, the coverage of this species will be dependent upon the CVCC demonstrating that the lands proposed for conservation within the Conservation Areas contain viable populations of the Coachella Valley milk-vetch that can be sustained in perpetuity. This would entail effective monitoring and management that focuses on substrate affinities, micro-habitat requirements, seed dispersal, pollination ecology, and weed management within the Conservation Areas, and potentially a seed salvage program on The Big Dune.

The Conservation Goals and Objectives for each of the Conservation Areas include conservation of Core Habitat for the milk-vetch and associated Ecological Processes, and allowing for evolutionary processes and natural population fluctuations to occur. While evolutionary processes and population fluctuations may be reasonable to expect, the Coachella Valley milk-vetch range has been much reduced from what existed historically. Specific Permit Terms and Conditions are provided below in regards to the prioritization of the Management Contingency Fund, the development a species-specific management strategy, incorporation of that strategy into the Management/Adaptive Management Programs for the Reserve Management Units, and consideration of any identified species-specific needs in the Joint Project Review process.

As discussed in the General Effects Section of the Biological Opinion, the Plan accounts for about 3,763 acres of Existing Uses within the Conservation Areas. About 358 acres of Existing Uses occur within the Conservation Areas that are modeled habitat for the Coachella Valley milk-vetch. Existing Uses consist of residential structures, houses, sand and gravel mining sites, water tanks, wind turbines, transmission towers, and well sites. While the Plan deducts the 3,763 acres of Existing Uses from the modeled habitat total, the Existing Uses acres were determined on a parcel basis and not necessarily from the amount of disturbance present within the parcel. Thus, there are many parcels where appropriate habitat occurs, but they have been deducted from the habitat totals in the Plan resulting in a reduction of the total habitat that would be subject to the Plan. This parcel-based accounting has resulted in de facto authorization of disturbance of the remainder of these parcels that are in key process areas or suitable habitat that warrant consideration for conservation. This triggers the need for a Permit Term and Condition to address this issue. New development on an Existing Use parcel that requires a discretionary permit from a Permittee and results in new disturbance shall be subject to MSHCP requirements. Any Covered Species modeled habitat loss or disturbance of Natural Communities shall count toward the amount of loss authorized under the Plan.

Within the Plan Area there are 13 Conservation Areas that have a total of 7,707 acres of modeled Coachella Valley milk-vetch habitat that are classified as Existing Conservation Lands (Table 9-4). Assurances that the Existing Conservation Lands would not be used, sold, or transferred for other purposes that would preclude the achievement of the Conservation Goals and Objectives of the MSHCP are necessary to conclude that these lands contribute to the Reserve System. Without such commitments that the Existing Conservation Lands will be conserved and managed in perpetuity, we would not be able to assume conservation of these lands in our biological analysis. Currently, the MSHCP commits to conserving the 11,650 acres of lands in perpetuity by a Legal Instrument, however, much of the Existing Conservation Lands currently are not assured for conservation. Based on the Plan, we anticipate that all of the Existing Conservation Lands (7,707 acres) will be conserved by a Legal Instrument and managed consistent with the MSHCP pursuant to MOUs either prior to Permit issuance or within three years post Permit issuance.

Snow Creek/Windy Point Conservation Area
Approximately 2,107 acres of modeled milk-vetch habitat are proposed to be conserved and 234 acres are anticipated to be lost within the Snow Creek/Windy Point Conservation Area.

Specifically, the Plan proposes to conserve at least 816 acres of Coachella Valley milk-vetch Core Habitat in the City of Palm Springs, 1,210 acres of Coachella Valley milk-vetch Core Habitat in the unincorporated Riverside County portion of the Conservation Area, as well as 81 acres of Other Conserved Habitat. An additional 359 acres is Existing Conservation Lands that are controlled by BLM land. Section 4.3.3 of the MSHCP further details the obligations of the Permittees and is herein incorporated by reference.

The Plan proposes to maintain connections between areas south of I-10 (Snow Creek and the adjacent San Jacinto Mountains) and areas north of I-10 (the San Gorgonio Wilderness and Whitewater Canyon ACEC in the San Bernardino Mountains) through two biological corridors: Stubbe and Cottonwood Canyons and the Whitewater River (MSHCP Section 4.3.3). The corridors are proposed to maintain fluvial sand transport, and retain connectivity to help maintain predator-prey relationships in the Snow Creek Conservation Area and provide for large mammal movement between the San Jacinto and San Bernardino Mountains.

As discussed above in the Environmental Baseline Section, the primary adverse effects to the Coachella Valley milk-vetch within the Snow Creek/Windy Point Conservation Area are invasive weeds and OHV activity. The overwhelmingly abundant invasive species, especially Saharan mustard, likely compete with Coachella Valley milk-vetch for water and stabilize the soil. Invasive plant species may out-compete and displace Coachella Valley milk-vetch. These invasives likely also stabilize loose sediments, and thus reduce aeolian sand transport in the Snow Creek/Windy Point Conservation Area to downwind habitats occupied by this species. The long-term persistence of the Coachella Valley milk-vetch is likely dependent upon controlling this threat.

The MSHCP currently anticipates that a weeding program would only be initiated once it is determined to be a possible stressor (refer to the Invasive Species Discussion in the General Effects Section of this Biological Opinion). The weed problem has been well-documented and appears to be persisting within this Conservation Area, therefore, to adequately address the Coachella Valley milk-vetch and ensure long-term conservation; a comprehensive weed management program will be needed in the short-term. This necessitates the inclusion of a Permit Terms and Condition to ensure the appropriate management actions are taken in a timely fashion. Management of invasive non-native plants is identified as a priority action.

OHV activity continues to degrade much of the habitat within this Conservation Area and likely results in the direct loss of plants. Thus, biological values in the Snow Creek/Windy Point Conservation Area will continue to be compromised by these activities unless management intervention occurs. Although it was the intention of BLM's CDCA Plan Amendment (and the associated Terms and Conditions within our Biological Opinion for BLM's action) to improve management of BLM lands in these areas, including management and enforcement activities such as patrolling and blocking access, these efforts to date have been unsuccessful in controlling OHV activity. The proposed MSHCP states that actions to control and manage impacts that degrade Coachella Valley milk-vetch habitat in protected habitat may be needed to ensure persistence of species. OHV is an existing problem within this area and controlling OHV is a management action that needs to be initiated to assure adequate conservation of the Coachella

Valley milk-vetch within this Core Habitat. Therefore, coverage of the Coachella Valley milk-vetch is contingent upon the development of a management strategy to address these problems. To adequately conserve this species within this Conservation Area, OHV activity needs to be controlled and the effects of these activities managed. The MSHCP states that CVCC will use its best efforts to enter into a MOU with BLM to ensure management consistent with the MSHCP either prior to issuance of the Permits or within three years post Permit issuance, however, to date, this has not been accomplished. It is critical that BLM and CVCC enter into an MOU to address management and joint enforcement on both the BLM lands as well as the other lands that are anticipated to become part of the Reserve System.

Whitewater Floodplain Conservation Area

Within the Whitewater Floodplain Conservation Area, 2,859 acres of modeled Coachella Valley milk-vetch habitat are proposed to be conserved and 318 acres are anticipated to be lost. About 2,535 acres of modeled Coachella Valley milk-vetch habitat are classified as Existing Conservation Lands. The Existing Conservation Lands are controlled or owned by BLM and CVWD and are anticipated to be included in the MSHCP Reserve System. Specifically, the Plan proposes to conserve at least 2,671 acres of Core Habitat for the Coachella Valley milk-vetch in the City of Palm Springs, at least 61 acres in the Cathedral City, and at least 58 acres in the unincorporated Riverside County portion of the Conservation Area. Section 4.3.6 of the MSHCP further details the obligations of the Permittees and is herein incorporated by reference.

Two main roads bisect Coachella Valley milk-vetch Core Habitat within the Whitewater Floodplain Conservation Area. The roads are Indian Avenue and Gene Autry Trail and run perpendicular to Interstate 10 (see the General Environmental Baseline and the Species Appendices [for the Coachella Valley Fringe-toed Lizard]) Sections of this Biological Opinion). The roads are currently limited to two lanes but the MSHCP contemplates expansion to six lanes as a Covered Activity. The MSHCP provides maintenance of the fluvial and aeolian sand transport and underpasses for wildlife crossing when the roads are expanded to six lanes or by year 2038. The measures would be beneficial in the long-term because fluvial and aeolian sand transport is essential to maintain populations of the milk-vetch within this Conservation Area.

Although 5,712 acres of modeled Coachella Valley milk-vetch habitat are mapped within the Whitewater Floodplain Conservation Area, much of this area does not support suitable habitat due to the armoring that has occurred. As stated above in the Environmental Baseline, modeled Coachella Valley milk-vetch habitat is likely overestimated. Our estimates, based on field and aerial photo reviews and Service GIS calculations, indicate that about 1,000-1,500 acres of habitat suitable for the Coachella Valley milk-vetch in the Whitewater Floodplain Conservation Area was extant at the end of the drought ending in early 2005 (less than 20 percent of the modeled habitat). Approximately 4,500 acres of modeled habitat in this Conservation Area were found to be devoid of substantial blowsand deposits (Jon Avery and Tyler Grant, Fish and Wildlife Biologists, pers comm.). While in the short-term the milk-vetch will persist in areas devoid of substantial blowsand deposits in the Whitewater floodplain, the long-term persistence of this species relies on the fluvial and aeolian processes. Some of these currently unsuitable areas in the Whitewater Floodplain are expected to become periodically suitable with the input of new aeolian sand in the months/years following the stormflow-generated fluvial deposits

upwind. Like the Coachella Valley fringe-toed lizard, suitable habitat currently is limited to the area just south of the railroad station (some of which is not within the boundary of the Conservation Area and thus not protected by the Plan) and the area east of Indian Avenue, west of Gene Autry Trail, and north of the Whitewater River. It is anticipated that a portion of this remaining habitat (10 percent of private modeled habitat and Natural Communities within the Conservation Area [318 acres]) would be lost through the MSHCP implementation. The MSHCP would result in the isolation of populations in this Conservation Area from other populations of the milk-vetch to the east. Accordingly, seed dispersal from plants within the Whitewater Floodplain Conservation Area would likely be limited to the Conservation Area since habitat to the southeast is not within the proposed Reserve System.

As stated in Section 4.3.6 of the MSHCP, "the groundwater recharge ponds (percolation ponds) west of Indian Avenue are in the path of the fluvial flows of the Whitewater River, and their presence has restricted flows to a narrower deposition area, which has affected the extent of suitable habitat" within the Whitewater Floodplain Conservation Area. The recharge ponds trap sediment when water from the Colorado River Aqueduct, released into the Whitewater River approximately one mile north of Interstate 10, flows down the river channel to the recharge ponds. Much of the habitat east of the percolation ponds has become armored and no longer provides suitable substrate conditions for the plant. Given the flow configuration in the system, this is likely to remain the case in the long-term. Although it is likely that much of the modeled habitat along the Whitewater River may be potential habitat, it currently does not support large populations of the milk-vetch.

The MSHCP states that CVCC will use its best efforts to enter into an MOU with BLM to ensure management consistent with the MSHCP either prior to issuance of the Permits or no later than three years post Permit issuance. All of the Existing Conservation Lands dedicated or conserved through the CVFTL HCP would be permanently protected by a Legal Instrument prior to relinquishment of the incidental take permit associated with the CVFTL HCP as stated in the Plan (Section 6.6.1.3).

Willow Hole Conservation Area

The Willow Hole Conservation Area includes approximately 3,334 acres of modeled habitat for the Coachella Valley milk-vetch. Of this total, about 3,039 acres of both Core and Other Conserved Habitat is proposed to be conserved through the implementation of the MSHCP, 388 acres are classified as Existing Conservation Lands, and 295 acres are anticipated to be lost. Specifically, the Plan proposes to conserve at least 782 acres of Core Habitat for the Coachella Valley milk-vetch in the Cathedral City and at least 1,751 acres in the Riverside County portion of the Conservation Area. Section 4.3.8 of the MSHCP further details the obligations of the Permittees and is herein incorporated by reference.

Mission Creek, Morongo Wash, and Long Canyon are the three primary sand sources entering the Conservation Area. Mission Creek carried sediment from the San Bernardino Mountains and Morongo Wash carries sediment originating in the Little San Bernardino Mountains in Morongo Canyon. Long Canyon also originates in the Little San Bernardino Mountains. The Willow Hole watershed originates in the western Indio Hills and prevailing winds deposit sand into the

Willow Hole area.

The MSHCP Planning Team considered Willow Hole as Core Habitat because its sand source is discrete from other sources and Willow Hole's geographic location in the Coachella Valley makes it intermediate climatically to the Whitewater Floodplain Conservation Area and the Thousand Palms Conservation Area. The availability of multiple habitat patches within the Willow Hole Conservation Area could be beneficial in the event of a population crash from stochastic or climatic events in the Plan Area.

As described above in the General Effects of the Action (Mesquite), the Willow Hole Conservation Area includes mesquite hummocks that contribute to the creation of the dunes by anchoring the dunes and making them less vulnerable to wind erosion. These mesquite hummocks are vulnerable to changes in groundwater level that have occurred and likely will continue (The Nature Conservancy 1985, MSWD 2008). Without the support of the mesquite hummocks to sustain the dune system within this Conservation Area, the Coachella Valley milk-vetch habitat may be diminished through time making long-term conservation of this species within the Conservation Area uncertain. Thus, the anticipated conservation of 98 acres of mesquite hummocks is imperative.

The Required Measure for the 9:1 Conservation to Development Ratio Area for the Willow Hole, as currently described in the MSHCP, indicates that this ratio may be difficult to achieve. Therefore, in order to provide the assurances that this measure will be achieved and benefit the milk-vetch, it must ensure that fluvial and aeolian sand transport is maintained. To ensure that the fluvial and aeolian process is maintained, Section 4.3 of the Plan describes Required Measures within the established 9:1 Conservation to Development areas. The 9:1 Conservation to Development ratio was applied where even limited Development could impede attainment of fluvial and/or aeolian Conservation Objectives. The ratio ensures that the Conservation Objectives will be attained by requiring that for every acre of development allowed in the specified area, 9 acres of conservation will occur. However, the ultimate configuration is unknown, and the functionality of the fluvial and aeolian processes cannot be assessed nor assumed to be maintained. To minimize obstruction to these ecological processes, Permit Terms and Conditions are necessary (as provided below; see Permit Terms and Conditions) to ensure that the Local Permittee(s) ensure adequate conservation and incorporate feasible design, orientation, or other criteria applying to all structures, landscaping, fencing, and juxtaposition of said features relative to any sand transport impediments on neighboring parcels. The criteria are to be described in the Implementation Manual language that requires Service review and concurrence. The criteria will apply to all development including single-family homes where conservation easements are proposed in the 9:1 conservation:development areas in the Willow Hole Conservation Area.

The Willow Hole Conservation Area is subject to fragmentation as a result of existing roads and at least one proposed new general plan road. Additionally, the Willow Hole Conservation Area is subject to illegal OHV activity. OHV activity continues to degrade BLM land, while providing access to the adjacent Existing Conservation Lands and the proposed MSHCP Reserve Lands. The OHV activity degrades the dunes and destroys mesquite plants within this

Conservation Area, as evidenced by documented incidents involving fires and wood cutting. Although it was the intention of BLM's CDCA Plan Amendment (and the associated Terms and Conditions within our Biological Opinion for BLM's action) to manage these areas, including management and enforcement activities such as patrolling and blocking access, these efforts to date have been unsuccessful in controlling OHV activity. Thus, the MOU described above between BLM and the Plan Permittees in the Evaluation Assumption is necessary and will allow for joint enforcement capabilities to ensure that these activities are addressed within this Conservation Area.

Thousand Palms Conservation Area
Within the Thousand Palms Conservation Area, 1,340 acres of modeled Core and Other Conserved Habitat for the Coachella Valley milk-vetch is proposed to be conserved and 149 acres is anticipated to be lost. About 3,596 acres of modeled Coachella Valley milk-vetch habitat are classified as Existing Conservation Lands. The Existing Conservation Lands are controlled or owned by BLM, State Parks, TNC, CDFG, and the Service and are anticipated to be included in the MSHCP Reserve System. Section 4.3.11 of the MSHCP further details the obligations of the Permittees and is herein incorporated by reference.

Unless the sand source corridors are protected, sand transport to the Coachella Valley/Thousand Palms Preserve will be obstructed and the blowsand habitat within the Preserve will continue to degrade at an accelerating rate that matches the growth of upwind urban areas (Simons, Li and Associates 1997). Thus, development within the 9:1 Conservation to Development Ratio Areas needs to be designed to ensure that the fluvial and aeolian sand transport systems are maintained. As with Willow Hole, the Required Measure for the 9:1 Conservation to Development Ratio Area for the Thousand Palms, as currently described in the MSHCP, indicates that this ratio may be difficult to achieve. Therefore, in order to provide the assurances that this measure will be achieved and benefit the milk-vetch, it must ensure that fluvial and aeolian sand transport is maintained. To ensure that the fluvial and aeolian process is maintained, Section 4.3 of the Plan describes Required Measures within the established 9:1 Conservation to Development areas. The 9:1 Conservation to Development ratio was applied, where even limited Development could impede attainment of fluvial and/or aeolian Conservation Objectives. The ratio ensures that the Conservation Objectives will be attained by requiring that for every acre of development allowed in the specified area, 9 acres of conservation will occur. However, the ultimate configuration is unknown, and the functionality of the fluvial and aeolian processes cannot be assessed nor assumed to be maintained. To minimize obstruction to these ecological processes, Permit Terms and Conditions are necessary (as provided below; see Permit Terms and Conditions) to ensure that the Local Permittee(s) provide adequate conservation and incorporate feasible design, orientation, or other criteria applying to all structures, landscaping, fencing, and juxtaposition of said features relative to any sand transport impediments on neighboring parcels where development is approved. The criteria are to be described in the Implementation Manual language that requires Service review and concurrence. The criteria pertains to all development including single-family homes where conservation easements are proposed in the 9:1 conservation:development areas of the Thousand Palms Conservation Area.

Following above-average precipitation in the winter of 2004-2005, Saharan mustard stands

dominated the Conservation Area, resulting in thick vegetation cover. As discussed above in the Environmental Baseline section, Saharan mustard was found to negatively impact native plants, including their reproduction. Thus, without controlling mustard within the Reserve System the long-term impacts could include the incremental reduction in the seed bank for the milk-vetch making it's persistence within the Reserve System tenuous. Mustard also stabilizes the soil and competes with the Coachella Valley milk-vetch for resources resulting in degradation of suitable habitat. Invasive weed control will need to be implemented within this Conservation Area to address the long-term effects on this species. This necessitates the inclusion of a Permit Term and Condition to ensure the appropriate management actions are taken in a timely fashion. Management of invasive non-native plants is identified as a priority action for use of the Management Contingency Fund.

Indirect Effects

The most important indirect effects to the Coachella Valley milk-vetch that would result from the Plan would primarily stem from Covered Activities that would impede fluvial erosion/transport/deposition or aeolian erosion/transport/deposition of sand in areas that are upwind of suitable habitat. Covered Activities that would disrupt these fluvial or aeolian processes would concomitantly disrupt the periodic supply of blowsand to remaining habitat. While some limited Covered Activities may increase the supply of appropriate blowsand to downwind ecosystems (such as certain types of disturbance to surface soils and vegetation), many proposed Covered Activities occurring in important sand source/transport zones would cause a net reduction in sand supply to remaining habitat; these activities would over time significantly reduce the input of sand that sustains dune/blowsand habitat. For example, the proposed Plan includes coverage for the future construction of homes (and associated landscaping and fences) within Sections 7 and 8 (T4S R6E) within the Thousand Palms area; this development would further exacerbate the already highly artificially constrained sand transport/supply corridor to the downwind blowsand ecosystems in the existing Thousand Palms Reserve (and surrounding proposed Thousand Palms Conservation Area). As noted above, proposed structures, paved roads, fences, drainage modifications, landscaping, etc., occurring in important sand supply/transport zones could have adverse effects on milk-vetch populations.

Similar to the existing development within the Thousand Palms area, the existing CVWD percolation ponds (surrounded by, but not within, the proposed Whitewater Floodplain Conservation Area) create an artificially constrained sand supply problem for essential remaining habitat within the proposed Whitewater Floodplain Conservation Area. Indirect effects result from barriers (e.g., windrows, buildings, certain types of fences, utility substations, or houses) associated with urban development within the Conservation Area that interfere with the fluvial and aeolian transport systems responsible for maintaining blowsand habitat (as discussed above). Because proposed Covered Activities could exacerbate the constrained fluvial sand supply to suitable/restorable habitat in the Whitewater River Floodplain Conservation Area and/or in Section 6 (T3S R4E) on the Tribal Reservation lands (outside the Plan Area), we have incorporated Permit Terms and Conditions as discussed above for the Whitewater Conservation Area to provide feasible measures to minimize these impacts. Any structures or features developed associated with proposed Covered Activities within the floodplain of the Whitewater River upstream of Section 6 (T3S R4E) incorporating those Permit Terms and Conditions are

expected to provide no net reduction in areas or amount of fluvial sediment deposition relative to potential habitat within the Whitewater River Floodplain Conservation Area or in Section 6.

OHV use and invasive plant impacts to milk-vetch on conserved habitat could increase as an indirect effect of the Covered Activities described above. Urbanization adjacent to Coachella Valley milk-vetch habitat likely promotes increased OHV use, spread of non-native invasive vegetation, and trash/debris dumping (see above for further discussion on direct effects of OHV use). Invasive plants associated with development (e.g., from landscaping or construction equipment) adjacent to the Conservation Areas may compete with the Coachella Valley milk-vetch. The presence of many of the invasive species, such as Saharan mustard, increases the fuel load resulting in a higher potential for fires. Non-native landscaping may promote the introduction of new or additional invasive species (including insects) to the surrounding natural habitat, which can also offset the biotic relationship between other plant species and pollinators.

Monitoring and Adaptive Management Program

The Monitoring and Management Programs are designed to: 1) determine if the Plan is achieving its Conservation Goals for the Covered Species and conserved Natural Communities; 2) specify the primary components of MSHCP Reserve System management; and 3) determine how Adaptive Management strategies will be used and how effective they are to address changes in habitat condition, Natural Communities, and/or species status. The Management and Monitoring Programs focus on identifying changes in identified Natural Communities and Covered Species condition (numbers, distribution, etc.) and what factors may be causing the identified changes. The data gathered will help identify the thresholds that would trigger Adaptive Management actions and test their efficacy.

As stated above in the Minimization and Mitigation Section above, the MSHCP proposes that the following actions may be needed to ensure Coachella Valley milk-vetch persistence and long-term viability: 1) Control and manage activities that result in sand compaction and vegetation destruction such as OHV use, vegetation manipulation or clearing, and other human disturbance that degrade Coachella Valley milk-vetch habitat; 2) Control invasive species if it is determined that there are impacts to the milk-vetch; 3) Address the maintenance of the aeolian sand transport system through the Monitoring and Management Programs; and 4) Develop and test models through the Management and Monitoring Programs to address the distribution, abundance, and ecological requirements of the Coachella Valley milk-vetch.

Because so little is known about the life history, habitat affinities, and densities, action item number 4 above will need to be addressed within the first 5 years after Permit issuance. To minimize impacts and ensure that the Conservation Areas contain viable populations of the Coachella Valley milk-vetch that can be sustained in perpetuity, CVCC shall monitor and manage the Coachella Valley milk-vetch by focusing on substrate affinities, micro-habitat requirements, seed dispersal, pollination ecology, and weed management within the Conservation Areas. Implementation of a seed salvage program on the Big Dune would provide additional enhancement opportunities.

To ensure the long-term survival of the Coachella Valley milk-vetch, specific actions will be

needed over time within the Thousand Palms, Whitewater Floodplain, and Willow Hole Conservation Areas. The Management Program, Adaptive Management Program, or Reserve Management Unit Plan (RMUP) will need to include specific management actions to enhance aeolian deposition in the downwind portions of the Conservation Areas, address invasive species, and OHV use. These management strategies shall be developed within the 3 years of Permit issuance.

The Plan establishes a Management Contingency Fund (Section 8.2.4.2 of the Plan) to provide the ability to address immediate and/or large-scale monitoring and management needs on Permittee lands and will be established in the first ten years post Permit issuance. The funds will be used to address management needs of sand dependent species Covered by the Plan. To ensure adequate conservation within Core Habitat for this species, a Permit Term and Condition has been included that requires CVCC to: manage and enhance all modeled Core Habitats for this species, assess specific habitat requirements of this species to ensure adequate habitat conditions in the Core Habitat areas are maintained, develop a long-term management strategy for this species that identify specific measures that will be implemented and a specific time line for implementation, and incorporate the measures identified in the long-term management strategy into the Joint Project Review process through appropriate revisions to the Conservation Objectives and Required Measures for the Conservation Areas that include Core Habitat. The complete version of the permit condition is provided at the end of the account.

Trails Plan and Recreation

Trails currently exist on Reserve Lands outside the Santa Rosa and San Jacinto Mountains Conservation Area (see the General Effects of the Action, Trails and Recreation section of this Biological Opinion). The existing trails are considered Allowable Uses (allowed, but not Covered Activities under the MSHCP) under the MSHCP and include: 1) a system of trails on the Thousand Palms Preserve; 2) the Pacific Crest National Scenic Trail traversing Reserve Lands in the Snow Creek/Windy Point and Stubbe and Cottonwood Canyons Conservation Areas; and 3) trails on non-Federal lands within Dos Palmas Preserve/ACEC. The Conditionally Compatible (Covered Activities) public access uses on Reserve Lands consist of trails, facilities, and passive recreational activities with the primary public access component on Reserve Lands being trails.

The MSHCP proposes the construction and maintenance of trails and passive recreation as Covered Activities. If trails are constructed and recreational activities occur within Coachella Valley milk-vetch habitat, it could result in loss of habitat from vegetation clearing from the trail footprint, crushing of individual plants, soil compaction, and dust accumulation from trail use. Maintenance of trails could result in loss of milk-vetch plants from vegetation removal along the trails. Effects due to the construction, operations and maintenance of trails would be minor. Similarly, minor effects are likely due to passive recreational uses. However, illegal OHV use could result in further detrimental effects to this species that could be promoted by the installation of trails and recreational access within the Reserve System. The Plan includes criteria for placement and design of the trails and facilities and guidelines for public use and maintenance to mitigate potential adverse effects. Specifically, Section 7.3.4.4 of the MSHCP proposes *Guidelines for Public Access and Recreation on Reserve Lands* to avoid and minimize

potential adverse effects of the Trails Plan and recreation activities.

Changed Circumstances
Changed Circumstances are future events that are reasonably foreseeable during the life of the MSHCP Permit, and that such an event may negatively affect the Covered Species and/or their associated habitat within the Reserve System. Section 6.8.3 of the MSHCP proposed to address the following Changed Circumstances: drought, fire, invasion by a new invasive species, lowering of the water table, and new listing of a species not covered by the MSHCP. Drought, fire, invasion by a new species, and lowering of the water table could affect the Coachella Valley milk-vetch. Although Coachella Valley milk-vetch populations can survive drought periods as dormant seeds, prolonged drought may result in sand depletion and increased soil armoring within the Conservation Areas, making the habitat unsuitable for the milk-vetch. Although fire events on the valley floor have been rare in the past, they could become more frequent in the future with the invasion of non-native plants that could result in the direct loss of milk-vetch plants and seeds, and could potentially affect the pollinators. Long-term adverse effects to the Coachella Valley milk-vetch from fire would be unlikely. A new invasive species could out-compete the milk-vetch for resources vital to their survival, affect pollinators, or result in less suitable habitat available for their life history requirements.

The MSHCP proposes to implement actions, such as preventative measures and planned responses, as described in Sections 6.8.3.1 through 6.8.3.5, to avoid and minimize potential adverse effects of Changed Circumstances. Implementation of the planned responses, in conjunction with Adaptive Management (Section 8 of the MSHCP), and the Permit Terms and Conditions described below, would likely minimize adverse effects to Coachella Valley milk-vetch from the Changed Circumstances.

Critical Habitat
The proposed critical habitat for the Coachella Valley milk-vetch initially designated 3,583 acres of land within the Plan Area. A final rule was published on December 14, 2005 (70 FR 74112) that determined designation of critical habitat was not warranted. The non-designation of critical habitat relied on successful completion of the MSHCP and reserve system established by the CVFTL HCP. Completion and adoption of the MSHCP proposes to conserve much of the habitat that met the primary constituent elements. Of the total acres initially designated as critical habitat, 886 acres of essential habitat are located within the City of Desert Hot Springs and are no longer subject to the MSHCP.

CUMULATIVE EFFECTS
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 anticipated that there may be conversion or degradation of Coachella Valley milk-vetch habitat within the action area resulting from OHV activity, development not contemplated in proposed Plan, illegal dumping, and invasive weeds. Activities such as these will degrade

existing habitat and affect Coachella Valley milk-vetch populations (refer to the Cumulative Effects discussion in the General Effects Section of this Biological Opinion). Some losses on private lands may occur within the Action Area because the plant is not a State-listed species.

Within the Action Area, one of the local jurisdictions (City of Desert Hot Springs) is no longer an Applicant seeking a Permit under the Plan. Therefore, the private lands within the City of Desert Hot Springs are not subject to the Plan. Pursuant to the California Environmental Quality Act (CEQA), the City of Desert Hot Springs (City) should avoid, minimize, and mitigate the impacts to milk-vetch. Mitigation for milk-vetch should include at least 1 acre conserved within the City limits for every 1 acre developed. If this occurs, then we expect that approximately half of the habitat within the City limits would be conserved. The City is not currently implementing such a mitigation strategy. However, the City has indicated its intent to join the Plan in the near future and to adopt measures to ensure project approval in compliance with the Plan in the future. To the extent that the City does not implement a mitigation strategy that results in half of the milk-vetch locations being conserved then the effects remain cumulative to the effects of the proposed action of the Service issuing a Permit.

Most occupied habitat for this species is found outside of the Waters of the United States. Army Corps of Engineers jurisdiction is typically limited to Waters of United States, thus most of the impacts to the milk-vetch within the City would not be subject to a Corps nexus and not be addressed under section 7 of the Act. However, we anticipate that some of this development may require other section 7 review (if a Federal action is involved) or permitting through Section 10 (if co-located with a threatened or endangered animal species).

The Agua Caliente Band of Cahuilla Indians is undertaking a Habitat Conservation Plan for all of their Tribal lands. The draft Plan and associated documents have been reviewed publicly. It is anticipated that the final Plan and associated environmental analysis will be complete in mid-2008 with permit issuance scheduled for late 2008. Although there will be habitat loss associated with that Plan, the overall net benefit to the species is expected to be positive given the conservation called for in the draft Plan. Because issuance of that permit is a Federal action, an analysis of the impacts of that Plan will be completed in the required section 7 process.

CONCLUSION

While the MSHCP proposes to conserve modeled Core and Other Conserved Habitat for the Coachella Valley milk-vetch across 15 Conservation Areas, the MSHCP likely overestimates extant habitat within the model for Coachella Valley milk-vetch. It is difficult to determine that the species will be supported in all 15 Conservation Areas in perpetuity due to the lack of population density information within the proposed Conservation Areas. However, with the proper implementation of the Plan, IA, Implementation Manual, and the Permit Terms and Conditions, it is likely that this species will persist in the Plan Area.

In summary, a total of 11,650 acres of Coachella Valley milk-vetch modeled habitat are proposed to be conserved in perpetuity by a Legal Instrument to mitigate the loss of 15,392 acres of modeled habitat as a result of proposed Covered Activities throughout the Plan Area. In

addition to the proposed mitigation lands, the Conservation Areas contain 7,707 acres of Existing Conservation Lands that enhance the Reserve System. We anticipate the proposed action will directly and indirectly affect the Coachella Valley milk-vetch as described in the analyses above, including the direct loss of 42 percent of the modeled habitat in the Plan Area (including Existing Conservation Lands). Implementation of the avoidance, minimization, and mitigation measures identified in the MSHCP will reduce the impacts to this species. We anticipate that this species will persist in the remaining 53 percent of the modeled habitat within both the Existing Conservation Lands and the Additional Conservation Lands. Additionally, this species will benefit from the establishment of Conservation Areas situated in close proximity that will be managed for the perpetual conservation 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 with the addition of the Permit Terms and Conditions, is not likely to jeopardize the continued existence of the Coachella Valley milk-vetch. We reached this conclusion because 11,650 of the modeled habitat for the Coachella Valley milk-vetch will be conserved and managed in perpetuity 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 Reserve System as offered by the Plan and required by the Permit Terms and Conditions, are not anticipated to result in an appreciable reduction in the numbers, reproduction, or distribution of this species throughout its range that are not adequately offset by the increased security and management of the conserved populations.

Permit Terms and Conditions

Based on the analysis above, the following Species-Specific Permit Terms and Conditions along with the General Permit Terms and Conditions (see General Effects Analysis), the Conservation Area Goals and Objectives, and Required Measures and the Species Conservation Goals and Objectives, identified in the MSHCP and other referenced documents will enable us to extend No Surprises assurances to the Coachella Valley milk-vetch. Thus, coverage of the Coachella Valley milk-vetch is contingent upon the following:

⇒ CVCC and the Land Manager, through the land management program, shall identify and document implementation compliance with the Land Use Adjacency Guidelines and work with the landowners and appropriate jurisdictions to address these concerns. This information shall be included in the Annual Report to the Wildlife Agencies and the Permittees.

⇒ New development that requires a discretionary permit from a Permittee which expands an Existing Use and results in new disturbance shall be subject to MSHCP requirements. Any authorized disturbance of Natural Communities and Covered Species modeled habitat shall count toward the amount of disturbance authorized under the Plan since the Covered Species habitat and Natural Communities on these lands were not addressed or included in the amount of anticipated disturbance authorized under the Plan.

⇒ The CVCC shall ensure that the mesquite hummocks Natural Community will be subject to a

"no net loss" requirement as described in Section 8.2.4.1 of the Plan. The CVCC shall ensure that these requirements are implemented within 10 years of impacts, including providing suitable or potential habitat for Covered Species if such habitat is affected or lost due to Covered Activities.

⇒ The CVCC, after coordination with its Implementation Manual Subcommittee, shall provide the Implementation Manual for review and concurrence by the Wildlife Agencies prior to its finalization and distribution to the Permittees.

⇒ A Conservation to Development ratio of 9:1 within the Willow Hole Conservation Area shall be maintained within each of the following areas: 1) the east half of the southwest quarter, and the east half of the east half of the west half of the southwest quarter, and east half of the west half of the southwest quarter, of Section 12, T3S R4E; 2) the east half of the east half of the southeast quarter, and the west half of the west half of the southeast quarter, and the west half of the east half of the west half of the southeast quarter of Section12, T3S R4E as shown in Figure 4-13f of the Plan; 3) the northwest quarter of Section 19, T3S R5E; 4) the portion of the northeast quarter of Section 19, T3S R5E that is in the Conservation Area; 5) the portion of the northern half of Section 20, T3S R5E as depicted in Figure 4-13f of the Plan; 6) the portion of the north half of Section 24, T3S R4E that is in the Willow Hole Conservation Area; 7) the portion of the southern quarter of Section 28, T3S R5E as depicted in Figure 4-13f; and 8) the east half of the northwest quarter within the Willow Hole Conservation Area, and the west half of the west half of the northeast quarter, and the east half of the west half of the northeast quarter (except those portions north of Varner road) of Section 29, T3S R5E.

⇒ CVCC shall conduct a Joint Project Review for proposed single family homes in the 9:1 areas to identify applicable measures needed to meet Conservation Area and Covered Species Goals and Objectives of the Plan. Should a Conservation Easement be obtained over a parcel or a portion of a parcel in the 9:1 areas, CVCC shall condition the acceptance of any easement to meet the Site Planning Standards described under Required Measure 3 of the Plan (with the exception of the first four sentences of Site Planning Standard 2).

⇒ Use of the Management Contingency Fund under Section 8 of the Plan shall include addressing the following sand-dependant species priorities: 1) funding of activities addressed in Special Permit Term and Condition #26 (see below); 2) development and implementation of an invasive species management plan that assesses the status of and threats from invasive species, identifies knowledge gaps, and addresses control of invasive plant species (e.g, Saharan mustard) in Snow Creek/Windy Point, Thousand Palms, Whitewater Floodplain, and Willow Hole Conservation Areas; and, 3) funding of other sand-dependent species/habitat related Special Permit Terms and Conditions. The invasive species management plan shall be developed within 3 years of Permit issuance in coordination with the Wildlife Agencies; this management plan shall be implemented beginning in year 4 post-Permit issuance. The Management Contingency Fund may supplement, but not replace, the Monitoring and Management Program budget.

⇒ For Coachella Valley Fringe-toed Lizard, Coachella Valley Round-tailed Ground Squirrel, Palm Springs Pocket Mouse, and Coachella Valley Milk-vetch, to ensure that a minimum of three (3) viable populations (long-term persistence of self-sustaining populations) within Core Habitat for these species is maintained, or if necessary re-established and maintained, the following measures shall be implemented:

a. The CVCC shall manage and enhance modeled Core Habitats for these species to provide for persistent and sustainable populations and essential ecological processes, including broader patterns of sand transport and deposition in the Whitewater Floodplain and maintenance of sand transport and deposition in all Core Habitats to the maximum extent practicable (e.g., sand fencing as appropriate in any of the Conservation Areas and restoring mesquite in Thousand Palms Conservation Area) to achieve the Conservation Objectives for these species in the Plan.

b. The CVCC shall assess the animal species identified above to determine the presence of persistent and sustainable populations and essential ecological processes within the Core Habitats. This assessment shall be completed within 3 years of Permit issuance using methods developed jointly by the CVCC and Wildlife Agencies.

c. Specific studies shall be conducted as part of the baseline monitoring for the Coachella Valley milkvetch to assess: viability and extent of seed bank, substrate affinities, micro-habitat requirements, seed dispersal, pollination ecology, and impacts of invasive species within the Core Habitat areas to ensure that the appropriate measures to support long-term conservation of this species are identified. These studies shall be completed within 5 years of Permit issuance using methods developed jointly by the CVCC and Wildlife Agencies.

d. The CVCC shall develop long-term management strategies for each of these species that identify specific monitoring approaches (e.g., the use of probabilistic population estimates, relativistic population indices, and/or assessments of effective population size) and management actions (including actions to address habitat as described in a) above) that will be implemented and a specific time line for implementation to ensure a minimum of 3 viable populations including adequate distribution to support long-term viability of the populations within Core Habitat areas. These management strategies shall be completed and provided to the Wildlife Agencies for their concurrence within 5 years of Permit issuance for the animal species and 7 years for the CV milkvetch..

e. Within 6 months of their completion, implementation of the measures associated with the management strategies shall begin through incorporation into the applicable Reserve Management Unit Plan(s) and Adaptive Management Program. Any changes to the Covered Species and Natural Communities Conservation Goals and Objectives and Required Measures for the Conservation Areas that include Core Habitat for each of the

species identified above shall be submitted to the Wildlife Agencies for review and approval within 8 years of permit issuance and incorporated into the Joint Project Review process as appropriate.

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Triple-ribbed milk-vetch (*Astragalus tricarinatus*)

STATUS OF THE SPECIES

Species and Critical Habitat Legal/Listing Status

Astragalus tricarinatus was federally listed as endangered on October 6, 1998 (63 *FR* 53596). The species was afforded protection under the Act in recognition of the plant's imperiled status from habitat losses/degradation caused by urban development, recreational activities, and modifications to the natural fluvial processes and sand transport system maintaining the region's unique habitat associations. Designation of critical habitat for the species was considered not prudent in the final listing rule (63 FR 53596).

Species Description

Astragalus tricarinatus, a member of the Fabaceae (pea family), was described by Asa Gray (1876) based on collections made by Charles C. Parry in 1873 at Whitewater in Riverside County. Rydberg (1927) transferred it to the segregate genus *Hamosa* and published the combination *Hamosa tricarinatus*. Current systematic treatments (Barneby 1964, Isely 1998) and floristic treatments (Munz 1974, Spellenberg 1993) recognize Gray's original treatment of the taxon.

Triple-ribbed milk-vetch is a vigorous, bushy species 30-50 centimeters (12-20 inches) tall, with a woody taproot. The species may also be a facultative annual, if conditions are adequate. The leaves usually possess 15 to 31 leaflets. The racemes are 6-18 centimeters (2-7 inches) long with 5 to 15 flowers. The cream-colored flowers have united sepals that form a calyx 4-5 millimeters (about 0.2 inch) long, a banner (upper petal) 12.6-15.7 millimeters (0.5-0.6 inch) long and a keel 9.7-11 millimeters (about 0.4 inch) long. The fruits are glabrous, two chambered, 24-42 millimeters (1.0-1.7 inches) long, and conspicuously three-sided in cross-sectional outline. *Astragalus tricarinatus* differs from its most closely related sister taxon, *A. bernardianus*, in generally having more leaflets on each leaf, larger upper petals, and a longer calyx tube.

Distribution

Astragaglus tricarinatus is endemic to California and is restricted to the dry slopes and canyons around the head of the Coachella Valley (Spellenberg 1993; Munz 1974; Barneby 1964). The range of the species extends from Whitewater Canyon eastward to Mission Creek, Dry Morongo Canyon, Big Morongo Canyon, and recently has been found in Long Canyon and East Deception Canyon in Joshua Tree National Park (Tasha LaDoux email comm. w/Scott D. White 2007). An occurrence in Agua Alta Canyon on the east slope of the Santa Rosa Mountains has not been revouchered since its discovery in 1985. Additional reports based on single collections not since refound include Coyote Hole and 29 Palms Canyon. Reference to this species being at Thousand Palms is based solely on a collection by E. C. Jaeger who is known for his misleading localities. This reference should be disregarded until substantiated by additional information. We have not been able to substantiate an occurrence cited in Barneby 1964 for the Orocopia Mountains. Thirty-four occurrences of the triple-ribbed milk-vetch have been recorded in the Plan Area. During the last 20 years, the species has been located in four areas: in the north at Big Morongo

Canyon and its tributary canyons; at two nearby locations at Whitewater Canyon and Mission Creek; and at a disjunct location in Agua Alta Canyon (64 kilometers [40 miles] to the southeast) (USFWS 1998). Historical occurrences include: Thousand Palms in Riverside County, about midway between the Morongo Canyon area and Agua Alta Canyon; Key's Ranch, San Bernardino County (now known as Desert Queen Ranch), within the boundary of Joshua Tree National Park; and north of the Hidden Valley Campground and Picnic Area.

Most of the triple-ribbed milk-vetch that has been seen in recent years occurs at several sites within Big Morongo Canyon. In 1992, 70 plants in five groupings were reported scattered along a 2- to 3-kilometer (1 to 2 miles) stretch of the canyon floor at the mouth of two tributary canyons 2 to 3 kilometers down Big Morongo Canyon from the Big Morongo Preserve, managed by the BLM (Jacobsen *in litt.* 1993). Thirty-three plants were counted at the same location in 1993 and 20 plants in 1994 (Mathews 1994). Additionally, 23 individuals were found in Big Morongo Canyon in 1997 (17 alive). That same year the occurrence at Mission Creek was reported. Thereafter, 13 plants were documented along the drainage on May 8, 1998 (USFWS *in litt.* 1998). Few sightings of the species have been reported in Whitewater Canyon since the 1980's. One plant was seen in the area in 1995 (Sanders pers. comm. 1995).

In April 2004, a population of at least 300 plants was located by Scott White and John Green (White 2004b) just west of Wathier Landing in Mission Creek canyon west of Catclaw Flat. This location is outside but near the Plan boundary. The plants were growing in a small outcrop of "unproductive-looking" green gravelly soil and the species was not seen in the surrounding granitic slopes or alluvial fans and washes. Most were adult plants, but juvenile and seedling plants were present. The site of this population is on land owned by the Wildlands Conservancy and is outside of the Existing Conservation Lands for this Plan. Many more plants were found at this small outcrop than have been censused at all other known occurrences. Additional triple-ribbed milk-vetch plants were seen but not counted at similar outcrops on Wildlands Conservancy lands in the vicinity, and it is likely they would also occur on adjacent BLM land (Scott White, email comm./J. Stuckrath 2007) This discovery supports the view that most previously found plants and observations of this species may have been "waifs" washed downstream or downslope from source populations higher in the canyons. White (2004a) speculated that source populations might exist higher up in the Mission Creek and Morongo Canyon watersheds. This speculation is worthy of consideration, as it would be highly improbable for waifs from the Whitewater watershed to have reached the other major watersheds in which the plant has been found. The headwaters of the watersheds known to support this species are largely within San Bernardino County, and outside of the Plan area. However, there may be source populations within the Plan area in appropriate habitat on the ridges and hillsides of the Whitewater, Mission Creek, Dry Morongo, and Big Morongo watersheds.

Habitat Affinities

Triple-ribbed milk-vetch was believed to be restricted to sandy or gravelly soils in arid canyons at the edge of the desert, and less commonly on steep scree slopes of decomposed granite (White 2004b). The species was recently and historically known to occur along the edges of boulder-strewn desert washes between elevations of 396-564 meters (1,300-1,850 feet). Other plant taxa commonly found in the washes include *Larrea tridentata* (creosote bush), *Encelia farinosa*

(brittlebush), *Lepidospartum squamatum* (scale-broom), *Acacia greggii* (catclaw), *Chaenactis* spp. (pincushion), *Chilopsis linearis* ssp. *arcuata* (desert willow), *Psorothamnus fremontii* (Fremont's dalea), *Bebbia juncea* var. *aspera* (sweetbush), and *Mirabilis bigelovii* var. *bigelovii* (desert four o'clock).

Recent information suggests that founder populations of the plants exist on uplands, above the washes, on unusual metamorphic rock weathering into an unproductive gravelly soil (White 2004b). The exact geological features of this habitat have yet to be described. Other plant taxa found within 25 m of this site include: *Yucca whippleyi* (our Lord's candle), *Guttierrezia californica* (California matchweed), *Stipa cernua* (needle grass), *Chaenactis fremontii* (Fremont's pincushion), *Dendromecon rigida* (bush poppy), *Bromus rubens* (red brome), *Bromus tectorum* (cheatgrass), *Erodium cicutarium* (redstem stork's bill), *Lotus scoparious* (deerweed), *Eriogonum fasciculatum* (California buckwheat), *Cercocarpus betuloides* (mountain mahogany), *Salvia columbiare* (chia), *Stephanomeria pauciflora* (desert straw), *Psorothamnus arborescens (*California dalea), *Yucca schidigera* (Mohave yucca), *Eriogonum wrightii* (Wright's buckwheat), *Mentzelia* spp. (blazing star), and *Calochortus* spp. (Mariposa lily) (R. Cox, pers. comm.).

Life History

Triple-ribbed milk-vetch's seed dispersal mechanisms, environmental cues for germinating, seed longevity in the soil, specific habitat requirements, pollinator associations, symbiotic relationships with soil microorganisms, and any ecological relationships with wildlife and surrounding vegetation are all unknown (White 2004a). The plants found downstream from the source populations may provide pollen and seeds for dispersal to adjacent watersheds and a source to ensure maintenance of genetic diversity for the species.

Population Trends

Triple-ribbed milk-vetch has consistently been noted to be sparsely distributed in any given location and never abundant, except for White (2004b). Observations that the plants often occur in canyons subject to flooding may suggest that the seeds may require scarification or soaking to promote germination. This seems unlikely, however, given the fact that the large occurrence recently found near Catclaw Flat is not near any water course. Plant occurrences, or lack thereof, may not reflect an accurate or complete assessment of the seed bank and the species' population structure. Washes and canyons may not be the species' primary habitat. The few individuals found there may represent 'waifs' washed down from more densely populated areas higher up in the watershed (White 2004b). The limited numbers and sparse occurrence of this plant require thorough, timely, and repeated habitat surveys to accurately determine its range-wide distribution. It may also require surveys to be conducted well outside of supposed habitat and explore alternate habitat types within the region.

In April 2004, a population of at least 300 plants was counted (White 2004b). This represented the most numerous occurrence of the species ever recorded. The plants were "growing on uplands, well above washes and were seen only on an unusual metamorphic rock weathering into an unproductive gravelly soil (White 2004b)." This occurrence was on private land, surrounded by Bureau of Land Management Wilderness. The land is owned and managed for permanent

conservation by the Wildlands Conservancy. On a return visit weeks later there was an estimated minimum 1,000 plants (R. Cox, pers. comm.). These were found on similar rock formations. Additional 'founder' populations higher up in the Mission Creek and Morongo Canyon watersheds may exist, as washes within those watersheds have supported scattered plants (White 2004a).

Threats

Primary threats to the triple-ribbed milk-vetch include: (1) potential loss of habitat associated with on-going maintenance activities along a pipeline through a canyon that contains one of the highest concentrations of the plant; (2) vehicle use in the canyon bottoms occupied by the species; (3) development in canyon areas, both within the canyon washes and on the slopes and ridges of the canyons, especially those not yet surveyed (e.g., Whitewater Canyon); (4) construction and development of sites for wind-power generation, as the majority of the population may not reside within the canyon bottoms; (5) flood control maintenance activities in the Whitewater Canyon and Mission Creek drainages; (6) potential sand and gravel mining in Whitewater Canyon; and (7) livestock grazing, which continues on the Wildlands Conservancy holdings in Mission Creek. Activities that increase the isolation of the localized occurrences would likely be detrimental to the continued existence of the species. The sparse and scattered distribution of the triple-ribbed milk-vetch makes it especially vulnerable to localized, unanticipated events, such as pipeline failure, maintenance activities, or natural fluvial processes. The limited numbers of plants and populations in scattered watersheds may also represent a threat in the form of decreased potential for genetic interaction among the occurrences. A future sale of the Wildlands Conservancy land could potentially place the largest known populations at risk of extirpation through development.

Synopsis of Status

This species has a range restricted to several scattered watersheds around the north end of the Coachella Valley. Occurrences of this species are all isolated from one another with low potential for interaction. Nearly all of the occurrences are small or very small. Even if additional source populations are located in the headwater areas of the several watersheds known to support this species, the occurrences in valleys and washes may represent the only genetic continuity among the watershed populations. Several threats to the long-term conservation of this species exist throughout its range.

ENVIRONMENTAL BASELINE

Status of the Species in the Action Area

The status of triple-ribbed milk-vetch is not well known in the action area due to either insufficient monitoring efforts or the monitoring of suboptimal habitat types that at best contain low numbers of individuals. The source populations may reside in different habitat types altogether. If the species is restricted to wash margins in the Plan Area, then current threats such as OHV activity and sand and gravel mining may be significant threats. Currently 2.1 percent of the wash and canyon bottom areas modeled as habitat for the species have been developed. It is unknown what effects this development is having upon the species. If population sources lie in upland or ridgeline habitat, BLM and the Forest Service may possess a majority of the suitable habitat, although some habitat may lie within the Mission Creek and Big Morongo watersheds.

If no further development were to occur, then it is probable that source populations within the canyons will remain stable, unless genetic input via waif populations is currently declining. We anticipate that activities on BLM lands will be addressed through our section 7 consultation process on the CDCA.

There are 3,007 acres (1,217 ha.) of modeled habitat, generally in wash bottoms, for *Astragalus tricarinatus* in the Plan Area. Of this total, 99 percent (2,986 acres) of the modeled habitat for triple-ribbed milk-vetch in the Plan Area occurs within five conservation areas: Whitewater Canyon (1,295 acres, Core Habitat), Highway 111/I-10 (5 acres, Other Conserved Habitat), Whitewater Floodplain (866 acres, Other Conserved Habitat), Upper Mission Creek/Big Morongo Canyon (819 acres, Core Habitat), and Santa Rosa and San Jacinto Mountain (1 acre, Other Conserved Habitat). Approximately 1,504 acres are within Existing Conservation Lands controlled by BLM or Wildlands Conservancy, and an additional 21 acres of modeled habitat occurs on Federal lands outside the conservation areas. Approximately 1,500 acres of modeled habitat would be subject to the Permit. The proposed conservation areas include 33 of the 34 known occurrences of this species in the Plan Area. Of these, 85 percent (approximately 28 occurrences) are on existing public and private conservation lands (e.g., BLM, Wildlands Conservancy). Development in washes downstream of the known occurrences has affected 65 acres of the 3,007 acres of modeled habitat. There are no accurate or relevant figures for species densities because of the sporadic germination and persistence of the plants. The known distribution patterns and plant numbers within the Plan Area may not be representative for the species as a whole. Individuals in the plan area may be derived from seeds washed down from stable upland populations, thus representing waif or transient populations. The known upland populations are potentially orders of magnitude greater than the populations within canyons and washes. Little information is available on the range or size of upland populations. However, we expect to find upland source populations in or near the headwaters of each of the watersheds that support this species.

Much of the potential upland habitat for the species occurs on BLM, Forest Service, National Park, and private conservation lands. The upland habitat is extremely rugged and not subject to much development pressure (Sanders 1999).

The action area as described may not support major portions of the species range. However, there may be source populations within the Plan area in appropriate habitat on the ridges and hillsides of the Whitewater, Mission Creek, Dry Morongo, and Big Morongo watersheds. The Plan area may serve an important role for the dispersal of genetic material and maintenance of diversity among populations. Seeds deposited in washes may end up closer to other populations of triple-ribbed milk-vetch than their parent population, thus shortening the distance necessary for a potential pollen or seed dispersal agent to travel between populations. Germinant waifs may serve as multi-generational dispersal agents, as seeds may germinate progressively downstream of parent plants along adjacent watersheds. A point may be reached that pollinators would be able to transfer pollen between plants across watersheds as well as up and down watersheds, acting as a conduit for alleles from separate watersheds to source populations.

Introgression of novel alleles may be an important factor for maintaining population viability, as

some species of milk-vetch exhibit sporophytic self-incompatibility (e.g., *Astragalus magdalenae* var. *peirsonii*, Porter *et al.* 2005). In such a genetic system, pollen from one plant will not germinate on the stigma of a receptor plant if either plant shares even one allele at the self-incompatibility loci. Lack of pollen germination precludes any opportunity for fertilization and subsequent seed formation. Therefore, population persistence may require high genetic diversity within the local population at the self-incompatibility loci.

Although a small percentage of the modeled habitat has been developed so far, the linear nature of the washes may exacerbate the effects of development on this species. There may currently be obstructions to movement of seeds downstream in Whitewater Canyon as well as in Mission Creek. If the species relies upon gene flow between watersheds to maintain genetic diversity, blockage of gene flow may imperil populations of the species or the species in general. Over time, isolated populations may become increasingly homogeneous, resulting in fewer individuals within populations being able to breed with one another.

Whitewater Canyon Conservation Area
The Whitewater Canyon Conservation Area consists of 1,295 acres of modeled habitat for this species. Of this total, 886 acres of modeled triple-ribbed milk-vetch habitat is Existing Conservation Land that is controlled by the BLM. Gravel mining has not occurred on the Whitewater River since 1985 and there are no existing mineral leases on BLM land within Coachella Valley. No mining is allowed in wilderness areas (BLM 2002a). Mineral materials sales within the conservations areas would be restricted to State of California Division of Mines and Geology classified and designated resource areas, and new mining proposals would be allowed if habitat conservation objectives could be met using appropriate mitigation measures (BLM 2002b). Mining operations holding a valid existing permit on non-federal lands could be expanded. Mining operations would potentially restrict or block fluvially-bourn seeds from dispersing below mining sites. Current conservation status within this conservation area ranges from Level 1 to Level 3.

Highway 111/I-10 Conservation Area
The Highway 111/I-10 Conservation Area consists of five acres of modeled habitat for this species. Triple-ribbed milk-vetch is not known to occur in this conservation area. None of the modeled triple-ribbed milk-vetch habitat is currently in Existing Conservation Land. Development is clustered and 90 percent of the private land is reserved for open space use.

Whitewater Floodplain Conservation Area
The Whitewater Floodplain Conservation Area consists of 866 acres of modeled habitat for this species. Of this total, 272 acres of modeled triple-ribbed milk-vetch habitat is Existing Conservation Land that is controlled by the BLM. Gravel mining has not occurred on the upper Whitewater River since 1985 and there are no existing mineral leases on BLM land within Coachella Valley. No mining is allowed in wilderness areas (BLM 2002a). Mineral materials sales within the conservations areas would be restricted to State of California Division of Mines and Geology classified and designated resource areas, and new mining proposals would be allowed if habitat conservation objectives could be met using appropriate mitigation measures (BLM 2002b). Mining operations holding a valid existing permit on non-federal lands could be

expanded. Triple-ribbed milk-vetch is not known to occur in this conservation area. Current conservation status within this conservation area ranges from Level 2 to Level 3.

Upper Mission Creek/Big Morongo Canyon Conservation Area
The Upper Mission Creek/Big Morongo Canyon Conservation Area consists of 819 acres of modeled habitat for this species. Of this total, 772 acres will be conserved and 346 acres of modeled triple-ribbed milk-vetch habitat is Existing Conservation Land that is controlled by the BLM. The recent acquisition by the Wildlands Conservancy (Mission Creek Preserve) conserved an additional 216 acres of modeled habitat for the triple-ribbed milk-vetch. Gravel mining is not currently occurring in the Upper Mission Creek/Big Morongo Canyon Conservation Area, although mining operations holding a valid existing permit on non-federal lands could be expanded. There are no existing mineral leases on BLM land within Coachella Valley. No mining is allowed in wilderness areas (BLM 2002a). Mineral materials sales within the conservations areas would be restricted to State of California Division of Mines and Geology classified and designated resource areas, and new mining proposals would be allowed if habitat conservation objectives could be met using appropriate mitigation measures (BLM 2002b). Mining operations would potentially restrict or block fluvially-bourn seeds from dispersing below mining sites. Flood control maintenance activities in the Mission Creek drainages and road widening along Highway 62 could impact this species in the future. Illegal berming and drainage diversions are potential impacts the may affect the structure and function of canyon bottom habitat in the future. Current conservation status within this conservation area ranges from Level 1 to Level 3.

Santa Rosa and San Jacinto Mountains Conservation Area
The Santa Rosa and San Jacinto Mountains Conservation Area consists of one acre of modeled habitat for this species. None is currently in Existing Conservation Lands. There is one apparently disjunct occurrence of triple-ribbed milk-vetch in Agua Alta Canyon.

Factors Affecting the Species' Environment within the Action Area
As stated above, the primary factors affecting triple-ribbed milk-vetch are probably damage by off-road vehicle activity, development activities in the canyon bottoms, flood control maintenance activities, road widening, and potential illegal berming and drainage diversions. Gravel mining has not occurred on the Whitewater River since 1985 and there are no existing mineral leases on BLM land within Coachella Valley. No mining is allowed in wilderness areas (BLM 2002a). Mineral materials sales within the conservations areas would be restricted to State of California Division of Mines and Geology classified and designated resource areas, and new mining proposals would be allowed if habitat conservation objectives could be met using appropriate mitigation measures (BLM 2002b). Expansion of mining operations holding a valid existing permit on non-federal land as of the date of Permit issuance must be consistent with the Conservation Objectives for the relevant Conservation Area.

Effects of the Action
The primary effects include direct impacts to standing triple-ribbed milk-vetch and the reduction and degradation of habitat within the washes, as well as impacts to populations on hillsides and hilltops. Secondary effects include the prevention of seeds and pollen from traveling past

development, affecting propagule dispersal. The primary effects of these actions would likely impact only a small number of individuals in washes, which would not constitute a substantial reduction in population size. Primary effects in upland areas have the potential for substantial reductions in population numbers, or elimination of the species from an entire watershed, in the action area if the appropriate substrate for the species lies in impacted areas. There may be few indirect effects if sediment is not impeded as it is washed past permitted development. Otherwise, there is a potential for a constriction of gene flow between populations.

Direct Effects

The entire Plan Area includes approximately 3,007 acres of modeled habitat for the triple-ribbed milk-vetch. Of the total modeled habitat acreage, 1,500 acres (50 percent) are subject to the Permit (i.e., non-Federal lands). Sixty-five acres of the modeled habitat are in existing use parcels.

Within the Conservation Areas 147 acres of loss of modeled Habitat (5 percent) could occur. There would be approximately 88 acres of Core Habitat (4 percent of all Core Habitat) and 60 acres of Other Conserved Habitat (7 percent of all Other Conserved Habitat) subject to loss under the Plan. The exact location and configuration of these acres are not known. However, the acreage proposed to be lost would be subject to the Conservation Objectives and Required Measures for each Conservation Area as described in Section 4 of the MSHCP.

Outside of the conservation areas, an additional 17 acres (0.6 percent) of modeled habitat is authorized for loss. The modeled habitat outside the MSHCP Reserve System occurs at the margins of the Whitewater Canyon Conservation Area, south of Interstate 10 where this species has not been observed. In total, 164 acres (5 percent) of modeled triple-ribbed milk-vetch habitat is subject to take as a result of the proposed action.

Approximately 1,504 acres of triple-ribbed mild-vetch modeled habitat is currently within Existing Conservation Lands. Pursuant to a Record of Decision (ROD) by BLM under the CDCA Plan Amendment signed on December 27, 2002, BLM is obligated to manage BLM lands consistent with the CVMSHCP. The ROD for the CDCA Plan Amendment commits BLM to "Establish habitat conservation objectives for assessing compatible uses in eight vegetation community types and developing appropriate mitigation measures. Approximately 95% of the public land base is to be managed consistent with the multi-species habitat conservation objectives established through the Coachella Valley Multiple Species Habitat Conservation Plan" (BLM 2002b). The ROD also indicates: "To facilitate consistency with the goals and objectives of the CVMSHCP, the BLM established habitat conservation objectives for protecting sensitive species and their habitats…These habitat objectives apply to all BLM-administered public lands that fall within the conservation area boundary established through the CVMSHCP. Future activities on public lands within the conservation area must achieve the habitat objectives either through avoidance or application of appropriate mitigation measures to be in conformance with the Coachella Valley Plan and consistent with the CVMSHCP" (BLM 2002b). Specifically, the CDCA Plan Amendment states: "For the 8 vegetation community types (Figure 2-4), the habitat conservation objectives outlined in Table 2-4 would be used to assess compatible uses and to develop appropriate mitigation measures within Conservation Areas on BLM-managed land"

(BLM 2002a). The objectives in Table 2-4 state that BLM will "Conserve 99 percent of…" each of the eight vegetation communities within Conservation Areas on BLM-managed land; these eight communities are: sand dunes and sand fields, desert scrub communities, chaparral communities, desert alkali scrub, marsh communities, dry wash woodland and mesquite communities, riparian communities, and woodland and forest communities. In the CDCA Plan Amendment BLM defines "conserve" as the use of "all methods and procedures which are necessary to bring any endangered species or threatened species to the points at which the measures provided pursuant to the Endangered Species Act are no longer necessary" (BLM 2002a). However, five acres of modeled habitat within the Plan Area occurs on Federal (BLM) land outside a conservation area, and it appears likely that these BLM lands would be subject to potential impacts as BLM performs land transfers as part of the process of securing private land in Conservation Areas (BLM 2002a).

The direct effects of the proposed action would be a result of the Covered Activities (refer to the Description of the Propose Action/Covered Activities Section of the Biological Opinion). Many of the proposed covered activities (e.g., mining, development) would likely directly injure or kill triple-ribbed milk-vetch. However, expansion of mining operations holding a valid existing permit on non-federal land as of the date of Permit issuance must be consistent with the Conservation Objectives for the relevant Conservation Area. The Covered Activities may destroy or alter the species' habitat making it unable to sustain individuals or populations of triple-ribbed milk-vetch.

Indirect Effects

Indirect effects resulting from the MSHCP would include Covered Activities that may impede the transport of triple-ribbed milk-vetch seed and sand/gravel substrate along canyon bottoms and washes. The indirect effects would not result in immediate harm to the species, but over time may interfere with the movement of genetic material between populations, which in turn may reduce the reproductive output and probability of persistence of isolated populations.

Indirect effects would result from the channelization of washes or the mining of gravel. These activities would hinder or preclude propagule establishment or movement downstream during flooding events.

Avoidance and Minimization Measures Included in the Plan

The mitigation measures proposed in the MSHCP are intended to conserve large blocks of viable habitat that support the triple-ribbed milk-vetch. There are 3,007 acres of modeled triple-ribbed milk-vetch Habitat in the Plan area. The Plan would ensure Conservation of 2,838 acres (92 percent) of the total modeled habitat, including 2,026 acres of Core Habitat (96 percent of total) and 812 acres of Other Conserved Habitat (93 percent). Approximately 1,504 acres (49 percent) of the modeled habitat are within Existing Conservation Lands and would be managed as part of the Reserve System. An additional 1,334 acres (43 percent) of the modeled habitat, including 33 of the 34 known locations, for triple-ribbed milk-vetch in the Plan Area would be conserved and managed in perpetuity. Specifically, the MSHCP proposes to protect two Core Habitat areas within the Whitewater Canyon (1,254 acres) and Upper Mission Creek/Big Morongo Canyon (772 acres). Additionally, the MSHCP proposes to protect Other Conserved Habitat in the

Whitewater Floodplain (807 acres), Hwy 111/I-10 (4 acres), and Santa Rosa and San Jacinto Mountain (1 acre) Conservation Areas. Biological corridors and linkages between conserved populations of this species would be maintained as described in Section 4 of the MSHCP.

It is anticipated that approximately 90 percent of private land that has been modeled as triple-ribbed milk-vetch habitat would be conserved within each Conservation Area; except for the Hwy 111//I-10 Conservation Area in which 80 percent of private land would be conserved. Thus, approximately 10 percent of privately-owned habitat within each Conservation Area would be subject to loss (20 percent in the Hwy111/I-10 Conservation Area). Although the majority of the private lands would be conserved within a given Conservation Area, the ultimate configuration of the Reserve System is unknown at this time because the location of future development is not currently known. Reserve System configuration would be subject to the Conservation Objectives and Required Measures established in Section 4 of the MSHCP for each Conservation Area.

Within the Conservation Areas potential adverse effects could occur to a maximum of 148 acres (5 percent) of modeled triple-ribbed milk-vetch habitat. There would be approximately 88 acres (4 percent of all Core Habitat) of Core Habitat and 60 acres of Other Conserved Habitat (7 percent of all Other Conserved Habitat) subject to disturbance.

Additionally, the Plan contains management and monitoring programs designed to ensure the conservation of this milk-vetch, including control of activities that degrade milk-vetch habitat. If the Monitoring Program identifies the substrate type on which White (2004b) found many triple-ribbed milk-vetch, then the CVCC would comply with the 5th Conservation Goal for the species and ensure conservation of habitat quality through Adaptive Management actions. It is probable that a majority of the source populations would be protected as a result of the action and the location of these lands within Existing Conservation Lands. This program would also determine conditions that favor germination and growth in this species to ensure that these conditions persist (e.g., scouring by large floods).

Minimization measures have also been developed to reduce impacts to this species. The measures include Required Avoidance, Minimization Measures, and Mitigation Measures such as the requiring biologists to survey for the presence of germinants during the growing and flowering period from February 1 - May 15. Any occurrences of the species would be flagged and public infrastructure projects shall avoid impacts to the plants. In addition, locations of known occurrences would not be disturbed.

CHANGED CIRCUMSTANCES

Expected climate change may render some current habitat unsuitable for this species. Climate change is likely to change temperatures and precipitation patterns and amounts; e.g., droughts within the Coachella Valley may become longer in duration, which would likely mean longer period between relatively wet precipitation years important to the production of standing plants of the species. The conditions this species has become adapted to over millennia may change relatively quickly in the near future. Because the longevity of this species' seeds in the seed

bank (the means by which it withstands drought) is unknown, the effects of this changed circumstance on the species cannot be determined. The Plan does not provide any response measures that are likely to benefit this species.

Invasive plants likely pose a future threat to this species. Portions of its habitat are likely to periodically become invaded by non-native plants, particularly during years of high precipitation. Considering past wet-year invasions in the Coachella Valley, these invasions likely would exclude this plant from otherwise suitable habitat areas, or substantially reduce its reproductive output. Given the response to invasion of current or new species will be determined in the future through adaptive management, we cannot determine whether the measures identified will be adequate to address the needs of this species. However, its habitat requirements (including sandy or gravelly soils in arid canyons and steep scree slopes of decomposed granite) may limit the extent of non-native plant invasions to some degree.

Fire and Lowering of the Water Table are not believed to be threats to this species.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

We anticipate that there may be conversion or degradation of triple-ribbed milk-vetch habitat within the action area resulting from OHV activity, construction, or gravel mining. However, we assume that management and enforcement against trespass on Reserve Lands, and BLM/USFS management of their lands, would be adequate to ensure the conservation of secure populations in the proposed Conservation Areas. Since very little potential habitat exists outside the proposed Conservation Areas, cumulative effects in these areas would be extremely limited. The status of the species may benefit from the action over a continuation of baseline conditions, as the action will curtail development and conserve a large portion of modeled habitat.

The Agua Caliente Band of Cahuilla Indians is undertaking a Habitat Management Plan for all of their Tribal lands. The draft Plan and associated documents have been reviewed publicly. It is anticipated that the final Plan and associated environmental analysis will be complete in mid-2008 with permit issuance scheduled for late 2008. Although there will be habitat loss associated with that Plan, the overall net benefit to the species is positive.

CONCLUSION

The proposed action would result in the loss of no more than 5 percent of modeled habitat in the Plan Area, including Federal and non-Federal lands. Nearly 90 percent (1,334 acres) of Lands Subject to the Permit that are modeled habitat would be conserved as a result of MSHCP implementation, totaling 2,986 acres in the Reserve System.

The status of triple-ribbed milk-vetch is unknown at this time. Described occurrences and populations along canyon floors and in washes have generally been temporary and comprised of

few individuals. It appears that upland populations may contain a majority of individuals, and small clusters of individuals found in canyon floors and washes may represent waif populations. Upland populations have been searched for prior to 2004 and were not found. However, in 2004 a geologically specific and as yet undescribed substrate type was discovered upon which greater than 1000 individuals were detected. This substrate type may represent the preferred habitat for triple-ribbed milk-vetch.

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 survival of the triple-ribbed milk-vetch. We reached this conclusion because 1,334 (43%) of the triple-ribbed milk-vetch modeled habitat within the Plan Area would be conserved and managed in perpetuity. Another 1,504 acres (49 percent) of habitat is anticipated to be managed consistently with the MSHCP as per BLM's Coachella Valley Amendment to the CDCA and pending MOUs or other legal instruments on Existing Conservation Lands within the Reserve System with all current managers of conserved land (Federal and NGO). Impacts to this species and its modeled habitat, when viewed in conjunction with the protection and management, including adaptive management, of the proposed MSHCP Reserve System are not likely to reduce the overall numbers, distribution, or reproduction of the species.

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Orocopia sage (*Salvia greatae*)

STATUS OF THE SPECIES

Species and Critical Habitat Legal/Listing Status

Salvia greatae (Orocopia sage) currently is not a Federal or State listed species. It is, however, on List 1B of the California Native Plant Society (CNPS), where it is considered rare, threatened, or endangered in California (CNPS 2005). NatureServe (2005) gives the Orocopia sage a Global Rank of G2 – Imperiled, and a California State Rank of S2.2 – Threatened.

Species Description

Salvia greatae (Orocopia sage) is an aromatic desert shrub in the Lamiaceae (mint family) with lavender flowers arranged on interrupted spikes. The shrub is less than 3.28 feet (1 meter) in height, with tangled, glandular hairs. The leaf is 0.35-0.79 inch (9-20 millimeters) long, opposite, more or less ovate, sessile or short-petioled, with one spine at the tip and two to seven pairs of spines on the margins. The leaves are generally deciduous. The upper lip of the calyx is 0.35-0.43 inch (9-11 millimeters) with three shallow, spine-tipped lobes; the corolla tube is 0.35-0.43 inch (9-11 millimeters), lavender to rose, upper lip two-lobed, 0.08-0.10 (2-2.5 millimeters), lower lip 0.16-0.20 inch (4-5 millimeters); mature stamens and style are exserted. The nutlet is 0.08–0.11 inch (2-3 millimeters), flat, keeled; gray to brown (Averett and Neisess 1993).

Distribution

The Orocopia sage is endemic, restricted to southeastern California, known from bajadas and mesas bordering the south side of the Orocopia Mountains, Mecca Hills, and Chocolate Mountains in Riverside and Imperial counties (Averett and Neisess 1993; Clary, in Jepson 1943). A report of Orocopia sage from limestone outcrops in the Marble Mountains of San Bernardino County near Cadiz is considered questionable and has not been confirmed since it was reported 20 years ago; a search for this species at this location was made but no plants were found (K. Barrows 1986). Surveys completed several years ago in the Chocolate Mountains Aerial Gunnery Range indicate it is fairly common in these mountains, which are outside the Plan Area boundary. This species was reported by BLM from the north side of the Chuckwalla Mountains. This location, south of Desert Center, was visited in 1986, but the presence of Orocopia sage was not confirmed (K. Barrows 1986).

Habitat Affinities

Orocopia sage is associated with desert dry wash woodland and Sonoran creosote bush scrub, generally below 600 feet in elevation (Munz and Keck 1975). This species is found on open, sandy ground of bajadas or detrital fans and desert mesas. It is often adjacent to desert washes or on the rocky slopes of canyons, but tends to avoid precipitous slopes and sandy washes. Three or more plants frequently clump together forming a dense rounded clump five or more feet in diameter, with branches pushing up through the loose sand and gravel collecting around the base of the plants (Jepson, 1943; Clary, in Jepson 1943). There is a possibility this species may occur at upper elevations in the Orocopia Mountains, but due to the remoteness and ruggedness of the mountains, such sites have not been adequately surveyed for this species (Cox 2005). Although

Orocopia sage is patchy in its distribution, it is typically one of the dominant members of the vegetation where it occurs. *Parosela schottii* often grows in close proximity, with *Cercidium*, *Olneya* and *Parosela spinosa* occurring less frequently. On the mesas, *Hymenoclea, Larrea*, and *Encelia* are abundant associates, while *Hyptis emoryi* and *Nicotiana trigonophylla* occur on the more rugged rocky areas (Clary, in Jepson 1943).

Life History
Little is known of the life history and ecology of Orocopia sage. The plant is generally deciduous (Averett and Neisess 1993). During dry years the general appearance is that of a low, bushy plant with many apparently dead branches; however, during years with more precipitation, the amount of new growth exceeds the amount of dead wood and the plants increase in height. The leaves from preceding years persist, becoming white and brittle (Clary, in Jepson 1943). Flowering is generally February to April (Jepson 1943). Orocopia sage is reportedly pollinated by bees (Jones 1995).

Population Trends
Observations at occurrences of the species by K. Barrows (1986) were reported as ranging from 50 plants to 1,000 or more plants. In the spring of 2002, botanists from U.C. Riverside initiated surveys of Orocopia sage as part of the preliminary development of monitoring protocols. Of the 15 known populations, two were not located, two new populations were located, and four populations appear to be much larger than previously described (Allen 2004). Orocopia sage was observed at 7 of the 10 locations visited in 2004, leading to a 70 percent occupation rate. Populations varied, but estimates averaged over 80 individuals per acre (200 per hectare) at each location (Cox 2005). However, complete information on population size and density of Orocopia sage is not available due to lack of surveys.

Threats
Orocopia sage is potentially threatened by OHV and other recreational activity through both destruction of individual plants and the degradation of habitat and the breakdown of bajadas and detrital fans. Another threat to Sonoran creosote bush scrub and desert dry wash woodland is the increase of Saharan mustard (*Brassica tournefortii*) and other invasive plant species. The proliferation of invasive species results in the loss of biodiversity and facilitates the increase in frequency and intensity of fires.

Synopsis of Status
Insufficient data exist to determine whether the population is stable, improving, or declining. This species may be fairly common in the Chocolate Mountains located outside the Plan Area on the Chocolate Mountains Aerial Gunnery Range. Many of the known locations for this species are within protected areas of the Mecca Hills, Orocopia Mountains, and Chuckwalla Mountains Wilderness Areas. During surveys conducted by U.C. Riverside in 2004, this species was observed at 7 of 10 locations.

ENVIRONMENTAL BASELINE
Status of the Species in the Action Area

Salvia greatae is endemic to the Orocopia Mountains and Mecca Hills in the eastern portion of the Plan Area. Approximately 78,868 acres of habitat were modeled for the Orocopia sage within the Plan Area. Of this total, approximately 90 percent (70,981 acres) occurs within three proposed conservation areas in the Plan Area: Desert Tortoise Linkage (779 acres, Core Habitat), Mecca Hills/Orocopia Mountains (66,180 acres, Core Habitat), and Dos Palmas (4,022 acres, Other Conserved Habitat). Approximately 50,664 acres (64 percent) are within Existing Conservation Lands controlled by BLM, and an additional 2,986 acres (4 percent) of modeled habitat occurs on Federal lands outside the conservation areas. Approximately 25,228 acres of modeled habitat would be subject to the Permit. The proposed conservation areas include 15 known occurrences of this species. The CNDDB lists three occurrences within the Dos Palmas Conservation Area that are outside modeled habitat for Orocopia sage but within Existing Conservation Lands controlled by BLM. Data are limited on the number of individuals at known occurrences throughout this species range; therefore, no attempt was made to estimate population densities.

Desert Tortoise Linkage Conservation Area
The Desert Tortoise Linkage Conservation Area consists of approximately 779 acres of modeled Core Habitat for Orocopia sage. Of this total, 337 acres are Existing Conservation Lands controlled by BLM. The habitat within this Conservation Area is contiguous with the Core Habitat for the Orocopia sage in the Mecca Hills/Orocopia Mountains Conservation Area. The primary threats to the species in this Conservation Area are the introduction of invasive plant species and illegal OHV and other recreational activity along the Bradshaw Trail where lands were excluded from the Wilderness Areas. This Conservation Area is within Conservation Level 1 where all development is precluded; therefore, no habitat loss is anticipated within Existing Conservation Lands controlled by BLM. Wilderness Areas are managed under the 1964 Wilderness Act, the 1994 California Desert Protection Act, and other applicable laws, regulations, and policies. These areas are also addressed in the Northern and Eastern Colorado Desert Coordinated Management Plan (NECO) and the California Desert Conservation Area Plan (CDCA).

Mecca Hills/Orocopia Mountains Conservation Area
This Conservation Area consists of 66,180 acres of modeled Core Habitat for the Orocopia sage. Of this total, 48,150 acres are within Existing Conservation Lands controlled by BLM. This conservation area is predominantly within the Mecca Hills Wilderness and the Orocopia Mountains Wilderness. Hydrological processes in this area maintain desert dry wash woodland and desert fan palm oasis woodland. This Conservation Area includes most of the significant Habitat known for Orocopia sage in the Orocopia Mountains. Primary threats to the species in this Conservation Area include disruption of hydrological processes, introduction of invasive plant species, and illegal OHV and other recreation activity along the Bradshaw Trail in areas that were excluded from the Wilderness Areas. This Conservation Area is within Conservation Level 1 where all development is precluded; therefore, no habitat loss is anticipated within Existing Conservation Lands. The Mecca Hills and Orocopia Mountains Wilderness Areas are managed under the 1964 Wilderness Act, the 1994 California Desert Protection Act, and other applicable laws, regulations, and policies. These areas are also addressed in the NECO Plan and the CDCA Plan.

Dos Palmas Conservation Area
Dos Palmas Conservation Area consists of 4,022 acres of modeled habitat for the Orocopia sage. Of this total, 2,177 acres are within Existing Conservation Lands controlled by BLM. The Dos Palmas Conservation Area consists of the existing Dos Palmas ACEC, the existing Oasis Springs Ecological Reserve, and a portion of the existing Salton Sea State Recreation Area. Habitat restoration opportunities exist in this Conservation Area because of the prevalence of tamarisk. The primary factors affecting Orocopia sage in this Conservation Area are the increase of invasive plant species and illegal OHV and other recreational activity. This Conservation Area is within Conservation Level 2. The primary management objective for Level 2 lands is maintenance of natural values, but some existing uses that impact natural qualities occur. The existing Management Plan focuses on protecting the entire Dos Palmas ecosystem to provide generally for the conservation of the species and natural communities that occur at Dos Palmas.

Outside the Conservation Areas
Approximately 2,986 acres of modeled habitat occurs on Federal lands outside the proposed conservation areas. Orocopia sage also occurs outside the Plan Area on the Chocolate Mountains Aerial Gunnery Range, a live bombing range that borders a portion of the Mecca Hills/Orocopia Mountains Conservation Area south of the Bradshaw Trail. The distribution and density of the population on the Gunnery Range are not known.

Factors Affecting the Species' Environment within the Action Area
Factors affecting the species within the action area are the same as those discussed above under *Threats*. Orocopia sage is potentially threatened by illegal OHV and other recreational activity, particularly along the Bradshaw Trail where lands on either side were excluded from the Wilderness Areas. However, it typically occurs on rocky slopes or alluvial fans that are either inaccessible to vehicular traffic or are some distance from major roads that appear to limit human access. This species occurs in the dry, desert habitat of washes and floodplains, but because populations generally occur adjacent to the wash rather than in the wash bottom, it is unlikely to be affected by a small flood (NatureServe 2005). Another threat to Sonoran creosote bush scrub and desert dry wash woodland is the increase of invasive plant species (e.g., tamarisk and Saharan mustard) that may result in increased fire frequency.

Management and Monitoring
In the spring of 2002, botanists from U.C. Riverside initiated surveys of Orocopia sage as part of the preliminary development of monitoring protocols for the Plan. Fifteen unique historic records were found on public lands within the Plan Area. Of these, two were not located, two new populations were located, and four populations appear to be much larger than previously described (Allen 2003). In 2004, 51 historic records were found for Orocopia sage locations. Of these, 24 were on private lands and 11 were determined to be duplicates, leaving 16 unique historic records on public lands within the Plan Area. Ten of these locations were visited; however, six were considered to be either too vague or too remote for further investigation. Orocopia sage was observed at seven of the ten locations visited in 2004, leading to a 70 percent occupation rate (Cox 2005).

The BLM lands within the conservation areas are managed to conserve at least 99 percent of the natural communities proposed for conservation under the Plan (50,664 acres for this species). Mechanized equipment and motorized vehicles are not allowed within Wilderness Areas managed by BLM; however, vehicles are allowed on established dirt or paved roads. The Mecca Hills, Orocopia Mountains, and Chuckwalla Mountains Wilderness Areas are managed under the 1964 Wilderness Act, the 1994 California Desert Protection Act, and other applicable laws, regulations, and policies. These areas are also addressed in the NECO Plan and the CDCA Plan. Given the significant acreage under BLM management and anticipated to contribute to the conservation achieved for this species under the Plan, the CVCC should pursue a legal mechanism (e.g., Memorandum of Understanding) with BLM to ensure consistent management for the benefit of this and all Covered Species on the BLM lands within the Reserve System as currently required by the Coachella Amendment to the CDCA Plan. This will facilitate the cooperative and coordinated management approach that has a higher likelihood of success that we have assumed in our analysis.

Effects of the Action

Urban Development

Direct Effects

The Plan Area includes 78,868 acres of modeled habitat for Orocopia sage. Of this acreage, 70,981 acres (90 percent) are within conservation areas and 25,228 acres are subject to the Permit (i.e., non-Federal lands) (Table 4-114 of the MSHCP). Approximately 7,887 acres (10 percent) of the modeled habitat is outside MSHCP conservation areas. Of this total, 2,986 acres (4 percent) are Existing Conservation Lands, and 4,901 acres (6 percent) are anticipated to be lost due to MSHCP implementation. Within the conservation areas, it is anticipated that 10 percent of modeled habitat on private lands would be subject to loss. Therefore, 2,032 acres of this species' habitat would be subject to take inside the conservation areas (Table 4-114 of the MSHCP). Specifically, the MSHCP anticipates that 1,847 acres (3 percent) of modeled Core Habitat and 185 acres (5 percent) of Other Conserved Habitat would be lost within three conservation areas: Desert Tortoise and Linkage (44 acres, Core Habitat); Mecca Hills/Orocopia Mountains (1,803 acres, Core Habitat); and Dos Palmas (185 acres, Other Conserved Habitat). The exact location and configuration of these acres is not known. However, the acres proposed to be lost would be subject to the Conservation Objectives and Required Measures for each conservation area as described in Section 4 of the MSHCP.

Direct effects on private lands inside the Conservation Areas (2,032 acres) and outside the Conservation Areas (4,901 acres) may occur as a result of urban development and associated infrastructure on alluvial fans as described below.

Inside of the Conservation Areas

The Conservation Areas within the Plan Area include 70,981 acre (90 percent) of the total modeled Orocopia sage habitat, of which 68,950 (97 percent) will be conserved. MSHCP anticipates the loss of up to 2,032 acres (3 percent) of the modeled habitat for Orocopia sage on private lands within the conservation areas. Land Use Adjacency Guidelines as described in Section 4.5 would minimize the impacts of development in the conservation areas and adjacent to the Reserve System.

Desert Tortoise and Linkage Conservation Area
The Desert Tortoise and Linkage Conservation Area consists of 779 acres of modeled Core Habitat for Orocopia sage. Of this total, 398 acres are proposed to be preserved and 44 acres are anticipated to be lost on private lands. An additional 337 acres are within Existing Conservation Lands controlled by BLM and anticipated to be included in the MSHCP Reserve System. Up to 1 percent of BLM lands may be impacted per the Coachella Amendment to the CDCA Plan.

Mecca Hills/Orocopia Mountains Conservation Area
Approximately 66,180 acres of modeled Core Habitat for Orocopia sage occurs within the Mecca Hills/Orocopia Mountains Conservation Area. Of this total, 16,227 acres are proposed to be preserved and 1,803 acres are anticipated to be lost on private lands. It is anticipated that an additional 48,150 acres within Existing Conservation Lands controlled by BLM would be included in the MSHCP Reserve System. Up to 1 percent of BLM lands may be impacted per the Coachella Amendment to the CDCA Plan.

Dos Palmas Conservation Area
The Dos Palmas Conservation Area includes 4,022 acres of modeled Other Conserved Habitat for Orocopia sage. Of this total, 1,661 acres are proposed to be preserved, and 185 acres are anticipated to be lost on private lands. An additional 2,177 acres are classified as Existing Conservation Lands managed by BLM and are anticipated to be included in the MSHCP Reserve System. Up to 1 percent of BLM lands may be impacted per the Coachella Amendment to the CDCA Plan.

Outside of the Conservation Areas
Approximately 7,887 acres of modeled Orocopia sage habitat occurs outside of the Conservation Areas. Of that total, 4,901 acres of modeled Orocopia sage habitat could be subject to disturbance predominately as a result of development and associated infrastructure, increased fire frequency, and continued illegal OHV and other recreational activities. The loss of 6 percent of modeled Orocopia sage habitat is relatively small compared to 87 percent of modeled habitat proposed for conservation within the Plan Area. An additional 2,986 acres of modeled habitat occurs on Existing Conservation Lands controlled by BLM outside the MSHCP Conservation Areas. Up to one percent of BLM lands may be impacted per the Coachella Amendment to the CDCA Plan.

Indirect Effects

The development permitted within and adjacent to Conservation Areas under the Plan may increase the spread of invasive non-native plants through disturbance of the existing vegetation community such that the likelihood of successful invasion is enhanced. Development activities also may increase the distribution of invasive seed material as a result of movement of vehicles and other equipment from sites with existing invasions to other un-invaded or minimally invaded sites. This is to be addressed through the Monitoring and Adaptive Management program as discussed below. Given the extent of this species' habitat that is located in designated Wilderness Areas on BLM lands and the small acreage within the Conservation Areas that will be authorized for disturbance, the extent of this indirect effect should be limited.

Indirect effects would include reduction of the periodic and unpredictable flooding necessary to rework stream channels and channel sediments and create shallow terraces along the wash bottoms as a result of upstream berming, drainage diversion, or urban development. The indirect effects would not necessarily result in immediate harm to the species, but over time may reduce the extent of bajadas and alluvial fans necessary for Sonoran creosote bush scrub and desert dry wash woodland. However, the remote locations, absence of infrastructure to support future development, topographic constraints (e.g., steep mountainsides and flood-prone washes), and land ownership patterns (e.g., extensive public lands surrounding isolated private parcels), likely would significantly limit the future extent of development-related indirect effects.

Avoidance and Minimization Measures Included in the Plan

The Plan Area includes 78,868 acres of modeled habitat for Orocopia sage, of which approximately 66,959 acres are identified as Core Habitat. The Plan would ensure conservation of 65,112 acres (97%) of the Core Habitat and 95% (3,838 acres) of the Other Conserved Habitat for this endemic plant. Each of the conserved Core Habitat areas would be greater than 3,000 acres. Approximately 50,664 acres (64%) of the modeled habitat are within Existing Conservation Lands and would be managed as part of the Reserve System. The Plan would protect an additional 18,286 acres (23 percent) of modeled habitat within conservation areas on private lands in three Conservation Areas: Desert Tortoise and Linkage (398 acres), Mecca Hills/Orocopia Mountains (16,227 acres), and Dos Palmas (1,661 acres). The conservation areas include most known occurrences of Orocopia sage within the Plan Area.

The Plan proposes management and monitoring to minimize impacts to this species, including control of activities that degrade Sonoran creosote bush scrub and desert dry wash woodland (e.g., OHV use), control of invasive species if monitoring results indicate it is necessary, and restoration and enhancement of degraded habitat as necessary. The Plan also proposes the control and management of sand and gravel mining, illegal berming, and drainage diversion. Baseline data would be gathered as part of the Monitoring Program. The potential for periodic and unpredictable flooding to rework stream channels and channel sediments and create shallow terraces along the wash bottom would be maintained through Adaptive Management. Land Use Adjacency Guidelines as described in Section 4.5 would minimize the impacts of Development in the Conservation Areas and adjacent to the Reserve System.

It is anticipated that the Conservation Goals and Objectives established in Section 9 would be

met through the Joint Project Review Process (Section 6.6.1.1) and the Monitoring and Adaptive Management Program (Section 8 and 9). Although the 90 percent of private lands would be conserved within a given conservation area, the ultimate configuration of the Reserve System is unknown at this time.

Monitoring and Adaptive Management Program
Adaptive Management, discussed in Section 8.4.3, would focus on identification of threats and development of a Monitoring Program to address management questions related to these threats. Initially baseline data would be collected on Orocopia sage. The precise protocols to be used for these surveys would be developed during the baseline phase. Surveys would be completed to better understand the distribution and refine the distribution model for Orocopia sage. These surveys would also gather baseline data on invasive species and their effects on the Covered Species. Based on the information gathered during the baseline phase, the appropriate level of ongoing monitoring would be determined for each of the Covered Species. Ongoing monitoring may change over time in response to Adaptive Management needs, changes in technology, or other circumstances.

One issue identified to be addressed through Adaptive Management includes research to determine causal relationships and control mechanisms for invasive species should it be determined they are a limiting factor in the distribution of Orocopia sage. It may not be feasible to control invasive species adequately for conservation of this (and other) Covered Species if action is delayed pending definitive monitoring results. Requiring statistically or biologically significant monitoring results before management is implemented is not prudent. The effect may not be detectable until the population has reached a seriously low level. In such a case, a reasonable management effort could be initiated, in the appropriate monitoring and adaptive management context. If large numbers of invasive species continue to cover the Conservation Areas, it seems reasonable to assume that they are having a negative effect, based simply on the fact that invasive plants will compete for the limited resources available (e.g., water and nutrients) and that the habitat structure is much more conducive to fire than the natural structure, a condition to which the Orocopia sage is not adapted. Thus some management of invasive species would likely be prudent. Thus, as a condition of the permit, use of the Management Contingency Fund shall be prioritized to include the control of invasive non-native plant species and implemented in an adaptive management framework.

Changed Circumstances
To avoid and minimize potential direct and indirect effects from changed or unforeseen circumstances on Orocopia sage and its habitat, the Plan would implement preventive measures and planned responses as discussed in Section 6.8.3.1 through 6.8.3.5 in conjunction with Adaptive Management (Section 8).

Changed Circumstances addressed by the Plan would include: drought, fire, invasion by new invasive species, lowering of the water table, and new listings of species not covered by the Plan. It is anticipated that fire would result in direct effects to Orocopia sage similar to those discussed above. Direct effects from drought or lowering of the water table could compromise the species' ability to survive and reproduce, but its largely remote distribution makes specific management

actions infeasible. Please see the discussion above in regards to invasion of new non-native species as the situation is similar to that with the existing invasive species.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

We anticipate that activities that have degraded Orocopia sage habitat in the past would continue until/unless more effective management of invasive plant species, illegal OHV activity, and other recreational activity is undertaken by the Plan. As such, the increase of uncontrolled OHV and other recreational activity, particularly along the Bradshaw Trail, and increased fire frequency due to the increase of invasive species on BLM lands would continue to challenge land managers with or without approval of the Plan. Activities such as these would degrade existing habitat and affect Orocopia sage populations.

CONCLUSION

In summary, the Conservation Areas within the Plan Area include 70,981 acre (90 percent) of the total modeled Orocopia sage habitat, of which 68,950 (97 percent) will be conserved. MSHCP anticipates the loss of up to 2,032 acres (3 percent) of the modeled habitat for Orocopia sage on private lands within the conservation areas. A total of 18,286 acres (23 percent) out of 78,868 acres of Orocopia sage modeled habitat within the Plan Area are proposed to be conserved on private lands in perpetuity to offset the loss of 6,933 acres (9 percent) of modeled habitat as a result of proposed Covered Activities throughout the Plan Area. The conservation areas also contain Existing Conservation Lands (50,664 acres, 64 percent) that augment the reserve design of the Plan, thereby enhancing the Reserve System. Orocopia sage is endemic within the Orocopia Mountains and Mecca Hills of the Plan Area. Thus, the Coachella Valley is an important part of the species' available habitat since it supports the majority of the species' range.

We anticipate the proposed action would affect Orocopia sage as described in the analysis above, including the loss of approximately 9 percent (6,933 acres) of modeled habitat within the Plan Area. In addition to the 50,664 acres of Existing Conservation Lands, at least 18,286 acres of Additional Conservation Lands that are modeled habitat would be conserved through the MSHCP implementation for a total of 68,950 acres in the Reserve System. The Reserve System includes Federal lands and other Existing Conservation Lands that are anticipated to be managed consistent with the MSHCP Conservation Goals and Objectives in the future. Implementation of the conservation measures; species-specific measures such as management to minimize impacts in Orocopia sage habitat, monitoring to better understand the distribution and ecology of this species, and long-term protection, management, and enhancement of Orocopia sage habitat is expected to further reduce impacts to this species. With the additional measures described in the analysis above, this species is anticipated to persist within the action area through the conservation and management of Core and Other Conserved Habitat within the Plan Area. We anticipate that Orocopia sage populations and habitat would be monitored and managed in

perpetuity.

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, the proposed permit condition, 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 Orocopia sage. Critical habitat has not been designated for this species; therefore, the proposed action would not destroy or adversely modify critical habitat. We reached this conclusion because a minimum of 90 percent of Orocopia sage modeled habitat within the Plan Area would be conserved and managed in perpetuity. Thus, impacts to this species and its modeled habitat, when viewed in conjunction with the protection and management of the MSHCP Conservation Areas, are not anticipated to result in an appreciable reduction in the numbers, potential for reproduction, or distribution of this species throughout its range.

PERMIT CONDITION
Use of the Management Contingency Fund under Section 8 of the Plan shall include addressing the following sand-dependant species priorities: 1) funding of activities addressed in Special Permit Term and Condition #26; 2) development and implementation of an invasive species management plan that assesses the status of and threats from invasive species, identifies knowledge gaps, and addresses control of invasive plant species (e.g, Saharan mustard) in Snow Creek/Windy Point, Thousand Palms, Whitewater Floodplain, and Willow Hole Conservation Areas; and, 3) funding of other sand-dependent species/habitat related Special Permit Terms and Conditions. The invasive species management plan shall be developed within 3 years of Permit issuance in coordination with the Wildlife Agencies; this management plan shall be implemented beginning in year 4 post-Permit issuance. The Management Contingency Fund may supplement, but not replace, the Monitoring and Management Program budget.

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Little San Bernardino Mountains linanthus (*Linanthus maculatus*) or (*Gilia maculata*)

STATUS OF THE SPECIES

Legal/Listing Status

Little San Bernardino Mountains linanthus currently is not a federally or State listed species. It is classified by the Bureau of Land Management (BLM) as a Sensitive Species, and is on the California Native Plant Society (2001) List 1B.

Species Description

Little San Bernardino Mountains linanthus is also known as Little San Bernardino Mountains gilia, as well as spotted gilia. The nomenclature for this species has been somewhat controversial but recently it has been included in the genus *Linanthus* (Porter and Johnson 2000).

Linanthus maculatus is a tiny annual plant in the Polemoniaceae (Phlox family). Plants are 0.5 to 1.5 inches (1-3 centimeters) high and are cryptic in coloration, blending in with the sandy background. The greenish-gray leaves and calyx lobes have fine hairs on their margins. Flowers are clustered at the ends of fine branches. The corollas are cream to white with red spots at the interior base. The slender, little-branched tap root may extend over 3 inches into the sand. *Linanthus maculatus* is an obligate out-crossing species and likely pollinated by small beetles. Beetles collected in the flowers by Dr. J. M. Porter (Rancho Santa Ana Botanic Garden) have not, as yet, been identified. The greenish-gray foliage and the very small stature of the *Linanthus maculatus* make it difficult to find even when it is in flower.

Linanthus maculatus (Parish) Milliken was originally described by Parish (1892) as *Gilia maculata* based on specimens collected by W.G. Wright at Agua Caliente, then part of San Diego County, California. This same area is now called Palm Springs, and it is in what is now Riverside County. Milliken (1904) included this species in the genus *Linanthus* and published the combination *Linanthus maculatus*. Various systematic and floristic treatments have recognized this species under one or the other of these two names. The most complete treatment to date, Porter (2000), recognized the closest relationships of this species are with those of other species of *Linanthus* and consequently uses Milliken's (1904) combination *Linanthus maculatus.* All systematic treatments have maintained this taxon at the species rank (Patterson 1989).

The type locality is now covered by development in the City of Palm Springs. Another historical locality was in the town of Joshua Tree, but this area is now covered by development as well.

Distribution

Linanthus maculatus is only found in the southern San Bernardino County and northern Riverside County, in the washes and alluvial fans of the Little San Bernardino Mountains. It is known from the north and south sides of the Little San Bernardino Mountains: on the north side, it occurs on the slope facing the cities of Yucca Valley, Joshua Tree, and Twenty-nine Palms; on the south side, it occurs on the slope facing the city of Desert Hot Springs. It has also recently been found at the mouth of Rattlesnake Canyon on the north side of the San Bernardino

Mountains; this is the only know location in the San Bernardino Mountains (Sanders 1999).

General Land Ownership: Range-wide, about 53 sites are known to have supported occurrences of *Linanthus maculatus* in Riverside and San Bernardino counties within the last several decades. Eighteen of the 53 sites currently occur entirely or partially on Federal lands (Joshua Tree National Park and Bureau of Land Management (BLM) lands), and the remaining populations are/were on private lands, where almost all are threatened by proposed development projects. No occurrences are known from tribal reservation or tribally-owned lands.

Historical Range/Distribution: This species is only associated with specific alluvial portions of desert washes on the north and south sides of the west end of the Little San Bernardino Mountains (with one exception in the San Bernardino Mountains), near or within Joshua Tree National Park in San Bernardino and Riverside counties, respectively. Most of the occurrences of this species are scattered along drainage channels/washes of 12 watersheds including the Whitewater River, Mission Creek, Dry Morongo Wash, Big Morongo Wash, Little Morongo Wash, Upper Pinto Wash, and Fried Liver Wash in Riverside County as well as along Quail Wash, Rattlesnake Creek, and an unnamed watershed that drain into Coyote Basin at the west base of Copper Mountain north of the town of Joshua Tree in San Bernardino County.

Understanding of the range and distribution of this species needs to take into account that most "occurrences" within the species' range are very small. In a 1997 survey of *Linanthus maculatus* occurrences in the northwest end of the Coachella Valley, 38 percent of the local subpopulation occurrences were 269 square feet (25 square meters) or less. The range is naturally dissected into small areas of temporally suitable habitat. Most of these very local occurrences are best considered as arrayed in a few complexes. The largest and most persistent known population complexes are those associated with the Mission Creek, Dry Morongo Wash, and Big Morongo Wash drainages on unincorporated lands within Riverside County and on lands within the City of Desert Hot Springs, in the northwest end of the Coachella Valley.

Some occurrences of this species have not been verified in over 20 years and may be considered historical and not extant. However, the cryptic nature and short flowering period of this small plant, and its dependence on adequate rainfall in the preceding rainy season, make an assumption of extirpation risky. A case in point is that the only occurrences along Highway 62 that were reported 8 and 17 miles west of Twenty-nine Palms had not been documented for 70 and 68 years, respectively, when the species was collected between the two sites in 2005. Consequently, historically occupied sites with persisting suitable habitat have a high potential to be occupied.

A few occurrences include vague locality data or are likely extirpated. Historically (e.g., more than 60 years ago), very few named landmarks existed for observers in the area to cite as reference, so these observers may have actually been miles from the site named in their report or on their specimens. This is especially evident when suitable habitat was/is lacking at the named site. In Riverside County, these include the type locality near Agua Caliente, now called Palm Springs, last collected in 1889; another, noted as northwest of Santa Rosa Mountain, was last collected (and perhaps mislabeled) in 1940; and yet another, recorded as east or south of Garnet near Willow Hole, was last collected in 1952. The Agua Caliente and Garnet references do,

however, indicate the likelihood that historically the species had a range that included some areas several miles farther south than its present distribution. Most suitable habitat in these locations has been directly or indirectly lost to development.

In terms of specific land ownership, the species is found on Federal lands (National Park Service or Bureau of Land Management) within or adjacent to Joshua Tree National Park (JTNP; Leary 1987). It has been observed in eight US Geological Survey (USGS) 7.5 minute quarter sections in Wilson Canyon in upper Pinto Wash and near Fried Liver Wash within JTNP. *Linanthus maculatus* has also been reported along short portions of several small drainages that straddle JTNP and private lands along the northern boundary of JTNP in San Bernardino County. The sites or portions of sites in JTNP are in four USGS quarter sections. The extent of suitable habitat in this area is limited because of the proximity of steep rocky slopes to the south within JTNP. The numbers of plants and acreage were not reported for most of these sites. Three occurrences, each in a separate USGS quarter section, are on BLM lands. One is associated with the Quail Wash drainage west of the west entrance to JTNP and another is on BLM lands in the Whitewater River drainage. A small occurrence in Rattlesnake Canyon on BLM lands is the only report of the species from the north-slope of the San Bernardino Mountains (Sanders 1996).

The remaining 41 (79 percent) occupied USGS quarter sections are all on private lands. Seventeen occurrences are reported from private lands, north and west of JTNP. Five reported occurrences are associated with an unnamed wash in Coyote Basin north of the town of Joshua Tree and were considered in the development of the West Mojave Plan Amendment to the California Desert Conservation Area Plan (West Mojave Plan) (West Mojave Planning Team 1999; BLM 2006). Along the northern boundary of JTNP, about 10 reported occurrences are (or were) on private lands. It is very likely that those portions of many of these occurrences that are outside the border of the JTNP have been extirpated due to urban development. West of the west road entrance to JTNP two occurrences were reported from private lands along the Quail Wash drainage, in addition to the one on BLM lands noted above.

Areas southwest of JTNP, in the north end of the Coachella Valley near Desert Hot Springs, contain the largest contiguous areas of suitable, occupied habitat for *Linanthus maculatus*. This area also supports the largest (by far) population complex (both in terms of numbers of plants counted and area occupied by the subpopulations) in the range of the species. This is likely because of the prevalence of the specific habitat for *Linanthus maculatus.* The specific narrow habitat needs of the species occurs at its widest expression in this area where Mission Creek, Dry Morongo Wash, Big Morongo Wash, and Little Morongo Wash exit the local hills. Nearly all of the occurrence sites in this population complex are east of Highway 62. The species is found on private lands in 19 USGS quarter sections associated with four drainage systems in this complex; the longest of these drainages is about 5 miles long. The farthest northwest occurrence in this complex is northwest of the junction of Indian Avenue and Highway 62. The farthest occurrence in the southeast portion of this complex is just north of Two Bunch Palms Trail in the City of Desert Hot Springs.

The remaining area that supports this species is along the Whitewater River upstream of Interstate-10. Three occurrences on private lands and one occurrence on BLM lands have been

reported from four USGS quarter sections in this area.

Current Range/Distribution: The current range of this species is reduced compared to the historical range, although additional sites within the known range of the species have come to light in conjunction with the development of the West Mojave Plan by the Bureau of Land Management (2006), other reports and documentation, and examination of herbarium specimens. The species is known from six adjacent geographic areas, 12 watersheds, and 53 USGS quarter sections. Most occurrences are quite small. Currently the range has been documented only as far south as Two Bunch Palms Trail in the City of Desert Hot Springs.

Apart from habitat destruction or degradation, some diminishment within some areas of the range has likely occurred, but the nature of the plant's life history makes specific determination of this problematic. Because of annual fluctuations in populations, little reliable information exists on the actual sizes of local suitable or occupied habitat. Nevertheless, significantly disjunct or large undiscovered populations likely do not exist. The actual area of suitable habitat for the species is quite small, as are the occurrence sizes of all populations except those in the Mission Creek/Dry Morongo Wash/Big Morongo Wash/Little Morongo Wash area.

Over the six occupied habitat areas, 14 of the total 53 occupied USGS quarter sections are at least partially on Federal lands (BLM or Joshua Tree National Park; JTNP), and reportedly support fewer than 4,000 plants. The remaining 39 USGS quarter sections supporting a cumulative total of more than 84,000 plants are on private lands within the watershed areas of the Whitewater River, Mission Creek, Dry Morongo Wash, Big Morongo Wash, Little Morongo Wash, and two unnamed watersheds north of JTNP. All of these areas are relatively well-known floristically. The Coachella Valley and surrounding areas have been well explored botanically over the past 125 years, and the area north of JTNP was moderately-well surveyed for the West Mojave Plan. Additional local sites may be discovered but it is unlikely that any considerable range extensions will be made or large populations found in the future.

Considering the range-wide distribution of habitat/occurrences/numbers of the species, the most important areas for maintaining the species are in the Desert Hot Springs/Hwy 62 region. Within this region, most important areas to maintain the necessary fluvial hydrology for the species and its habitat are within: USGS Sections 15, 16, 17, 21, 22, and 26 (Township 2 south, Range 4 east), within the 100–year floodplains of Mission Creek, Dry Morongo Wash, Big Morongo Wash, and Morongo Wash. In the same region, the following USGS quarter sections (Township 2 south, Range 4 east) contain the most important *Linanthus* habitat and occurrences that need to be maintained long-term: Section 15: SW, NW (S half); Section 16: NE, SW, SE; NW (E third); Section 22: NW, NE, SE, SW (NE third); and Section 26: NW, NE (SW half).

Habitat Affinities

Linanthus maculatus is found in local and scattered occurrences in a narrow "band" on alluvial fans of the Little San Bernardino Mountains (and one occurrence in the San Bernardino Mountains) containing a particular combination of slope-angle, soils, flood frequency and power, and fluvial processes. Its habitat is loose, soft, sandy soils on low benches along washes, where the substrate shows some evidence of water flow and deposition but no scour. It usually occurs

in areas where few or no competing plant species are found, with little shrub or tree cover in the immediate vicinity; this denudation is likely a result of past flood events. The sand in occupied areas is loose and well-aerated, soft and unconsolidated (Sanders 1999). The taxon is associated with creosote bush scrub, but avoids growing in the shadow of other plants. The elevation range of the species is from 500 to 4,000 feet.

The species has narrow habitat requirements, consisting of alluvial fans and wash margins on floodplain sediments (predominantly made up of sand) deposited by periodic surface flow or flood events. These flows must be slow enough to deposit and/or redistribute relatively fine sands on floodplain terraces, and fast enough to remove smaller silts. These flows likely also need to have enough velocity and duration to denude vegetation from newly formed or rejuvenated habitat areas. As evidenced by the very limited and specific areas (e.g., slope angle, alluvial fan width, watershed area, distance from low-flow channel, amount/type of nearby vegetation, etc.) of the alluvial fans occupied range-wide by the species, the floodplain fluvial flows necessary to create or maintain habitat for the species also have periodicity and sediment carrying components that are specific and narrow. The optimal periodicity (e.g., overbank flood flows once every 10-15 years, plus less frequent larger events, etc.) of these fluvial events is, as yet, unknown given the complex factors involved. The distribution of this species' habitat is naturally very patchy and likely somewhat transient.

Life History

The pollinators, germination requirements, seed longevity, and demographic parameters of this taxon have not been described. The flower form and color are indicative of insect pollination but no information on pollination ecology is available.

Rarely are relatively large numbers of standing plants of the taxon found at a given site in consecutive years. As is common with small desert annual plants, numbers of observable individuals may exhibit drastic fluctuations in numbers from year to year, including many years where no standing plants are to be found. During most years the taxon largely persists at a site as a soil seed bank. This is a typical desert annual plant in that a considerable portion of the species' numbers exists as a dormant seed bank in the soil awaiting suitable conditions (e.g., adequate rainfall amount and distribution) to germinate, flower, and set seed for future generations. Annual differences in numbers of standing plants at a site reflect differences in annual environmental conditions. The amount and local position of habitat occupied by standing plants does vary a bit from year to year, although site fidelity is apparent from decades of observations of some sites.

Most areas of the range consistently support only low numbers of individuals, e.g., interior Joshua Tree National Park, while one area, the northwest Coachella Valley near Desert Hot Springs, has supported numerous large populations. Associated plant species include: *Eriophyllum wallacei*, *Larrea tridentata, Hymenoclea salsola*, *Yucca brevifolia*, *Ephedra* spp., *Acacia greggii*, *Chilopsis linearis*, *Eriophyllum pringlei*, *Monoptilon bellioides*, *Leptosiphon aureus*, *Nemacladus sigmoideus*, and *Filago arizonica*.

Population Trends

Individuals of this species are very cryptic and small (often less than one-half of an inch tall). Locating and counting individuals is difficult even for an experienced surveyor. Usually plant numbers over fifty individuals are estimated by surveyors in reports. Some survey efforts have been presence or absence surveys and no numbers were recorded. Three sites in the Mission Creek/Dry Morongo Creek watershed area supported about 100 plants in 1992. The same three sites reportedly supported an estimated total of over 19,000 standing plants in the 1997 season, demonstrating the potential variation in occurrences over time. No range-wide survey has been conducted in a given year to allow comparisons among all of the known population sites. The maximum number of plants attributed to sites for which we have counts is over 88,000. Of these, over 73,000 persist on the floodplain complex of Mission Creek, Dry Morongo Wash, Big Morongo Wash, and Little Morongo Wash in the northwest end of the Coachella Valley. Thus, 83 percent of the plants counted for the species across its entire range occur in Mission Creek, Dry Morongo Wash, Big Morongo Wash, and Little Morongo Wash; all of these areas are within the Plan Area for the proposed action. A trend for the various populations is generally unknown, although it is expected that losses and degradation of habitat that has occurred to date has had linear concomitant reductions on population numbers.

Threats

The greatest threats to this species are growing urbanization and uncontrolled and expanding recreational use in the area. Development in the vicinity of Desert Hot Springs and in the County of Riverside just north of Desert Hot Springs and east of Highway 62 where the largest populations and main habitat concentration exist has the highest development potential. This species is also threatened by development approaching the northern boundary of Joshua Tree National Park in the communities of Yucca Valley, Joshua Tree, and Twenty-nine Palms.

Urbanization

Occurrences north of the town of Joshua Tree are on private lands subject to direct loss in the foreseeable future due to development. The occurrences reportedly supported 1,060 plants (1 percent of the total count).

Occurrences on privately owned lands adjacent to the northern boundary of JTNP (in San Bernardino, outside JTNP) are extirpated or are at high risk of extirpation due to direct and indirect effects of increased urbanization in the area; these losses are likely due to direct habitat loss or the indirect effects of damage to fragile sandy habitat for the taxon, recreation activities (e.g., OHVs), and invasive non-native species. Many of these sites were visited by surveyors in 1995 and populations were reported as present but no numbers of plants or relative size of the populations were indicated. Some of these sites are along small washes that run south to north and straddle the boundary of JTNP. The portions of these occurrences within JTNP face the some of the same threats, although direct loss of habitat (e.g., from development) in these sites would not be expected. The JTNP portion of one of the drainages along the north boundary of the park is partially protected by a fence from the adjacent development area outside the park. Both of the two herein presumed extant sites on private lands north-west of the JTNP may actually have been extirpated by development, but current information is lacking. Another site at the northwest side of the JTNP, apparently on BLM land, reportedly supported 35 plants in 1993 but has since been developed (J. Mark Porter 1996 pers. comm.).

All of the occupied sites associated with the Mission Creek, Dry Morongo Wash, Big Morongo Wash, and Little Morongo Wash drainages are on private lands (except for potential occurrences in a CalTrans right-of-way). The occurrences in these four drainages extend over the largest contiguous areas of occupied habitat for the taxon found range-wide, and support 83 percent of the plants counted across the species entire range; this complex of drainages is clearly the most important area for the species range-wide. These sites are almost all substantially threatened by development projects; many of these occurrences are threatened by projects currently proposed or approved in the area generally extending from the Highway 62 eastward into Desert Hot Springs to the current southern end of the range (e.g., see California Natural Diversity Database; CNDDB 2007, USFWS files (FWS-ERIV-4698.5)).

An existing development with an accompanying golf course and housing just north of the city limits of Desert Hot Springs has already altered the drainage course of the Little Morongo Wash drainage, likely destroying historic habitat and indirectly impacting two downstream occurrences that supported about 3,000 *Linanthus maculatus* plants in 1997 (CNDDB 2007).

Essentially all of the known occurrences associated with private lands are threatened by habitat loss and degradation. The most immediate threat to the species is from development in the Desert Hot Springs area. Proposed developments in this area would result in direct elimination of plants and habitat as well as direct and indirect impacts to the upper ends of three most extensive watersheds associated with the largest occurrence complex for the species (83 percent of the counted individuals). Although the indirect impacts of channelization and alteration of alluvial processes that would be expected with such proposed development may not be evident for years after direct impacts have occurred, these effects would none-the-less be far reaching and essentially permanent to the taxon. This species relies for its survival on older alluvial benches of a particular range of slope angles, in areas replenished by occasional/periodic flood or sheet flow events. If these natural processes are removed from habitat areas that support this species, the species will not likely survive in these areas over the long term. Other future threats in the action area are discussed in Cumulative Effects below.

The occurrences of this species in the northern Coachella Valley near Desert Hot Springs include a considerable number of sites where substantial amounts of trash are dumped in and around the washes where habitat occurs (CNDDB 2007). The direct impacts from access, and the dumping itself burying plants and/or altering fluvial sand deposition patterns, lead to short- or long-term losses of habitat and may lead to the local extirpation of the plants from some of these sites.

Recreational Use

Joshua Tree National Park does not have specific protections for this species beyond those typically given to sensitive species; no specific management plan is in place for the occurrences in the Park. Long-term monitoring of occurrences in the Park is relatively comprehensive: it depicts consistently low numbers of individuals, indicating that suitable habitat is either marginal or quite limited in its distribution in JTNP. In the interior of the JTNP fewer than 2,000 plants have been counted, despite repeated surveys of eight USGS quarter sections across two separate watersheds. No closed areas specifically managed for *Linanthus maculatus* occur in the Park. A

fence currently protects one of the drainages at the northwest corner of the JTNP from human incursion from the developed area to the north; however, the majority of the drainages along the north boundary of the JTNP are not so protected. Regulated access to the known extant populations in the Park is only controlled by the JTNP's Vegetation Management Specialist, rather than by Park-wide policy or physical exclosures. This protection does not extend to controls on incidental trampling or OHV activity, and these were cited as threats to at least one of the occurrences along the northern boundary of JTNP, interior populations within JTNP, and an occurrence along Quail Creek west of JTNP (CNDDB 2007).

Linanthus maculatus is a covered species under the West Mojave Plan (BLM 2006); however, the levels of protection for this species under this Plan are essentially unknown at this time, and only a small portion of the range of the species and few populations occur within the West Mojave Plan Area.

Much of potential or suitable habitat in the Whitewater Canyon is heavily affected by hiking, etc. All of the occurrences on private lands west of Desert Hot Springs have likely been subject to disturbance from OHV activity (CNDDB 2007). Invasive nonnative plants are often associated with OHV activity areas and pose a major threat to *Linanthus maculatus*.

Invasive nonnative plant species may be passively controlled to a degree by the periodic deposition of fresh alluvium (during flood events) that is not conducive to their growth. This species likely does not persist where invasive nonnative plants are present in large numbers.

Synopsis of Status
This species is restricted to the washes and alluvial fans of the Little San Bernardino Mountains (with one locality in the San Bernardino Mountains) of Riverside and San Bernardino Counties. The occurrences are generally small and scattered across several drainages, with the exception of the large complex of populations found in the Mission Creek, Dry Morongo Wash, Big Morongo Wash, and Little Morongo Wash system where over 80 percent of the counted individuals have been found. The majority of the known occurrences range-wide, including that major complex, are near populated or developable areas on alluvial fans. This, and their small size, makes these plants susceptible to local extirpation by a variety of local disturbances such as development for residential and recreational uses, OHV activity, and trampling.

ENVIRONMENTAL BASELINE
Status of the Species in the Action Area
The occurrences within the Plan Area and Action Area are on the south side of the Little San Bernardino Mountains, on the margins of larger washes on shallow sandy floodplain benches, not on areas where a hard surface layer occurs, and not on loose blowsand away from washes and their floodways.

Almost all populations (known occurrences) of the taxon in the Plan Area/Action Area are on private land. Known extant populations in the action area are in Whitewater Canyon and Dry Morongo and Mission Creek drainage complex. The populations at the north end of the Coachella Valley are consistently much larger and more detectable (in average rainfall years)

than the other populations. Local occurrences are generally small and plant counts typically range from one plant to a few hundred plants. Of the 41 subpopulations surveyed (USFWS unpublished data, W. Miller, 1997) 34 percent supported 50 or fewer plants. However, near the City of Desert Hot Springs/Riverside County, one occurrence reportedly supported 10,000 plants and four other sites had plants "too numerous to count" (Miller 1997). This latter designation is taken here to mean at least 10,000 plants. Only one other occurrence, in Whitewater Canyon, was cited by Miller as having plants too numerous to count. Populations in the Whitewater River area have been reported in the range of 200 individuals. In Dry Morongo Canyon, Helmkamp reported a few hundred plants in 1995 but only six in 1996 (Sanders 1999). At the mouth of Big Morongo Canyon, north of Indian Avenue, more than 10,000 plants were reported in the spring of 1996. In Mission Creek wash east of old Highway 62, Helmkamp reported a single population of more than 2,000 plants in 1992. No plants were found at a site in Whitewater Canyon in 2003, but 1,781 plants were observed at this site in 2004 and 2800 plants were observed in 2005 (CCB 2005).

Approximately 3,389 acres of habitat were modeled by CVAG (CVAG 2004, 2006, 2007) for this species within the Plan Area and Action Area. This modeled habitat occurs within the proposed Whitewater Canyon, Upper Mission Creek/Big Morongo Canyon, and Willow Hole Conservation Areas.

Approximately 363 acres of modeled habitat for this species are on Existing Conservation Lands as defined in the CVAG Plan. Approximately 81 acres are "Level 1" Existing Conservation Lands in the BLM San Gorgonio Wilderness in the upper reaches of Mission Creek. No occurrences of the taxon are known from this area. Approximately 177 acres of CVAG modeled habitat are Level 2 Conservation Lands: 171 acres owned by BLM in the Whitewater Canyon Area of Critical Environmental Concern (ACEC), 3 acres owned by the BLM in the Big Morongo Canyon ACEC, and 3 acres owned by the State Wildlife Conservation Board at the southern end of modeled habitat where Big Morongo Wash enters the Willow Hole area. One occurrence is known from BLM land in the Whitewater Canyon ACEC. Approximately 105 acres are on 'Level 3' Existing Conservation Lands managed by BLM as multiple-use lands. The remaining 3,026 acres of CVAG modeled habitat for the species are on "Level 4" lands with no existing conservation.

Most of the habitat and occurrences for the species range-wide is found in the Plan Area/Action Area. Currently the hydrology and amount of habitat for the species in the Action Area is likely sufficient to support the species successfully in the long-term. Developments that are approved or proposed within the range of the species, if completed, would directly or indirectly threaten the continued existence of the species. Only 2 percent of the occurrences for the taxon in the action area are currently protected on public or private lands (Existing Conservation Lands). Planned or proposed urban/commercial/golf/infrastructure development substantially threatens almost all of the occurrences and habitat in the Action Area and, thus, threatens the viability of the species.

Factors Affecting the Species' Environment within the Action Area
Little San Bernardino Mountains linanthus is found almost entirely on private lands in the Action

Area (one occurrence is known on BLM land), and almost 90 percent of this habitat is on private lands directly or indirectly threatened with development. Existing development to-date within the Plan Area within what was likely historical habitat includes golf course and dense residential development (Village at Mission Lakes), water impoundment structures (Desert Water Agency), and some scattered rural (unincorporated Riverside County) and urban/commercial (Desert Hot Springs) development.

Disturbance of 1 linear mile of modeled habitat occurred historically when Metropolitan Water District buried a water aqueduct through the area in the mid 20th century. The fill on top of the aqueduct is generally at-grade with generally minor changes to hydrology that supports the species. Much of the area disturbed by aqueduct construction area has passively restored over several decades, although debris piles, vent structures, and access roads remain within modeled habitat. These debris piles may have modified the hydrology of Big Morongo Wash, particularly north of Indian Avenue.

Off-highway vehicle activity and trash dumping in the Action Area, particularly in Big Morongo Wash, Morongo Wash, and Mission Creek, have and continue to threaten this small plant, which is easily uprooted or buried by disturbance.

The channelization of Mission Creek through the southern portion of the range of the species likely eliminated large areas of historic habitat along that creek, as the channelization highly modified the fluvial hydrology the species depends upon in that creek stretch. This portion of Mission Creek is within a right-of-way controlled by Riverside County Flood Control and Water Conservation District. This reach of Mission Creek is in the southern part of the range known to be occupied by the species, but no occurrences of the taxon are known from this channelized stretch, as the terrace habitat required by the species no longer exists.

Road development, particularly Highway 62, Indian Avenue, Worsley Road, and Mission Lakes Blvd., have likely caused direct losses of habitat as well as moderate indirect effects through hydrological changes. Highway 62 is above-grade and has small/moderate-sized bridge openings over Mission Creek compared to anticipated flood-flows. Indian Avenue and Mission Lakes Blvd. have their road surfaces largely just above-grade, and are typically over-topped during flood events with larger surface flows. A substantial number and area of dirt roads bisect modeled habitat for the species in the Plan Area; most of these are at or near original grade.

Within the Plan Area, all populations and habitat not on public land or conserved private land are threatened as they occur on relatively flat sites (alluvial fans) that are subject to future development. Some minor protection from development has existed for most of these areas, as they are typically mapped or zoned as floodplains for development purposes, with the resultant requirements for flood damage reduction infrastructure as part of local agency development approvals. As a result, development in these floodplain areas has been slower than surrounding areas due to the costs associated with such infrastructure.

Approximately 1,020 acres of the modeled habitat for the species is found within the City of Desert Hot Springs. Several large developments are proposed within the City of Desert Hot

Springs in modeled habitat for the species; please see Cumulative Effects below. The current city limit boundaries of Desert Hot Springs interdict 25 percent of the watersheds known to support this species (Mission Creek, Big Morongo Wash, and Little Morongo Wash). A recently developed golf course (Village at Mission Lakes), noted above, channelized the Little Morongo Wash at the upper end of the alluvial fan portion of that watershed, in what was likely historical habitat. Within the current city limits of Desert Hot Springs are 11 percent of the known occurrences of the plant range-wide, and these occurrences have supported 15,290 standing plants (17 percent of the total range-wide). These occurrences extend across eight (15 percent) of the occupied USGS quarter sections of known occupied habitat.

Several projects in modeled habitat within the City of Desert Hot Springs have been approved by the City but have not yet developed. As of 2005, apparently 1,215 new homes had been approved by the City within a one mile radius of the intersection of Mission Lakes Blvd. and Little Morongo Road (Village at Mission Lakes 2005). At least four large projects in modeled habitat for the species have been approved by the City of Desert Hot Springs, but remain unbuilt: a) "Vista Del Monte" (TTM 31540; approximately 80 acres of development disturbance); b) "Indigo Lakes" (VTM 34070; approximately 78 acres of development disturbance); c) "Alibaba"/Abbas Subdivision (Kohl Corporation; approximately 38 acres of development disturbance); and d) "Whitehawk" (TTM 35374; approximately 67 acres of development disturbance). Large portions of the Vista Del Monte site may have already been graded; the other sites remain essentially ungraded. Another site mostly consisting of modeled habitat for the species, "Los Nietos"/ Bochner and Inland Empire Land Company (USFWS files (Tentative Tract Map (TTM) 34773 from the City of Desert Hot Springs, FWS-ERIV-5354.1)); approximately 75 acres of development disturbance), will likely become vested in the near future. Thus, approximately 263 acres of modeled habitat for the species within Desert Hot Springs have been locally approved for development, and another 75 acres is close to local approval, for a total of approximately 346 acres that are highly threatened with direct development and associated (yet undetermined) indirect impacts. Nevertheless, based on discussions between representatives of the City and USFWS, it is expected that many of these parcels remain open to potential conservation (Jon Avery, Fish and Wildlife Biologist, personal communication 2007). On-site and upstream/downstream impacts from any of these noted projects, if constructed, would indirectly impact several known occurrences and a considerable amount of modeled habitat.

The Vista Del Monte project local approval required a small portion of Little Morongo Wash and a moderate-sized portion of Big Morongo Wash set aside on the parcel (for a total of 29 acres of "open space"), likely for flood control, with an undetermined level (if any) of required ecological conservation. The Bochner/Inland Empire Land Company development, as based on recent discussions and if approved by the City, would likely be required to provide 2:1 mitigation in a combination of on-site and off-site conservation of *Linanthus maculatus* habitat in perpetuity.

Within unincorporated lands in Riverside County with modeled habitat for the species, a project known as "Watkins" (approximately 25 acres of development disturbance) has been approved (or is close to approval) by the County, on the east side of Hwy 62, south of Indian Avenue. A larger version of this project was initially approved by the City of Desert Hot Springs (USFWS

files (TTM 34588 from the City of Desert Hot Springs)) as part of a proposed annexation into the City that ultimately was not approved by the Riverside Local Agency Formation Commission ("LAFCO"). The City of Desert Hot Springs similarly approved the "Palmwood" project, as described below.

The proposed development known as Palmwood within the Plan Area would, if developed, impact the water courses and surface flows of Mission Creek, Dry Morongo Wash, and Big Morongo Wash. This proposed project is located at Hwy. 62 and Indian Avenue. In May 2007 the Riverside Local Area Formation Commission (LAFCO) approved the proposed annexation of Palmwood (USFWS files (LAFCO notice 2006-152-5)) into the City of Desert Hot Springs. The annexation included 2,114 acres to the City of Desert Hot Springs from Riverside County at the intersection of Indian Avenue and Highway 62 on the far northwestern fringe of the Coachella Valley. The stated purpose of the Annexation Project was to allow the conversion of largely undeveloped desert open space to thousands of residential units, 2 golf courses, over one million square feet of commercial development, a 400-room hotel, and a commercial multi-use amphitheater. The project was locally approved by the City of Desert Hot Springs on December 22, 2006 (USFWS files (TTM 34182/34183from the City of Desert Hot Springs)).

On July 12, 2007, LAFCO rescinded its previous approval of LAFCO 2006-152-5, the annexation of Palmwood into the City of Desert Hot Springs, and kept the project site and environs in unincorporated Riverside County. The area that would be directly and indirectly affected by Palmwood, should it move forward, constitutes the largest array of contiguous habitat for this species found range-wide. About 671 acres of modeled habitat for the species occurs within project site. Palmwood remains an unbuilt proposed project in unincorporated Riverside County. For more information, see Cumulative Effects below.

EFFECTS OF THE ACTION

Evaluation Assumptions

In addition to the assumptions made in the Effects of the Action section of the main body of this Biological Opinion, we made the following specific assumptions to evaluate the impacts to the *Linanthus maculatus*:

The Plan-described Existing Conservation Lands controlled by the Permittees (cities, County, CVWD, etc.), and those controlled by non-profit organizations (The Nature Conservancy, CNLM, etc.), would be protected by an appropriate legal instrument in perpetuity, such as a conservation easement held by a third party consistent with California Civil Code 815 *et seq.* The lands will be permanently protected and managed in a natural, ecologically-beneficial, open-space condition.

The Plan-described Existing Conservation Lands controlled by BLM, Service, CDPR, and CDFG, will be conserved in perpetuity by these respective agencies, or by any organization/agencies that are given control over these lands from these agencies. The Existing Conservation Lands would be protected and managed in a natural, ecologically-beneficial, open-space condition.

BLM will enter into an MOU with CVCC to ensure management consistent with the MSHCP. The MOU will also include a Joint Enforcement Agreement to address law enforcement activities, such as trespassing, dumping, and OHV use occurring on the Reserve System lands.

BLM will control OHV trespass across BLM lands through implementation of the CDCA Plan Coachella Valley Amendment and associated section 7 consultation, consistent with the Terms and Conditions in our associated Biological Opinion.

General Effects
More than 94 percent of the known range-wide populations (by counts of standing plants) of *Linanthus maculatus* occur in the Plan Area/Action Area. As such, impacts to, and conservation of, ecological processes, habitat, and occurrences within the Plan Area are critical to consider in ensuring the continued existence of the species.

Based on modeling, CVAG estimates that approximately 3,389 acres (1,372 hectares) of habitat for the Little San Bernardino Mountains linanthus occurs in the MSHCP Plan Area. Under the proposed action, a total of 429 acres (174 hectares) of modeled habitat for the taxon would be authorized for direct impacts in the Plan Area. Approximately 363 acres (147 hectares) of modeled habitat for the species are considered Existing Conservation Lands under the Plan, and 2,592 acres (1,049 hectares) are remaining acres to be conserved under the proposed Plan, for a total of 2,955 acres (1,196 hectares), defined as Core and Other Conserved Habitat, to be conserved in the Conservation Areas under the Plan. Thus, the MSCHP would protect from direct losses about 87 percent of the modeled habitat in the Plan Area.

Of the 3,389 acres of habitat modeled for this species in the action area, 3,029 acres are non-federal lands. Approximately 360 acres of modeled habitat in the Plan Area is on federal lands. Approximately 2,012 acres (815 hectares) of modeled habitat in the Plan Area/Action Area would fall under the land use authority of the proposed Permittees. The remaining acreage, 1,017 acres (557 hectares), are lands under the land use authority of non-Permitees (City of Desert Hot Springs); actions or approvals by non-Permittees would not be covered under the proposed Plan.

Not all modeled habitat in the Plan, including considerable stretches of the drainages of Mission Creek and Big Morongo Wash, have not been verified by surveys to support *Linanthus maculatus.*

By far, the most important areas to the continued existence of the species, range-wide and within the Plan Area/Action Area, are within the proposed Upper Mission Creek/Big Morongo Canyon Conservation Area (>75 percent of the modeled acreage and >80 percent of counted individuals). The proposed Willow Hole Conservation Area has a comparatively small amount of suitable/potential habitat, and likely limited extant occupation by the species. The proposed Whitewater Canyon Conservation Area has a limited amount of suitable/potential habitat and comparatively moderate level of occupation.

Mitigation and Minimization Measures

The goals of the MSHCP for the *Linanthus maculatus* (Section 9.2.5.1) include:
Conserve and manage populations within the MSHCP Reserve System according to the following criteria:
Protect Core Habitat areas that include occupied habitat, and associated Essential Ecological Processes.
Protect Other Conserved Habitat to provide sufficient area and variety of habitat types to accommodate for population fluctuations, allow for genetic diversity, and to conserve the range of environmental conditions within which this small annual plant is known to occur.
Protect Essential Ecological Processes, including hydrological regimes, necessary to maintain Core Habitat and Other Conserved Habitat for this species.
Maintain Biological Corridors and Linkages among all conserved populations to provide for seed dispersal and shifts in species distribution over time.
Ensure conservation of Little San Bernardino Mountains linanthus by maintaining the long-term persistence of self-sustaining populations and conserving habitat quality through biological monitoring and Adaptive Management actions in the Plan Area.

The "Conservation Objectives" of the Plan for *Linanthus maculatus* (Table 4-116) are summarized as follows:
Ensure Conservation of Core Habitat within two Conservation Areas and one Special Provisions Area.
Protect Other Conserved Habitat in two Conservation Areas through adherence to other Conservation Objectives.
Ensure Conservation of Essential Ecological Processes including hydrological regimes.
Maintain Linkages among all conserved populations.
Implement biological monitoring and Adaptive Management to ensure long-term persistence of this species

The specific proposed "Measures to Avoid, Minimize, and Mitigate Take" of the Plan for *Linanthus maculatus* are (Table 4-116):
Permittees will protect and manage 2,592 acres of modeled habitat, together with Existing Conservation Lands, for a total of 2,955 acres conserved, including 2,235 acres of Core Habitat. At present, only one known occurrence, located east of Mission Lakes Country Club, is identified as subject to potential disturbance. This disturbance is expected to occur primarily in the lower reaches of Mission Creek and Big Morongo Canyons, south of Indian Avenue.

In the proposed Whitewater Canyon Conservation Area, 579 acres of modeled habit for the species occurs; approximately 387 acres are subject to the permit in this Conservation Area, of which 348 acres would be conserved under the Plan. In the proposed Upper Mission Creek/Big Morongo Canyon Conservation Area, 2,410 acres of modeled habitat occur; approximately 1,390 acres are subject to the permit through Riverside County's land use authority in this Conservation Area, and an additional 1,020 acres within Desert Hot Springs are subject to the permit under the auspices of specific Covered Activities proposed by the Riverside County Flood Control and Water Conservation District (a Permittee). A total of 2,067 acres would be conserved in perpetuity. (Please see Tables 4-42a-e in the Plan for an explanation of acreages for this Conservation Area.)

In the proposed Willow Hole Conservation Area, about 200 acres of modeled habitat occur; approximately 197 acres are subject to the permit in this Conservation Area, of which about 177 acres would be conserved under the Plan.

The Plan (Table 4-116) proposes to (directly) conserve 58 of 60 known occurrences of this species in the Plan Area. Also, the Plan proposed to protect 87 percent of the modeled habitat for the species in the Plan Area (Table 4-116). Also noted in Table 4-116, the "Plan ensures that Essential Ecological Processes that maintain this species' habitat, including flooding events, can continue to occur."

Pursuant to the requirements for conservation under the Plan, over 90 percent of the modeled habitat for the species on private lands in Conservation Areas would be conserved, though the ultimate configuration of conserved and developed land can not known at this time. The configuration and unpredictable location of future development would be partially mitigated by Conservation Area Required Measures (Section 4.3 of the Plan). Edge effects would be partially mitigated by Land Use Adjacency Guidelines (Section 4.5). Project-specific issues would be fully or partially mitigated through the Joint Project Review Process (Section 6.6.1.1)

Because of the unique situation presented by Desert Hot Springs' decision not to participate in the Plan, special conservation objectives were developed specifically to address the gap in land use authority among the Permittees under the Plan. This includes the following objective: Conserve at least 967 acres of Core Habitat for the Little San Bernardino Mountains linanthus in the Desert Hot Springs portion of the area (including at least 891 acres in the Special Provisions Area) and at least 1,100 acres in the Riverside County portion (including at least 65 acres in the Special Provisions Area), including the hydrologic processes upon which the plant depends. If, through means not under the control of the Permittees, this Conservation Objective cannot be achieved, for every acre less than 967 acres conserved in the Desert Hot Springs portion of the area (within the current Desert Hot Springs City limits), and for every acre less than 1,100 acres conserved in the Riverside County portion of the area, 2 acres of suitable habitat shall be conserved adjacent to or within this Conservation Area, Willow Hole Conservation Area, or Whitewater Canyon Conservation Area. These acquisitions shall occur, at a minimum, incrementally with disturbance, so as to occur within 2 years of whenever the acres not conserved shown in Table 4-42a or acres of disturbance authorized in Table 4-42c are exceeded, at the same ratio (2:1 for losses beyond those anticipated in the tables). These substitute acquisitions within Conservation Areas pursuant to the requirements above would be beyond the minimum Conservation Objectives identified in the Plan. Proposed acquisitions shall be subject to Wildlife Agencies' review and approval. If, as described above, the maximum impacts are exceeded or the minimum required conservation is not occurring, coverage for the Little San Bernardino Mountains linanthus shall automatically terminate and the CVCC and Permittees will be given written notice acknowledging the termination of coverage for the above-referenced species 30 days prior to coverage terminating.

As note above within section 4.3.7 of the Plan, conservation of modeled habitat for the species is proposed within the City of Desert Hot Springs, with required substitute mitigation outside the

City if that conservation can not be fulfilled. Approximately 1,017 acres of modeled habitat for the species in the Plan Area is within the jurisdiction of Desert Hot Springs, a non-Permittee under the Plan. Because Desert Hot Springs is a non-Permittee, the only project within the city limits of Desert Hot Spring to potentially receive coverage under the Plan would be a flood damage reduction facility ("Covered Facility") proposed by Riverside County Flood Control and Water Conservation District along Morongo Wash (see Table 7-8a in the Plan). More importantly, direct acquisition would be required for the Permittees under the Plan to conserve substantial acreage of modeled habitat lands within the City of Desert Hot Springs, as none of the Permittees have land use authority within the City. The required 2:1 mitigation for substitute acquisitions outside the City (or County) noted above (Section 4.3.7) for *Linanthus maculatus* is quite limited by the availability of additional suitable habitat for mitigation in the Plan Area; very little additional suitable habitat for *Linanthus maculatus* is available in the Plan Area for substitution that would not otherwise be subject to conservation or development loss under the Plan. As such, a substantial amount of conservation would need to occur in Desert Hot Springs in any scenario where coverage for the species is maintained. Considering that Desert Hot Springs is not a Permitee and has been approving projects in recent months within modeled habitat for the species, it may be difficult for the current Permittees to fulfill the requirements of these Conservation Objectives for *Linanthus maculatus*. As described above in Section 4.3.7, if the maximum impacts allowed for under the Plan are exceeded, or the minimum required conservation would not occur, coverage under the Plan for Little San Bernardino Mountains linanthus would automatically terminate. The level of development associated with this scenario would also indicate that the species status had declined substantially, which may warrant further scrutiny for consideration of listing the species under the Endangered Species Act. If coverage is terminated, then projects would be subject to individual project environmental analysis and review (e.g., pursuant the California Environmental Quality Act) for the species.

Monitoring and Management

Monitoring and adaptive management are required by the Plan. The scope and methodology of monitoring for the species is not specifically laid out in the Plan, nor are trigger levels identified at which management actions would be required As such, the ultimate effectiveness of any management performed under the Plan is undetermined. The Plan proposes Monitoring and Management related to *Linanthus maculatus*, specifically in Section 9.2.5.2, but no specific benefits to the species can be described relative to those proposed activities at this time.

Specific Proposed Covered Activities with Potential Effects to Linanthus maculatus

Table 7-8 in the Plan lists Riverside County Flood Control and Water Conservation District's existing facilities within Conservation Areas, and Table 7-8a lists Riverside County Flood Control and Water Conservation District's proposed facilities within Conservation Areas and a Special Provisions Area (also see Section 4.3.7 in the Plan). Construction of the proposed facilities and maintenance of the noted existing and proposed facilities are Covered Activities under the MSHCP.

Pertinent to potential effects to *Linanthus maculatus*, maintenance of Mission Creek Channel (interim) is noted as a Covered Activity in Table 7-8 of the Plan. The specifics of this maintenance are undetermined, as the avoidance/minimization measures required under the

proposed Plan relate predominantly to maintaining fluvial sand transport through the channel. The channel of Mission Creek in the subject stretch is mapped as modeled habitat by CVAG. The existing construction of this soft-bottom channel has drastically changed the fluvial hydrology of this portion of Mission Creek, and as such it is no longer high-function habitat for the species. The channelized stretch of Mission Creek has not been actively surveyed for the species in recent years, so occupancy is undetermined. Due to the ecosystem processes modification associated with channelization, it appears probable that the channelized portion does not currently support substantial occurrences of the species. As such, maintenance of this stretch of Mission Creek, as proposed by Riverside County Flood Control and Water Conservation District under the Plan, likely would have minor to moderate adverse effects on the species. It is not clear how this channel (or a portion) is expected to count towards the conservation acreage commitments under the Plan (as noted in Section 4.3.7 of the Plan), when any temporary or permanent losses associated with proposed maintenance have not been acknowledge nor addressed under the Plan. The only requirement associated with the facility is that fluvial sand transport be maintained, which can occur without the maintenance of appropriate conditions for *Linanthus maculatus*. Therefore, it is undetermined how the required conservation objectives would be achieved under the Plan.

Also pertinent to potential effects to *Linanthus maculatus*, proposed construction and maintenance of a Morongo Wash Flood Control Facility is noted as a Covered Activity (proposed Covered Facility) in Table 7-8a of the Plan. The facility is proposed from Indian Avenue (near Mission Lakes Blvd.) downstream to the Banning (San Andreas) Fault, a reach of about 11 miles (18 kilometers). The specifics of construction and maintenance of this facility are undetermined, though avoidance/minimization measures are required as outlined on pages 7-35/36 and Section 4.3.7 of the Plan. Morongo Wash in the subject stretch is mapped as modeled habitat by CVAG and is substantially occupied by the species. The existing condition of Morongo Wash is unchannelized with intact fluvial hydrology supporting occupied high-function habitat for the species, particularly in the northern third of the reach proposed to be channelized. Due to the ecosystem processes modification associated with channelization, it appears probable that a channelized portion would not support substantial occurrences of the species. Such losses would constitute a considerable reduction in the overall status of the species. In addition, maintenance of this stretch of Morongo Wash, as anticipated by Riverside County Flood Control and Water Conservation District under the Plan, likely would have minor to moderate adverse effects on the species. It is not clear how this channel (or a portion) is expected to count towards the conservation acreage commitments under the Plan (as noted in Section 4.3.7 of the Plan), when any potential temporary or permanent losses associated with proposed maintenance have not been acknowledge nor addressed under the Plan. Therefore, it is currently undetermined how the required conservation objectives associated with this Covered Facility would be achieved under the Plan. However, this facility is subject to review under a minor amendment and requires the concurrence of the Wildlife Agencies. Once additional specifics are available for the amendment process, it should be possible to assess the potential impacts of construction and maintenance more fully and incorporate avoidance and minimization measures as appropriate.

Direct Effects

All known occurrences of the species in the Plan Area are within proposed Conservation Areas.

Any currently unknown occurrences outside of Conservation Areas would likely be lost pursuant to development under the Plan (or otherwise, as a result of activities of non-Permitees; see Cumulative Effects).

As indicated in the Plan (Table 4-116), at least two of 60 known occurrences would likely be subject to habitat loss and probable extirpation as a result of the Plan. The Plan identifies only one of those two occurrences, located east of Mission Lakes Country Club in Desert Hot Springs, as clearly subject to potential loss under the Plan (Table 4-116). The Plan also indicated that losses of known occurrences under the Plan would occur primarily in the lower reaches of Mission Creek and Big Morongo Canyons, south of Indian Avenue (Table 4-116). Direct losses of additional occurrences within Conservation Areas would potentially occur because the ultimate configuration of development (as approved by Permittees and non-Permittees) and the proposed Reserve System is unknown.

As noted above, a total of 429 acres (174 hectares) of modeled habitat for the species would be authorized for direct impacts in the Plan Area; this is approximately 14 percent of the modeled habitat for the species on non-federal lands in the Plan Area. The location or configuration of these acres that would be lost is unknown at this time, as they subject to local land use approvals.

Outside of Conservation Areas

Within the Plan Area, approximately 195 acres of modeled habitat occur outside of proposed Conservation Areas; all of this habitat would be expected to be lost under the proposed Plan. Within the Plan Area, no occurrences are known to exist outside of proposed Conservation Areas.

Inside Conservation Areas

Approximately 10 percent of the modeled habitat for the species on private lands under Local Permittee jurisdiction would be authorized for loss inside Conservation Areas (Section 4.3 Conservation Area Objectives). Approximately 234 acres (95 hectares) of modeled habitat for the species are authorized for loss inside proposed Conservation Areas under the Plan.

The Plan assumes that Existing Conservation Lands will continue as conservation lands at least for the duration of the permit. Approximately 364 acres of modeled habitat for the species occurs on Existing Conservation lands in the Plan Area, all of which is within a proposed Conservation Area.

Within the proposed Upper Mission Creek/Big Morongo Canyon Conservation Area, 2,410 acres of modeled habitat for the species occurs, or about 71 percent of the total modeled habitat for the species within the Plan Area. Of these 2,410 acres, approximately 1,390 acres under the jurisdiction of Riverside County are subject to the proposed Permit, under which 122 acres (approximately 9 percent) would be authorized for disturbance under the Plan. Approximately 53 acres of the modeled habitat within the Conservation Area would not be conserved by the Plan, nor would it be authorized for disturbance under the Plan (see Tables 4-42a and d); this acreage would likely be subject to land-use approvals of the City of Desert Hot Springs, a non-Permittee. Within this Conservation Area approximately 168 acres are within Existing

Conservation Lands, and 2,067 acres are anticipated to be conserved within Riverside County and in association with the proposed Riverside County Flood Control and Water Conservation District Covered Facility in Desert Hot Springs (subject to the concerns raised above).

As described above under the Current Range/Distribution information, this species major population complex lies within a specific subset of the Upper Mission Creek/Big Morongo Canyon Conservation Area. Given this specificity, Conservation Objectives based on jurisdictional boundaries within the Conservation Area are likely to be too coarse to achieve the conservation actually required to sustain the species. To achieve targeted land conservation that will not only support the overall numeric goals but will ensure conservation of this species, a project specific analysis would be required, including within the City of Desert Hot Springs. The City of Desert Hot Springs has recently indicated through a resolution their commitment to seeking permit coverage under the Plan and as part of that will submit projects for Interim Project Review. This process includes a requirement that projects be approved by the Wildlife Agencies prior to the application being considered by the City. This interim measure combined with future inclusion in the Plan as a Permittee are expected to provide for the needed conservation.

In the proposed Whitewater Canyon Conservation Area, 579 acres of modeled habit occur; or about 17 percent of the modeled habitat for the species within the Plan Area. Of this, approximately 387 acres are subject to the proposed Permit, under which 39 acres (approximately 10 percent) would be authorized for disturbance under the Plan. Within this Conservation Area approximately 192 acres are Existing Conservation Lands, and 348 acres would be conserved by the Plan. Thus, in combination about 540 acres or 93 percent of the modeled habitat within the Conservation Area would likely be conserved.

In the proposed Willow Hole Conservation Area, about 200 acres of modeled habitat occur. Of these 200 acres, about 197 acres are subject to the permit in this Conservation Area, under which about 20 acres would be authorized for disturbance and 177 acres would be conserved under the Plan.

Indirect Effects

As a result of future development covered under the Plan, substantial impacts to the natural flood regime necessary to maintaining habitat for this species in the long-term is expected to occur. In certain areas flooding regimes are expected to become too frequent or intense to support habitat for the species, or too infrequent or weak. In either scenario, soil matrix and/or vegetation cover changes would likely degrade or eliminate habitat areas.

In areas where floodplains would be artificially narrowed by proposed Covered Activities, flood flow velocities are expected to be slowed where flood waters backup behind artificial constrictions (such as culverts or locally narrow channels), then speed up through narrow passages, then slow again where floodplains are allowed to remain wide downstream. Where local velocities are increased, increased scour of sediments is expected. Where local flood flow velocities are decreased over natural conditions, increased deposition of sediments is expected. Where flooding is greatly reduced, increased vegetation cover is expected due to lack of

denudation events. All these changes are likely to degrade or eliminate habitat for the species. Given enough area, it is expected that some of these development-caused fluvial process changes may also create new habitat for the species elsewhere within Conservation Areas, but future development within and surrounding Conservation Areas would likely keep this effect quite limited in extent. Natural flood regimes create/sustain the habitat necessary for this species by denuding areas, removing silts, and depositing/sorting fresh sand. Flood control actions, road construction, or other activities that inhibit or adversely modify this natural flood regime in suitable habitat would degrade or reduce available habitat for this species. The commitments of the Plan, (most notably the requirements to "not obstruct natural watercourses" and to not impede "the rate of flow and sediment transport" in habitat areas) reduce the otherwise likely indirect effects that would be expected.

This species has specific habitat requirements (see Habitat Affinities above) in the areas specified above that are not captured in the general functional and acreage requirements set forth in the Conservation Objectives of the Plan. To ensure conservation of these habitat conditions concomitant with the conservation of the lands, the following conditions will be provided for incorporation into the Implementation Manual: within the USGS Sections 15, 16, 17, 21, 22, and 26 (Township 2 south, Range 4 east), the necessary fluvial hydrology for *Linanthus* habitat in these conserved areas shall be maintained, and any future artificial cumulative narrowing of the 10- and/or 100–year floodplains of Mission Creek, Dry Morongo Wash, Big Morongo Wash, and/or Morongo Wash to less than 1,000 feet wide shall be limited to a length of no more than 1,500 feet (as the linear distance along these creeks/washes), and any single artificial narrowing or constriction of these 10- and/or 100–year floodplains to less than 750 feet wide shall be limited to a creek-/wash-length of no more than 400 feet. In addition, for any roadway improvements associated with Mission Lakes Boulevard, Indian Avenue, Pierson Boulevard, Hacienda Avenue, Two Bunch Palms Road, and/or Cholla Drive in the Upper Mission Creek/Big Morongo Canyon Conservation Area, the appropriate Permittee (if the action is a Covered Activity) shall ensure that the proposed actions will not cause flood flows of 10 to 50 year flood events to appreciably change the area of floodplain affected (outside of the direct disturbance footprint of the roadway improvements) or associated flow velocities, compared to existing conditions (e.g., cause appreciable changes in flow backups, sedimentation, or scour), within modeled habitat for the species along the floodplains of Morongo Wash, Dry Morongo Wash, or Big Morongo Wash through the provision of adequately sized and configured culverts or bridges associated with these roadways.

Analysis with and without Permit Conditions
The general Permit Conditions and additional measures identified above, along with the Conservation Goals and Objectives and Required Measures in the MSHCP, allow us to extend No Surprises Assurances to the Little San Bernardino Mountains linanthus. Without these Conditions, future development and roadway improvements associated with crossings over Morongo Wash are likely to directly impact key occurrences and adversely change the flood flow regimes that maintain Little San Bernardino Mountains linanthus habitat in upstream and downstream areas. With these Permit Conditions, adequate occupied habitat would be conserved and the resulting configuration of the waterways would maintain the existing flood-associated fluvial processes of affected portions of Morongo Wash that are essential to species.

CUMULATIVE EFFECTS

Urbanization spreading westward from Desert Hot Springs is expected to eliminate or degrade a large part of the populations of the species in the long term. Development pressures are a concern primarily in the Mission Creek drainage east of Highway 62 and along Dry Morongo Wash/Morongo Wash from Highway 62 to the downstream crossing of Indian Avenue. Another likely threat to this species is future OHV activity in the washes and along the sandy benches where *Linanthus maculatus* occurs. The small size of the plants and their occurrence along the margins of washes, which often serve as routes of travel for OHV users, make them particularly vulnerable to OHV damage.

The City of Desert Hot Spring's population in 2005 was estimated to be 18,000, and was projected to be over 60,000 by 2012, and 250,000 by 2030 (Village at Mission Lakes 2005). Substantial growth in the City is expected, with more than 10,000 new unbuilt homes approved by the City as of 2005 (Village at Mission Lakes 2005).

Parcels that are important to the species are slated for development in the City of Desert Hot Springs. For example, one called Vista Del Monte (locally approved) would further interdict the Little Morongo Wash and directly impact a site that supported an occurrence of 150 individuals of *Linanthus maculatus,* and indirectly impact the second largest population of those actually counted (2,500 plants). Another project called Los Nietos on what has been termed the Bochner/Inland Empire Company property would, if approved, likely impact more than 75 acres of Big Morongo Wash near the southern end of the largest occurrence complex of the species (USFWS files (FWS-ERIV-5354.1)). The Los Nietos project (depending on its configuration) would likely indirectly impact six or seven subpopulations that supported a total of almost 900 plants. The proposed Vista Del Monte and Los Nietos developments would further disrupt the habitat continuity and considerably limit the range of the species.

A recreational trail to follow Big Morongo Wash is apparently under consideration by the City of Desert Hot Springs. It is undetermined where this trail, if constructed, would be located.

The proposed Palmwood project was annexed to the City of Desert Hot Springs, but this annexation was rescinded as discussed above. Given the project proponents have challenged the Plan, we are describing its potential impacts herein. However, should the project remain in unincorporated Riverside County, it is expected that the project would be subject to the requirements of the proposed Plan and subsequently would be considerably reduced in scope, size, and impacts. If the project receives coverage under the proposed Plan then its impacts would not be cumulative to the effects of the action considered herein.

The proposed Palmwood project would include residential, golf, and commercial developments, and would likely directly or indirectly eliminate the single largest population actually counted to be 10,000 plants in 1997 surveys, and would likely adversely affect other occurrences that supported an additional 4,500 plants, for a total of 17 percent of the plants counted range-wide. The proposed impacts would occur at the upstream end of the largest contiguous series of occurrences of *Linanthus maculatus* within the entire range of the species, and would likely

adversely affect many downstream occurrences even off the project site through changes in fluvial hydrology associated with development of the site. The project would impact 25 percent of the watersheds, and 35 percent of the quarter sections known to support the species. About 83 percent of the known range-wide populations of *Linanthus maculatus* occur in the watersheds that would adversely affected by the proposed project.

Flood damage reduction infrastructure, road construction, golf-course construction and maintenance, as well as large increases in the impervious surfaces (e.g., pavement, hard structures, etc.) associated with the proposed Palmwood development likely would alter the velocities, location, periodicities, and fluvial (sediment-carrying) properties of flood flows through the potential and suitable habitat in the watersheds on and downstream of the project; these modifications would likely redirect or adversely modify the essential surface fluvial flows (e.g. through channelization) that sustain three of the five populations considered "too numerous to count" in 1997 in these watersheds. (For the sake of comparison, we consider "too numerous to count" herein to represent at least 10,000 plants each. This figure is equal to the largest number of plants actually counted at any occurrence in the 1997 surveys.)

Additional potential threats from projects such as Palmwood include adverse affects to the quality of the surface water and sediments that would reach any remaining downstream *Linanthus maculatus* habitat, particularly during smaller flood events, due to contaminants (e.g., fertilizers, herbicides, pesticides, etc) expected in runoff from the proposed golf courses, businesses, and residential development. The decrease of *Linanthus maculatus* plants and habitat (and adjacent natural communities) due to proposed development will likely threaten any necessary pollinators of *Linanthus maculatus* (e.g., by reductions in pollinator numbers from direct and indirect losses of habitat, impacts from pesticide use, etc.).

CHANGED CIRCUMSTANCES

Expected climate change may render some current habitat unsuitable for this species. Climate change is likely to change temperatures and precipitation patterns and amounts; e.g., droughts within the Coachella Valley may become longer in duration, which would likely mean longer period between denuding flood flows and relatively wet precipitation years important to the production of standing plants of the species. The conditions this species has become adapted to over millennia may change relatively quickly in the near future. Because the longevity of this species' seeds in the seed bank (the means by which it withstands drought) is unknown, the effects of this changed circumstance on the species cannot be determined. The Plan does not provide any response measures that are likely to benefit this species.

Invasive plants likely pose a future threat to this species. This species has never been found to grow too near other plants, native or non-native. Portions of its habitat are likely to periodically become invaded by non-native plants, particularly during years of high precipitation. Considering past wet-year invasions in the Coachella Valley, these invasions likely would exclude this plant from otherwise suitable habitat areas, or substantially reduce its reproductive output. Given the response to invasion of current or new species will be determined in the future through adaptive management, we cannot determine whether the measures identified will be adequate to address the needs of this species. However, its habitat requirements (including

active fluvial processes) may limit the extent of non-native plant invasions to some degree.

Fire and Lowering of the Water Table are not believed to be threats to this diminutive annual species.

CONCLUSION

After reviewing the current status of this species, the environmental baseline for the Action Area, the effects of the proposed action (the Plan), and the cumulative effects, it is the Service's biological opinion that the proposed Plan in combination with our described Permit Conditions are not likely to jeopardize the continued existence of this species range-wide. We reached this conclusion because even though most of the range-wide habitat and occurrences of this plant occur in Action Area, about 97 percent of known occurrences and 87 percent of modeled habitat in the Action Area are proposed to be conserved under the Plan. Also, the Required Measures, Conservation Objectives, and our Permit Conditions provide substantial protection to the habitat and essential fluvial processes for the species.

PERMIT CONDITIONS

No species specific Permit Conditions are necessary for *Linanthus maculatus.* However, the Service will continue to work with the City of Desert Hot Springs to ensure that their interim process adequately conserves habitat for this species. The specific measures for conservation of the hydrological characteristics necessary for this species will be provided to the CVCC as part of the Implementation Manual.

CVCC shall provide the Implementation Manual to the Wildlife Agencies for final review and concurrence.

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INSECTS

Coachella Giant Sand Treader Cricket (*Macrobaenetes valgum*)

STATUS OF THE SPECIES

Legal/Listing Status

The Coachella giant sand treader cricket (*Macrobaenetes valgum*; sand treader cricket) currently is not a Federal or State listed species. It is, however, considered a Species of Concern by the U.S. Fish and Wildlife Service. NatureServe (2005) gives the sand treader cricket a Global Rank of G1 – Critically Imperiled.

Distribution

The historic range of this species is entirely within the Plan Area, from Fingal's Finger east to the sand dune areas in the vicinity of Indio. Tinkham (1962) describes them as occurring on "sand dune ridges to two miles west of Indio." This description would include portions of the Big Dune area. Information on the occurrence of this species in the remnants of the Big Dune, from Palm Springs east to La Quinta and Indio, is limited, as most of the land is privately owned and has not been accessible for surveys. The species distribution model indicates that potential habitat occurs on the Big Dune.

The sand treader cricket can also be found in appropriate habitat west of Palm Drive at least to Snow Creek Road, adjacent to the Whitewater River and San Gorgonio River washes. Suitable Habitat also occurs within the Whitewater Floodplain Preserve and at the Thousand Palms Preserve, on the main dunes and on the Simone Dunes. Despite the low numbers reported below from pit-trap samples at the Thousand Palms Preserve, burrows of these crickets are commonly observed in the more active portions of the aeolian sands in the southern dunes. The distinctive, cone-shaped excavation tailings of this species' diurnal burrows can be easily identified and used to confirm this species' occurrence at a given location (Barrows 1998a); these distinctive excavations were common on the Simone Dune at the Thousand Palms Preserve, and at the Snow Creek and Windy Point locations. They were not as common at Willow Hole, and were not observed at a La Quinta site and at the east end of the Indio Hills. The east end of the Indio Hills also includes suitable active blowsand habitat, and, although comprehensive surveys have not been conducted, this species has not been observed there. Their apparent absence at this location may relate to moisture regimes such that these crickets occur in lower numbers in the drier eastern portion of the Plan Area. Based on information gathered during the limited studies conducted to date, perennial shrubs, including creosote bush (*Larrea tridentate*)**,** burrobush (*Ambrosia dumosa*)**,** honey mesquite (*Prosopis glandulosa*), Mormon tea (*Ephedra* sp.), and desert willow (*Chilopsis linearis*), dominate the preferred habitat of this species in windblown environments. Stabilized sand areas appear to be avoided. Evidence for their affiliation with active, unshielded sand habitats again comes from trapping results reported by Barrows (1998b). He reports that after more than 900 trap nights, using pitfall traps and drift fences, no sand-treader crickets were captured on a stabilized and previously disturbed sand area of the Thousand

Palms Preserve.

Habitat Affinities
Based on information collected during the limited number of surveys that have been conducted to date, the sand-treader cricket appears to depend on the active dunes and ephemeral sand fields at the west end of the Coachella Valley. In addition, a study conducted by Barrows (2005) found that relative abundance of sand treader crickets was highest in active sand dunes, followed by ephemeral sand dunes.

Life History
The life history of these insects is not well known. The sand-treader cricket has its primary period of activity during the spring. They are nocturnal, coming to the surface to forage on detritus blown over the dunes, or to look for mates. During the day they conceal themselves in self-dug burrows from five to 20 meters deep in the sand. These burrows are often associated with the roots of perennial shrubs or are found under boards, rocks, and other hiding places. The adult and juvenile instars disappear during the warm months of the year, suggesting that individuals spend the summer in the egg stage. Activity of small juvenile instars begins in the late fall through early winter. By mid to late spring the adults disappear.

Population Trends
Limited trapping studies conducted within the Coachella Valley by Barrows (1998) reported widely varying densities from 0.8 individuals per acre (Thousand Palms Preserve near Varner Road) to up to 76 individuals per acre (Snow Creek/Windy Point area). However, complete information on the population size and density of sand treader crickets is not available due to lack of surveys.

Threats
The most limiting factor for the Coachella Valley sand-treader cricket is the availability of the aeolian sand ecosystem and the sand sources and corridors that maintain it. Threats to this species include habitat loss and degradation as a result of development, in particular where sand transport processes are disturbed. OHV activity is a threat to this species, as the shallow burrows of these crickets can be crushed and the sand compacted. This species is strongly associated with wind-blown, active sand dunes and fields. Sand sources, sand corridors, and dune hummocks must all be connected and protected to maintain this species. Any human activity that results in sand stabilization is also a concern. Non-native species, including Saharan mustard (*Brassica tournefortii*) and Russian thistle (*Salsola tragus*), can stabilize active sand habitats and may decrease available habitat for this cricket.

Synopsis of Status
Insufficient data exist to determine whether the population is stable, improving, or declining.

ENVIRONMENTAL BASELINE
Status of the Species in the Action Area
The sand treader cricket is restricted to the active sand hummocks and dunes in the Coachella Valley. Within the Action Area, the current sand treader cricket distribution in the Coachella

Valley area roughly spans from Fingal's Finger east to the sand dune areas in the vicinity of Indio. The sand-treader cricket is most abundant in the active dunes and ephemeral sand fields at the west end of the Coachella Valley, west of Palm Drive at least to Snow Creek Road, adjacent to the Whitewater River and San Gorgonio River washes. Suitable habitat also occurs within the Whitewater Floodplain Preserve and at the Thousand Palms Preserve, on the main dunes and on the Simone Dunes. The Action Area supports all of the known sand treader cricket occurrences. Population estimates throughout the Action Area are not currently available because insufficient monitoring data are available.

Due to insufficient monitoring data, it is unknown whether the overall range of this species has been significantly reduced from the historical distribution, and if the number of extant occurrences has declined dramatically. However, portions of the sand treader cricket's historic habitat have been eliminated or degraded by reduced/eliminated sand sources, OHV use, and/or invasive plant species.

The elimination of habitat for the sand treader cricket likely began with the introduction of agriculture over a century ago, but urbanization has accelerated these losses in the past 40 years. Increased urbanization has reduced available habitat through direct conversion of land and alterations in the sand transport system responsible for the creation/maintenance of sandy ecosystems. As habitat for the species becomes increasingly fragmented by urban development, remaining populations become more vulnerable to adverse effects of vehicular activities, roadside maintenance, or subsequent paving/landscaping and accompanying exotic plant invasions. Fragmentation increases the potential for stochastic events that detrimentally affect long-term survival probability. Similarly, fragmentation also decreases the species' resilience to rebound from such events. Additionally, OHV activities have contributed to reductions/alterations in the sand treader cricket habitat.

The Core Habitat areas of the proposed MSHCP Reserve System for the sand treader cricket consist of the Snow Creek/Windy Point, Whitewater Floodplain, and Thousand Palms Conservation Areas. Other Conserved Habitat occurs within the Willow Hole, Edom Hill, East Indio Hills, Santa Rosa and San Jacinto Mountains Conservation Areas.

Snow Creek/Windy Point Conservation Area

The Snow Creek/Windy Point Conservation Area consists of 1,374 acres of Core Habitat for this species. Of this total, 70 acres of modeled habitat is Existing Conservation Land that is controlled by BLM. Result from a trapping effort in 1998 (Barrows 1998b) reported an average density of 3.4 individuals per acre.

The sand sources for this area include primarily the Whitewater and San Gorgonio Rivers plus their tributaries, originating in the San Jacinto and San Bernardino Mountains. The sand supply to this Conservation Area has likely been significantly reduced by sand and gravel mining upstream on the San Gorgonio River, but the blowsand ecosystem likely remains functional in the long-term with the reduced sand input.

The Snow Creek/Windy Point Conservation Area currently is heavily affected by invasive exotic

plants, notably Saharan mustard. These invasive plants have increased the stabilization of soils within the Conservation Area and reduced or slowed aeolian sand transport. These plants likely compete with and reduce the productivity of native plants, and likely affect wildlife by altering the availability of forage plants and the characteristics of the ecosystem structure (Cal-IPC 2005; Brooks 2005). In addition, some of these plants likely increase the potential for fire (Sanders and Minnich 2000; Cal-IPC 2005; Brooks 2005). Dense stands of Saharan mustard in the Coachella Valley appear to suppress native wildflowers; because of its quick growth and flowering following rains, it appears to monopolize available soil moisture as it builds canopy and matures seed long before many native species have begun to flower (Sanders and Minnich 2000).

In addition to the presence of invasive plants, this Conservation Area has been and continues to be subject to substantial illegal OHV activity that has resulted in the alteration/degradation of much of the sand treader cricket habitat (as described above). One major OHV access point into the Conservation Area (that is currently open) is through BLM lands into other portions of the Conservation Area. Thus, the proposed Snow Creek/Windy Point Conservation Area portion has been and continues to be compromised by these activities.

Whitewater Floodplain Conservation Area

The Whitewater Floodplain Conservation Area consists of 5,617 acres of Core Habitat for this species. Of this total, 2,532 acres are Existing Conservation Lands controlled by BLM and CVWD. Trapping results from studies conducted by Barrows (1998b) in the active dune area west of Gene Autry Trail at the Whitewater Wash reported an average density of 6.4 individuals per acre.

The Whitewater Floodplain Conservation Area includes portions of the Whitewater River floodway and floodplain south of Interstate-10. The blowsand ecosystem of the Whitewater River floodplain includes fluvial (sediments moved by water flows) and aeolian (sediments moved by wind) components. Sediments, most importantly sand, is fluvially deposited (and existing deposits exposed) during stormwater flows within the floodway and portions of the floodplain of the Whitewater River. Much of this sand is dropped (fluvially deposited) where storm flows slow down; in this case much of it is fluvially deposited in the wide portions of the floodplain/floodway downstream of Windy Point and upstream of Section 6 of the Agua Caliente Indian Reservation. The consistent winds down the Coachella Valley (northwest to southeast) move those sediments sand-sized and smaller that are exposed on the ground surface. The winds at the upper end (northwestern) of the Valley are strongest (where the Valley is narrow) and thus have the highest potential to move the larger (sand sized) sediments in quantity. Sediments that are not exposed (not on the ground surface) are not picked up by the wind. Aeolian sand movement is slowed (or even stopped) by vegetation or other similar features (berms, fences, buildings, windrows, etc. that slow the wind near the ground surface), as this sand movement happens close to the ground. Over a period of years following a large fluvial deposition event (such as typically occurs once a decade in the Valley) a large amount (a spike of sand quantity over time) of sand is blown from these fluvial deposition areas into, and eventually through, aeolian transition areas. The last substantial drought period, which ended the winter of 2004-2005, involved an extended period with little fluvial deposition in the Whitewater River floodway or floodplain (upwind and within the Conservation Area). During this drought period

most of the surface sand deposits within these aeolian transition areas were eroded by the consistent winds and blown downwind. Most of this aeolian sand traversing this portion of the Whitewater Floodplain used to end up in the Big Dune, but relatively recent urban development now intercedes between these transition areas and the Big Dune; the sand that reaches this interceding development predominately ends up at this downwind edge, or is removed from within the developed area. Much of the Big Dune is now developed, as described above and no appreciable aeolian sand is expected to currently reach the remaining portions of the Big Dune.

The predominant watercourse that provides the sand source for the existing Whitewater Floodplain Reserve/proposed Whitewater Floodplain Conservation Area is the Whitewater River. The construction and maintenance of dikes and percolation ponds on the Whitewater River downstream from Windy Point has eliminated (or drastically altered) fluvial sedimentation within large areas of the Whitewater River floodplain (within the conservation area) that historically received periodic natural sediment deposition during stormflow events (Griffiths *et al.* 2002). Some of these dikes also block aeolian sand transport within/across the conservation area (Griffiths *et al.* 2002).

Based on Griffiths *et al.* (2002), the percolation ponds affect the Whitewater River depositional area by causing deposition and downstream movement out of the desired depositional areas. The result is less sand being deposited into the Whitewater Floodplain Reserve and in the Whitewater Floodplain Conservation Area as a whole. The percolation ponds have narrowed the channel for the Whitewater River causing the higher velocities of water that move the fluvial depositions through this Conservation Area. The suitability of habitat within this Conservation Area is also compromised by armoring caused by the high winds that blow aeolian sand out of the system. The percolation ponds have altered much of the available habitat within this area making it unsuitable for the sand treader cricket.

In addition to sand depletion that is occurring in the Conservation Area, OHV activity also affects the ability of this area to provide habitat for the sand treader cricket.

Thousand Palms Conservation Area

The Thousand Palms Conservation Area consists of 3,962 acres of Core Habitat and 3 acres of Other Conserved Habitat. Of this total, 3,037 acres are Existing Conservation Lands are controlled by BLM, CVWD, the Service, and Wildlife Conservation Board. The existing Thousand Palms Preserve established by the Coachella Valley fringe-toed lizard HCP totals 17,651 acres and is located south of the central portion of the Indio Hills. The Preserve includes the Coachella Valley Ecological Reserve lands owned by CDFG.

The Thousand Palms Preserve includes Core Habitat for the sand treader cricket in the main dune system in the area south of Ramon Road and west of Washington Avenue, and in the area north of Ramon Road, including dunes in Thousand Palms Canyon. Because Ramon Road and Washington Avenue receive moderate traffic volumes that are likely to increase, the main dune system is somewhat isolated from the remaining dune habitat on the preserve. This species may be restricted to the more active dune areas on the preserve. Trapping results from studies conducted by Barrows (1998b) at a site near Varner Road reported an average density of 0.8

individuals per acre.

Geological process areas were identified as sand source and transport corridors for wind-blown sand habitat occurring on the Preserve. Absent an adequate sand supply, the strong, unidirectional winds erode and deplete sand accumulations. The Thousand Palms Canyon and western Indio Hills were thought to contribute equally to accretion of wind-blown sand on the Preserve; however, further investigation (Lancaster *et al.* 1993, Meek and Wasklewicz 1993, and Simons, Li and Associates 1997) found that the western Indio Hills contributed a majority of the sand. These studies concluded Thousand Palms Canyon was only a minor contributor of blow-sands to the Preserve.

Saharan mustard substantially invaded the Thousand Palms Preserve in 2005. Saharan mustard was estimated to cover 40 percent of sampled sand fields in the Thousand Palms Preserve (C. Barrows, pers. comm.). Active dunes had much less cover of Saharan mustard (5 percent). The effects of this invasive vegetation is still under debate, however, it may result in less suitable habitat available for the sand treader cricket.

Willow Hole Conservation Area

The Willow Hole Conservation Area consists of 1,754 acres of Other Conserved Habitat. Of this total, 157 acres are Existing Conservation Lands are controlled by CVWD, Wildlife Conservation Board, and BLM. Trapping results from studies conducted by Barrows (1998b) near the junction of Varner Road and Mountain View Drive reported average densities of 0.6 individuals per acre. Barrows (1998b) reported that the cone-shaped excavations characteristic of this species were less common at Willow Hole than at areas to the west (Snow Creek and Whitewater Floodplain). The largest area of contiguous habitat for the sand treader cricket within this Conservation Area is 800 acres located west of Palm Drive.

Habitat for the sand treader cricket within this Conservation Area occurs primarily within the existing preserve east of Mountain View Road and south of the San Andreas Fault where sandy deposits from Mission Creek and Big Morongo Wash provide suitable habitat. The westerly wind transports sands over Flattop Mountain and into the Willow Hole Reserve and Stebbins Dune. Recent storms have entrenched the channel through Willow Hole with the result that much of the fluvial sediment is now deposited just outside of the Reserve (Griffiths *et al.* 2002). This material has the potential to be carried back into the reserve by aeolian processes only if sufficient winds occur.

Within the Willow Hole Conservation Area, there are about 125 acres of mesquite hummocks that are important for sand stabilization. Retention and restoration of mesquite is necessary to maintain the sand systems that many of the proposed covered species are dependant upon. Mesquite hummocks are limited throughout the Plan Area and will continue to be lost if the ground water continues to be depleted (refer to Ground Water discussion in the General Effects Section of this Biological Opinion).

The Willow Hole Conservation Area is subject to fragmentation as a result of roads, including Palm Drive, Mountain View Drive, and Varner Road. Additionally, like Snow Creek/Windy

Point Conservation Area, the Willow Hole Conservation Area is subject to illegal OHV activity. OHV activity continues to modify BLM land, while providing access to the adjacent Existing Conservation Lands and proposed CVAG reserve lands. Thus, a portion of the proposed Reserve System has been and will continue to be compromised by these activities unless intervention occurs.

Edom Hill Conservation Area

The Edom Hill Conservation Area consists of 120 acres of Other Conserved Habitat. Of this total, 58 acres are Existing Conservation Lands and are controlled by BLM and the County of Riverside. This Conservation Area includes scattered sandy substrate habitat between Willow Hole and the Thousand Palms Preserve in the Indio Hills. Trapping results from studies conducted by Tierra Madre (1994) in association with expansion of the Edom Hill Landfill reported 17 sand treader crickets. The Edom Hill Conservation Area provides slightly higher elevation habitat and provides a linkage between Willow Hole and the Thousand Palms Preserve.

East Indio Hills

The East Indio Hills Conservation Area consists of 824 acres of Other Conserved Habitat. Of this total, 123 acres are Existing Conservation Lands controlled by BLM and CVWD. Trapping results from studies conducted by Barrows (1998b) report no captures of this species at this location. The typical cone-shaped excavations of this species were not observed at all in what appeared to be suitable habitat at the East Indio Hills.

The sand transport system, which carried sand from Whitewater River, Mission Creek, and Morongo Wash, has been partially blocked by development upwind. In addition, the remaining sand sources in the Indio Hills and Little San Bernadino Mountains are at least partially compromised by existing roads. The hummocks and dunes of the Edom Hill/Willow Hole Conservation Area receive sand from the Morongo and Mission Creek washes west of the Indio Hills (Meek and Wasklewicz 1993). Reportedly, little to no substantial evidence exists of recent aeolian activity northwest of the Edom Hill Reserve, which suggests these deposits may have slowly accumulated over thousands of years (Meek and Wasklewicz 1993). The present immobility of sands, anchoring of sand by mesquite, and protection of deposits from wind within valleys suggest sands in this area could remain indefinitely (Meek and Wasklewicz 1993). Griffiths *et al.* (2002) stated that fluvial sediment from the Mission-Morongo depositional plain is transported by strong winds to the hummocks of Willow Hole and Edom Hill. In addition, during intense storm events, these aeolian deposits on Edom Hill are recycled as fluvial sediment into Willow Hole. About 125 acres of mesquite hummocks occur within the proposed Willow Hole Conservation Area and play a role in deposition and stabilization of blowsand within and surrounding these hummocks, which is likely essential to maintaining sand treader crickets in the Conservation Area into the future. However, lowering the groundwater table through well pumping for human use likely would result in the slow dieback and degradation of significant portions of the mesquite plants that anchor the Willow Hole hummocks and dunes in the Conservation Area (Mission Springs Water District 2004). The eventual loss of these mesquite plants would render the adjacent dunes vulnerable to loss through aeolian erosion off the Reserve (Meek and Wasklewicz 1993).

Santa Rosa and San Jacinto Mountains

The Santa Rosa and San Jacinto Mountain Conservation Area consists of 122 acres of Other Conserved Habitat. Of this total, 22 acres are Existing Conservation Lands and are controlled by BLM. Habitat for the sand treader cricket within this Conservation Area is limited primarily to sandy substrate habitat along the toe of the San Jacinto Mountains near the Snow Creek/Windy Point Conservation Area. No trapping results are available for this Conservation Area.

Outside of Conservation Areas

Of the 27,070 acres of modeled habitat within the entire Plan Area, 13,682 acres (51 percent of the modeled habitat) are anticipated to be lost through MSHCP implementation. The majority of the modeled habitat outside of the Conservation Areas occurs in the remnants of the Big Dune south of Interstate 10, and in the area south of Desert Hot Springs and east of Highway 62.

The Big Dune was determined to be highly fragmented by the MSHCP and subject to edge effects due to major roadways within the area. The MSHCP Planning Team determined that Essential Ecological Processes, including sand transport were no longer intact there.

Factors Affecting the Species' Environment within the Action Area

BLM lands within the Plan Area (and environs) are subject to the Coachella Valley California Desert Conservation Area (CDCA) Amendment (BLM 2002). On BLM lands within the Plan Area, BLM has committed within the CDCA to a series of protections that influence the conservation of sand treader crickets; within the biotic communities of sand dunes and sand fields, BLM will manage their lands under the following conservation objectives:

Conserve at least 99 percent of extant sand dunes and sand fields.
Avoid stabilization of sand dunes due to adjacent development and spread of non-native species.
Maintain, and enhance where feasible, aeolian (wind blown) and fluvial (water borne) sand transport systems.
Minimize sand compaction to protect Jerusalem cricket and giant sand treader habitat and to minimize crushing of fringe-toed lizards.
Minimize roads within flat-tailed horned lizard habitat which are prone to crushing by vehicles.
Avoid disturbance and compaction of sandy habitats associated with Coachella Valley milk-vetch and avoid crushing of Coachella Valley milk-vetch plants.
Reduce/control spread of non-native plants like Russian thistle and Saharan mustard; and exotic animals such as non-native ants and brown-headed cowbirds.
Minimize loss of native vegetation, minimize habitat fragmentation and maintain habitat patch connectivity.

Management and Monitoring

Extensive monitoring of the sand treader cricket population within the Coachella Valley has not occurred to date. However, as discussed above, Barrows (1998b) conducted limited trapping studies throughout the Plan Area to obtain average sand treader cricket density estimates at the various survey locations. In addition, sand treader cricket surveys were conducted in 2004 and 2005 at 22 sites and 17 sites respectively (Barrows 2005). The study sites were stratified between four subdivisions of the Coachella Valley aeolian sand community: active sand dunes,

sand hummocks, ephemeral sand fields, and mesquite dunes. The questions to be addressed by the studies were: (1) to determine the habitat affinities for the species, and (2) to evaluate the effectiveness of the sampling protocol as an indication of sand treader cricket range, occupancy, and relative abundance. While these studies obtained limited information regarding the habitat affinities and relative abundance of crickets within each habitat type, they determined that additional years of sampling were necessary.

Extensive species-specific management actions have not been developed or implemented for the sand treader cricket. The conservation areas where the sand treader cricket occurs are within Reserve Management Units 1 and 6. Management actions that have affected the sand treader cricket have been done in association with the Coachella Valley fringe-toed lizard HCP, and range from control of exotic species and limiting public access to compatible scientific, educational, and recreational uses. A successful tamarisk eradication program has been completed. Within the Willow Hole-Edom Hill Reserve, the BLM lands are designated as an ACEC. The BLM ACEC lands are classified as Class "Limited" in the CDCA Plan. Management objectives include control of deleterious activities such as OHV use and perimeter fencing to limit OHV activity. However, OHV activity continues to be a problem.

EFFECTS OF THE ACTION

Assumptions

The effects analysis below is based on the following assumptions:

General Plans of Local Permittees, future land uses and development patterns will reflect current land use trends (largely residential and tourist resort-commercial uses), thereby explicitly ruling out unlikely future land uses such as heavy industry, expansion of agriculture into native habitat (unregulated by the County and therefore not a Covered Activity), etc.

Approximately 2,141 acres of the total 27,070 acres of sand treader cricket modeled habitat within the Plan Area are managed by BLM. This biological opinion assumes that the CVCC will enter into a Memorandum of Understanding with BLM prior to issuance of the Permits to ensure that all BLM lands within the Plan Area are managed consistent with the MSHCP.

The BLM lands containing sand treader cricket modeled habitat are designated as Conservation Level 2 and 3 lands. It is assumed that habitat loss will occur on no more than one percent of these lands, and will only occur in conjunction with providing reasonable access across public lands to private inholdings within the Wilderness Areas, trails and trailheads, or as necessitated by an Adaptive Management action, and that development will be consistent with the Conservation Objectives for the relevant Conservation Area.

Urban Development

Direct Effects

The entire Plan Area includes approximately 27,070 acres of modeled habitat for the sand treader cricket. Of this acreage, 22,500 acres are subject to the Permit (i.e., non-Federal lands) (Table 4-114 of the MSHCP). Approximately 13,264 acres (49 percent) of the modeled habitat is outside MSHCP Conservation Areas. Of this total, 12,903 acres are anticipated to be lost due to

MSHCP implementation. Within the Conservation Areas, it is anticipated that 10 percent of modeled habitat on private lands would be subject to loss. Therefore, an additional 779 acres of this species' habitat would be subject to take inside the Conservation Areas (Table 4-114 of the MSHCP). Specifically, the MSHCP anticipates that 533 acres (5 percent) of modeled Core Habitat and 246 acres (9 percent) of Other Conserved Habitat would be lost within seven Conservation Areas: Snow Creek/Windy Point (131 acres; Core Habitat); Whitewater Floodplain (309 acres; Core Habitat); Thousand Palms (93 acres; Core Habitat); Willow Hole (160 acres; Other Conserved Habitat); Edom Hill (6 acres; Other Conserved Habitat); East Indio Hills (70 acres; Other Conserved Habitat), and Santa Rosa and San Jacinto Mountains (10 acres; Other Conserved Habitat).

Although the majority of the Core Habitat would be conserved, the configuration of allowable development is unknown at this time. Therefore, as currently proposed, development within the Conservation Areas", although it represents a small percentage of total sand treader cricket Core Habitat, could directly injure or kill individuals within the Plan Area. Furthermore, development within these areas could eliminate Core Habitat necessary for survival or expansion of extant populations. Based on limited studies and observations it is assumed that this species requires active blowsand such that natural disturbance from aeolian and fluvial processes (wind and flooding) is considered essential. Therefore, our analysis is based on this assumption. As part of the Plan, extensive studies should be conducted throughout the Plan Area to better determine the habitat requirements of this species.

Outside of the Conservation Areas
The proposed loss of 12,903 acres (48 percent of the total modeled habitat within the Plan Area) of sand treader cricket habitat outside of the conservation areas would predominately result from development, associated infrastructure, construction of roads, and continued illegal OHV and other recreational activities. The sand treader cricket would be impacted due to being crushed, conversion of habitat to development, and precluding the necessary fluvial and aeolian processes to maintain habitat for this species.

The overall amount and proportion of modeled habitat (compared to what would remain) that would be lost to development within the next 75 years is substantial. However, as discussed above, most of the habitat outside of the Conservation Areas consists of relatively disjunct, small patches of suitable habitat where the sand source/transport system has been compromised. Much of this land is fragmented and has a limited ability to provide for long-term conservation of the cricket. The fragmented blocks of habitat are more susceptible to edge effects, including crushing by OHV activity.

The MSHCP proposes to address the losses of sand treader cricket habitat by conserving large blocks of habitat, protecting core habitat, maintaining sand source and transport systems, and managing and monitoring the lands to address edge and other stressors to the sand treader cricket.

Inside of the Conservation Areas
A wide variety of sandy substrate types is important for the conservation of sand treader cricket

because of the dynamics of the aeolian sand transport processes. The proposed loss of 779 acres (10 percent) of modeled sand treader cricket habitat on private lands within the Conservation Areas would predominately result from Covered Activities including development, associated infrastructure, construction of roads, and continued illegal OHV and other recreational activities. The sand treader cricket would be impacted due to being crushed, conversion of habitat to development, and precluding the necessary fluvial and aeolian processes to maintain habitat for this species.

The MSHCP creation of conservation areas for the sand treader cricket was based on the delineation of Core Habitat that 1) is large enough to support a viable population of the species independent of other Core Habitat areas; 2) is not fragmented by development, including roads; 3) contains lightly traveled two-lane roads that have limited potential for expansion; 4) has intact Essential Ecological Processes, including sand source and sand delivery systems; and 5) provides suitable areas to act as refugia in the event of large-scale flood events or other extreme conditions (climate change, extended drought).
Using the above criteria, the MSHCP identifies Core Habitat for the sand treader cricket within three conservation areas. The potential effects of Plan implementation on the sand treader cricket and Core Habitat within each of these conservation areas is discussed below.

Snow Creek/Windy Point Conservation Area
Approximately 1,243 acres of modeled sand treader cricket Core Habitat are proposed to be conserved and 131 acres are anticipated to be lost within the Snow Creek/Windy Point Conservation Area.

The overriding adverse effects to the sand treader cricket within the Snow Creek/Windy Point Conservation Area are invasive weeds and OHV activity. Invasive weeds have stabilized the soils and reduced aeolian sand transport to the Snow Creek/Windy Point Conservation Area. OHV activity continues to degrade much of the habitat within this Conservation Area and may result in direct mortality to the sand treader cricket. Thus, the Snow Creek/Windy Point Conservation Area will continue to be compromised by these activities unless intervention occurs. The MSHCP currently anticipates that a weeding program will only be initiated once it is determined to be a possible stressor. (refer to the Invasive Weed Species Discussion in the General Effects Section of this Biological Opinion). The weed problem appears to be persisting within this Conservation Area. Given the species' affinity for unstabilized sand habitat types, to adequately address the sand treader cricket and ensure long-term conservation a comprehensive weed management program will need to be implemented. In addition to invasive plants, OHV use is an existing problem within this area. Controlling OHV use is a management action that needs to be initiated to eliminate ongoing habitat degradation and ensure adequate conservation of potential sand treader cricket habitat within this Conservation Area.

Whitewater Floodplain Conservation Area
Within the Whitewater Floodplain Conservation Area, 5,309 acres of sand treader cricket Core Habitat are proposed to be conserved and 309 acres are anticipated to be lost.

As with the Coachella Valley fringe-toed lizard, in the Whitewater River floodplain it is

imperative to maintain the sand transport necessary to support sand treader cricket populations within the Conservation Area. Thus, to ensure the long-term survival of the sand treader cricket, specific management actions will be needed over time within the Whitewater River floodplain. Management within this Conservation Area should include enhancing/restoring more natural patterns of fluvial sediment deposition to provide a longer-term sediment source for aeolian sand transport and enhancing aeolian deposition to improve habitat function in the downwind portions of the Conservation Area.

Barriers to sand movement within sand transport corridors negatively affect sand treader cricket populations in otherwise suitable habitat because such obstructions greatly reduce the movement of blowsand and causes stabilization. Based on the information available, blowsand is a required resource to support sand treader cricket populations. The Required Measures within the Whitewater Floodplain Conservation Area does not eliminate this threat of blowsand losses. Thus, any future development in the Whitewater Floodplain Conservation Area upwind of Gene Autry Trail should be configured to minimize downwind/stream effects to the fluvial and aeolian processes. To minimize degradation of aeolian sand deposition patterns, additional measures are needed as described below under the Permit Conditions section.

The MSHCP states that CVCC will use its best efforts to enter into an MOU with BLM to ensure management consistent with the MSHCP prior to issuance of the Permits. However, without adequate assurance that these lands will be managed to benefit the sand treader cricket prior to a permit decision no conservation credit can be assessed in this analysis. All of the Existing Conservation Lands dedicated or conserved through the CVFTL HCP will be permanently protected by a legal instrument within the 6 months of permit issuance. The Existing Conservation Lands owned or controlled by Local Permittees will need to be assured to assess credit for our analysis purposes.

Thousand Palms Conservation Area

The Thousand Palms Conservation Area includes 3,962 acres of Core Habitat for the sand treader cricket. Of this total, 3,869 acres of Core Habitat are proposed to be conserved through implementation of the MSHCP, 3,035 acres of Core Habitat are classified as Existing Conservation Lands, and 93 acres of Core Habitat are anticipated to be lost.

Unless the sand sources and corridors are protected, sand transport to the Preserve will be obstructed and the blowsand habitat within the Preserve will continue to degrade at an accelerating rate that matches the growth of upwind urban areas (Simons, and Li and Associates 1997). Thus, development within the designated Existing Uses and the 9:1 Conservation to Development Ratio Areas in the Thousand Palms Conservation Area need to be designed to ensure that the fluvial and aeolian sand transport systems are maintained.

In Section 4 of the MSHCP, the Site Planning Standards in T4S, R6E, Sections 7 and 8, located in the Thousand Palms Conservation Area are too vague to address the needs of the sand treader cricket within this Conservation Area and to provide adequate coverage. Maintaining the sand transport corridor is essential for the Thousand Palms Conservation Area's ability to support the sand treader cricket. Sand transport must be addressed explicitly. Coordinated conservation of

aeolian sand transport among adjacent parcels must be maximized to achieve conservation of the species.

Other Conserved Habitat

Within the Plan Area, Other Conserved Habitat for the sand treader cricket totals 2,823 acres. Of this total 246 acres will be lost due to MSHCP implementation and 2,577 acres are proposed to be conserved within five Conservation Areas. The amount of Other Conserved Habitat within the Conservation Areas ranges from 3 to 1,754 acres. Although some of the other conserved habitat within the Conservation Areas could support the sand treader cricket, little is known about the status of the species within these areas. Furthermore, the Conservation Areas such as East Indio Hills and the Santa Rosa and San Jacinto Mountains are disjunct from any Core Habitat areas. As such, the viability the sand treader cricket within these Conservation Areas is tenuous.

Indirect Effects

Indirect effects resulting from the MSHCP are primarily Covered Activities that may impede the transport of sand that supports habitat for the sand treader cricket. The indirect effects will not result in immediate harm to the species, but over time will prohibit sand from re-entering the system and sustaining the dune habitat necessary for cricket survival.

The existing percolation ponds in the Whitewater Floodplain Conservation Area are one of the most problematic sources of indirect effects that will continue to impact the fluvial and aeolian processes necessary to sustain sand treader cricket habitat. The effects to the cricket have been discussed above in the Environmental Baseline and Effects Sections regarding the Whitewater Floodplain Conservation Areas.

Indirect effects would also result from barriers associated with urban development upwind of each of the respective Conservation Areas as discussed above. Windrows, barns, storage sheds, certain types of fences, utility substations, or houses in sand source areas and sand transport corridors, interfere with the fluvial and aeolian transport systems responsible for maintaining blowsand habitat within the proposed Conservation Areas. Interference with these systems results in the erosion and armoring of blowsands on the Coachella Valley Preserve and the consequent loss of suitable habitat within its boundary (Simons, Li and Associates 1997). In addition to the Preserve, the other established reserves that will be incorporated into the MSHCP Reserve System are subject to these same affects. Erosion of dunes and sand habitat occurs when more sand leaves the system than is transported from upwind sources. Armoring is created when smaller particles are blown or washed away, and larger particles left behind shield underlying sediments from the wind transport. Interference can result from: 1) obstructing upwind sand sources; 2) reducing aeolian transport capacity by increasing surface resistance and obstruction within the wind corridor; 3) capping sediments by paving, building and landscaping over them; 4) encouraging surface armoring by reducing fluvial and blowsand surface disturbance; and 5) reducing plant growth and its anchoring effect in sand accumulation areas through lowering the groundwater availability by groundwater pumping (Simons, Li and Associates 1997).

Additional indirect effects, including increases in invasive flora, and OHV use, are expected to occur to sand treader crickets and sand treader cricket habitat with Plan implementation. As described in detail above, invasive plants such as Saharan mustard and OHV activity may result in stabilization of blowsand areas rendering the areas unsuitable for the sand treader cricket.

Avoidance and Minimization Measures Included in the Plan
Minimization measures would be included in the Plan to reduce many of the above-described direct and indirect impacts to sand treader crickets. Required Avoidance, Minimization, and Mitigation Measures would protect and maintain the natural fluvial sand transport capacity of fluvial systems (Section 4.4 of the MSHCP), and Land Use Adjacency Guidelines would minimize indirect effects from development discussed above within or adjacent to Conservation Areas by regulating drainage, toxics, lighting, noise, invasive species, and human intrusion (Section 4.5 of the MSHCP). General management actions would conserve the function of sand treader cricket habitat by controlling unauthorized OHV/vehicle trespass and invasive species, (Section 8.2.4 and 8.4.3 of the MSHCP).

Monitoring and Adaptive Management Program
Adaptive Management, discussed in Section 8.4.3, would focus on identification of threats and development of a Monitoring Program to address management questions related to these threats. Initially baseline data would be collected on sand treader crickets. The precise protocols to be used for these surveys would be developed during the baseline phase. Surveys would be completed to better describe the distribution and refine the distribution and habitat association models for sand treader crickets. These surveys would also gather baseline data on invasive species and their effects on the Covered Species. Based on the information gathered during the baseline phase, the appropriate level of ongoing monitoring would be determined for each of the Covered Species. Ongoing monitoring may change over time in response to Adaptive Management needs, changes in technology, or other circumstances.

The Monitoring and Adaptive Management Plan also will address the management and monitoring of the aeolian sand communities within the Plan Area. Management action for these communities include elimination of OHV trespass, the protection of wind and sand deposition corridors, and control of invasive species

Avoidance and Minimization Measures Included in the Plan
To avoid and minimize the direct and indirect effects to the sand treader cricket (as described in the previous section), and protect ecosystem integrity, and the Covered Species and natural communities they encompass, the Plan would include general management actions as described in Section 8.2.4.1 of the Plan, as well as specific monitoring objectives as described in Section 8.4.3.3 of the Plan. It is possible that a small number of sand treader crickets and/or acres of sand treader cricket habitat may be impacted by implementation of these general management actions and monitoring objectives. However, these actions likely would minimize the above-described potential threats to the sand treader cricket and sand treader cricket habitat in the long-term.

Trails Plan

Trails currently exist on Reserve Lands outside the Santa Rosa and San Jacinto Mountains Conservation Area. The existing trails are considered Allowable Uses (allowed, but not Covered Activities under the MSHCP) under the MSHCP and include 1) a system of trails on the Thousand Palms Preserve; 2) the Pacific Crest National Scenic Trail traversing Reserve Lands in the Snow Creek/Windy Point and Stubbe and Cottonwood Canyons Conservation Areas; and 3) trails on non-Federal lands within Dos Palmas Preserve/ACEC. The conditionally compatible public access uses on Reserve Lands consist of trails, facilities, and passive recreational activities.

The MSHCP proposes the construction and maintenance of trails and passive recreation as Covered Activities. If trails are constructed and recreational activities occur within sand treader cricket habitat, it could result in loss of habitat from vegetation clearing from the trail footprint, crushing of individuals, and soil compaction. Effects due to the construction and operations and maintenance of trails would be minor. Similarly, minor effects are likely due to passive recreational uses. However, illegal OHV use could result in further detrimental effects to this species that could be promoted by the installation of trails and recreational uses within the Reserve System. Section 7.3.4.4 of the MSHCP proposes *Guidelines for Public Access and Recreation on Reserve Lands* to avoid and minimize potential adverse effects of the Trails Plan and recreation activities. Specifically, the Plan includes criteria for siting and design of the trails and facilities and guidelines for public use and maintenance. Implementation of these guidelines, in conjunction with Adaptive Management (Section 8 of the Plan), would avoid and minimize adequately the adverse direct and indirect effects to sand treader crickets and sand treader cricket habitat from the trails plan.

Changed and Unforeseen Circumstances

The Plan would address the following Changed Circumstances: drought, fire, invasion by a new exotic species, lowering of the water table, and new listing of a Species Not Covered by the MSHCP. It is anticipated that drought, fire, invasion by a new invasive species, and lowering of the water table would result in direct and indirect effects to the sand treader cricket that are similar to those described in the previous sections (i.e., Urban Development, Monitoring and Adaptive Management, and Trails Plan). No direct or indirect effects beyond those previously discussed are anticipated to occur as a result of Changed Circumstances.

Avoidance and Minimization Measures Included in the Plan

To avoid and minimize potential adverse direct and indirect effects of the Changed Circumstances (as described in the previous section) on the sand treader cricket, the Plan would include remediation actions, as described in Sections 6.8.3.1 through 6.8.3.5. Implementation of these actions, in conjunction with Adaptive Management (Section 8 of the Plan), would avoid and minimize adequately the adverse direct and indirect effects to sand treader crickets and sand treader cricket habitat from Changed Circumstances.

Cumulative Effects

It is anticipated that there may be conversion or degradation of sand treader cricket habitat within the action area resulting from OHV, development not contemplated in plan, illegal dumping, and invasive weeds. Activities such as these will degrade existing habitat and affect sand treader

cricket populations (refer to the Cumulative Effects discussion in the General Effects Section of this Biological Opinion).

The Agua Caliente Band of Cahuilla Indians is undertaking a Habitat Conservation Plan for all of their Tribal lands. The draft Plan and associated documents have been reviewed publicly. It is anticipated that the final Plan and associated environmental analysis will be complete in mid-2008 with permit issuance scheduled for late 2008. Although there will be habitat loss associated with that Plan, the overall net benefit to the species is positive. Because issuance of that permit is a Federal action, an analysis of the impacts of that Plan will be completed in the required section 7 process.

CONCLUSION

In summary, a total of 12,997 acres (48 percent) of sand treader cricket modeled habitat, of which 10,421 acres are Core Habitat and 2,577 acres are Other Conserved Habitat, are proposed to be conserved on private land in perpetuity to offset the loss of 13,682 acres (50 percent) of modeled habitat as a result of proposed Covered Activities throughout the Plan Area. However, it should be noted that the total of 13,682 acres to be lost includes only 533 acres (5 percent) of the modeled Core Habitat. The Conservation Areas also contain Existing Conservation Lands (362 acres; 1.4 percent) that augment the reserve design of the Plan, thereby enhancing the Reserve System. The sand treader cricket is endemic within the Plan Area; therefore, the Coachella Valley is an essential part to the species survival since it supports the entirety of the species range.

We anticipate the proposed action would affect the sand treader cricket as described in the analysis above. Implementation of the avoidance, minimization, and mitigation measures identified in the MSHCP and the recommended changes would further reduce impacts to this species. With the additional measures described in the analysis above, this species is anticipated to persist within the Action Area through the conservation and management of Core and Other Conserved Habitat within the Plan Area. We anticipate that sand treader cricket populations and habitat would be monitored and managed in perpetuity.

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 sand treader cricket. Critical habitat has not been designated for this species; therefore, the proposed action would not destroy or adversely modify critical habitat. We reached this conclusion because a minimum of 95 percent of sand treader cricket Core Habitat and 91 percent of Other Conserved Habitat within the Plan Area would be conserved and managed in perpetuity. 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, potential for reproduction, or distribution of this species throughout its range.

AMOUNT OR EXTENT OF TAKE

It is difficult to quantify the number of sand treader crickets that would be impacted as a result of

the proposed action over the 75-year permit term due to the large Plan Area. Therefore, the Service is quantifying the take as the number of acres of modeled habitat that would be impacted in the MSHCP Plan Area as a result of the proposed action. We anticipate that up to 13,682 acres of modeled habitat within the Plan Area would become unsuitable for the sand treader cricket as a result of the proposed action. Additionally, a small, but undeterminable, number of sand treader cricket individuals are anticipated to be taken as a result of monitoring and management actions.

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Coachella Valley Jerusalem Cricket (*Stenopelmatus cahuilaensis*)

STATUS OF THE SPECIES

Legal/Listing Status

The Coachella Valley Jerusalem cricket (*Stenopelmatus cahuilaensis*; Jerusalem cricket) currently is not a Federal or State listed species. NatureServe (2005) gives the Jerusalem cricket a Global Rank of G1 – Critically Imperiled.

Species Description

Tinkham first described this species in 1968 from collections made in 1962 and after. The type locality of the species is described as "undulating dunes piled up at the northern base of the San Jacinto Mountains," reached by traveling south from the old Palm Springs Depot (10 miles west of Palm Springs). This location is likely at or near the Snow Creek dunes area. The known range also includes portions of what is now northern Palm Springs and Cathedral City.

Distribution

The known range for the Jerusalem cricket is entirely within the Plan Area. It is known from near the Plan boundary in the Cabazon area west of Fingal's Finger to the Snow Creek area and east to Windy Point, and from remnants of sand dune habitat around the Palm Springs Airport. It has also been found in the sandy soils on the ridgeline along the eastern side of Whitewater Canyon. This species has been observed on some of the lands owned by the BLM in the Windy Point area, and on lands recently purchased by the BLM or by the Friends of the Desert Mountains along Snow Creek Road. Cameron Barrows (pers. comm.) has reported observing these crickets only in the Snow Creek area; this Jerusalem cricket has not been detected on the Thousand Palms Preserve despite trapping efforts in this area (C. Barrows, pers. comm.). Jerusalem crickets have not been found in the vicinity of the Whitewater Floodplain Preserve. The easternmost occurrence is in the vicinity of Thousand Palms, near Bob Hope Drive and Interstate 10. This location may no longer be extant, as the area is increasingly developed. The lack of observations of this species east of Windy Point suggests that they may not occur in significant numbers in the central Coachella Valley. Greg Ballmer suggests in the Independent Science Advisors review (Noss *et al.* 2001) that a predicted climatic shift toward warmer and drier conditions would emphasize the importance of protecting habitat for this species at the western end of its range, especially along the Whitewater River wash from Palm Springs westward to Fingal's Finger.

In the spring of 2003, biologists from UC Riverside conducted surveys for the Jerusalem cricket by revisiting previously known locations and new areas (Barrows 2005). To date, more than 60 crickets have been located, extending the known distribution of this species west nearly to the Plan boundary. At the same time, sites checked within the potential habitat area east of Windy Point have not yielded any crickets.

Habitat Affinities

Jerusalem crickets occur in sandy to somewhat gravelly sandy soils and have been called an

obligate sand species (G. Ballmer, pers. comm.). They do not necessarily require active blowsands, and have been found in loose wind blown drift sands, dunes, and sand in vacant lots if native vegetation exists. Jerusalem crickets have also been found associated with the roots of members of the sunflower family, including *Ambrosia* sp. and *Encelia* sp. (D. Weissman and G. Ballmer, pers. comm.). Dave Hawks and Greg Ballmer excavated one individual from the root zone under a creosote bush (G. Ballmer, pers. comm.).

According to Hawks (1995), these Jerusalem crickets require high humidity; most observations have followed winter and spring storms while the soil substrate remains moist. They are most often located beneath surface debris during the cooler and wetter months of the year. During the summer months, they spend daylight hours in deep burrows in the ground; they may rarely be encountered at the surface during the night (Hawks 1995). Because these Jerusalem crickets have been observed more widely at the western edge of the Coachella Valley and because of their affiliation with cool, moist conditions, it has been suggested that they may be limited in distribution by temperature and moisture regimes (Tinkham 1968, Hawks 1995).

Life History
The life history of these insects is not well known. The Jerusalem cricket feeds at night on roots, tubers, and detritus; they have also been occasionally observed feeding on dead animals and may be cannibalistic. Male and female Jerusalem crickets drum their abdomens against the bottom of their burrows or the ground to attract one another. The female lays small clusters of relatively large eggs in soil pockets. Their complete life cycle may extend three years or more.

Population Trends
Ballmer (1993) has suggested that average annual precipitation and floral community components may be used to predict the occurrence of this species. He suggests that dunes east of Ramon Road (Bob Hope Drive), at the Thousand Palms Preserve, and in Indian Wells/La Quinta (mostly extirpated) appear to be drier than sites where *S. cahuilaensis* was found, as evidenced by the comparative lack of winter/spring annuals and herbaceous perennials. Ballmer describes observations of sand near Windy Point that was wet to a depth of several inches following winter storms, while sand at Washington Street was damp to a depth of one to two inches, at most. However, complete information on the population size and density of Jerusalem crickets is not available due to lack of surveys.

Threats
The most significant threats to the Jerusalem cricket are habitat fragmentation and OHV activity. OHV activity damages the Coachella Valley Jerusalem cricket habitat by crushing underground burrows and eliminating native vegetation. This species is apparently limited to sand dunes and sand fields at the west end of the Plan Area where the temperature/moisture gradients are within their tolerance levels.

Synopsis of Status
Insufficient data exist to determine whether the population is stable, improving, or declining. However, surveys did not detect crickets in the eastern portion of its former range (Barrows 2005), and development in Palm Springs suggests that much of the habitat is no longer suitable

for Coachella Valley Jerusalem crickets.

ENVIRONMENTAL BASELINE

Status of the Species in the Action Area

The Jerusalem cricket is restricted to the aeolian sand communities in the Coachella Valley. Within the Action Area, the current Jerusalem cricket distribution in the Coachella Valley area is known from near the Plan boundary in the Cabazon area west of Fingal's Finger to the Snow Creek area and east to Windy Point, and from remnants of sand dune habitat around the Palm Springs Airport. It has also been found in the sandy soils on the ridgeline along the eastern side of Whitewater Canyon. This species has been observed on some of the lands owned by the BLM in the Windy Point area, and on lands recently purchased by the BLM or by the Friends of the Desert Mountains along Snow Creek Road. The easternmost occurrence is in the vicinity of Thousand Palms, near Bob Hope Drive and Interstate 10. The Action Area supports all of the known Jerusalem cricket occurrences. Population estimates throughout the Action Area are not currently available.

It is unknown whether the overall range of this species has been significantly reduced from the historical distribution, and if the number of extant occurrences has declined dramatically. However, portions of the Jerusalem cricket's historic habitat have been eliminated or degraded by reduced/eliminated sand sources, OHV use, and/or invasive plant species.

In the past 40 years, urbanization has accelerated the loss of suitable Jerusalem cricket habitat. Increased urbanization has reduced available habitat through direct conversion of land and alterations in the sand transport system responsible for the creation/maintenance of sandy ecosystems. As habitat for the species becomes increasingly fragmented by urban development, remaining populations become more vulnerable to adverse effects of vehicular activities, roadside maintenance, or subsequent paving/landscaping and accompanying exotic plant invasions. Fragmentation increases the potential for stochastic events that detrimentally affect long-term survival probability. Similarly, fragmentation also decreases the species' resilience to rebound from such events. Additionally, OHV activities have contributed to reductions/alterations in the Jerusalem cricket populations.

The Snow Creek/Windy Point Conservation Area is the only Core Habitat area of the proposed MSHCP Reserve System for the Jerusalem cricket. Other Conserved Habitat occurs within the Cabazon, Stubbe and Cottonwood Canyon, Whitewater Canyon, Highway 111/I-10, Whitewater Floodplain, Upper Mission Creek/Big Morongo Canyon, Willow Hole, Long Canyon, Edom Hill, Thousand Palms, and Santa Rosa and San Jacinto Mountains Conservation Areas.

Snow Creek/Windy Point Conservation Area

The Snow Creek/Windy Point Conservation Area consists of 1,690 acres of Core Habitat and 283 acres of Other Conserved Habitat for this species. Of this total, 187 acres of Core Habitat is Existing Conservation Land that is controlled by BLM. According to Greg Ballmer (pers. comm.) the area around Fingal's Finger appears to have the highest density for this species within its known distribution.

The sand sources for this area include primarily the Whitewater and San Gorgonio Rivers plus their tributaries, originating in the San Jacinto and San Bernardino Mountains. The sand supply to this Conservation Area has likely been significantly reduced by sand and gravel mining upstream on the San Gorgonio River, but the blowsand ecosystem likely remains functional in the long-term with the reduced sand input.

The Snow Creek/Windy Point Conservation Area currently is heavily affected by invasive exotic plants, notably Saharan mustard. These invasive plants have increased the stabilization of soils within the Conservation Area and reduced or slowed aeolian sand transport. These plants likely compete with and reduce the productivity of native plants, and likely affect wildlife by altering the availability of forage plants and the characteristics of the ecosystem structure (Cal-IPC 2005; Brooks 2005). In addition, some of these plants likely increase the potential for fire (Sanders and Minnich 2000; Cal-IPC 2005; Brooks 2005). Dense stands of Saharan mustard in the Coachella Valley appear to suppress native wildflowers; because of its quick growth and flowering following rains, it appears to monopolize available soil moisture as it builds canopy and matures seed long before many native species have begun to flower (Sanders and Minnich 2000).

In addition to the presence of invasive plants, this Conservation Area has been and continues to be subject to substantial illegal OHV activity that has resulted in the alteration/degradation of much of the Jerusalem cricket habitat (as described above). One major OHV access point into the Conservation Area (that is currently open) is through BLM lands into other portions of the Conservation Area. Thus, the proposed Snow Creek/Windy Point Conservation Area portion has been and continues to be compromised by these activities. Although it was the intention of BLM's CDCA Plan Amendment (and the associated Terms and Conditions within our Biological Opinion for BLM's action) to manage these areas, including management and enforcement activities of patrolling and blocking OHV access, these efforts to date have been unsuccessful in stemming illegal OHV activity in this area.

Highway 111/I-10 Conservation Area

The Highway 111/I-10 Conservation Area consists of 372 acres of Other Conserved Habitat for the Jerusalem Cricket. Of this total, there are no Existing Conservation Lands. This area likely provides habitat for the Jerusalem cricket, as well as an important linkage to Core Habitat within the Snow Creek/Windy Point Conservation Area to the south and Other Conserved Habitat within the Whitewater Canyon Conservation Area to the north. There are three known occurrences of Jerusalem crickets within this Conservation Area.

Whitewater Floodplain Conservation Area

The Whitewater Floodplain Conservation Area consists of 5,646 acres of Other Conserved Habitat for this species. Of this total, 2,532 acres are Existing Conservation Lands controlled by BLM and CVWD. To date, Jerusalem crickets have not been observed within the Whitewater Floodplain Conservation Area. More information is needed about the extent to which this cricket may occur in this area.

The Whitewater Floodplain Conservation Area includes portions of the Whitewater River floodway and floodplain south of Interstate-10. The blowsand ecosystem of the Whitewater

River floodplain includes fluvial (sediments moved by water flows) and aeolian (sediments moved by wind) components. Sediments, most importantly sand, is fluvially deposited (and existing deposits exposed) during stormwater flows within the floodway and portions of the floodplain of the Whitewater River.

In addition to sand depletion that is occurring in the Conservation Area, OHV activity also affects the ability of this area to provide habitat for the Jerusalem cricket.

Upper Mission Creek/Big Morongo Canyon Conservation Area
The Upper Mission Creek/Big Morongo Canyon Conservation Area consists of 715 acres of Other Conserved habitat for this species. Of this total, 154 acres are Existing Conservation Lands controlled by the BLM.

Within this Conservation Area suitable habitat is located within scattered patches of Aeolian sand on the bluffs east of Whitewater Canyon within a wind farm area. There is one known occurrence of Jerusalem cricket from within this Conservation Area.

Willow Hole Conservation Area
The Willow Hole Conservation Area consists of 2,632 acres of Other Conserved Habitat. Of this total, 245 acres are Existing Conservation Lands and are controlled by Wildlife Conservation Board and BLM. There are no known occurrences of this species within this Conservation Area. Greg Ballmer (pers. comm.) has done some searching for Jerusalem crickets in the dunes along the San Andreas Fault west of Palm Drive, but has not located any individuals. He suggests that this area is comparatively drier than the Snow Creek area, which reduces the viability of the habitat for the Jerusalem cricket. Additional information is needed to determine the extent to which this cricket may occur within the Willow Hole Conservation Area.

The Willow Hole Conservation Area is subject to fragmentation as a result of roads, including Palm Drive, Mountain View Drive, and Varner Road. Additionally, like Snow Creek/Windy Point Conservation Area, the Willow Hole Conservation Area is subject to illegal OHV activity. OHV activity continues to modify BLM land, while providing access to the adjacent Existing Conservation Lands and proposed CVAG reserve lands. Thus, a portion of the proposed Reserve System has been and will continue to be compromised by these activities unless intervention occurs.

Edom Hill Conservation Area
The Edom Hill Conservation Area consists of 1,256 acres of Other Conserved Habitat. Of this total, 219 acres are Existing Conservation Lands and are controlled by BLM and the County of Riverside. There are no known occurrences of Jerusalem Crickets within the Edom Hill Conservation Area. Like Willow Hole, this area is drier than Snow Creek, which reduces the viability of the habitat for the Jerusalem cricket. This area was included in the habitat model for the species because the species has been observed as far east as Thousand Palms in the vicinity of Bob Hope Drive and there is suitable sandy substrate habitat in this Conservation Area. Additional information is needed to determine the extent to which this cricket may occur within the Edom Hill Conservation Area.

Thousand Palms Conservation Area
The Thousand Palms Conservation Area consists of 197 acres of Other Conserved Habitat. Of this total, 51 acres are Existing Conservation Lands and are controlled by BLM.

Santa Rosa and San Jacinto Mountains
The Santa Rosa and San Jacinto Mountain Conservation Area consists of 199 acres of Other Conserved Habitat. Of this total, 32 acres are Existing Conservation Lands and are controlled by BLM. No trapping results area available for this Conservation Area.

Cabazon Conservation Area
The Cabazon Conservation Area consists of 356 acres of Other Conserved Habitat. Of this total, there are no Existing Conservation Lands. No trapping results are available for this Conservation Area.

Stubbe and Cottonwood Canyons Conservation Area
The Stubbe and Cottonwood Canyons Conservation Area consists of 12 acres of Other Conserved Habitat. Of this total, 8 acres are Existing Conservation Lands. No trapping results are available for this Conservation Area.

Long Canyon Conservation Area
The Long Canyon Conservation Area consists of 110 acres of Other Conserved Habitat. Of this total, there are no Existing Conservation Lands. No trapping results are available for this Conservation Area.

Outside of Conservation Areas
Of the 22,811 acres of modeled habitat within the entire Plan Area, 9,034 acres (40 percent of the modeled habitat) are anticipated to be lost outside of the Conservation Areas through MSHCP implementation. The habitat outside of the Conservation Areas is highly fragmented, surrounded by development, and has a compromised sand transport system. These areas are primarily in the area north of Interstate 10 at the Highway 111 intersection, south of the Whitewater Floodplain Preserve, and in areas outside the Conservation Area boundary near the Whitewater percolation ponds. There are also remnants of the Big Dune area which no longer has a viable sand transport/wind corridor and is highly fragmented by major roads.

Factors Affecting the Species' Environment within the Action Area
BLM lands within the Plan Area (and environs) are subject to the Coachella Valley California Desert Conservation (CDCA) Area Amendment (BLM 2002). On BLM lands within the Plan Area, BLM has committed within the CDCA to a series of protections that influence the conservation of Jerusalem crickets; within the biotic communities of sand dunes and sand fields, BLM will manage their lands under the following conservation objectives:
Conserve at least 99 percent of extant sand dunes and sand fields.
Avoid stabilization of sand dunes due to adjacent development and spread of non-native species.
Maintain, and enhance where feasible, aeolian (wind blown) and fluvial (water borne) sand transport systems.

Minimize sand compaction to protect Jerusalem cricket and giant sand treader habitat and to minimize crushing of fringe-toed lizards.
Minimize roads within flat-tailed horned lizard habitat which are prone to crushing by vehicles.
Avoid disturbance and compaction of sandy habitats associated with Coachella Valley milk-vetch and avoid crushing of Coachella Valley milk-vetch plants.
Reduce/control spread of non-native plants like Russian thistle and Saharan mustard; and exotic animals such as non-native ants and brown-headed cowbirds.
Minimize loss of native vegetation, minimize habitat fragmentation and maintain habitat patch connectivity.

Wind turbines may create noise and vibration sufficient to disrupt the cricket communication system (M. Swartz, CVWD, pers. comm.). This factor potentially would apply in the Cabazon, Stubbe and Cottonwood Canyons, Snow Creek/Windy Point, Highway 111/I-10 (turbines are not in, but close to, this Conservation Area), Whitewater Floodplain, Upper Mission Creek/Big Morongo Canyon, and Willow Hole Conservation Areas.

Management and Monitoring
Extensive monitoring of the Jerusalem cricket population within the Coachella Valley has not occurred to date. Extensive species-specific management actions have not been developed or implemented for the Jerusalem cricket. The Conservation Areas where the Jerusalem cricket occurs are within Reserve Management Units 1 and 6. Management actions that have affected the Jerusalem cricket have been done in association with the Coachella Valley fringe-toed lizard HCP, and range from control of exotic species and limiting public access to compatible scientific, educational, and recreational uses. A successful tamarisk eradication program has been completed. Within the Willow Hole-Edom Hill Reserve, the BLM lands are designated as an ACEC. The BLM ACEC lands are classified as Class "Limited" in the CDCA Plan. Management objectives include control of deleterious activities such as OHV use and perimeter fencing to limit OHV activity. However, OHV activity continues to be a problem.

EFFECTS OF THE ACTION
Assumptions
The effects analysis below is based on the following assumptions:
General Plans of Local Permittees, future land uses and development patterns will reflect current land use trends (largely residential and tourist resort-commercial uses), thereby explicitly ruling out unlikely future land uses such as heavy industry, expansion of agriculture into native habitat (unregulated by the County and therefore not a Covered Activity), etc.
Approximately 2,602 acres of the total 22,811 acres of Jerusalem cricket modeled habitat within the Plan Area are owned and managed by BLM. This biological opinion assumes that the CVCC will enter into a Memorandum of Understanding with BLM prior to issuance of the Permits to ensure that all BLM lands within the Plan Area are managed consistent with the MSHCP.
The BLM lands containing Jerusalem cricket modeled habitat are designated as Conservation Level 2 and 3 lands. It is assumed that habitat loss will occur on no more than one percent of these lands, and will only occur in conjunction with providing reasonable access across public lands to private inholdings within the Wilderness Areas, trails and trailheads, or as necessitated by an Adaptive Management action, and that development will be consistent with the

Conservation Objectives for the relevant Conservation Area.

Urban Development
Direct Effects
The entire Plan Area includes approximately 22,811 acres of modeled habitat for the Jerusalem cricket. Of this acreage, 20,209 acres are subject to the Permit (i.e., non-Federal lands) (Table 4-114 of the MSHCP). Approximately 9,424 acres (41 percent) of the modeled habitat is outside MSHCP Conservation Areas. Of this total, 9,034 acres are anticipated to be lost due to MSHCP implementation. Within the Conservation Areas, it is anticipated that 10 percent of modeled habitat on private lands would be subject to loss. Therefore, an additional 955 acres of this species' habitat would be subject to take inside the Conservation Areas (Table 4-114 of the MSHCP). Specifically, the MSHCP anticipates that 150 acres (9 percent) of modeled Core Habitat and 805 acres (7 percent) of Other Conserved Habitat would be lost within ten Conservation Areas: Snow Creek/Windy Point (150 acres Core Habitat; 28 acres Other Conserved Habitat); Stubbe and Cottonwood Canyons (1 acre Other Conserved Habitat); Whitewater Canyon (1 acre; Other Conserved Habitat); Highway 111/I-10 (37 acres; Other Conserved Habitat); Whitewater Floodplain (311 acres; Other Conserved Habitat); Thousand Palms (15 acres; Core Habitat); Willow Hole (239 acres; Other Conserved Habitat); Edom Hill (104 acres; Other Conserved Habitat); Upper Mission Creek/Big Morongo Canyon (52 acres; Other Conserved Habitat), and Santa Rosa and San Jacinto Mountains (17 acres; Other Conserved Habitat).

Although the majority of the Core Habitat would be conserved, the configuration of allowable development is unknown at this time. Therefore, as currently proposed, development within the area Conservation Areas, although it represents a small percentage of total Jerusalem cricket Core Habitat, could directly injure or kill individuals within the Plan Area. Furthermore, development within these areas could eliminate Core Habitat necessary for survival or expansion of extant populations. Based on limited studies and observations, this species habitat includes aeolian sand communities. According to Barrows (2005), habitat requirements appear to be seasonably moist friable soils. As part of the Plan, extensive studies should be conducted throughout the Plan Area to better determine the habitat requirements of this species.

Outside of the Conservation Areas
The proposed loss of 9,034 acres (40 percent of the total acres of modeled habitat within the Plan Area) of Jerusalem cricket habitat outside of the Conservation Areas would predominately result from development, associated infrastructure, construction of roads, and continued illegal OHV and other recreational activities. The Jerusalem cricket would be impacted due to being crushed, conversion of habitat to development, and precluding the necessary fluvial and aeolian processes to maintain habitat for this species.

The overall amount and proportion of modeled habitat (compared to what would remain) that would be lost to development within the next 75 years is considerable. However, as discussed above, most of the habitat outside of the Conservation Areas consists of relatively disjunct, small patches of suitable habitat where the sand source/transport system has been compromised. Much of this land is fragmented and has a limited ability to provide for long-term conservation of the

species. The fragmented blocks of habitat are more susceptible to edge effects, including crushing by OHV activity.

The MSHCP proposes to address the losses of Jerusalem cricket habitat by conserving large blocks of habitat, protecting Core Habitat, maintaining sand source and transport systems, and managing and monitoring the lands to address edge and other stressors to the Jerusalem cricket.

Inside of the Conservation Areas

A wide variety of sandy substrate types is important for the conservation of Jerusalem cricket because of the dynamics of the aeolian sand transport processes. The proposed loss of 955 acres (10 percent) of modeled Jerusalem cricket habitat on private lands within the Conservation Areas would predominately result from Covered Activities including development, associated infrastructure, construction of roads, and continued illegal OHV and other recreational activities. The Jerusalem cricket would be impacted due to being crushed, conversion of habitat to development, and precluding the necessary fluvial and aeolian processes to maintain habitat for this species.

The MSHCP creation of conservation areas for the Jerusalem cricket was based on the delineation of Core Habitat that 1) is large enough to support a viable population of the species independent of other Core Habitat areas; 2) is not fragmented by development, including roads; 3) contains lightly traveled two-lane roads that have limited potential for expansion; 4) has intact Essential Ecological Processes, including sand source and sand delivery systems; and 5) provides suitable areas to act as refugia in the event of large-scale flood events or other extreme conditions (climate change, extended drought).

Using the above criteria, the MSHCP identifies Core Habitat for the Jerusalem cricket within one conservation area. The potential effects of Plan implementation on the Jerusalem cricket and Core Habitat within this conservation area are discussed below.

Snow Creek/Windy Point Conservation Area

Approximately 1,540 acres of modeled Jerusalem cricket Core Habitat are proposed to be conserved and 150 acres are anticipated to be lost within the Snow Creek/Windy Point Conservation Area.

The adverse effects to the Jerusalem cricket within the Snow Creek/Windy Point Conservation Area are invasive weeds, wind farm development and OHV activity. OHV activity continues to degrade much of the habitat within this Conservation Area and may result in direct mortality to the Jerusalem cricket. Thus, the Snow Creek/Windy Point Conservation Area will continue to be compromised by these activities unless intervention occurs. The MSHCP currently anticipates that a weeding program will only be initiated once it is determined to be a possible stressor. (refer to the Invasive Weed Species Discussion in the General Effects Section of this Biological Opinion). The weed problem appears to be persisting within this Conservation Area, therefore, to adequately address the Jerusalem cricket and ensure long-term conservation a comprehensive weed management program will need to be implemented. In addition to invasive weeds, OHV use is an existing problem within this area. Controlling OHV use is a management action that

needs to be initiated to ensure adequate conservation of potential Jerusalem cricket habitat within this Conservation Area. Regarding wind farm development, the disturbance and fragmentation associated with the construction of the wind farms may have impacts to the crickets. The extent to which an increase in noise and/or vibration from additional wind turbines would impact Jerusalem crickets cannot be determined from the available information.

Other Conserved Habitat

Within the Plan Area, Other Conserved Habitat for the Jerusalem cricket totals 11,780 acres. Of this total 805 acres will be lost due to MSHCP implementation and 10,509 acres are proposed to be conserved within 12 Conservation Areas. As described in the Environmental Baseline section above, the amount of Other Conserved Habitat within the Conservation Areas ranges from 2 to 5,646 acres. Although some of the other conserved habitat within these Conservation Areas could support the Jerusalem cricket, little is known about the status of the species within these areas. Furthermore, the Conservation Areas such as the Santa Rosa and San Jacinto Mountains are disjunct from any Core habitat areas. As such, the viability the Jerusalem cricket within these Conservation Areas is tenuous.

Indirect Effects

Indirect effects resulting from the MSHCP are primarily Covered Activities that may impede the transport of sand that supports habitat for the Jerusalem cricket. The indirect effects will not result in immediate harm to the species, but over time will prohibit sand from re-entering the system and sustaining the dune habitat necessary for cricket survival.

The existing percolation ponds in the Whitewater Floodplain Conservation Area are one of the most problematic sources of indirect effects that will continue to impact the fluvial and aeolian processes necessary to sustain Jerusalem cricket habitat. The effects to the cricket have been discussed above in the Environmental Baseline Section regarding the Whitewater Floodplain Conservation Area.

Indirect effects would also result from barriers associated with urban development upwind of each of the respective Conservation Areas as discussed above. Existing infrastructure in sand source areas and sand transport corridors, interfere with the fluvial and aeolian transport systems responsible for maintaining blowsand habitat within the proposed Conservation Areas.

Additional indirect effects, associated with increases in invasive flora and OHV use, are expected to occur to Jerusalem crickets and Jerusalem cricket habitat with Plan implementation. As described in detail above, invasive plants such as Saharan mustard and OHV activity may substantially degrade blowsand areas rendering the areas unsuitable for the Jerusalem cricket.

Avoidance and Minimization Measures Included in the Plan

Minimization measures would be included in the Plan to reduce many of the above-described direct and indirect impacts to Jerusalem crickets. Required Avoidance, Minimization, and Mitigation Measures would protect and maintain the natural fluvial sand transport capacity of fluvial systems (Section 4.4 of the MSHCP), and Land Use Adjacency Guidelines would minimize indirect effects from development discussed above within or adjacent to Conservation

Areas by regulating drainage, toxics, lighting, noise, invasive species, and human intrusion (Section 4.5 of the MSHCP). General management actions would conserve the function of Jeruslaem cricket habitat by controlling unauthorized OHV/vehicle trespass and invasive species, (Section 8.2.4 and 8.4.3 of the MSHCP).

Monitoring and Adaptive Management Program
Adaptive Management, discussed in Section 8.4.3, would focus on identification of threats and development of a Monitoring Program to address management questions related to these threats. Initially baseline data would be collected on Jerusalem crickets. The precise protocols to be used for these surveys would be developed during the baseline phase. Surveys would be completed to better describe the distribution and refine the distribution and habitat association models for Jerusalem crickets. These surveys also would gather baseline data on invasive species and their effects on the Covered Species. Based on the information gathered during the baseline phase, the appropriate level of ongoing monitoring would be determined for each of the Covered Species. Ongoing monitoring may change over time in response to Adaptive Management needs, changes in technology, or other circumstances.

The Monitoring and Adaptive Management Plan will also address the management and monitoring of the aeolian sand communities within the Plan Area. Management action for these communities include elimination of OHV trespass, the protection of wind and sand deposition corridors, control of invasive species, and adaptive management regarding new information on impacts to the species (i.e., wind turbine operations).

Avoidance and Minimization Measures Included in the Plan
To avoid and minimize the direct and indirect effects to the Jerusalem cricket (as described in the previous section), and protect ecosystem integrity, and the Covered Species and natural communities they encompass, the Plan would include general management actions as described in Section 8.2.4.1 of the Plan, as well as specific monitoring objectives as described in Section 8.4.3.3 of the Plan. It is possible that a small number of Jerusalem crickets and/or Jerusalem cricket habitat may be impacted by implementation of these general management actions and monitoring objectives. However, these actions likely would minimize the above-described potential threats to the Jerusalem cricket and Jerusalem cricket habitat in the long-term.

Trails Plan
Trails currently exist on Reserve Lands outside the Santa Rosa and San Jacinto Mountains Conservation Area. The existing trails are considered Allowable Uses (allowed, but not Covered Activities under the MSHCP) under the MSHCP and include 1) a system of trails on the Thousand Palms Preserve; 2) the Pacific Crest National Scenic Trail traversing Reserve Lands in the Snow Creek/Windy Point and Stubbe and Cottonwood Canyons Conservation Areas; and 3) trails on non-Federal lands within Dos Palmas Preserve/ACEC. The conditionally compatible public access uses on Reserve Lands consist of trails, facilities, and passive recreational activities.

The MSHCP proposes the construction and maintenance of trails and passive recreation as Covered Activities. If trails are constructed and recreational activities occur within Jerusalem

cricket habitat, it could result in loss of habitat from vegetation clearing from the trail footprint, crushing of individuals, and soil compaction. Effects due to the construction and operations and maintenance of trails would be minor. Similarly, minor effects are likely due to passive recreational uses. However, illegal OHV use could result in further detrimental effects to this species that could be promoted by the installation of trails and recreational uses within the Reserve System. Section 7.3.4.4 of the MSHCP proposes *Guidelines for Public Access and Recreation on Reserve Lands* to avoid and minimize potential adverse effects of the Trails Plan and recreation activities. Specifically, the Plan includes criteria for siting and design of the trails and facilities and guidelines for public use and maintenance. Implementation of these guidelines, in conjunction with Adaptive Management (Section 8.0 of the Plan), would avoid and minimize adequately the adverse direct and indirect effects to Jerusalem crickets and Jerusalem cricket habitat from the trails plan.

Changed and Unforeseen Circumstances

The Plan would address the following Changed Circumstances: drought, fire, invasion by a new invasive species, lowering of the water table, and new listing of a Species Not Covered by the MSHCP. It is anticipated that drought, fire, invasion by a new invasive species, and lowering of the water table would result in direct and indirect effects to the Jerusalem cricket that are similar to those described in the previous sections (i.e., Urban Development, Monitoring and Adaptive Management, and Trails Plan). Field observations of this species, and the limited studies that have been conducted to date, suggest that this species may be limited by temperature and moisture regimes (Tinkham 1968, Ballmer pers.comm.).

Avoidance and Minimization Measures Included in the Plan

To avoid and minimize potential adverse direct and indirect effects of the Changed Circumstances (as described in the previous section) on the Jerusalem cricket, the Plan would include remediation actions, as described in Sections 6.8.3.1 through 6.8.3.5. Implementation of these actions, in conjunction with Adaptive Management (Section 8.0 of the Plan), would avoid and minimize adequately the adverse direct and indirect effects to Jerusalem crickets and Jerusalem cricket habitat from Changed Circumstances.

Cumulative Effects

It is anticipated that there may be conversion or degradation of Jerusalem cricket habitat within the action area resulting from OHV, development not contemplated in plan, illegal dumping, and invasive weeds. Activities such as these will degrade existing habitat and affect Jerusalem cricket populations (refer to the Cumulative Effects discussion in the General Effects Section of this Biological Opinion).

The Agua Caliente Band of Cahuilla Indians is undertaking a Habitat Conservation Plan for all of their Tribal lands. The draft Plan and associated documents have been reviewed publicly. It is anticipated that the final Plan and associated environmental analysis will be complete in mid-2008 with permit issuance scheduled for late 2008. Although there will be habitat loss associated with that Plan, the overall net benefit to the species is positive. Because issuance of that permit is a Federal action, an analysis of the impacts of that Plan will be completed in the required section 7 process.

CONCLUSION

In summary, a total of 12,049 acres (53 percent) of Jerusalem cricket modeled habitat, of which 1,540 acres are Core Habitat and 10,509 acres are Other Conserved Habitat, are proposed to be conserved on private land in perpetuity to offset the loss of 9,989 acres (44 percent) of modeled habitat as a result of proposed Covered Activities throughout the Plan Area. However, it should be noted that the total of 9,989 acres to be lost includes only 150 acres (9 percent) of the modeled Core Habitat. The Conservation Areas also contain Existing Conservation Lands (3,429 acres; 15 percent) that augment the reserve design of the Plan, thereby enhancing the Reserve System. The Jerusalem cricket is endemic within the Plan Area; therefore, the Coachella Valley is an essential part to the species survival since it supports the entirety of the species range.

We anticipate the proposed action would affect the Jerusalem cricket as described in the analysis above. Implementation of the avoidance, minimization, and mitigation measures identified in the MSHCP and the recommended changes would further reduce impacts to this species. With the additional measures described in the analysis above, this species is anticipated to persist within the Action Area through the conservation and management of Core and Other Conserved Habitat within the Plan Area. We anticipate that Jerusalem cricket populations and habitat would be monitored and managed in perpetuity.

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 Jerusalem cricket. Critical habitat has not been designated for this species; therefore, the proposed action would not destroy or adversely modify critical habitat. We reached this conclusion because a minimum of 91 percent of Jerusalem cricket Core Habitat and 93 percent of Other Conserved Habitat within the Plan Area would be conserved and managed in perpetuity. 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, potential for reproduction, or distribution of this species throughout its range.

AMOUNT OR EXTENT OF TAKE

It is difficult to quantify the number of Jerusalem crickets that would be impacted as a result of the proposed action over the 75-year permit term due to the large Plan Area. Therefore, the Service is quantifying the take as the number of acres of modeled habitat that would be impacted in the MSHCP Plan Area as a result of the proposed action. We anticipate that up to 9,989 acres of modeled habitat within the Plan Area would become unsuitable for the Jerusalem cricket as a result of the proposed action. Additionally, a small, but undeterminable, number of Jerusalem cricket individuals are anticipated to be taken as a result of monitoring and management actions.

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FISH

Desert pupfish (*Cyprinodon macularius*)

STATUS OF THE SPECIES

Legal/Listing Status

There are two recognized subspecies of the desert pupfish, *Cyprinodon macularius macularius*, which resides in the Salton Sea/Colorado River region in California and Mexico and *C. m. eremus*, which is found in Quitobaquito Springs, Arizona and Rio Sonoyta, Mexico. Both subspecies are included in the Federal listing of the desert pupfish, as endangered, March 31, 1986 (51 *FR* 10842). Critical habitat was designated for this species at San Felipe Creek and two of its tributaries, Carrizo Wash and Fish Creek Wash in Imperial County, California and Quitobaquito Spring, Pima County, Arizona [50 CFR 17.95 (e)]. A total of approximately 770 acres of critical habitat have been designated. A recovery plan issued in September, 1993 (58 *FR* 6526) , includes 3 goals to aid in the recovery of the desert pupfish: 1) secure, maintain (including habitat and water rights), and replicate all extant natural populations; 2) acquire additional natural habitats; and 3) establish replicates in the most natural habitats within the probable historic range. Further objectives include determination of habitat and biological criteria, acquisition of life history information, development and implementation of genetic protocol, population monitoring, and information and education. In the Salton Trough, this species would benefit from a reduction in the populations of exotic fish species that compete with or prey upon the desert pupfish. Efforts are ongoing by CDFG to maintain pupfish habitats in San Felipe and Salt Creeks free of exotic fish species. Control of exotic fish in the drains is not likely possible, but habitat conditions that favor pupfish over the exotic species (e.g., shallow depths) could be targeted to reduce the impacts of exotic fish species on desert pupfish in the drains. CDFG and BLM have been implementing measures that reduce tamarisk stands around San Felipe and Salt Creeks to maintain adequate flows for desert pupfish in these areas. Tamarisk removal is an ongoing need.

Species Description

The desert pupfish is the largest of the North American pupfish (Schoenherr 1992). Although they may reach 3 inches (7.6 centimeters) in total length, total length rarely exceeds 1.5 inches (3.8 centimeters) (Schoenherr 1992). Desert pupfish have a smoothly rounded body shape and narrow, vertical dark bars on the sides (Schoenherr 1992). Breeding males are blue on the tops and sides with yellow to orange fins. Females and juveniles have tan to olive colored backs and silvery sides. Pupfish typically occupy the shallow waters of springs, small streams and marshes (USFWS 1993). Desert pupfish are adapted to harsh desert environments and capable of surviving extreme environmental conditions (Moyle 2002; Lowe *et al.* 1967). Although desert pupfish are extremely hardy in many respects, they prefer quiet water with aquatic vegetation (Schoenherr 1992), and they are vulnerable to competition or predation and thus can be displaced by exotic fishes (USFWS 1986).

The population is defined as occurring in two disjunct regions: Quitobaquito Springs/Rio Sonoyta in Arizona and Sonora, Mexico, respectively, and the Colorado River Drainage that includes several sites in and around the Salton Sink, California (USFWS 1986; Moyle 2002; Martin and Saiki 2005) and at least seven sites along the Colorado River Drainage in Baja California and Sonora, Mexico (Hendrickson and Varela-Romero 1989; Varela-Romero *et al.* 2002). In California the San Felipe Creek system, which includes San Sebastian Marsh, and Salt Creek provide natural habitat for desert pupfish populations.

Echelle *et al.* (2000) examined the taxonomic status of *C. macularis* using haplotyic variation and direct sequencing of two mitochondrial genes (ND2 and D-loop). They found that *C. macularis* is comprised of two evolutionarily divergent entities that should be recognized as distinct monophyletic groups: Rio Sonoyta/Quitobaquito Springs (*Cyprinodon macularius eremus*) and Salton Sea/Colorado River Delta (*Cyprinodon macularius macularius*). These two groups also differ morphologically and were previously designated as distinct subspecies (Miller and Fuiman 1987). The degree of genetic separation between individuals in these two regions suggests that they have been isolated on the order of 100,000 years, a hypothesis that is consistent with geological history (Echelle *et al*. 2000). Analysis of genetic differentiation within the Salton Sea/Colorado River Delta region produced two results. First, analysis based solely on the frequency of haplotypes generated through PCR-SSCP failed to differentiate samples from the Salton Sea and the Colorado River Delta as the 60-89% of individuals in each sample site contained the most common haplotype. Second, analysis based on direct sequence data indicated that there was small, but significant, genetic differentiation between the Salton Sea and Colorado River Delta. The apparent cause of this discrepancy is that although the most common haplotype was widespread, less common haplotypes were not shared throughout the region. Echelle *et al.* (2000) interpreted this result to mean that although gene flow probably occurred rarely throughout this area during large rain events, individuals typically do not move between the Salton Sea and Colorado River Delta. Hence, Echelle *et al*. (2000) recommend that the two regions be managed as separate units and that managers avoid intermixing individuals from these locations. In contrast with the Salton Sea/Colorado River samples, there was no evidence for genetic differentiation between the Rio Sonoyta/Quitobaquito samples. In this region, however, Echelle et al. (2000) also recommended against artificial intermixing as there is some degree of morphological divergence (Miller and Fuiman 1987) and a potentially long history of isolation between populations in Rio Sonoyta and Quitobaquito Springs.

Distribution

The historic range once extended from the Gila River tributaries in southern Arizona and northern Sonora, westward to the Salton Sea area and southward into the Colorado River delta region in Sonora and Baja California, Mexico (Minckley 1980; Miller 1943; Miller and Fuiman 1987). It also formerly occurred in the slow-moving reaches of some large rivers, including the Colorado, Gila, San Pedro, Salt, and Santa Cruz Rivers. Where suitable habitat was available, desert pupfish probably occurred in the Agua Fria, Hassayampa, and Verde Rivers of Arizona as well. Distribution of desert pupfish was widespread, but probably not continuous within its historic range (Echelle *et al*. 2000).

Currently, this species is known from only a few locations in California (Echelle *et al*. 2000;

Sutton 2002; Martin and Saiki 2005) and Mexico (Hendrickson and Varela-Romero 1989; Varela-Romero *et al*. 2003). The only remaining natural populations are found in a few sites in the Salton Sea drainage, and the Colorado River Delta in Baja California and Sonora, Mexico. Specifically, populations are found in two tributaries to the Salton Sea: San Felipe Creek and its associated wetlands in Imperial County and Salt Creek in Riverside County (Nicol *et al.* 1991). In addition, individuals have recently been found in more than fifty localities in drains and shoreline pools on the southern and eastern margins of the Salton Sea (Lau and Boehm 1991), and in small pools in the upper Coachella Valley. Sutton (1999, 2002) recorded desert pupfish movement from a shore line pool to a nearby drain and from the drain to the shoreline pool in the southwestern portion of the Salton Sea. Pupfish movement was also documented from Salt Creek to a shoreline pool at the terminus of Salt Creek (Sutton 2002). Decreases in the size of shoreline pools during seasonal fluctuations in water levels may affect fish health and/or force pupfish to seek other habitat. Thus, the connectivity between habitat types may be necessary to prevent pupfish from becoming stranded in habitats that cannot sustain them for prolonged periods (Sutton 1999). These observations indicate the importance of agricultural drains as pupfish habitat and the potential for pupfish to use shoreline aquatic habitats as corridors. This potential movement may be important in providing genetic mixing between various populations.

Varela-Romero *et al.* (2003) evaluated some of the characteristics of known localities of pupfish in the Colorado Rover Delta area in Mexico. These sites received flows from the Cerro Prieto Geothermal Station, nearby agritultural fields via an irrigation drain, subsurface flows from the Cienaga de Santa Clara, a series of hot springs that flow into the Cienaga de Santa Clara, and the outlet of the Wellton-Mohawk drainage system that bypasses the Colorado River and flows into the Cienaga. All of these sites were the subject of one or more of the following concerns: introduction of exotic fish species, potential reclamation of flows for re-use within the source system, and selenium concentrations reaching levels hazardous to fish or their prey.

Habitat Affinities

Tolerance for environmental extremes is a hallmark of the desert pupfish (Moyle 2002). Desert pupfish are capable of surviving in salinities ranging from twice the concentration of saltwater to that of freshwater (Barlow 1958a; Schoenherr 1992), temperatures ranging from 7 ^{o}C in the winter to 45 ^{o}C in the summer (Lowe *et al.* 1967; Schoenherr 1992), and oxygen levels ranging from saturation to 0.1-0.4 mg/L (Lowe *et al.* 1967). Lowe *et al*. (1967) found that desert pupfish survival was significantly greater under low oxygen conditions than survival of three other species of native Arizona stream fishes. A recent analysis of thermal tolerance in stream fishes demonstrated that the desert pupfish tolerated and survived in higher temperatures than 17 other native and nonnative species found in Arizona streams (Carveth *et al*. 2006).

Desert pupfish are typically found in backwater areas, springs, streams, and pools (Barlow 1958b; Moyle 2002). In the Salton Sea region, desert pupfish reside, in part, in pools formed by barnacle bars located in shoreline areas of the Salton Sea. Barnacle bars are deposits of barnacle shells on beaches, shoreline areas, and at the mouths of agricultural drains that discharge to the Salton Sea. The bars form pools that provide habitat for desert pupfish (IID 1994). Habitat for desert pupfish also occurs in the downstream ends of agricultural drains discharging directly to the Salton Sea, in the Salton Sea itself, and in San Felipe Salt Creeks.

Although desert pupfish are capable of surviving in extreme temperature, salinity and oxygen levels, these conditions are not necessarily optimal for this fish. Indeed, Barlow (1958b) observed that desert pupfish moved into the shallows to feed during the morning and evening but spent the day in deeper, cooler areas, apparently to avoid temperatures higher than 36 ^{o}C. In addition, desert pupfish were reported to bury themselves in the sediment and become dormant when the water becomes cold during the winter (Miller & Fuiman 1987; Moyle 2002). Further, Courtois & Hino (1979) found a negative relationship between salinity and egg deposition, likely because increased energy expenditure towards osmoregulation decreases egg supply. It is generally believed that desert pupfish are currently restricted to habitats characterized by extreme abiotic conditions because these areas preclude nonnative competitors and predators (Martin and Saiki 2005).

Life History

Desert pupfish are opportunistic feeders. Their diet varies seasonally with food availability and consists of algae, minute organisms associated with detritus, insects, fish eggs, and small crustaceans (Cox 1972; Naiman 1979). In the Salton Sea, desert pupfish are known to consume ostracods, copepods, and occasionally insects and pile worms (Moyle 2002). They are not considered food for piscivorous birds or fish because of their sparse density (Walker *et al.* 1961; Barlow 1961).

Spawning at the Salton Sea takes place between late March and late September when water temperatures exceed 20^{o}C (Moyle 2002; University of California Los Angeles; UCLA 1983). Pupfish can spawn several times during this period. Adult male desert pupfish are very territorial during the spawning season such that schools consist either entirely of adult females or entirely of juveniles. Desert pupfish usually set up territories in water less than 1 meter (3 feet) deep and associated with structure (Barlow 1961) and silt-free substrata (Loiselle 1982). Aggression in relation to territoriality is highest in locations with large amounts of habitat, high productivity, high population densities, and limited spawning substrate (USFWS 1993). Depending on size, a female pupfish may lay 50 to 800 eggs or more during a season (Crear and Haydock 1971). The eggs hatch in 10 days at 20^{o}C, and the larvae start feeding on small invertebrates within a day after hatching (Crear and Haydock 1971). Larvae are frequently found in shallow water where environmental conditions are severe.

Population Trends

Many surveys for desert pupfish were conducted in the Salton Sea region [agricultural drains: (Lau and Boehm 1991; Sutton 2002; M. Remington, IID, pers. comm. 1993 and 1995), shoreline pools (Sutton 2002) and tributaries (Sutton 2002; Martin & Saiki 2005)] over the past two decades. Although a lack of quantitative sampling precludes the ability to accurately discern population trends, contemporary population sizes appear to be dramatically reduced relative to historic abundances (Coleman 1929; Cowles 1934). Recent presence/absence surveys in the Salton Sea region indicate that occupancy is dynamic both within and among seasons (Martin & Saiki 2005). The Quitobaquito Springs population increased between 2000 and 2004, but the 2005 numbers declined substantially decline to <1,500 fish. Several refugia have been established per the direction of the Recovery Plan, and these are carefully managed. However,

several populations still need to have refugia established in order to meet the reclassification criterion provided in the Recovery Plan.

Threats

Although remarkably tolerant of extreme environmental conditions, the desert pupfish is threatened throughout its native range primarily because of habitat loss or modification, pollution, and introductions of exotic fishes (USFWS 1986; Moyle 2002). Improper grazing can increase turbidity by increasing erosion and reducing riparian vegetation. Water pollution from the application of pesticides in proximity to desert pupfish habitat has contributed to the decline of the Quitobaquito subspecies (Miller and Fuiman 1987). Droughts can cause the springs and headwaters that this species inhabits to dry up. Water development projects can degrade desert pupfish habitat by removing water through groundwater pumping, diversion, canal lining and irrigation. Water reduction can directly destroy habitats such as shoreline pools or sever connections between drainages and the Salton Sea, thus cutting off movement between drainages. The Salton Sea restoration may require infrastructure that could be a problem for desert pupfish. Careful consideration of the design will be necessary to meet the needs of the desert pupfish.

Current drain flows from the Wellton-Mohawk system that support aquatic habitats in the Cienaga de Santa Clara in Mexico are not secured. As is the case for the Yuma clapper rail, plans under consideration to capture, treat, and re-use these flows in the United States (USFWS 2006) would constitute a significant threat to this population of desert pupfish.

Synopsis of Status

Overall numbers of the species are low in both the Salton Sea and Quitobaquito Springs relative to historic values. The Quitobaquito population has shown a decline this past year that warrants close monitoring.

Environmental Baseline

Status of the Species in the Action Area

Desert pupfish were abundant along the shore of the Salton Sea through the 1950's (Coleman 1929; Cowles 1934; Barlow 1961). During the 1960's, the numbers declined, and by 1978 they were noted as scarce and sporadic (Black 1980). Declines are thought to have resulted from the introduction and establishment of several exotic tropical species into the Salton Sea (Bolster 1990; Black 1980). These introduced species prey on juveniles (Martin & Saiki 2005) and eggs (Schoenherr 1988), compete with desert pupfish for food and space (Moyle 2002), and disrupt breeding (Schoenherr 1988). Other factors responsible for declines in desert pupfish populations include habitat modification due to water diversions and groundwater pumping for agriculture (Pister 1974; Black 1980). There is also concern that introduced saltcedar (tamarisk) near pupfish habitat may cause a lack of water at critical times due to evapotranspiration (Marsh and Sada 1993). Aerial pesticide application is a common practice around the Salton Sea that may also affect pupfish populations (Marsh and Sada 1993).

Natural desert pupfish habitat in the Salton Sea region occurs in Salt Creek (Martin & Saiki 2005) and San Felipe Creek (Sutton 2002). This species also occurs at and within the mouths of

agricultural drains that discharge directly to the Salton Sea (Remington & Hess 1993) and shoreline pools (Sutton 2002) along the edge of the Salton Sea and along the shoreline of the Salton Sea (Sharon Keeney, CDFG, pers. comm.). Desert pupfish have been located in agricultural drains within and adjacent to the Plan Area on the northwest, southwest, south, and southeast sides of the Salton Sea (Lau & Boehm 1991; Remington & Hess 1993). Maintaining these populations in the long-term has been determined to be necessary for the recovery of the species (USFWS 1993). Based on our current understanding, this includes maintaining the drain populations and providing for pupfish movement between individual drains.

In addition to the aforementioned locations that were naturally colonized by the desert pupfish, this species was translocated to several refuge locations over the past two decades. As of 2006, extant refugium populations within the action area were found in several ponds in the Dos Palmas region. In addition, a refugium population was established in the Thousand Palms Preserve in the 1980s as part of the Coachella Valley Fringe-Toed Lizard Habitat Conservation Plan. Recent surveys, however, indicated that desert pupfish are nearly extirpated at this location. It is possible that pupfish were eradicated by crayfish from this site (Sharon Keeney, CDFG, pers. comm.).

Cooperative monitoring surveys have been conducted in 1993, 1994, and in 1996 for desert pupfish in non-refugium habitats in the Salton Sea, specifically in the mouths of irrigation drains and in two shoreline pools (Remington & Hess 1993; Sutton 1999). The total number of pupfish trapped in 1993 was 504. In 1994, the total number was 538, however 259 of the pupfish were found dead in the traps that year (Michel Remington, IID, pers. comm.). Pupfish were trapped in over half of the 29 possible locations in the IID irrigation drains and shoreline pools sampled in the 1993 and 1994 surveys. Results from the 1996 surveys indicated that the pupfish were only caught in the Trifolium Storm drain (16 pupfish), Trifolium 20-A (13 pupfish), San Felipe Wash (31 pupfish), Trifolium 19 (1 pupfish), Trifolium 12 (1 pupfish), Trifolium 23 (1 pupfish), Trifolium 1 (1 pupfish), and the "R" drain (1 pupfish; Sharon Keeney, CDFG, pers. comm.; and Michel Remington, IID, pers. comm.). The total number trapped in the 1996 survey was 65 pupfish. A total of 23 pupfish were caught in ten drains and two shoreline pools during surveys in 1998. A study conducted by Sutton (2002) in 1999 focused on the movement of pupfish between drains and creeks and their associated shoreline pools. This was not a comprehensive survey, but the total number of individuals captured was 3,239. The vast majority of these were found in two locations: the Trifolium 20A drain and the shoreline pool associated with the Trifolium 23 drain. More recent and limited surveys by the U.S. Geological Survey (USGS) found 217 desert pupfish in three locations around the north end of the Salton Sea (Martin & Saiki 2005) but these surveys were not designed to estimate the desert pupfish population at the Salton Sea. Over 500 pupfish were trapped during general fish surveys conducted by CDFG in 2003. Pupfish were found in ten drains (four within CVWD's area at the north end of the Salton Sea) and six boat ramp facilities (Sharon Keeney, CDFG, pers. comm.). Despite the plethora of survey efforts, it is difficult to estimate population sizes because quantitative estimates cannot be derived from the available data.

Factors Affecting the Species' Environment within the Action Area
As a result of the recent completion of the Quantification Settlement Agreement, IID will be

implementing water conservation measures and certain required fish and wildlife conservation measures. These activities will result in reductions in flow and increases in selenium concentrations that may harm desert pupfish in the 29 drains that flow directly to the Salton Sea in IID's system. Construction of the connections between individual pupfish drains at both the north and south ends of the Salton Sea may result in harm or mortality of pupfish through temporary disturbance of those drains with heavy equipment during construction. These connections also may require periodic maintenance (approximately once every 5 years) that may harm or kill pupfish through the use of heavy equipment for sediment removal. Adaptive management measures (*e.g*, splitting operational from irrigation flows in the drains and blending flows) may be required to address increased selenium concentrations in these 29 drains. Construction activities would be required to implement these measures, and these construction activities may harm or kill desert pupfish as described above. However, construction of the connections and adaptive management measures are anticipated to have long-term benefits.

IID and the Bureau of Reclamation have committed to the creation of a desert pupfish refugium. This refugium may require some maintenance activities that could harm pupfish, but these effects are expected to be short-lived. All of these areas (the 29 drains, the inter-drain connections, and the refugium habitat) will require monitoring to assure their successful management. Pupfish monitoring requires capture, and on occasion may result in pupfish mortality. We anticipate that all of these pupfish habitats will be monitored once annually (or less frequently if appropriate), and one pupfish mortality event (one trap found with dead pupfish) may occur over the course of this survey activity. Monitoring will utilize quantitative methods (Bryant 2000) to provide repeatable estimates of population size rather than relative abundance or presence/absence.

As part of the mitigation for the Coachella Canal lining project, the lead agencies (CVWD and the Bureau of Reclamation) have committed to maintaining the existing limited baseline flows in Salt Creek as measured at the U.S. Geological Survey gauge near the Salton Sea (623 acre-feet/year). This commitment, in combination with ongoing salt cedar removal and restoration in the Salt Creek watershed, is intended to ensure that impacts from the lining-associated reductions in seepage to the existing aquatic habitats used by pupfish in Salt Creek are avoided.

Management and Monitoring

Pupfish occurring in natural habitats in the Plan area (i.e., Salt Creek and the CVWD irrigation drains) are not subject to planned management activities. Drain cleaning by CVWD, while it may have direct impacts on pupfish, may result in the prevention of drains from becoming choked with vegetation such that pupfish use is precluded or limited. Pupfish located in the various refugia within the Plan area are subject to management activities such as vegetation removal, addition/replacement of water, and cleaning of the substrate on an as needed basis. Fish are generally held in temporary aerated containment pending the completion of management activities, and these activities are scheduled to occur outside the spawning period.

The California Department of Fish and Game has undertaken trap and release surveys for this species in the Coachella Valley irrigation drains and refugia on multiple occasions over the last 25 years. Although intermittent during the 1980's and 1990's, they have undertaken a quarterly

sampling of most sites over the last several years. As a result of the expertise of their staff, mortality incidents associated with trapping for surveys have been extremely limited.

Effects of the Action

Mitigation and Minimization Measures

The CVMSHCP calls for the conservation of all known populations and maintenance of existing refugia within the Plan Area. Conservation Areas within the Plan Area consist of 25 acres of agricultural drains that enter the northern portion of the Salton Sea (Reserve Management Unit 5) and Salt Creek (Reserve Management Unit 4). In addition, Conservation Areas include refugium populations within the Thousand Palms Preserve (Reserve Management Unit 1) and the Dos Palmas Conservation Area. Several actions will take place to mitigate and minimize impacts to the desert pupfish.

CVWD has agreed to conduct a drain maintenance study to investigate ways (e.g., sample methods; timing, direction, or only dredging portions of the drain) to minimize the potential effects to desert pupfish associated with maintenance activities. CVWD has also agreed to monitor selenium concentrations in the drains with the implementation of their Water Management Plan. Selenium monitoring should help evaluate the risk of this constituent to desert pupfish, and, if needed, guide an adaptive management strategy. The study proposal will be submitted to the Wildlife Agencies within two years of permit approval. A Maintenance Plan will be applied towards all of their facilities to provide guidance to their staff on special measures required in pupfish habitat.

The Plan calls for the development and implementation of an ongoing desert pupfish monitoring program that will estimate and describe the distribution, abundance and habitat parameters of the desert pupfish throughout the Reserve System. Objectives of the monitoring plan are as follows: 1) to determine if desert pupfish are being sustained and restored; 2) to further delimit species distribution; 3) to develop and evaluate ecological models that propose relationships between biotic and abiotic variables and desert pupfish; 4) to identify and evaluate potential threats to the desert pupfish; and 5) to develop effective, non-lethal sampling protocols for desert pupfish. The specific protocol for monitoring is currently under development and will be guided by ongoing baseline surveys. The monitoring plan will specify the location and frequency of sampling and will need to be reviewed and approved by the Wildlife Agencies. Specific funding for this activity has not been identified in the Plan.

Within six months of permit issuance, CVCC shall develop and submit for review and approval by the Wildlife Agencies an interim plan to control non-native species in the Dos Palmas Conservation Area.

CVWD has proposed to widen the drain mouths and/or create shoreline pools to offset the loss of approximately 12 acres of pupfish habitat associated with flow changes in the drains.

Within five years of permit issuance CVCC shall develop, submit for review by the Resource Agencies, and implement a management strategy with the goal of maintaining healthy populations in perpetuity within the Plan Area. Management will help alleviate threats identified

by monitoring including control of exotic species that threaten desert pupfish and restoration and enhancement of degraded habitat. This plan shall address mechanisms to control potential parasitic impacts of Asian tapeworm to desert pupfish.

A hydrological study will be completed to determine if water sources for Salt Creek are adequately protected or if there is a need for additional water.

The Plan includes the creation of 25 acres of refugium habitat to offset the impacts of ongoing activities in the CVWD drains that are potential pupfish habitat and occupied intermittently. The 25 acre refuge habitat will be maintained to provide desired habitat characteristics for the desert pupfish. Water quality, including selenium concentrations will be maintained at acceptable levels.

Road widening of Highway 111 by CalTrans will include exclusion of pupfish from the construction zone through the use of trapping and barriers. A monitor will check the exclusion area at least two times a day to ensure that pupfish have not entered the area. If necessary, any pupfish would be captured and removed and the barrier re-set securely.

Direct Effects

Included among the covered activities are the operation and maintenance of the Coachella Valley Storm Channel and the agricultural drains. Those drains that flow directly to the Salton Sea may be occupied by desert pupfish below the last control structure. CVWD conducts maintenance of these drains on an as-needed basis, and this occurs approximately once per year. This is done in accordance with their existing Memorandum of Understanding with the California Department of Fish and Game, so only one side of the drain is cleaned at a time. While no studies have been completed that quantify the impacts of this activity on desert pupfish, it is logical to conclude that the sediment resuspension and vegetation removal associated with drain cleaning may result in the take of desert pupfish in the form of harm (degradation of habitat) or direct mortality if the circumstances within individual drains preclude pupfish movement away from the heavy equipment used in these activities. In the short-term, degradation of habitat could result in increase uptake of selenium from disturbed sediments, impaired gas exchange resulting from suspended sediments clogging pupfish gills, and increased vulnerability to predation with the loss of vegetative cover (after suspended sediments re-settle). It is not possible to quantify the number of fish impacted by these short-term changes in habitat.

Surveys of these drains indicate intermittent occupation (Sharon Keeney, CDFG, pers. comm.) suggesting that pupfish are able to re-enter and occupy drain areas following cleaning. It has not been determined if those fish are the same as had previously occupied the drain or new fish entering the drain from another drain via the Salton Sea. However, because pupfish have been found in the drains over time while these activities have been conducted, annual cleaning events in these drains are not expected to result in the long-term loss of these areas as habitat for the desert pupfish.

CVWD has committed to certain measures that will reduce the impact of this take on the desert pupfish. CVWD will develop a Maintenance Plan for their facilities within one year of permit

issuance that will consider the needs of covered species and minimize the impacts associated with their covered operations and maintenance activities such that the long-term persistence of desert pupfish in the agricultural drains is ensured. In addition, CVWD will develop a study to evaluate the potential effects of drain maintenance on pupfish to determine if there are modifications that can be made to their maintenance practices that would minimize pupfish take. This will include an evaluation of methods to survey for pupfish. The study proposal will be prepared and submitted to the USFWS and CDFG within two years of permit issuance, and the study will begin in the field season following approval. They have also committed to establishing 25 acres of replacement habitat to offset the intermittent disturbance of habitat in the irrigation drains that flow to the Salton Sea. The water used in this created habitat will be from the Colorado River, of the same or better quality as the Colorado River, or water that meets an Environmental Protection Agency selenium standard that has received a no jeopardy determination from the Service. This combination of in-drain management actions and creation of additional habitat, while allowing some take of individual pupfish as a result of operation and maintenance activities in the drains, should provide for the long-term persistence of pupfish in the Coachella Valley Storm Channel and Delta Conservation Area.

CVWD has proposed to widen the drain mouths and/or create shoreline pools to offset the loss of approximately 12 acres of pupfish habitat associated with flow changes in the drains. Some pupfish may be harmed or killed during these construction activities, but the extent should be limited because the fish will have the ability to seek shelter in unaffected portions of the drains. The long-term benefits of maintaining appropriate habitat conditions for desert pupfish should offset any short-term losses that occur.

CalTrans would be widening Highway 111 as part of the covered activities under the Plan. This will include construction of a second bridge over the lower end of Salt Creek which is occupied by desert pupfish. These activities could directly kill or injury pupfish, but the fish will be excluded from the construction zone through the placement of barriers and trapping and removing pupfish from the exclusion area. This would require capture and handling of pupfish, but the construction area will be limited in size. Pupfish can be released outside of the exclusion area quickly. Because of their small size, an unquantifiable but small number may escape detection and be injured or killed as construction proceeds. Construction also may have temporary impacts on water quality in Salt Creek downstream from the construction site. Pupfish are extremely tolerant of high temperatures and low dissolved oxygen, so the effect of these changes is expected to be small.

Indirect Effects

The desert pupfish is known to use irrigation drains that flow directly into the Salton Sea and the Salton Sea itself, and this species will be affected by water use changes related to the CVWD Water Management Plan (WMP) in those two areas. These impacts are expected to be associated with potential modifications to habitat and increases in selenium concentrations in the drains.

The water management activities proposed by CVWD will result in the increases in flows in the drains that flow directly to the Salton Sea. Total flows in the CVWD system are expected to

increase by over 100 percent. The amount of habitat may increase or decrease with the changes in flow depending on the specific configuration within each drain. Maximum velocity in the drains is expected to increase as a result of the WMP. Of the 23 drains that flow to the Salton Sea, 17 currently do not exceed the suggested velocity preference for the pupfish of 1 foot per second (fps; Glenn Black, CDFG, pers. comm.). Three of the 17 would be expected to exceed that 1 fps level as a result of implementation of the WMP. Currently, one of the 23 drains exceeds the 16 inch depth preference identified for pupfish, but eight of the drains would exceed this depth with the WMP. This could allow for greater spatial separation between pupfish and potential predators and/or competitors. On the other hand, increases in depth associated with increased flows could create more habitat for predators and/or competitors resulting in adverse effects on pupfish. *Tilapia zillii* and other exotic fish species are known to use the drains in addition to the desert pupfish. *Tilapia zillii*, in particular, favors deeper water for spawning, and its reproduction may be enhanced by depth increases in the drains. Thus, increases in depth of flow may offset the increases in of extent of habitat by enhancing competition and/or predation by exotic species. The net effect of these changes cannot be quantified at this time, but take in the form of harm may occur from increased flows that result in degraded habitat and/or increased competition and predation in those drains in the CVWD system that flow directly to the Salton Sea.

As a result of the use of additional Colorado River water, selenium concentrations may increase over time to higher concentrations than are anticipated under the baseline. The flow-weighted average selenium concentration in the drains in the most recent sampling (2001) was 10.5 µg/L. The flow-weighted average for the period from 1987 through 2001 was 5.3 µg/L. These concentrations exceed the current Environmental Protection Agency criterion for chronic selenium exposure of 5 µg/L. The WMP is expected to result in selenium concentrations similar to or higher than those determined in the 2001 sampling in the drains.

Hazards of Selenium

Selenium Sources

Selenium, a semi-metallic trace element with biochemical properties very similar to sulfur, is widely distributed in the earth's crust, usually at trace concentrations (<1 µg/g, ppm; e.g., Wilber 1980; Eisler 1985). Some geologic formations, however, are particularly seleniferous (e.g., Presser and Ohlendorf 1987, Presser 1994, Presser *et al.* 1994, Piper and Medrano 1994, Seiler 1997, Presser and Piper 1998), and when disturbed by anthropogenic activity provide pathways for accelerated mobilization of selenium into aquatic ecosystems. Abnormally high mass-loading of selenium into aquatic environments is most typically associated with the use of fossil fuels, with intensive irrigation and over-grazing of arid lands, and with mining of sulfide ores (Skorupa 1998). Intensive confined livestock production facilities and municipal wastewater treatment plants may also contribute to accelerated mass-loading of selenium into surface water bodies. Agricultural irrigation over large areas of the western United States causes accelerated leaching of selenium from soils into groundwater. Natural and anthropogenic discharge of subsurface agricultural drainage water to surface waters is a major pathway for the mass-loading of selenium into aquatic ecosystems (Presser *et al.* 1994, Presser 1994, Seiler 1997, Presser and Piper 1998, Skorupa 1998).

Toxicity
For vertebrates, selenium is an essential nutrient (Wilber 1980). Inadequate dietary uptake (food and water) of selenium results in selenium deficiency syndromes such as reproductive impairment, poor body condition, and immune system dysfunction (Oldfield 1990; CAST 1994). However, excessive dietary uptake of selenium results in toxicity syndromes that are similar to the deficiency syndromes (Koller and Exon 1986). Thus, selenium is a "hormetic" chemical, i.e., a chemical for which levels of safe dietary uptake are bounded on both sides by adverse-effects thresholds. Most essential nutrients are hormetic; what distinguishes selenium from other nutrients is the very narrow range between the deficiency threshold and the toxicity threshold (Wilber 1980, Sorensen 1991). Nutritionally adequate dietary uptake (from feed) is generally reported as 0.1 to 0.3 µg/g (ppm) on a dry feed basis, whereas, the toxicity threshold for sensitive vertebrate animals is generally reported as 2 µg/g (ppm). That dietary toxicity threshold is only one order-of-magnitude above nutritionally adequate exposure levels (see review in Skorupa *et al*. 1996, USDI-BOR/FWS/GS/BIA 1998).

Hormetic margin-of-safety data suggest that environmental regulatory standards for selenium should generally be placed no higher than one order of magnitude above normal background levels (unless there are species-specific and site-specific data to justify a variance from the general rule). For freshwater ecosystems that are negligibly influenced by agricultural or industrial mobilization of selenium, normal background concentrations of selenium have been estimated as 0.25 µg/L (ppb; Wilber 1980), 0.1-0.3 µg/L (ppb; Lemly 1985), 0.2 µg/L (ppb; Lillebo *et al*. 1988), and 0.1-0.4 µg/L (ppb; average <0.2, Maier and Knight 1994).

Direct Waterborne Contact Toxicity
Selenium occurs in natural waters primarily in two oxidation states, selenate (+6) and selenite (+4). Waters associated with various fossil-fuel extraction, refining, and waste disposal pathways contain selenium predominantly in the selenite (+4) oxidation state. Waters associated with irrigated agriculture in the western United States contain selenium predominantly in the selenate (+6) oxidation state. Based on traditional bioassay measures of toxicity (24- to 96-hour contact exposure to contaminated water *without* concomitant dietary exposure), selenite is more toxic than selenate to most aquatic taxa (e.g., see review in Moore *et al*. 1990).

Most aquatic organisms, however, are relatively insensitive to waterborne contact exposure to either dissolved selenate or dissolved selenite, as adverse-effects generally occur at concentrations above 1,000 µg/L (ppb). By contrast, waterborne contact toxicity for selenium in the form of dissolved seleno-amino-acids (such as selenomethionine and selenocysteine) has been reported at concentrations as low as 3-4 µg/L for striped bass (*Morone saxitilis)* (ppb; Moore *et al*. 1990). It would be expected, however, that at a long-term concentration of 5 µg/L (ppb) *total selenium* the concentration of dissolved seleno-amino-acids would be substantively below 3-4 µg/L (ppb) because seleno-amino-acids usually make up much less than 60-80 percent of *total dissolved selenium* in natural waters. For example, it was estimated that organoselenium made up only 4.5 percent of the total dissolved selenium in highly contaminated drainage water from the San Joaquin Valley (Besser *et al*. 1989). Under most circumstances, a long-term concentration of 5 µg/L should be protective of aquatic life *with regard to direct contact toxicity*. Selenium, however, is bioaccumulative and therefore the direct contact exposure is only

considered a minor exposure pathway for aquatic organisms (e.g., see review by Lemly 1996a).

Bioaccumulative Dietary Toxicity
Although typical concentrations of different chemical forms of selenium would be unlikely to cause direct contact toxicity at a long-term concentration of 5 µg/L (ppb), as little as 0.1 µg/L of dissolved selenomethionine has been found sufficient, via bioaccumulation, to cause an average concentration of 14.9 µg/g (ppm, dry weight) selenium in zooplankton (Besser *et al*. 1993), a concentration that would cause dietary toxicity to most species of fish (Lemly 1996a). Based on Besser *et al.* (1993) bioaccumulation factors (BAFs) for low concentrations of selenomethionine, as little as 6 ng/L of dissolved selenomethionine would be sufficient to cause food chain bioaccumulation of selenium to concentrations exceeding toxic thresholds for dietary exposure of fish and wildlife. Thus, at a chronic concentration of 5 µg/L (ppb) as *total selenium*, if more than 0.1 percent of the total dissolved selenium were in the form of selenomethionine, food chain accumulation of selenium to levels sufficient to cause dietary toxicity in sensitive species of fish and birds would occur. Unfortunately, relative concentrations of selenoamino-acids have not been determined in the field in California for waters where total selenium is found in the critical 1-5 µg/L range. Further research is required to characterize typical proportions of seleno-amino-acids in waters containing 1-5 µg/L (ppb) *total selenium*.

Based on waters containing 1-5 µg/L (ppb) *total selenium*, composite bioaccumulation factors (defined as: the total bioaccumulation of selenium from exposure to a composite mixture of different selenium species measured only as *total selenium*) for aquatic food chain items (algae, zooplankton, macro-invertebrates) are typically between 1,000 and 10,000 (on dry weight basis; Lillebo *et al*. 1988, Lemly 1996a). Therefore, based on risk from bioaccumulative dietary toxicity, a chronic concentration somewhere in the range of 0.2 to 2 µg/L (ppb) would not be expected to have adverse effects. More specifically, based on an analysis of bioaccumulative dietary risk and a literature database, Lillebo *et al*. (1988) concluded that a chronic criterion of 0.9 µg/L (ppb) for *total selenium* is required to protect fish from adverse toxic effects. Furthermore, Peterson and Nebeker (1992) applied a bioaccumulative risk analysis to semi-aquatic wildlife taxa and concluded that a chronic standard of 1 µg/L (ppb) for *total selenium* was warranted. Most recently, Skorupa (1998) has compiled a summary of field data that includes multiple examples of fish and wildlife toxicity in nature at waterborne selenium concentrations below 5 µg/L (ppb), supporting the criteria recommendations of Lillebo *et al*. (1988) and Peterson and Nebeker (1992).

Interaction Effects Enhancing Selenium Toxicity
Toxic thresholds for fish and wildlife dietary exposure to selenium have been identified primarily by means of controlled feeding experiments with captive animals (e.g., see reviews by NRC 1980, 1984, 1989; Heinz 1996, Lemly 1996a, Skorupa *et al*. 1996, USDI-BOR/FWS/GS/BIA 1998). Such experiments are carefully designed to isolate the toxic effects of selenium as a *solitary stressor*. Consequently, the toxic thresholds identified by such studies are prone to overestimating the levels of selenium exposure that can be tolerated, without adverse effects, in an environment with *multiple stressors* as is typical of the real ecosystems (Cech *et al.* 1998). There are at least three well-known multiple-stressor scenarios for selenium that dictate a very conservative approach to determining adequately protective concentrations for

aquatic life:

1. Winter Stress Syndrome - More than 60 years ago it was first discovered in experiments with poultry housed in outdoor pens that dietary toxicity thresholds were lower for experiments done in the winter than at other times of the year (Tully and Franke 1935). More recently this was confirmed for mallard ducks (*Anas platyrhynchos*) by Heinz and Fitzgerald (1993). Lemly (1996b), studying fish, conducted the first experimental research taking into account the interactive effects of winter stress syndrome and confirmed that such effects are highly relevant even for waters containing <5 µg/L (ppb) selenium. Consequently, Lemly (1996b) presents a general case for winter stress syndrome as a critical component of hazard assessments. It can be further generalized that any metabolic stressor (cold weather, migration, smoltification, pathogen challenge, etc.) would interact similarly to lower the toxic thresholds for dietary exposure to selenium. Based on a comparison of results from Heinz and Fitzgerald (1993) and Albers *et al*. (1996), the dietary toxicity threshold in the presence of winter stress was only 0.5-times the threshold level for selenium as a solitary stressor.

2. Immune System Dysfunction - Also more than 60 years ago, it was first noted that chickens exposed to elevated levels of dietary selenium were differentially susceptible to pathogen challenges (Tully and Franke 1935). More recently this was confirmed for mallard ducks by Whiteley and Yuill (1989). Numerous other studies have confirmed the physiological and histopathological basis for selenium-induced immune system dysfunctions in wildlife (Fairbrother and Fowles 1990, Schamber *et al*. 1995, Albers *et al*. 1996). Based on Whiteley and Yuill's (1989) results, *in ovo* exposure of mallard ducklings to as little as 3 .9 µg/g (ppm dry weight basis) selenium was sufficient to significantly increase mortality when ducklings were challenged with a pathogen. The lowest confirmed *in ovo* toxicity threshold for selenium as a solitary stressor is 10 µg/g (ppm dry weight basis; Heinz 1996, reported as 3 µg/g wet weight basis and about 70% moisture). In this case the multiple-stressor toxicity threshold is only 0.39-times the threshold level for selenium as a solitary stressor.

3. Chemical Synergism - Multiple stressors can also consist of other contaminants. For example, Heinz and Hoffman (1998) recently reported very strong synergistic effects between dietary organo-selenium and organo-mercury with regard to reproductive impairment of mallard ducks. The experiment of Heinz and Hoffman (1998) did not include selenium treatments near or below the threshold for diet-mediated reproductive toxicity and therefore no ratio of single-stressor versus multiple-stressor threshold levels is available. A field study involving 12 lakes in Sweden, however, found that in the presence of threshold levels of mercury contamination, the waterborne threshold for selenium toxicity was about 2.6 µg/L (ppb; see review in Skorupa 1998, and review in USDI-BOR/FWS/GS/BIA 1998). Meili (1996) concluded that, "The results [of the Swedish Lakes studies] suggest that a selenium concentration of only 3 µg/L can seriously damage fish populations."

Environmental Partitioning and Waterborne Toxicity Thresholds

Risk management via water concentration-based water quality criteria is an inherently flawed process for selenium (Pease *et al*. 1992, Taylor *et al*. 1992, 1993; Canton 1997). The process is flawed because the potential for toxic hazards to fish and wildlife is determined by the rate of

mass-loading of selenium into an aquatic ecosystem and the corresponding environmental partitioning of mass-loads between the water column, sediments, and biota (food chain). However, a water column concentration of selenium can be an imperfect and uncertain measure of mass-loading and food chain bioaccumulation. For example, a low concentration of waterborne selenium can occur because mass-loading into the system is low (i.e., low potential for hazard to fish and wildlife) or because there has been rapid biotic uptake and/or sediment deposition from elevated mass-loading (i.e., high potential for hazard to fish and wildlife). Toxicity to fish and wildlife is ultimately determined by how much selenium is partitioned into the food chain. Several examples of potentially hazardous food chain bioaccumulation of selenium at waterborne selenium concentrations <2 µg/L are known from California (Maier and Knight 1994, Pease *et al*. 1992, Luoma and Linville 1997, San Francisco Estuary Institute [SFEI] 1997, Setmire *et al*. 1990, 1993; Bennett 1998) and elsewhere (Birkner 1978, Lemly 1997, Hamilton 1998).

Fish

A tremendous amount of research regarding toxic effects of selenium on fish has been conducted since the late 1970's. Recently, this body of research was reviewed and summarized by Lemly (1996b). Lemly reports that salmonids are very sensitive to selenium contamination and exhibit toxic symptoms even when tissue concentrations are quite low. Survival of juvenile rainbow trout (*Oncorhynchus mykiss*) was reduced when whole-body concentrations of selenium exceeded 5 µg/g (dry wt.). Smoltification and seawater migration among juvenile chinook salmon (*Oncorhynchus tshawytscha*) were impaired when whole-body tissue concentrations reached about 20 µg/g. However, mortality among larvae, a more sensitive life stage, occurred when concentrations exceeded 5 µg/g. Whole-body concentrations of selenium in juvenile striped bass (*Morone saxitilis*) collected from areas in California impacted by irrigation drainage ranged from 5 to 8 µg/g.

Summarizing studies of warm-water fish Lemly reports that growth was inhibited at whole-body tissue concentrations of 5 to 8 µg/g selenium or greater among juvenile and adult fathead minnows (*Pimephales promelas*). Several species of centrarchids (sunfish) exhibited physiologically important changes in blood parameters, tissue structure in major organs (ovary, kidney, liver, heart, gills), and organ weight-body weight relations when skeletal muscle tissue contained 8 to 36 µg/g selenium. Whole-body concentrations of only 4 to 6 µg/g were associated with mortality when juvenile bluegill (*Lepomis macrochirus*) were fed selenomethionine-spiked commercial diets in the laboratory. When bluegill eggs contained 12 to 55 µg/g selenium, transfer of the selenium to developing embryos during yolk-sac absorption resulted in edema, morphological deformities, and death prior to the swim-up stage. In a laboratory study of "winter stress syndrome" juvenile bluegill exposed to a diet containing 5.1 µg/g selenium and water containing 4.8 µg/L (ppb) selenium exhibited hematological changes and gill damage that reduced respiratory capacity while increasing respiratory demand and oxygen consumption. In combination with low water temperature (4 degrees centigrade) these effects caused reduced activity and feeding, depletion of 50 to 80 percent of body lipid, and significant mortality within 60 days. Winter stress syndrome resulted in the death of about one-third of exposed fish at whole body concentrations of 5 to 8 µg/g selenium.

Based on Lemly's review of more than 100 papers, he recommended the following toxic effects thresholds for the overall health and reproductive vigor of freshwater and anadromous fish exposed to elevated concentrations of selenium: 4 µg/g whole body; 8 µg/g skinless fillets; 12 µg/g liver; and 10 µg/g ovary and eggs. He also recommended 3 µg/g as the toxic threshold for selenium in aquatic food-chain organisms consumed by fish. Lemly reported that when waterborne concentrations of inorganic selenium (the predominant form in aquatic environments) are in the 7- to 10-µg/L (ppb) range, bioconcentration factors in phytoplankton are about 3,000. Consequently, he concluded that patterns and magnitudes of bioaccumulation are similar enough among various aquatic systems that a common number, 2 µg/L (ppb) (for filtered samples of water), could be given as a threshold for conditions "highly hazardous to the health and long-term survival of fish".

Recently, Hamilton (1998) reviewed the demonstrated and potential effects of selenium on six species of endangered fish in the Colorado River basin, including the humpback chub (*Gila cypha*), Colorado squawfish (*Ptychocheilus lucius*), bonytail chub (*Gila elegans*), razorback sucker, flannelmouth sucker (*Catostomus latipinnis*), and roundtail chub (*Gila robusta*). Hamilton presents historical data supporting a hypothesis that long-term selenium contamination of the lower Colorado River basin may have been one of the factors contributing to the disappearance of endangered fish in the early 1930's. Contemporary issues of concern included the unusually high incidence of abnormal lesions on fish in the San Juan River, especially flannelmouth sucker, attributed to pathogens requiring inducement by stressors such as high contaminant concentrations or poor body condition. Other concerns included concentrations of selenium in fish eggs as high as 28 µg/g in razorback sucker from the Green River and as high as 73 µg/g in eggs of rainbow trout collected from the mainstem Colorado River between Glen Canyon Dam and Lee's Ferry. In controlled studies of larval razorback suckers fed food organisms collected from the wild, Hamilton found 2.3 µg/g or more of selenium in the diet to be sufficient to cause reduced survival. In an enclosure study where razorback suckers were held in selenium-contaminated aquatic environments (Adobe Creek, 9-90 µg/L (ppb) selenium, and North Roadside Pond of Ouray National Wildlife Refuge, 40 µg/L (ppb) selenium) for 9 months, muscle plugs contained 17 and 12 µg/g selenium respectively and eggs contained 44 and 38 µg/g selenium. Finally, Hamilton stressed that consideration of selenium effects was an important component of recovery planning for the Colorado River basin endangered endemics.

Desert Pupfish: Specific data exist to support a conclusion that the desert pupfish could be at risk from chronic selenium concentrations occurring in the CVWD irrigation drains. Setmire and Schroeder (1998) report on a field study of sailfin mollies in the Salton Sea area of California. The mollies were chosen as surrogate species to assess contaminant threats to the co-occurring endangered desert pupfish. Mollies and pupfish were simultaneously collected from one site and found to contain virtually identical whole-body selenium concentrations (Bennett 1998), which verified the utility of mollies as a surrogate indicator of pupfish exposure. During 1994, mollies were collected from 13 Imperial Valley agricultural drains. For 10 of the 13 drains, whole-body selenium concentrations were in the range of 3 to 6 µg/g, a level designated by a panel of selenium researchers as "of concern" for warmwater fishes (USDI-BOR 1993, also see Gober 1994, CAST 1994, Ohlendorf 1996). Two of the other three drains that were sampled yielded mollies averaging >6 µg/g, a level designated by the panel of researchers as exceeding the toxic

threshold for warmwater fishes. Unfortunately, contemporaneous measures of waterborne selenium in the sampled drains were not obtained for comparison to the mollie tissue data.

An inquiry with California's Colorado River Basin Regional Water Quality Control Board yielded file data on waterborne selenium for one of the 13 drains sampled for mollies in 1994; however the file data is for water samples collected in 1996 Ray Lukens, Regional Water Board, pers. comm.). Ten monthly (March to December, 1996) measures of waterborne selenium in the Trifolium 12 drain averaged 4.96 µg/L (ppb). Sailfin mollies collected from Trifolium 12 drain in 1994 averaged 3.6 µg/g whole-body selenium, with a maximum of 3.8 µg/g (n=3). If the concentrations of selenium in the drain were roughly the same in 1994 as in 1996, then a concentration on the order of 5 µg/L (ppb) would be associated with expected pupfish tissue concentrations of selenium at the "level of concern". Borderline exposures for direct toxic effects may be particularly hazardous at the Salton Sea because of the recent record of diverse and frequent epizootic events documented for fish and birds at the Sea. It is well established for birds that selenium-induced immune dysfunction occurs at exposure levels below those required for direct selenium-poisoning. Until comparable studies are completed for fish, the safest assumption is that the results for selenium-induced immune dysfunction documented for birds may also apply to fish.

Harm in the form of reduced reproductive success and increased vulnerability to pathogen challenge (that could result in injury or mortality) could occur depending on the actual magnitude of changes in selenium concentrations in the water and biota of the drains and the sensitivity of this species to such increases in selenium concentrations. The average concentrations in the drains that are expected with the WMP (on the order of 10 µg/L) are not anticipated to result in direct mortality, although peaks in concentrations, depending on their magnitude and duration, may result in mortality. These changes will affect slightly under half (23 of 52) of the agricultural drains that are currently occupied or potential habitat for the desert pupfish. This habitat has been identified as necessary for recovery of the species. CVWD has committed to monitoring the selenium concentrations in the Coachella Valley Storm Channel and the drains. That monitoring should provide results that will support the evaluation of the magnitude of these effects and the development of appropriate adaptive management measures.

The increased use of Colorado River water with the WMP is expected to increase the loading of selenium to the Salton Sea as compared to the use of local groundwater. Locally high concentrations of selenium could result from the discharge of brine if drain water desalination and re-use is pursued in the Coachella Valley. This increase in selenium would not be offset by the proposed evaporation of Salton Sea water. While less Salton Sea water would need to be evaporated to balance the salt load coming in with the brine because of the much higher total dissolved solids (TDS) concentrations of the Salton Sea relative to the brine, dissolved selenium concentrations in Salton Sea water are much lower as a result of the selenium assimilation process that occurs there so the offset would not work for selenium. Given that the use of the Salton Sea by desert pupfish appears to have increased recently (Jack Crayon, CDFG, pers. comm.), these higher concentrations of selenium may result in localized harm to desert pupfish as described above for the irrigation drains.

Other Contaminant Concerns
Ammonium perchlorate is a contaminant that occurs in Colorado River water as a result of contamination upstream in Las Vegas Wash. Concentrations in the Coachella Canal have been measures at 5 µg/L (CVWD 2002). With implementation of the WMP, perchlorate concentrations in the drains could increase to 10-15 µg/L. Studies have not yet been completed that identify perchlorate toxicity thresholds for fish, but thyroid changes have been observed in fish as a result of perchlorate exposure (Kendall 2003). Although increased use of Colorado River water under the WMP is expected to result in increased concentrations in the drains, control measures currently underway at the source are expected to reduce perchlorate concentrations in the Colorado River over time. Without additional information on pupfish sensitivity to this constituent and on the efficacy of source control measures, it is not possible to quantify the impact of the WMP-related changes in perchlorate concentrations on desert pupfish in the drains.

Salinity Effects
The TDS concentrations in the drains are anticipated to increase with implementation of the WMP. Average and maximum concentrations are 2,000 mg/L and 4,500 mg/L, respectively. With the WMP these concentrations will increase to 2,800 mg/L (average) and 5,200 mg/L (maximum). These changes are not expected to impact the desert pupfish because it can tolerate much higher levels of salinity (Schoenherr 1992).

Changes in the salinity of the Salton Sea resulting from implementation of the WMP would not be distinguishable from those identified for the IID Water Conservation and Transfer Project. No independent impacts to desert pupfish are identifiable as a result of the Salton Sea salinity changes associated with implementation of the WMP.

Management and Monitoring
The pupfish refugia (a total of 25 acres) established as part of CVWD's proposed mitigation will require regular maintenance to control vegetative growth and maintain the appropriate habitat conditions for desert pupfish. It is anticipated that this will result in harm in the form of temporary disturbance of the habitat. Use of heavy equipment could result in mortality of some fish. It is not possible to quantify this harm in terms of numbers of fish impacted. Overall, the maintenance will benefit the pupfish by maintaining the appropriate habitat conditions so the impacts associated with this activity should be offset by the benefits.

Monitoring activities currently require capture of the pupfish using minnow traps. In some limited cases there may be mortality associated with the trapping as a result of unanticipated changes in water quality conditions. In most cases the pupfish are expected to be released without harm. Other methods may be considered, such as the use of seines, as determined to be appropriate based on the conditions. Because the monitoring protocol has not yet been written, the Service is not yet able to assess accurately the impacts of monitoring on desert pupfish. Once the plan is available, the Service will review the protocol to ensure that effects are minimal to desert pupfish.

Changed Circumstances

The changed circumstances likely to affect desert pupfish are drought and invasion by new exotic species. Drought may reduce the flows through areas of existing habitat and/or reduce the volume of water available for created habitat. The need to maintain flows through the created habitat is a firm commitment in the Plan and as such should dictate that guaranteeing adequate flows for sustainability would be of the highest priority for CVWD. Drought may affect the pupfish using the irrigation drains, but this is likely to be ameliorated by the fact that water is imported into the Coachella Valley for use in agriculture. Based on the agreements associated with the Quantification Settlement Agreement and the operation of the lower Colorado River in drought conditions, CVWD is unlikely to be subject to major reductions in access to Colorado River water such that water for their 25 acre obligation cannot be met and drainwater flows cease in the Coachella Valley drains. Because pupfish are tolerant of a wide range of temperatures and tend to prefer shallower depths, they are likely to fair better than some of the exotic species in drought-caused conditions of lower flow.

Desert pupfish are already impacted by the wide array of exotic species that have been introduced to the Salton Basin. Monitoring and management for this species must, out of necessity, track population trends in exotic species along with the desert pupfish if the appropriate management actions are to be identified and implemented. This effort should bring to light any new invasive species early in their presence in the system so that they can be managed appropriately.

Cumulative Effects

Proposed future groundwater withdrawals from San Felipe Creek could affect the quality of habitat in that area. However, no projects have been approved to date, and some proposals fall under federal jurisdiction and thus would be required to undergo section 7 consultation. Salton Sea restoration may require substantial infrastructure that could impact desert pupfish. The Service is working closely with the California Departments of Water Resources and Fish and Game to address the species needs in the context of a restoration program.

Conclusion

Given the current state of our knowledge, our greatest concern for the pupfish is associated with the changes in habitat anticipated with the Plan. There is no designated critical habitat for the pupfish, therefore, no critical habitat would be adversely modified as a result of the implementation of the Plan. We are currently conducting studies on selenium toxicity to desert pupfish and hope to complete those studies in a timely fashion (5 years). This information, in combination with selenium monitoring proposed by CVWD for these drains, should identify the magnitude of these impacts. CVWD has committed to the creation and maintenance of 25 acres of desert pupfish habitat to offset the impacts associated with potential increases in selenium concentrations in the drains with implementation of the WMP. This habitat will be supported with low-selenium water, so pupfish in this habitat will not be harmed by the selenium-related impacts described above for the drains. Habitat degradation associated with flow increases (greater depths and higher velocities) are to be offset by widening the drain mouths and/or constructing sandbars to form shoreline pool habitat near the mouths of the drains. The combination of these actions should provide for the long-term survival of the desert pupfish population in the Coachella Valley Storm Channel and Delta Conservation Area.

No activities are planned within the area that has been designated as critical habitat for this species. Critical habitat has been designated within the San Felipe Creek watershed (San Felipe and Fish Creeks) upstream and to the west of the Salton Sea.

Amount or Extent of Take

Because of the large variability in survey results over time for the occupied and potentially occupied areas likely to be affected by covered activities in the Dos Palmas and Coachella Valley Stormwater Channel and Delta Conservation Areas, it is not possible to specify a number of fish anticipated to be taken by the covered activities (many of which will repeat over time and may vary in extent from year to year) at this time. As survey methods are refined under the MSHCP, the Service will continually review all survey reports, including any pre- and post-construction reports or other reports outlining the extent of covered activities in pupfish habitat, to ensure that our expectations of the magnitude of impacts of the take expressed here are not exceeded.

We anticipate that all pupfish in the drains may be harmed and/or harassed by the covered activities (e.g., flow and selenium changes, maintenance activities that disturb the vegetation and substrate) occurring in the 25 acres of habitat in the drains flowing directly to the Salton Sea, and there may be some mortalities associated with these covered activities. However, the minimization and mitigation measures will offset this take and should reduce it over time as studies are completed and new procedures implemented. Pupfish in Salt Creek will be harassed as a result of capture and relocation for the widening of Highway 111, and there may be limited mortalities associated with some unquantifiable but likely small number fish and a small proportion of the fish present that escape detection and are not excluded from the construction area. Construction may degrade downstream water quality temporarily, but harm to pupfish is likely to be limited as a result of their high tolerance of extreme conditions.

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AMPHIBIANS

Arroyo toad (*Bufo californicus*)

STATUS OF THE SPECIES

Species and Critical Habitat Legal/Listing Status

The Service listed the arroyo toad as endangered on December 16, 1994 (*Federal Register* 59: 64859) and a recovery plan was published in July 1999 (Service 1999). Critical habitat for the arroyo toad was designated on February 7, 2001 (*Federal Register* 66: 9414). However, in October 2002, the courts set aside the designation and ordered the Service to publish a new critical habitat designation rule for the arroyo toad. A final critical habitat designation was republished on April 13, 2005 (*Federal Register* 70: 19562).

The April 13, 2005, final rule includes a total of 6 critical habitat units, designated based on occupancy at the time of listing, presence of the primary constituent elements, and requirement of special management. The final rule eliminates habitat areas that are not expected to be used by arroyo toads; eliminates a small amount of developed area; removes the 82-foot (25-meter) elevation criteria previously used to determine the extent of the essential upland habitat when it extends upstream or downstream beyond the starting and ending points of essential stream segments; includes upland habitat up to a 1,640 feet (500 meters) distance from the essential stream, rather than a 4,921 feet (1,500 meters) distance, if the 82-foot (25-meter) elevation limit had not yet been reached; removes unoccupied upstream areas beyond 0.7 mile from known occupied sites; and defines essential occupied areas as those areas within approximately 0.7 mile (1.1 kilometers) up and down stream from where the species is known to have occurred at the time of listing or subsequently ("at the time of listing" for the arroyo toad is defined as the period from 1974 to 1994). This resulted in the removal of several upstream areas previously proposed as critical habitat in a number of units, including Unit 23, which is located within the MSHCP Whitewater Canyon Conservation Area. In the final rule, Unit 23 encompasses approximately 333 acres (135 hectares) of which100 percent is Bureau of Land Management (BLM) land. All private land within Unit 23 subject to the pending MSHCP is designated as essential but excluded, pursuant to section 4(b)(2). Therefore, there will be no further discussion of critical habitat in the Plan area as none has been designated.

Species Description

Bufo californicus is a small, dark-spotted toad of the family *Bufonidae*. The parotoid glands, located on the top of the head, are oval-shaped and widely separated. A light/pale area or stripe is usually present on these glands and on top of the eyes. *B. californicus* underside is buff-colored and usually without spots (Stebbins 1985). Recently metamorphosed individuals will easily blend with the substrate and are usually found adjacent to water. At the time of listing, the arroyo toad was described as the "arroyo" subspecies of the southwestern toad (*Bufo microscaphus californicus*). Gergus (1998) recently published genetic justification for the reclassification of the arroyo southwestern toad as a full species (i.e., arroyo toad [*Bufo*

californicus]).

Distribution
The current distribution of the arroyo toad in the United States is from the Salinas River Basin in Monterey County, south to the Tijuana River and Cottonwood Creek Basin along the Mexican Border. Arroyo toads are also known from a seemingly disjunct population in the Arroyo San Simeon River System, about 10 kilometers (16 miles) southeast of San Quintin, Baja California (Gergus *et al.* 1997). Although the arroyo toad occurs principally along coastal drainages, it also has been recorded at several locations on the desert slopes of the Transverse and Peninsular Mountain ranges south of the Santa Clara River, Los Angeles County (Patten and Myers 1992, Jennings and Hayes 1994).

The elevational 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) perhaps due to widespread habitat loss at lower elevations. The upper elevational limits may be due to an inability to withstand cooler temperature regimes, especially during the larval stage (Sweet 1992). Differences in elevational limits in different parts of the species' range may be due to climate and also to geological features or other habitat characteristics.

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, and the proportion of suitable habitat may change during the year and from year to year. 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. The reaches that typically support, or historically supported, the highest densities of toads are those in the lower and middle portions of the river basins, usually associated with third order or larger streams. Many of those reaches have been lost to, or degraded by, urbanization, agriculture, water diversion, mining operations, and threats described below.

The distribution of arroyo toads fits the definition of metapopulations in some parts of the range, but not in others. A metapopulation is defined as a population of subpopulations in somewhat geographically isolated patches, interconnected through patterns of gene flow, extinction, and recolonization (Soule 1987). 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, but in other cases the changes have been so extensive that reconnection is not an option.

One record exists for the MSHCP Plan Area, specifically in the Whitewater Canyon Conservation Area approximately 2 to 3 kilometers (3 to 5 miles) north of Interstate 10 at an elevation of about 1,380 meters (420 feet) (Patten and Myers 1992). This occurrence represents an isolated desert population on the easternmost periphery of the species' range that may possess unique phenotypic and genetic variation that is distinct from other desert populations (Service

1999). Delisting criteria includes securing the full range of genetic and phenotypic variation within the species by maintaining 15 self-sustaining populations, including the Whitewater Canyon population (Service 1999).

Habitat Affinities

Appropriate habitat for the arroyo toad is created and maintained by the fluctuating hydrological, geological, and ecological processes operating in riparian ecosystems and the adjacent uplands. Arroyo toads require shallow, slow-moving streams, and riparian habitats that have natural flooding regimes which maintain areas of open, sparsely vegetated, sandy stream channels and terraces (Service 2001). Stream order, elevation, and floodplain width are important factors in determining the size and long-term viability of a population of arroyo toads (Sweet 1992, Barto 1999, Griffin 1999). Streams with the greatest potential to support self-sustaining populations are typically of a high stream order (i.e., 3rd to 6th order), at low elevations (below 3,000 feet), with wide floodplains (Sweet 1992, Barto 1999, Griffin 1999). Optimal breeding habitat consists of low gradient stream reaches that have shallow pools with fine textured substrates (i.e., sand or gravel). Upland habitats used by arroyo toads during both the breeding and non-breeding seasons include alluvial scrub, coastal sage scrub, chaparral, grassland, and oak woodland (Holland 1995, Griffin *et al.* 1999, Service 2001). Arroyo toads have also been found in agricultural fields (Griffin *et al.* 1999).

This species has been observed moving approximately 1 kilometer (1.6 mile) within a stream reach and 0.6 kilometer (1 mile) away from the stream, into native upland habitats (Holland 1995, Sweet 1992) or agricultural areas (Griffin *et al.* 1999). Movement distances may be regulated by topography and channel morphology. Griffin (1999) reported a female arroyo toad traveling more than 948 meters (300 feet) perpendicular from a stream. Arroyo toads are critically dependent on upland terraces and the marginal zones between stream channels and upland terraces during the non-breeding season, especially during periods of inactivity, generally late fall and winter (Sweet 1992).

Essential habitat for the arroyo toad includes those habitat features that are required for the primary biological needs of foraging, nesting, rearing of young, intra-specific communication, roosting dispersal, genetic exchange, or sheltering. These features include, but are not limited to: space for individual and population growth and for normal behavior; food, water, or other nutritional or physiological requirements; cover or shelter; sites for breeding, reproduction, and rearing of offspring; and habitats that are protected from disturbance or are representative of the historic and geographical and ecological distributions of arroyo toads.

The habitat features that are essential to the conservation of arroyo toad include, but are not limited to: Rivers and streams with hydrologic regimes that supply water to provide space, food, and cover needed to sustain eggs, tadpoles, metamorphosing juveniles, and adult breeding toads. Specifically, the conditions necessary to allow for successful reproduction of arroyo toads are: Breeding pools with areas less than 12 deep; Areas of flowing water with current velocities less than 1.3 feet per second; and Surface water that lasts for a minimum length of two months in most years, *i.e.,* sufficient wet period in the spring months to allow arroyo toad larvae to hatch, mature, and metamorphose. Low-gradient stream segments (typically less than six percent) with

sandy or fine gravel substrates that support the formation of shallow pools and sparsely vegetated sand and gravel bars for breeding and rearing of tadpoles and juveniles.

A natural flooding regime, or one sufficiently corresponding to a natural regime that will periodically scour riparian vegetation, rework stream channels and terraces, and redistribute sands and sediments, such that breeding pools and terrace habitats with scattered vegetation are maintained.
Riparian and adjacent upland habitats (particularly alluvial streamside terraces and adjacent valley bottomlands that include areas of loose soil where toads can burrow underground) to provide foraging and living areas for sub-adult and adult arroyo toads. Stream channels and adjacent upland habitats that allow for migration to foraging areas, over-wintering sites, dispersal between populations, and recolonization of areas that contain suitable habitat.

Arroyo toads are not distributed uniformly throughout suitable habitat areas. Arroyo toad breeding habitat is patchily distributed along the stream courses, and the same is true of appropriate upland habitat. Some areas primarily provide for migration and dispersal between breeding and foraging habitats or allow for dispersal to additional breeding pools that will accommodate increased populations during favorable years. Habitat conditions within streams can change rapidly in response to streamflows and other factors, such as the development and shifting of sand and gravel bars, and creation and disappearance of pools. Terrace and upland habitats, although more stable than streambed and riparian habitats, may change as a result of rainfall, earthquakes, fires, and other natural events. These factors may cause the habitat suitability of given areas to vary over time, thus affecting the distribution of arroyo toads. The combination of appropriate aquatic, riparian, and upland habitats forms ecologically functional units. These features and the lands that they represent are essential to the conservation of the arroyo toad.

Life History
Arroyo toad larvae feed on loose organic material such as interstitial algae, bacteria, and diatoms. They do not forage on macroscopic vegetation (Sweet 1992, Jennings and Hayes 1994). Juvenile toads rely on ants almost exclusively (Service 1999). By the time they reach 17 to 23 millimeters in length, they take more beetles, along with the ants (Sweet 1992, Service 1999). Adult toads probably consume a wide variety of insects and arthropods including ants, beetles, spiders, caterpillars, and others.

Breeding typically occurs from February to July on streams with persistent water (Griffin *et al.* 1999). Female arroyo toads must feed for a minimum of approximately two months to develop the fat reserves needed to produce a clutch of eggs (Sweet 1992). Eggs are deposited and larvae develop in shallow pools with minimal current and little or no emergent vegetation. The substrate in these pools is generally sand or fine gravel overlain with silt. Arroyo toad eggs hatch in 4 to 5 days and the larvae are essentially immobile for an additional 5 to 6 days (Sweet 1992). They then begin to disperse from the pool margin into the surrounding shallow water, where they spend an average of 10 weeks (Sweet 1992). After metamorphosis (June-July), the juvenile toads remain on the bordering gravel bars until the pool no longer persists (usually from eight to twelve weeks depending on site and yearly conditions) (Sweet 1992). Most individuals

become sexually mature by the following spring (Sweet 1992).

Population Trends
Arroyo toad population numbers and densities are not currently known because insufficient data is available on the species' normal population dynamics and on habitat characteristics that correlate with density. This species was historically found in at least 22 river basins in southern California from the upper Salinas River system in Monterey County to San Diego County and southward to the vicinity of San Quintin, Baja California, Mexico. They have been extirpated from an estimated 75 percent of their former range in the United States (Jennings and Hayes 1994), and they now occur primarily in small, isolated areas in the middle to upper reaches of streams.

Because arroyo toad habitats (i.e., broad, flat floodplains in southern California) are favored sites for flood control projects, agriculture, urbanization, and recreational facilities such as campgrounds and off-highway vehicle parks, many arroyo toad populations were reduced in size or extirpated due to extensive habitat loss from 1920 to 1980 (Service 1999). The loss of habitat, coupled with habitat modifications due to the manipulation of water levels in many central and southern California streams and rivers, as well as predation from introduced aquatic species, caused arroyo toads to disappear from a large portion of their previously occupied habitat in California (Jennings and Hayes 1994).

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).

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. 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, and upland habitats, upon which arroyo toads depend for reproduction, development, and survival.

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 1998), 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 that 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 1998) and can alter the fire regimes, leading to intense fires in the riparian zones. Some habitat changes may favor other native species such as the California toad. In small breeding populations of arroyo toads, increased densities of California toads can interfere with the calling activities of male arroyo toads (Awbrey 1972, Sweet 1992). Additionally, juvenile California toads may out-compete juvenile arroyo toads for prey (Sweet 1993).

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.

Currently, the major threats to arroyo toad populations are from stream alteration, introduction of invasive species, urban and rural development, mining, recreation, grazing, drought, wildfire, and large flood events.

Synopsis of Status
Arroyo toad population numbers and densities are not currently known because insufficient data is available on the species' normal population dynamics and on habitat characteristics that correlate with density. They have been extirpated from an estimated 75 percent of their former range in the United States and a large portion of their previously occupied habitat in California (Jennings and Hayes 1994). They now occur primarily in small, isolated areas in the middle to upper reaches of streams. Arroyo toad populations have historically been, and continue to be, threatened by loss of habitat and habitat alteration due to human-related activities. The arroyo toad recovery plan (Service 1999) describes the species, in general, as having a moderate degree of imminent threat and high recovery potential. The arroyo toad population located in the Whitewater River is part of the Desert Recovery Unit, as identified in the recovery plan. The recovery plan states that protection of the two known populations within this unit, located in the Mojave River and Whitewater River basins, is essential for delisting this species.

One record exists for the MSHCP Plan Area in the Whitewater Canyon Conservation Area (Patten and Myers 1992). This occurrence represents an isolated desert population on the easternmost periphery of the species' range that may possess unique phenotypic and genetic variation that is distinct from other desert populations (Service 1999). Arroyo toad habitats have been, and continue to be, affected by human activities, making small isolated populations especially vulnerable to natural disturbances such as extended droughts, fires, and rare large floods. Delisting criteria include securing the full range of genetic and phenotypic variation within the species by maintaining 15 self-sustaining populations, including the Whitewater Canyon population (Service 1999).

ENVIRONMENTAL BASELINE
Status of the Species in the Action Area
The current status of arroyo toads in the action area is poorly known. The Whitewater Canyon Conservation Area contains the only population of arroyo toads within the Plan Area. A small population of arroyo toads, consisting of three specimens, were observed and photographed in the Whitewater River Basin in 1992 (Patten and Myers 1992) approximately 2 to 3 kilometers (3 to 5 miles) north of Interstate 10 at an elevation of about 420 meters (1,380 feet). There is also potential habitat within the riparian areas along Mission Creek in the Upper Mission Creek/Big Morongo Canyon Conservation Area; however, arroyo toads have not been observed within this conservation area.

No arroyo toads were detected in surveys conducted in the Whitewater Canyon during the 2000, 2001, and 2003 breeding seasons (Jones and Stokes, *in litt*. 2000; Brown and Fisher 2002, Hitchcock *et al.* 2004). However, 2000 was generally a bad year for arroyo toad breeding activity, particularly in the southern half of the species' range, because of below average precipitation and subsequent low stream flows

Arroyo toad surveys and habitat assessments conducted in the Whitewater Canyon in 2001 identified over eleven miles of moderate to low gradient boulder-strewn river wash above the Whitewater Fish Hatchery (hereafter referred to as trout farm). This area is owned and managed by BLM and is designated as Wilderness Area. Exotic fish are abundant in much of the river, but there are some areas of low flow with shallow pools without fish. California treefrogs (*Hyla cadaverina*) are present in the wash and the wash habitat is in good condition. No pools suitable for arroyo toad breeding and no arroyo toads were observed during surveys along the upper regions of the Middle and North forks of the canyon, however, "access to much of the upper regions of the wash is difficult and this region still needs to be examined for suitable habitat" (Brown and Fisher 2002).

Arroyo toad surveys and habitat assessments conducted in 2003, including an approximate two mile channel drained by the trout farm water diversion, determined that, "water has been diverted out of the main channel and up onto the terraced slope or underground leaving no breeding habitat and minimal habitat for daily activity in the area surveyed" (Hitchcock *et al.* 2004). No arroyo toads were observed during the 2003 surveys. The only invasive species detected was the trout (*Oncorhynchus mykiss*). Native amphibians observed included western toad (*Bufo boreas*), the red-spotted toad (*Bufo punctatus*), and the California treefrog.

There are approximately 2,082 acres of Core Habitat for the arroyo toad within the Whitewater Canyon Conservation Area. Of the 2,082 acres of Core Habitat, approximately 1,298 acres are controlled by the BLM and are classified as Existing Conservation Lands. The remaining 784 acres of Core Habitat within the conservation area are in private ownership, including areas downstream from the trout farm, and are subject to the Plan. The approximate 1.5 mile stretch of the Whitewater River south of the trout farm supports some of the best known arroyo toad habitat in the Whitewater Canyon, and is the location of the only confirmed arroyo toad occurrence in the Plan area (Patten and Myers 1992). The Core Habitat within this conservation area is designated as Conservation Level 1 and 2 lands. It is anticipated that there would be only minimal habitat loss in conjunction with providing reasonable access across public lands to private inholdings within the Wilderness Areas, trails and trailheads, or as necessitated by an Adaptive Management action.

Given the recent documentation of arroyo toads in the Whitewater Canyon drainage and the continued presence of suitable habitat, it is likely that arroyo toads are extant in the Whitewater Canyon Conservation Area (Service 2005).

There are currently three acres of Other Conserved Habitat modeled as arroyo toad habitat within the Upper Mission Creek/Big Morongo Canyon Conservation Area. The three acres are

controlled by the BLM and are classified as Existing Conservation Lands. As previously stated, no arroyo toads have been observed within this conservation area. The potential arroyo toad habitat within this conservation area is designated as Conservation Level 3 land. It is anticipated that habitat loss would not occur on more than 1 percent of these lands and that any development would be consistent with the Conservation Goals and Objectives and Required Measures for the conservation area.

Factors Affecting the Species' Environment within the Action Area
In the Whitewater Canyon, the Banning fault is a unique "thrust fault" that forms a barrier to the passage of groundwater down-canyon, thus creating factors that support riparian vegetation and arroyo toad habitat in the canyon floor. Arroyo toad habitat in the Whitewater Canyon Conservation Area is impacted by water manipulation, off-highway vehicle use, and other recreational activities including fishing and hiking (Brown and Fisher 2002).

Since beginning operation, the trout farm operation has been the major threat to the Whitewater Canyon population (Brown and Fisher 2002). As previously discussed (See *Status of the Species in the Action Area*), the trout farm operation has been diverting water from an approximate two mile stretch of the original streambed course via a diversion canal for over 70 years, leaving no breeding habitat and minimal habitat for daily activity within the channel drained by the water diversion (Hitchcock *et al.* 2004). Additionally, the amount and quality of natural water flows in Core Habitat downstream have been compromised by the trout farm operations. In low rainfall years, a majority of the water flow was siphoned into the diversion canal, leaving little or no natural water flow in the downstream river channel. In moderate to high rainfall years, high velocity flows bypassed the diversion channel and scoured-out excess sediment that had accumulated in the river channel, which may have resulted in an increased sediment load deposited downstream. Furthermore, water diverted by the trout farm was used for trout production and fishing and then released back into the main channel without any filtering or cleaning process, thus potentially compromising the water quality in the downstream natural river channel. The potential for trout to escape from the trout farm into the main water channel was not documented; however, trout are abundant in the stream system and may pose a substantial threat to arroyo toad recruitment because they may devour amphibian larvae (Brown and Fisher 2002).

In 2006 the Wildlands Conservancy purchased the trout farm and ceased farming operations. Under ownership of the Wildlands Conservancy, the former trout farm will be used as an interpretive center. Over time the dams used to create the trout farm ponds will be allowed to blow out during high rainfall years with high velocity flows, thereby allowing for passive restoration of the natural river channel and unrestricted waterflow throughout this portion of the Whitewater River. With the closing of the trout farm it is anticipated that the above-described threats to the arroyo toad would be eliminated and that over time there would be an increase in the amount of suitable arroyo toad habitat within the Whitewater River.

Management and Monitoring
Currently, no management or monitoring specific to this species occurs within the Plan Area. Management of Existing Conservation Lands focuses on conservation of the entire ecosystem,

thus potentially providing for the conservation of the species.

EFFECTS OF THE ACTION

Assumptions

The effects analysis below is based on the following assumptions:

General Plans of Local Permittees, future land uses and development patterns will reflect current land use trends (largely residential and tourist resort-commercial uses), thereby explicitly ruling out unlikely future land uses such as heavy industry, expansion of agriculture into native habitat (unregulated by the County and therefore not a Covered Activity), etc.

Approximately 1,301 acres of the total 2,085 acres of arroyo toad modeled habitat within the Plan Area are owned and managed by BLM. This biological opinion assumes that the CVCC will enter into a Memorandum of Understanding with BLM prior to issuance of the Permits to ensure that all BLM lands within the Plan Area are managed consistent with the MSHCP.

The 3 acres of arroyo toad modeled habitat within the Upper Mission Creek/Big Morongo Conservation Area are designated as Conservation Level 3 lands. It is assumed that habitat loss will occur on no more than one percent of these lands and that any development will be consistent with the Conservation Goals and Objectives and Required Measure for this conservation area.

Urban Development

Direct Effects

The Plan Area includes 2,085 acres of modeled habitat (2,082 acres of Core Habitat and 3 acres of Other Conserved Habitat) for the arroyo toad (including Federal lands). Table 4-114 of the MSHCP identifies 784 acres of modeled habitat "Subject to the Permit" (excluding federal lands).

Three acres of Other Conserved Habitat for the arroyo toad would be conserved within the Upper Mission Creek/Big Morongo Conservation Area. The 3 acres of arroyo toad habitat within this conservation area are controlled by BLM and are therefore not subject to the Permit. However, these lands are considered Existing Conservation Lands and are anticipated to be 99 percent conserved. In addition, as stated in the assumptions listed above, they would be managed consistent with the Plan.

Within the Whitewater Canyon Conservation Area it is anticipated that approximately 706 acres of the total Core Habitat not currently conserved would be conserved, and 78 acres of the total Core Habitat not currently conserved would be lost due to MSHCP implementation. It is anticipated that 90 percent of the Core Habitat in private ownership would be conserved within the Whitewater Canyon Conservation Area, and that approximately 10 percent of Core Habitat in private ownership within the conservation area would be subject to loss. The lands within the Whitewater Canyon Conservation Area allowable 10 percent habitat loss (private lands) would occur within the Core Habitat that contains the only occurrence of arroyo toads (Patten and Myers 1992) within the Plan Area. Additionally, the portion of the Whitewater River within this area contains some of the best arroyo toad habitat within the Whitewater Canyon Conservation Area. Little is known about the current status of the Whitewater Canyon arroyo toad population, such as location and extent of occupied habitat and breeding and upland use areas. Although the

majority of the private lands would be conserved, the configuration of allowable development is unknown at this time. Therefore, as currently proposed, development within the Plan Area, although it represents a small percentage of total arroyo toad habitat, could directly injure or kill individuals within what may be the only extant population within the Plan Area. Furthermore, development in this area could eliminate Core Habitat necessary for survival or expansion of an extant population.

Indirect Effects

Activities that alter the natural stream flow, such as water diversion, are the most problematic cause of indirect effects that may impact the fluvial processes necessary to sustain arroyo toad habitat in the Whitewater Canyon Conservation Area. The arroyo toad requires shallow pools (less than 12 inches) with clear water for breeding (Sweet 1992 and 1993). In addition, the reproductive success of the arroyo toad is dependent upon the duration of breeding pools, such that breeding pools must remain long enough to sustain the development of egg masses, larvae, and metamorphs (Service 1999). Therefore, arroyo toad survival and reproductive success are particularly susceptible to changes in hydrological regimes such as those caused by water diversions.

As stated in Section 4.3.4 of the MSHCP, water diversion activities are not covered activities under the Plan. To become a covered activity, the Plan requires that any water diversion activities in arroyo toad habitat be submitted as a Minor Plan Amendment for Wildlife Agency concurrence. As such, the Plan allows the Wildlife Agencies to regulate activities that affect stream flows in a way that benefits arroyo toad conservation. Therefore, we anticipate that if a Plan Amendment were to be proposed, the Service would ensure that the breeding habitat requirements of the arroyo toad would be accommodated, and there would be no loss of capability to manage arroyo toads would result from the amendment process.

Additional indirect effects, including increases in invasive flora and fauna and increased predation, are expected to occur to arroyo toads and arroyo toad upland and breeding habitat as a result of urban development associated with Plan implementation. Invasive plant species are now recognized as a threat to biodiversity within native vegetation, second only to direct habitat loss and fragmentation (Pimm and Gilpin 1989, Scott and Wilcove 1998). Non-native, weedy species may out-compete and exclude native species potentially altering the structure of the vegetation, degrading or eliminating upland habitat utilized by the arroyo toad, and providing food and cover for undesirable non-native animals (Bossard *et al.* 2000). Furthermore, the increased irrigation required by many common landscaping species may provide suitable conditions for the establishment of introduced Argentine ants (*Linepithema humile*) within the on-site and adjacent biological open space areas. Argentine ants can build up to large colonies and eliminate the native ant fauna that is a major food source of the arroyo toad (Ward 1987, Holway 1995, Human and Gordon 1997). If standing water features (i.e., ponds, lakes) are included in development designs adjacent to arroyo toad habitat they may provide breeding and live-in habitat for bullfrogs (*Rana catesbiana*), a major predator of both adult and larval arroyo toads. In addition, human activity within development areas adjacent to conserved arroyo toad habitat may result in accumulation of trash and food, attracting predators that may prey on arroyo toads, as well as increased frequency of intrusion into conserved areas by both humans and

domestic animals.

Avoidance and Minimization Measures Included in the Plan
Minimization measures would be included in the Plan to reduce many of the above-described direct and indirect impacts to arroyo toad. Required Measures for the Whitewater Canyon Conservation Area include: 1) conduct covered activities in arroyo toad breeding habitat outside the reproductive season (March 1- June 30), unless otherwise authorized through a Minor Plan Amendment, and 2) water diversion activities and projects in arroyo toad habitat would require a Minor Plan Amendment with Wildlife Agency concurrence to be authorized under the Plan (Section 4.3.4 of the MSHCP). Additionally, Required Avoidance, Minimization, and Mitigation Measures would protect and maintain the natural fluvial sand transport capacity of fluvial systems (Section 4.4 of the MSHCP), and Land Use Agency Guidelines would minimize indirect effects from development discussed above within or adjacent to conservation areas by regulating drainage, toxics, lighting, noise, invasive species, and human intrusion (Section 4.5 of the MSHCP). General management actions would conserve the function of arroyo toad habitat by controlling unauthorized OHV/vehicle trespass, unauthorized dumping, sand and gravel mining, road widening, illegal berming, drainage diversions, invasive species, and predators such as bullfrogs and exotic fish species (Section 8.2.4 and 8.4.3 of the MSHCP).

Monitoring and Adaptive Management Program
Direct effects
The Monitoring and Adaptive Management Program is designed to monitor success of achieving the Conservation Objectives at the landscape, natural community and species levels by detecting large-scale changes and threats to the integrity of essential ecological processes, changes in key habitat variables, and changes in the distribution and abundance of the covered species. Currently little is known about the status of the arroyo toad populations within the Plan area. Therefore, baseline data would be collected on the arroyo toad. The precise protocols to be used for these surveys would be developed during the baseline phase.

Adaptive Management, as discussed in Section 8.4.3, would focus on identification of threats and development of a Monitoring Program to address management questions related to these threats. Issues identified to be addressed through Adaptive Management that may effect the arroyo toad and its habitat include changes in hydrological regimes and the monitoring of riparian species and habitats within the Whitewater River. The arroyo toad requires shallow pools (less than 12 inches) with clear water for breeding (Sweet 1992 and1993). In addition, the reproductive success of the arroyo toad is dependent upon the duration of breeding pools, such that breeding pools must remain long enough to sustain the development of egg masses, larvae, and metamorphs (Service 1999). Therefore, arroyo toad survival and reproductive success may be particularly susceptible to changes in hydrological regimes.

Baseline surveys would gather baseline data on invasive species and their effects on the Covered Species. Numerous exotic species known to occur within the Plan area would pose a threat to the arroyo toad either through competition for food sources (i.e., argentine ants), predation (i.e., bullfrogs and non-native fish), or habitat degradation (i.e., invasive plants).

The Monitoring and Adaptive Management Program likely would have little to no direct effects on arroyo toads. However, any ground disturbing activities conducted as part of the Monitoring and Adaptive Management Program, such as exotics removal or the installation of groundwater monitoring wells, may result in direct mortality and harassment of individuals. These activities would benefit the arroyo toad in the long- term.

Indirect effects

It is anticipated that the Monitoring and Adaptive Management Program would have little to no indirect effects on the arroyo toads. However, added sedimentation within arroyo toad breeding habitat could result from hand or mechanized work associated with exotics removal/control, and arroyo toad habitat could be trampled by foot traffic during studies and/or management activities. These activities would likely benefit the arroyo toad in the long-term.

Avoidance and Minimization Measures Included in the Plan

To avoid and minimize the direct and indirect effects to the arroyo toad (as described in the previous section), and protect ecosystem integrity, and the Covered Species and natural communities they encompass, the Plan would include general management actions as described in Section 8.2.4.1 of the Plan, as well as specific monitoring objectives as described in Section 8.4.3.3 of the Plan. It is possible that a small number of arroyo toads may be impacted by implementation of these general management actions and monitoring objectives. However, these actions likely would minimize the above-described potential threats to the arroyo toad and arroyo toad habitat in the long-term.

Trails Plan

Direct Effects

The Plan would include the construction and maintenance of trails as covered activities. If trails are sited within suitable arroyo toad habitat, trail construction and use could result in harassment and the loss of habitat from mechanical disturbance, increased sedimentation of aquatic habitats, direct crushing of individuals in the creeks and along the trail itself, and noise and dust. Maintenance of trails could result in loss of habitat due to removal of vegetative cover that has grown over into the trail or along the trail footprint itself. Added sedimentation could result from hand or mechanized maintenance work, and arroyo toads could be trampled by worker foot traffic. We anticipate that the potential impacts due to the construction, use and maintenance of trails would be minor.

In addition to trail construction/maintenance, the Plan would include hiking, mountain biking, and equestrian use as Covered Activities. Human use of developed recreation sites in potential arroyo toad habitat could result in direct and indirect effects to arroyo toads. Mortality and harassment to adults, tadpoles, and eggs could result from people trampling in and around stream habitat. The potential impacts of people walking along stream banks could be especially high on juvenile and adult arroyo toads, which burrow into sandy banks during daylight hours. Arroyo toads are known to disperse in the evening into adjacent upland habitat to search for aestivation sites and to forage, which may increase their susceptibility to human activities.

Harassment of arroyo toads could also result from individuals needing to constantly move away

from human traffic. Individual arroyo toads moving away from an activity area may be driven into areas where they would be more susceptible to injury or mortality due to predation, vehicular traffic, or foot or equine traffic. The extent to which this form of harassment occurs would be difficult to determine.

Indirect Effects

Potential indirect effects to arroyo toads include degradation of habitat from trampling, soil compaction and bank destruction. When near recreational areas, pools are frequently dammed and adjacent sand or gravel bars subjected to trampling and clearing when used for streamside recreation. Vegetation is often cut or limbs pulled off for use as firewood. Introduction of exotic species of fish and wildlife such as turtles, bullfrogs, and fish by trail users could lead to increased predation on and elimination of native species.

In addition, with an increase of human activity comes the increased probability of wildland fires. Ignition may be from escaped campfires, sparks, or arson. This could affect arroyo toads by destruction or modification of habitat. Increased sedimentation and impaired water quality in habitat downstream of wildfires could also negatively affect arroyo toads.

Avoidance and Minimization Measures Included in the Plan

To avoid and minimize potential adverse direct and indirect effects of the Trails Plan (as described in the previous section) on the arroyo toad, the Plan would include Guidelines for public access and recreation, including criteria for siting and design of trails and facilities, and public use and maintenance, as defined in Section 7.3.4.2 of the Plan. Implementation of these Guidelines would avoid and minimize adverse direct and indirect effects to arroyo toads and arroyo toad habitat from public access covered activities.

Changed Circumstances

Direct Effects

The Plan would address the following Changed Circumstances: drought, fire, invasion by a new invasive species, lowering of the water table, and new listing of a Species Not Covered by the MSHCP. It is anticipated that drought, fire, invasion by a new exotic species would result in direct effects to the arroyo toad that are similar to those described in the previous sections (i.e., Urban Development, Monitoring and Adaptive Management, and Trails Plan). No direct effects beyond those previously discussed are anticipated to occur as a result of Changed Circumstances.

Indirect Effects

We anticipate that drought, fire, invasion by a new invasive species would result in indirect effects to the arroyo toad that are similar to those described in the previous sections (i.e., Urban Development, Monitoring and Adaptive Management, and Trails Plan). No indirect effects beyond those previously discussed are anticipated to occur as a result of Changed Circumstances.

Avoidance and Minimization Measures Included in the Plan

To avoid and minimize potential adverse direct and indirect effects of the Changed Circumstances (as described in the previous section) on the arroyo toad, the Plan would include remediation actions, as described in Sections 6.8.3.1 through 6.8.3.5. Implementation of these

actions, in conjunction with Adaptive Management (Section 8.0 of the Plan), would avoid and minimize adverse direct and indirect effects to arroyo toads and arroyo toad habitat from Changed Circumstances.

CUMULATIVE EFFECTS

It is anticipated that there may be further loss and/or degradation of arroyo toad habitat within the Action Area resulting from human disturbance, exotic animal species, and invasive weeds.

The Agua Caliente Band of Cahuilla Indians is undertaking a Habitat Management Plan for all of their Tribal lands. The draft Plan and associated documents have been reviewed publicly. It is anticipated that the final Plan and associated environmental analysis will be complete in mid-2008 with permit issuance scheduled for late 2008. Although there will be habitat loss associated with that Plan, the overall net benefit to the species is positive.

CONCLUSION

The Whitewater Canyon Conservation Area contains the only known population of arroyo toads within the Plan Area, however, little is known about the status of the species in the Action Area. The Whitewater Canyon population is a small isolated population on the easternmost extent of the species range that may provide important genetic diversity for the long-term survival and full recovery of the species. Arroyo toads in the Whitewater Canyon Conservation Area are heavily impacted by habitat degradation from water diversion, as well as other human influences described above, making this population especially vulnerable to additional adverse impacts from natural or anthropogenic causes.

As discussed above, implementation of the avoidance, minimization, and mitigation measures identified in the MSHCP would reduce impacts to this species, however, they would not assure achievement of the MSHCP's Conservation Goal to restore and/or maintain a self-sustaining population of arroyo toads within the Whitewater Canyon Conservation Area and ensure the long-term persistence of the species in the Plan Area. Though the private land subject to the 10 percent habitat loss supports some of the best arroyo toad habitat within the Plan Area and the only confirmed arroyo toad occurrence, no specific criteria for allowable development configuration within this area subject to habitat loss have been defined. Also, this population, as the sole extant population known in the Plan Area, is subject to stochastic factors outside the Permittee's control that may result in its loss. Loss of the Whitewater Canyon population would result in a significant reduction of the species range and may represent the loss of important genetic diversity that would preclude the full recovery of the species (Service 1999). However, the Service assumes that the Joint Project Review analysis would be implemented prior to any specific development within the Conservation Area, and that process would promote the achievement of the Plan's stated Conservation Goals and Objectives and assist in ensuring the long-term persistence of arroyo toads in the Plan Area.

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 a total of 2,082 acres of Core Habitat in

Whitewater Canyon Conservation Area and three acres of modeled habitat in Upper Mission Creek/Big Morongo Canyon Conservation Area would be conserved through the MSHCP implementation, for a total of 2,007 acres (96 percent) conserved in the Reserve System. The Reserve System includes Federal lands and other Existing Conservation Lands that are anticipated to be managed consistent with the MSHCP conservation goals and objectives in the future. Approximately 1,301 acres (62 percent) of Core Habitat are anticipated to be managed pending an MOU with BLM. We anticipate that the arroyo toad populations and habitat would be monitored and managed in perpetuity. Thus, impacts to this species and its modeled habitat, when viewed in conjunction with the protection and management of the MSHCP Reserve System, 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 difficult to quantify the precise number of arroyo toads that would be impacted as a result of the proposed action over the 75-year Permit term due to the large Plan Area and to the lack of information regarding the current status of arroyo toads in the Plan Area. Therefore, the Service is quantifying the take as the number of acres of modeled habitat that would be impacted in the MSHCP Plan Area. We anticipate that up to 78 acres of Core Habitat within the Plan Area, specifically within the Whitewater Canyon Conservation Area, would become unsuitable for the arroyo toad as a result of the proposed action. Additionally, a small, but undeterminable, number of arroyo toads may be taken as a result of monitoring and management actions. Take would likely be in the form of harm, death, and injury.

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REPTILES

Desert tortoise (*Gopherus agassizii*)

STATUS OF THE SPECIES

Species Legal/Listing Status

The Mojave population of the desert tortoise was emergency listed as endangered by the Service on August 4, 1989, and on April 2, 1990, the Service changed this listing to threatened (55 FR 12178). The desert tortoise is also listed as threatened under the California Endangered Species Act.

Critical Habitat Listing/Legal Status

On February 8, 1994, the Service designated approximately 6.47 million acres of critical habitat for the Mojave population of the desert tortoise (i.e., California-8 units, 4.8 million acres; Nevada-4 units, 1.2 million acres; Arizona-2 units, 338,700 acres; Utah-2 units, 129,100 acres [59 FR 5820]). The rule became effective on March 10, 1994, and a final Desert Tortoise (Mojave Population) Recovery Plan was published in June 1994 (USFWS 1994). The Recovery Plan serves as the key strategy for recovery and delisting of the desert tortoise. The document divides the species' range into six distinct population segments or recovery units (i.e., Northern Colorado, Eastern Colorado, Eastern Mojave, Northeastern Mojave, Western Mojave, and upper Virgin River) and recommends the establishment of 14 Desert Wildlife Management Areas (DWMAs) throughout the recovery areas. Within each designated region, the recovery plan recommends reserve level protection for both desert tortoise populations and habitat, while maintaining and conserving sensitive species and ecosystem functions. The design of the DWMAs would follow accepted concepts of reserve design and, as part of the actions, restrict human activities that negatively affect the desert tortoise (USFWS 1994).

Species Description

Tortoises are any of the land-dwelling turtles of the family Testudinidae. The desert tortoise is one of four species of the genus *Gopherus*, known collectively as gopher tortoises. Gopher tortoises are characterized by brown shells 8 to15 inches long with flattened front limbs adapted for burrowing. The desert tortoise may attain a length of 9 to 15 inches in upper shell (carapace) length. The Sonoran desert tortoise is flat and pear-shaped compared to the Western Mojave desert tortoise which is more butterball shaped; they are usually active in spring. The desert tortoise can live 80 to 100 years.

The desert tortoise is a large herbivorous reptile found in portions of the California, Arizona, Nevada, and Utah deserts, and extending in range to Sonora and Sinaloa, Mexico. In California, the species occurs primarily within the creosote bush, shadscale, and Joshua tree series of the Mojave Desert scrub, and the lower Colorado River Valley subdivision of the Sonoran Desert scrub. The tortoise is able to live where ground temperature may exceed 140 degrees Fahrenheit because of its ability to dig underground burrows and escape the heat. At least 95 percent of its

life is spent in burrows. There, it is also protected from freezing while dormant, November through February or March.

Distribution
The Mojave population is defined as occurring north and west of the Colorado River in California (Mojave and Sonoran deserts), southern Nevada, northwestern Arizona, and southwestern Utah. The Mojave population Recovery Plan (USFWS 1994) recognized six evolutionarily significant units within the Mojave population, and subsequently referred to these evolutionarily significant units as recovery units.

Habitat Affinities
Desert tortoises are found in a variety of desert habitats, including arid, sandy or gravelly areas in creosote bush scrub. They retreat into their horizontal burrows to avoid high daytime temperatures. Desert tortoises are most active in California during the spring and early summer when annual food plants are most prevalent. Additional activity occurs during the warmer fall months and sometimes following summer rain storms. Desert tortoises spend the remainder of the year in burrows, escaping the extreme conditions of the desert. Further information on the range, biology, and ecology of the desert tortoise is described in Burge and Bradley (1976), Burge (1978), Luckenbach (1982), Weinstein *et al.* (1987), Hovik and Hardenbrook (1989), and USFWS (1994).

Food resources for desert tortoises are dependent on the availability and nutritional quality of annual and perennial vegetation, which is greatly influenced by climatic factors, such as the timing and amount of rainfall, temperatures, and wind (Beatley 1969, 1974, Congdon 1989, Polis 1991). In the Mojave Desert, these climatic factors are typically highly variable; this variability can limit the desert tortoise's food resources.

Desert tortoises will eat many species of plants. However, at any time, most of their diet often consists of a few species (Nagy and Medica 1986, Jennings 1993). Additionally, their preferences can change during the course of a season (Avery 1998) and over several seasons (Esque 1994). Possible reasons for desert tortoises to alter their preferences may include changes in nutrient concentrations in plant species, the availability of plants, and the nutrient requirements of individual animals (Avery 1998). In Avery's (1998) study in the Ivanpah Valley, desert tortoises consumed primarily green annual plants in spring; cacti and herbaceous perennials were eaten once the winter annuals began to disappear. Medica *et al.* (1982) found that desert tortoises ate increased amounts of green perennial grass when winter annuals were sparse or unavailable; Avery (1998) found that desert tortoises rarely ate perennial grasses.

Life History
Optimal habitat has been characterized as creosote bush scrub in which precipitation ranges from 2-8 inches, the diversity of perennial plants is relatively high, and production of ephemerals is prominent (Luckenbach 1982, Turner 1982, Turner and Brown 1982, Schamberger and Turner 1986). Soils must be friable to allow for burrow excavation, but firm to avoid burrow collapse. In California, desert tortoises are typically associated with gravelly flats or sandy soils with some clay, although the species has occasionally been found on windblown sand or rocky terrain

(Luckenbach 1982).

Tortoise populations are probably dependent on relatively rare years of sufficient and timely precipitation to produce sufficient forage for reproduction and survival. This life history makes the species susceptible to environmental perturbations that may affect recruitment of young animals into the population, or survival of breeding adults before replacement (55 FR 12179).

Desert tortoises do not reach sexual maturity until they are 10 to 15 years old. Desert tortoises can produce from one to three clutches of eggs per year. On rare occasions, clutches can contain up to 15 eggs; most clutches contain 3 to 7 eggs. Multiple decade studies of the Blanding's turtle (*Emydoidea blandingii*), which, like the desert tortoise, is long lived and matures late, indicate that approximately 70 percent of the young animals must survive each year until they reach adult size; after this time, annual survivorship exceeds 90 percent (Congdon *et al.* 1993). Research has indicated that 50 to 60 percent of young desert tortoises typically survive from year to year, even in the first and most vulnerable year of life. We do not have sufficient information on the demography of the desert tortoise to determine whether this rate is sufficient to maintain viable populations; however, it does indicate that maintaining favorable habitat conditions for small desert tortoises is crucial for the continued viability of the species.

Desert tortoises typically hatch from late August through early October. At the time of hatching, the desert tortoise has a substantial yolk sac; the yolk can sustain them through the fall and winter months until forage is available in the late winter or early spring. However, neonates will eat if food is available to them at the time of hatching; when food is available, they can reduce their reliance on the yolk sac to conserve this source of nutrition. Neonate desert tortoises use abandoned rodent burrows for daily and winter shelter, which are often shallowly excavated and run parallel to the surface of the ground.

Neonate desert tortoises emerge from their winter burrows as early as late January to take advantage of freshly germinating annual plants; if appropriate temperatures and rainfall are present, at least some plants will continue to germinate later in the spring. Freshly germinating plants and plant species that remain small throughout their phenological development are important to neonate desert tortoises because their size prohibits access to taller plants. As plants grow taller during the spring, some species become inaccessible to small desert tortoises. Neonate and juvenile desert tortoises require approximately 12 to 16 percent protein content in their diet for proper growth. Both juvenile and adult desert tortoises seem to selectively forage for particular species of plants with favorable ratios of water, nitrogen (protein), and potassium. The potassium excretion potential model (Oftedal 2001) predicts that, at favorable ratios, the water and nitrogen allow desert tortoises to excrete high concentrations of potentially toxic potassium, which is abundant in many desert plants. Oftedal (2001) also reports that variation in rainfall and temperatures cause the potassium excretion potential index to change annually and during the course of a plant's growing season. Therefore, the changing nutritive quality of plants, combined with their increase in size, further limits the forage available to small desert tortoises to sustain their survival and growth.

Population Trends

Before entering into a discussion of the status and trends of desert tortoise populations across its range, a brief discussion of the methods of estimating the numbers of desert tortoises would be useful. Three primary methods have been widely used: permanent study plots, triangular transects, and line distance sampling.

Generally, permanent study plots are defined areas that are visited at roughly 4-year intervals to determine the numbers of desert tortoises present. Desert tortoises found on these plots during the spring surveys were marked so they could be identified individually during subsequent surveys. Between 1971 and 1980, 27 plots were established in California to study the desert tortoise; 15 of these plots were used by the Bureau of Land Management to monitor desert tortoises on a long-term basis (Berry 1999). Range-wide, 49 plots have been used at one time or another to attempt to monitor desert tortoises (Tracy et al. 2004).

Triangular transects are used to detect sign (i.e., scat, burrows, footprints, etc.) of desert tortoises. The number of sign is then correlated with standard reference sites, such as permanent study plots, to allow the determination of density estimates.

Finally, line distance sampling involves walking transects while trying to detect live desert tortoises. Based on the distance of the desert tortoise from the centerline of the transect, the length of the transect, and a calculation of what percentage of the animals in the area were likely to have been above ground and visible to surveyors during the time the transect was walked, an estimation of the density can be made. Each of these methods has various strengths and weaknesses; the information we present on the density of desert tortoises across the range and in the action area is based on these methods of collecting data.

When reviewing the information presented in the following sections, note that determining the number of desert tortoises over large areas is extremely difficult. The report prepared by the Desert Tortoise Recovery Plan Assessment Committee (Tracy et al. 2004) acknowledges as much. Desert tortoises spend much of their lives underground or concealed under shrubs, are not very active in years of low rainfall, and are distributed over a wide area in several different types of habitat. Other factors, such as the inability to sample on private lands and rugged terrain further complicate sampling efforts. Consequently, the topic of determining the best way to estimate the abundance of desert tortoises has generated many discussions over the years. As a result of this difficulty, we cannot provide concise estimations of the density of desert tortoises in each recovery unit or desert wildlife management area that have been made in a consistent manner. Given the difficulty in determining the density of desert tortoises over large areas, the reader needs to understand fully that the differences in density estimates in the recovery plan and those derived from subsequent sampling efforts may not accurately reflect on-the-ground conditions. Despite this statement, the reader should also be aware that the absence of live desert tortoises and the presence of carcasses over large areas of some desert wildlife management areas provide at least some evidence that desert tortoise populations seem to be in a downward trend in some regions.

Threats

Numerous factors are likely involved in the decline of desert tortoise populations. Predation by

common ravens and domestic and feral dogs, unauthorized off-road vehicle activity, authorized vehicular activity, illegal collecting, upper respiratory tract disease, possibly other diseases, mortality on paved roads, vandalism, drought, livestock grazing, feral burros, human development, non-native plants, changes to natural fire regimes, and environmental contaminants are known or potential contributing factors. Tracy et al. (2004) postulate that "disease alone is not sufficient to explain (desert) tortoise die-offs." They state that a combination of factors may be responsible for declines in the numbers of desert tortoises across its range and cite a "growing awareness" among experts on disease "that the probability of infection leading to death in (desert) tortoises may be a function of chronic stress (e.g., malnutrition) and the strain of infectious agent. This means that the presence of disease alone is not sufficient to explain (desert) tortoise die-offs. For example, it is possible that habitat degradation results in physiologically stressed (desert) tortoises that then succumb to disease agents that are normal at background levels in healthy populations." Oftedal (2005) has advanced the concept that desert tortoises "must match their ability to balance nutrient intake and excretion over a period of years to ephemeral plant resources that change over period of weeks." Basically, Oftedal contends that desert tortoises are completely dependent on nutrient resources that are only available briefly and on an irregular basis to sustain them over years when these resources are scarce or absent; furthermore, the ephemeral plants that they need to ingest at these times are high in protein and water relative to potassium. In areas where non-native plant species that do not contain these specific nutrients, such as Mediterranean grass and brome grass, have displaced the plants that desert tortoises require, they may be in a state of chronic nutritional stress. This level of stress may be an important component in the declines that have been observed over large portions of the California desert. Federal, State, and local agencies and non-governmental organizations have undertaken numerous activities to attempt to recover the desert tortoise in California. Agencies and others have modified grazing procedures, retired livestock allotments, fenced highways, removed burros, and restored disturbed habitat, among other activities in an attempt to recover the desert tortoise. The extent that these efforts will benefit the desert tortoise will be difficult to measure because of the slow reproductive rate of the species and other factors, such as disease, drought, and predation, that may be affecting the number of individuals in a region.

Increases in non-native plant presence and vegetative biomass may increase the propensity for habitat to burn. Desert tortoises and their habitat are not adapted for regular fires as some ecosystems are and the fire may kill tortoises directly or affect the microhabitats available to them. In 2005, 136,447 acres of desert tortoise Critical Habitat (2.1% of total) burned.

Critical Habitat

The Service designated critical habitat for the desert tortoise in portions of California, Nevada, Arizona, and Utah in a final rule, published February 8, 1994 (59 FR 5820-5846, also see corrections at 59 FR 9032-9036). Critical habitat is designated by the Service to identify the key biological and physical needs of the species and key areas for recovery, and focuses conservation actions on those areas. Critical habitat is composed of specific geographic areas that contain the biological and physical attributes that are essential to the species' conservation within those areas, such as space, food, water, nutrition, cover, shelter, reproductive sites, and special habitats. These features are called the primary constituent elements of critical habitat. The specific primary constituent elements of desert tortoise critical habitat are: sufficient space to support

viable populations within each of the six recovery units and to provide for movement, dispersal, and gene flow; sufficient quality and quantity of forage species and the proper soil conditions to provide for the growth of these species; suitable substrates for burrowing, nesting, and overwintering; burrows, caliche caves, and other shelter sites; sufficient vegetation for shelter from temperature extremes and predators; and habitat protected from disturbance and human-caused mortality.

The final rule for designation of critical habitat did not explicitly ascribe specific conservation roles or functions to the various critical habitat units. Rather, it refers to the strategy of establishing recovery units and desert wildlife management areas recommended by the recovery plan for the desert tortoise, which had been published as a draft at the time of the designation of critical habitat, to capture the "biotic and abiotic variability found in desert tortoise habitat" (59 FR 5820, see page 5823). Specifically, we designated the critical habitat units to follow the direction provided by the draft recovery plan for the establishment of desert wildlife management areas. Note that each critical habitat unit functions independently of the others in terms of providing the physical and biological needs of individual desert tortoises; that is, desert tortoises are not required to move between or among units to complete their life histories. We also note that the critical habitat units in aggregate are intended to protect the variability that occurs across the large range of the desert tortoise; the loss of any specific unit would eliminate elements of the species' behavioral, ecological, and genetic variability.

We did not designate the Desert Tortoise Natural Area and JTNP in California and the Desert National Wildlife Refuge in Nevada as critical habitat because they are "primarily managed as natural ecosystems" (59 FR 5820, see page 5825) and provide adequate protection to desert tortoises. Since the designation of critical habitat,
Congress increased the size of JTNP; a portion of the expanded boundary of JTNP lies within critical habitat of the desert tortoise.

The Chuckwalla Critical Habitat Unit (1,020,600 acres), the largest critical habitat unit and only critical habitat unit/DWMA in the Eastern Colorado Recovery Unit, overlaps the Plan area. The Chuckwalla Desert Wildlife Management Area, designated by the BLM, covers 818,685 acres. This Critical Habitat overlaps National Park and Military lands. Approximately 107,183 acres of this critical habitat unit lie within JTNP (Service 2005a). We were unable to obtain any information on specific uses of this area from the National Park Service; however, given the general patterns of visitor use at JTNP, we expect that this area receives little use.

Approximately 187,046 acres of this critical habitat unit lie within the Chocolate Mountains Aerial Gunnery Range (Pearce pers. comm., cited in Service 2005b). Within the area designated as critical habitat of the desert tortoise, the Marine Corps primarily uses the Chocolate Mountains Aerial Gunnery Range to support target sites for aircraft and, to a lesser degree, ground-based artillery; maintenance of the targets is the other primary activity in this area. Target areas cover approximately 2,095.5 acres and forward arming and refueling points occupy 161 acres. Approximately 202.8 miles of roads cross this portion of the critical habitat unit. Forward arming and refueling points are areas that the Marine Corps uses to land helicopters to refuel and rearm them in the field. Refueling can be done from a large transport helicopter to a

smaller attack helicopter, but it is usually done from pre-positioned trucks. The trucks stay on designated routes to minimize surface disturbance and dust in the landing zone. Except to place targets in the designated targets areas, which are both mapped and marked with permanent monuments on the ground, vehicles are required to stay on the designated roads. Washes are only used when they are part of the designated routes. The Marine Corps and Service consulted, pursuant to section 7(a)(2) of the Act, on the effects on the desert tortoise and its critical habitat of the roads, target areas, and forward arming and refueling points in 1996 (Pearce pers. comm., cited in Service 2005b). The remainder of the Critical Habitat Unit is primarily BLM and private lands. The portion of the Chuckwalla Critical Habitat Unit in the Plan area will be described in the Environmental Baseline section of this biological opinion.

Synopsis of Status

In summary, we note that the general trend for the listed population of desert tortoise is one of decline. We make this statement despite acknowledging the difficulties involved in estimating the numbers of a species that spends a large portion of its life underground and that occurs over millions of acres. Although some statistical tests do not indicate obvious declines, other studies and observations clearly indicate that desert tortoise populations are not functioning normally. For example, the transects in the Western Mojave Recovery Unit that did not detect any sign over large areas of previously occupied habitat and the numerous carcasses found on permanent study plots and lack of recent sign also suggest population decline. During line distance sampling conducted in 8 desert wildlife management areas in California in 2003, 930 carcasses and 438 live desert tortoises were detected; more carcasses than live animals were detected in every study area (Woodman 2004). In 2004, workers conducting line distance sampling in California detected 1,796 carcasses and 534 live desert tortoises; once again, more carcasses than live animals were detected in every study area (Woodman 2005).

ENVIRONMENTAL BASELINE

Status of the Species in the Action Area

The Plan area is a small portion of the overall range of the listed desert tortoise population. The range of the desert tortoise west of the Colorado River is less than 30 million acres in the states of California, Nevada, Arizona, and Utah. However, inside this range the amount of suitable and occupied desert tortoise habitat is much less. Critical Habitat comprises approximately 6.5 million acres. The action area has approximately 0.6 million acres of modeled habitat.

Most of the Plan area is part of the Eastern Colorado Recovery Unit designated by the Recovery Plan (USFWS 1994). Through a minor oversight the western part of the Coachella Valley is not mapped within a recovery unit, but is most likely part of the Eastern Colorado Recovery Unit. Nor has genetic analysis of the alliances of tortoises in this area been completed. The Mojave Desert portion of Joshua Tree National Park (JTNP), which is in the north part of the Plan area, is part of the Western Mojave Recovery Unit. The Recovery Plan is currently being revised and Recovery Units will likely change.

CVAG has constructed a model of habitat in the plan area. There is a considerable amount of modeled habitat, but little is known of the desert tortoise in most of the modeled habitat. The modeled habitat is fragmented by roads in several areas.

The CVAG model designates 571,098 acres of habitat for the desert tortoise in the Plan Area. Modeled habitat surrounds the valley floor on all sides in the foothills of the mountains, but the valley floor is not modeled as habitat. It is not known how much of the modeled habitat is occupied by tortoise due to lack of focused surveys. The model appears to be based primarily on elevation, designating everything below 1067m (3500 ft) and above the toe of slope as habitat. The CVAG Plan documents approximately 200 occurrences of tortoise in the Plan Area. Notable hotspots of known occurrences are in the proposed Stubbe and Cottonwood Canyons Conservation Area where Lovich et al. (1999) and Lovich and Daniels (2000) studied desert tortoises and in southern JTNP where there have been surveys and studies.

Of the 571,098 acres of modeled tortoise habitat in the action area, 240,247 acres (42 percent) are subject to the permit. The vast majority of non-federal lands are subject to the permit, though the Plan does not provide a precise number of acres. The lands subject to the permit are primarily private land with no current conservation of any kind, though most state, county, and city lands are also subject to the permit. Non-federal lands that are not subject to the permit include utilities that have rights-of-way through the Plan area, such as Southern California Edison (SCE) and Metropolitan Water District (MWD), and some state agencies, such as the University of California, which owns nearly 17,000 acres on the Boyd Deep Canyon Desert Research Center.

Approximately 345,899 acres (61 percent) of modeled desert tortoise habitat are on Existing Conservation Lands (see following table). The Plan classifies Existing Conservation Lands as Level 1, 2, or 3. Level 1 lands are state and federal wilderness areas protected from all development. Level 2 lands, such as non-wilderness areas of JTNP, Bureau of Land Management (BLM) Areas of Critical Environmental Concern (ACEC), and the Coachella Valley Preserve, are primarily managed for natural qualities but some impacts occur. Level 3 lands, primarily BLM multiple use and National Forest lands, are managed for multiple uses but provide some conservation. Most Existing Conservation Lands are federal lands not subject to the permit, but there is a relatively small amount of state, county or city Existing Conservation Lands that are subject to the permit.

Level 1 Existing Conservation Lands in modeled desert tortoise habitat consist primarily of areas in the Mecca Hills Wilderness Area, Orocopia Mountains Wilderness Area, JTNP Wilderness Area, Santa Rosa Mountains Wilderness Area, and small areas on the edges of the San Jacinto Wilderness Area and San Gorgonio Wilderness Area.

Level 2 Existing Conservation Lands in modeled desert tortoise habitat consist primarily of JTNP (non-wilderness areas), the BLM Chuckwalla Desert Wildlife Management Area (DWMA – designated for desert tortoise), Big Morongo Canyon ACEC, Whitewater Canyon ACEC, and Santa Rosa and San Jacinto Mountains National Monument.

Level 3 Existing Conservation Lands in modeled desert tortoise habitat consist primarily of BLM multiple-use lands.

Approximately 225,199 acres of modeled habitat are lands with no current protection. These are primarily private lands and compose most of the 240,247 acres subject to the permit.

No long-term monitoring of desert tortoise has occurred in the Plan Area. Plots established for monitoring long-term trends of tortoise populations have been surveyed for many years in other areas of the range of the desert tortoise (Tracy et al. 2004), but no such plots have been monitored in the action area. Some monitoring has taken place in JTNP, but JTNP is not subject to the Plan. Data on the tortoise in the Plan area consists primarily of occurrences from project monitoring, incidental sightings, or studies such as Lovich et al. (1999).

No estimates of population size or density have been attempted in the area. CVAG has gathered 197 occurrences of desert tortoise, though there are number of these occurrences that are not unique individuals. Two large clusters of occurrences are notable. These clusters likely represent relatively large, reproducing populations. The first is in the Whitewater Hills, primarily in the proposed Stubbe and Cottonwood Canyons Conservation Area. Aspects of this population were reported by Lovich et al. (1999) and Lovich and Daniels (2000). This population resides in a windfarm where windmills are used for energy production. The windfarm has no public access and the windmill workers are trained to avoid harm to the tortoises. Lovich et al. (1999) studied reproductive output and Lovich and Daniels (2000) detailed attributes of tortoise burrows in the altered landscape of this study site. No estimates of density or population size were attempted. CVAG notes 86 occurrences from this study site, though many are relocations of previously captured individuals. There appears to be 23 or less individual tortoises on which data was collected at the site. All occurrences fall within a circle of less than 500 acres. A 2004 report includes the CVAG records and additional records from after 1997 (Meyer and Lovich 2004). In total 48 adult tortoises and 88 hatchling and immature tortoises were found at the windfarm between 1997 and 2001. One adult and one immature tortoise were found at the Painted Hills site. Two adult and one immature tortoise were found at the Verbenia site (north of the town of Verbenia).

The second cluster of occurrences is in southern JTNP. This cluster extends from within the park to outside the Park near Interstate 10. CVAG records reflect 68 occurrences from this area that can further be broken down into two areas: in the valley and in the mountains. There are 44 occurrences on the alluvial plain in the valley between the mouth of Cottonwood Canyon and the aqueduct that runs roughly parallel to Interstate 10. Most fall within a circle of approximately 2500 acres and 2.2 miles across. At least 9 of these occurrences are duplicate records for a tortoise that already has an occurrence. Two more occurrences fall farther east near the aqueduct and one more occurs near Cottonwood Road between the aqueduct and the interstate. Another two tortoise occurrences are 6.2 miles southeast of the mouth of Cottonwood Canyon and 1mile south of the interstate. An additional 19 occurrences are farther up Cottonwood Canyon in higher elevation areas above the valley all within a few miles of the Cottonwood Visitor Center and Cottonwood Campground. These nineteen occurrences all fall within a circle of just over 3000 acres. The boundary of the action area is approximately 0.6 miles north of the Cottonwood Visitor Center.

Additional occurrences have been recorded since CVAG collected occurrences. The Paradise

Valley project recorded 12 live tortoises and signs of 138 carcasses in 2003, along with numerous scat and burrows, west of Cottonwood Canyon in Shavers Valley and the foothills of the Cottonwood Mountains. These occurrences were after CVAG collected data on occurrences. Other occurrences are described in individual conservation area analyses below.

Other populations likely occur in modeled habitat in the Plan area but are unknown simply due to lack of study or surveys. No tortoises were known from the area of the Paradise Valley project previously but intensive surveys discovered 12 live tortoises and extensive sign. The Whitewater Hills was another area of unknown data until it was studied intensively.

Modeled habitat in the Plan area is fragmented by roads in several places. Interstate 10 is the largest barrier to movement because it is a six to eight-lane interstate. It fragments modeled habitat in two places. In the eastern part of the action area Interstate 10 runs east-west between JTNP and the Chocolate Mountains. A number of existing culverts are present that potentially provide opportunities for desert tortoises to cross the interstate without entering traffic. The Plan divides the existing culverts and undercrossings in this area into 5 biological corridors. Each corridor is comprised of a variable number of culverts of varying sizes. Corridor 1 has one culvert at Thermal Canyon that is 25 feet high, 62 feet wide and 275 feet long. Corridor 2 has two culverts at E. Cactus City Wash and Hazy Gulch. One is 9 feet high, 64 feet wide and 226 feet long. The other is 14 feet high, 45 feet wide and 191 feet long. Corridor 3 has one culvert at Happy Gulch that is 4 feet high, 36 feet wide and 191 feet long. Corridor 4 has one culvert at Desperation Arroyo that is 9 feet high, 18 feet wide and 190 feet long. Corridor 5 has 10 culverts along 4 miles east of Cottonwood Canyon ranging from 4.6 feet to 9 feet high, 18 feet to 99 feet wide, and 190 feet to 252 feet long. Certainly these culverts are large enough for tortoise to pass through and most have natural bottoms but it is not known if or to what extent these corridors and culverts are used by desert tortoises. Movement of tortoise from one side of road to the other by means of the culverts has not been documented. Fencing or other structures to direct the movement of tortoise to the culverts is absent. Without fencing, tortoise will likely attempt to cross on the asphalt, placing themselves at risk of a vehicle strike. In many places in the Plan area, vehicle traffic is high enough that 100% mortality of desert tortoises crossing the road is expected.

Interstate 10 also fragments modeled habitat in the western portion of the action area in San Gorgonio Pass. Desert tortoise populations north of the interstate in the San Bernardino Mountains foothills are disconnected from populations to the south in the foothills of the San Jacinto and Santa Rosa mountains. The Plan designates two biological corridors in this area within desert tortoise modeled habitat, each with one or two culverts. The Stubbe Canyon Wash Biological Corridor has two undercrossings. One is 17 feet high, 37 feet wide and 230 feet long. The other is 15 feet high, 55 feet wide and 243 feet long. The Whitewater River Biological Corridor has one culvert at the Whitewater River. This culvert is 24 feet high, 270 feet wide and 157 feet long. Fornat Wash, to the west, is also in desert tortoise habitat. Movement of tortoise from one side of road to the other by means of the culverts has not been documented. Fencing or other structures to direct the movement of tortoise to the culverts is absent.

Highway 111 poses another barrier to movement in the eastern portion of the San Gorgonio Pass.

Highway 111 exits Interstate 10 to the south between Stubbe Canyon Wash and the Whitewater River and runs east. Highway 111 is a 4-lane divided road with heavy traffic. A tortoise crossing Interstate 10 at the Whitewater River would also have to cross Highway 111 to get to the San Jacinto Mountains. There are two culverts under Highway 111 that tortoise could use at Snow Creek and the Whitewater River. The Snow Creek culvert is 15 feet high, 487 feet wide, and 221 feet long. The Whitewater River culvert is 9 feet high, 207 feet wide, and 122 feet long. This portion is also not fenced with tortoise-proof fencing.

State Highway 62 intersects Interstate 10 east of San Gorgonio Pass and runs north. Modeled habitat lies on both sides of Highway 62. This road is not fenced with tortoise-proof fencing. Two culverts at Mission Creek potentially allow tortoise movement. One culvert is 8 to 11 feet high, 28 to 29 feet wide and 143 feet long. It is not known if or to what extent these culverts are used by desert tortoises.

Highway 74 exits the city of Palm Desert to the south and travels up the foothills through desert tortoise habitat into the mountains. No tortoise fencing is present.

The above highways and interstate fragment habitat by completely bisecting modeled habitat such that there is no connection except across the road. Additional roads are present throughout the modeled habitat and while they may not fragment populations to the degree that the above interstates and highways do, they are likely causes of mortality.

To summarize the fragmentation of habitat by roads, the modeled habitat can be conceptualized as a ring of habitat, open on the southeast side, around the Coachella Valley. This ring is bisected by roads at several points: I-10 in the east, Highway 62 in the northwest, I-10/Highway 111 in the west, and Highway 74 in the south. Potential exists for desert tortoises to use large culverts under these roads, but the actual usage is unknown. No tortoise fencing exists on any roads in the action area. Right-of-way fences exist in many areas, for instance along highway 62, but the effectiveness of these fences in keeping tortoises off the road is likely poor.

Desert tortoise populations in the Plan area may be connected to or are part of populations outside the Plan area. These connections or contiguities occur in three areas. The first area is on the east side of the Plan area from southern JTNP to south of Interstate 10. This area is part of the Chuckwalla DWMA and Chuckwalla Critical Habitat and is contiguous with the rest of the Chuckwall DWMA and Chuckwalla Critical Habitat that are outside the Plan area to the south and east. The second area is in the northwest part of the Plan area habitat where habitat extends to an unknown degree north of the Plan area into Morongo Valley. Morongo Valley west of the intersection of highway 62 and highway 247 was not considered part of the range of the desert tortoise in the Final EIR of the BLM West Mojave Plan. No tortoises are known from the Morongo Valley but no surveys have been done there either. The Morongo Valley may provide a linkage to populations north of JTNP. The third area is in the southern part of the Plan area where the foothills of the Santa Rosa mountains may contain populations of desert tortoise south of the Plan area.

In the following analysis by conservation area, lands not conserved are primarily private lands,

which are subject to the permit. CVWD, County, City, and State lands may also be present and most are subject to the permit. The relatively smaller amount of acres of quasi-public lands such as Metropolitan Water District and Southern California Edison are not subject to the permit, but may participate in the Plan as a Participating Special Entity (Section 7.4). Acreages are from Table 9-15 of the Plan. An analysis of the status of the species in each conservation area with any modeled tortoise habitat follows:

Cabazon Conservation Area
Approximately 3,216 acres of modeled habitat occur in this conservation area, of which 42 acres is on Existing Conservation Lands managed by BLM at Level 3 as multiple-use. The remaining 3,174 acres are not conserved and are primarily private land. This area consists of a checkerboard pattern of land within the Conservation Area and Reservation Land (not part of the Plan). As a result, there are large chunks of Reservation Land between and adjacent to land that would be conserved under the Plan. The future of Reservation Land is uncertain as to whether the land will be preserved or developed. A very narrow corridor (less than 0.5 mile) is located at Fornat Wash under Interstate 10. A large culvert 11 feet high, 54 feet wide and 276 feet long passes under Interstate 10 at this point. Adjacent to this corridor and undercrossing is Tribal Land to the east and existing development to the west. Also, there are miscellaneous roads effectively throughout the majority of the Fornat Wash undercrossing site. The presence of tortoise within this Conservation Area and their usage of the undercrossing at Fornat Wash are unknown. There have been no occurrences of tortoise reported in this area.

Stubbe and Cottonwood Canyons Conservation Area
Approximately 5,779 acres of modeled habitat occur in this conservation area. Existing Conservation Lands, consisting primarily of BLM lands, comprise 3,242 acres of this habitat. Approximately 323 acres are on Level 1 Existing Conservation Lands in the southern San Gorgonio Wilderness Area. Approximately 134 acres are Level 2 Existing Conservation Lands in the Whitewater Canyon ACEC. Approximately 2,783 acres are Level 3 Existing Conservation Lands on BLM multiple-use land. Approximately 2,536 acres are not currently conserved and are primarily private land. Two large culverts (37 feet wide, 17 feet tall, 230 feet long and 55 feet wide, 15 feet tall, 243 feet long) under Interstate 10 at the southern end of this conservation area potentially function as a biological corridor. No data is available, but the possibility exists that these culverts would be used by desert tortoises on rare occasions. This proposed conservation area harbors most of the vigorously reproducing population studied by Lovich and Daniels (2000), one of the two apparent populations in the action area. CVAG records 86 occurrences in this conservation area. Eighty-four of the occurrences are from the windmill park of the Lovich et al. (1999) study, of which many are relocations of individual tortoises. There are approximately 23 individual tortoises in these 84 occurrences, all from 1997. The other two occurrences, from 1976 and 1998, are north of the town of Verbenia. However, a 2004 report includes the CVAG records and additional records from after 1997 (Meyer and Lovich 2004). In total 48 adult tortoises and 88 hatchling and immature tortoises were found at the windfarm between 1997 and 2001. One adult and one immature tortoise were found at the Painted Hills site. Two adult and one immature tortoise were found at the Verbenia site (north of the town of Verbenia).

Snow Creek/Windy Point Conservation Area
Approximately 1,559 acres of modeled habitat occur in this conservation area, of which 290 acres are on Existing Conservation Lands managed by the BLM at Level 3 as multiple use lands. The remaining 1,269 acres are not currently conserved and are primarily private lands. The eastern half of this Conservation Area runs along the southern boundary of Highway 111 and contains two underpasses which tortoises could potentially use. One underpass, which consists of two bridges, is immediately adjacent (west) to Windy Point. Snow Creek passes under the two sections of Highway 111 and meets the Whitewater River. The second underpass is further west of Windy Point, where a tributary of the Whitewater River appears to branch off of the main stem and travel under the railroads tracks, then under Highway 111 and into the Snow Creek/Windy Point Conservation Area. Adjacent to this underpass, Highway 111 is lined with salt cedar. This corridor extends to the north and into the Whitewater Floodplain Conservation Area where there is a second underpass associated with the railroad.

This Conservation Area further extends to the west, but remains south of Highway 111 and Interstate 10. Just west of Verbenia Avenue, Stubbe east and west waterways flow under Interstate 10 through two sets of bridges and into the Snow Creek/Windy Point Conservation Area. The Conservation Area further extends to the west where an existing windmill farm is located. On the other side of Interstate 10 are the Stubbe and Cottonwood Conservation Area and to the south is the Santa Rosa and San Jacinto Conservation Area. The Snow Creek/Windy Point Conservation Area directly abuts the Santa Rosa and San Jacinto Conservation Area, while it is separated from the Stubbe and Cottonwood Conservation Area by Interstate 10.

The Conservation Area's positioning between two high traffic roadways also results in high amounts of garbage collecting in the area. Movement of tortoise from one side of road to the other by means of the corridors (culverts/bridges) has not been documented. Fencing or other structures to direct the movement of tortoise to the corridors (culverts) is absent.

Whitewater Canyon Conservation Area
Approximately 4,579 acres of modeled habitat occur in this conservation area. Modeled habitat occurs in two areas in this conservation area: in the southern finger of the conservation area in and around Whitewater Canyon and in the eastern part of the conservation area east of the Whitewater River. Approximately 3,343 acres of modeled habitat are on Existing Conservation Lands, specifically BLM land at Levels 1, 2 and 3. Approximately 1,236 acres are not currently conserved and are primarily private lands. Five occurrences are known from this conservation area; 4 are on the edge of the population studied by Lovich and Daniels (2000) on the west side of the lower finger of the conservation area and were seen in 1997. One occurrence is slightly east and north of the Lovich and Daniels study population, in a side canyon of the Whitewater Canyon, seen around 1976.

Highway 111/I-10 Conservation Area
Approximately 389 acres of modeled habitat occur in this conservation area, of which all are private lands not currently conserved and subject to the permit. This conservation area occurs between Highway 111 and Interstate 10 and serves as part of a biological corridor in concert with the Whitewater Floodplain and Snow Creek/Windy Point Conservation Areas, connecting the

tortoise populations north of Interstate 10 to populations south of Interstate 10. Tortoise usage of this Conservation Area is not known, however it is modeled as tortoise habitat and geographically it is situated within one of few potential crossing sites. This Conservation Area does not contain any culverts or underpasses.

Whitewater Floodplain Conservation Area
Approximately 1,110 acres of modeled habitat occur in this conservation area, of which 307 acres are on Existing Conservation Lands managed by the BLM as multiple-use lands. Approximately 803 acres are not currently conserved and are predominantly private land, but there is also Coachella Valley Water District (CVWD), MWD, and SCE land. Modeled habitat is in the western portion of this conservation area west of the percolation ponds. No occurrences are recorded from in the conservation area, but one occurrence is 0.3 miles to the northeast of the conservation area. This conservation area lies between Interstate 10 and Highway 111. This habitat may be an important biological corridor for this species between northern/eastern and southern/western populations in the valley.

Upper Mission Creek/Big Morongo Canyon Conservation Area
Approximately 27,676 acres of modeled habitat occur in this conservation area, of which 17,106 acres are on Existing Conservation Lands, primarily BLM lands at Level 1, 2, and 3. Existing Conservation Lands consist primarily of the San Gorgonio Wilderness Area, Big Morongo ACEC, and BLM multiple use lands. Approximately 10,570 acres of modeled habitat are not conserved and are primarily private land.

Eight occurrences of desert tortoises are known from this proposed conservation area. Seven of the eight occurrences are from 1997 or later. Occurrences are from the vicinity of the Painted Hills, in Mission Creek wash and one from Long Canyon in the eastern part of the conservation area.

The northwestern portion of this Conservation Area contains Mission Creek, Big Morongo Creek, and Dry Morongo Creek, as well as other smaller less distinguished waterways and washes. These waterways, washes and associated watersheds play an important role in tortoise life history, particularly for movement and dispersal corridors.

The northwestern portion of the Conservation Area is fragmented into east-west portions by Highway 62. This area is also modeled tortoise habitat. Highway 62 does not have tortoise proof fencing along any stretches of the roadway. Culverts or bridges are present at some waterway intersections with Highway 62 including Dry Morongo Creek, an unnamed waterway approximately 0.5 mile north of Indian Avenue, unnamed waterway immediately north of the Mission Creek crossing, Mission Creek, and an unnamed waterway near the crossing of the Colorado River Aquaduct. The Mission Creek crossing has two culverts, one culvert is 8 to 11 feet high, 28 to 29 feet wide and 143 feet long. It is not known if or to what extent these culverts are used by desert tortoises.

This conservation area surrounds the City of Desert Hot Springs on the west, north and east. There are countless dirt roads in the southwestern portion of the Conservation Area and the area

is adjacent to Interstate 10 and the Whitewater River. Development is present generally south of the Conservation Area with numerous outcroppings of development beyond the core urban area. The core development area of Desert Hot Springs is immediately adjacent to and within the lower reaches of Mission Creek, which is modeled tortoise habitat.

Willow Hole Conservation Area
Approximately 36 acres of modeled habitat occur in this conservation area, none of which is conserved. This habitat is in the southern end of Big Morongo Wash where it enters this Conservation Area. No occurrences are known from this conservation area.

Long Canyon Conservation Area
The primary purpose of this conservation area is to conserve fluvial transport, however, 506 acres of modeled desert tortoise habitat occur here, of which 102 acres are Existing Conservation Lands managed by the BLM. The remaining 404 acres are not conserved and are primarily private land. This habitat is in the northern half of this conservation area. No occurrences are known from this conservation area.

West Deception Conservation Area
This primary purpose of this area is to maintain fluvial transport, however, 2,028 acres of modeled habitat occurs here, of which 132 acres is on Existing Conservation Lands managed by the BLM at Level 3 as multiple-use. Approximately 1,896 acres are not currently conserved and are primarily private lands. This habitat occurs on the northern third of this conservation area. No occurrences are known from this conservation area.

Indio Hills/Joshua Tree National Park Linkage Conservation Area
Approximately 10,308 acres of modeled habitat occurs in this conservation area. All modeled habitat in this conservation area is east of Dillon Road. Approximately 1,714 acres of the modeled habitat in this conservation area is on Existing Conservation Lands managed by the BLM at Level 3. Approximately 8,594 acres are not currently conserved and are private or Metropolitan Water District land. CVAG recorded no known occurrences in this conservation area, but 5 tortoises and 8 carcasses were found here in 2002 during project monitoring for the Joshua Hills Specific Plan (EDAW 2002).

East Indio Hills Conservation Area
Approximately 397 acres of modeled habitat occur in this conservation area, none of which are currently conserved. This habitat is in the southeast finger of this conservation area. No occurrences are known from this conservation area.

Joshua Tree National Park Conservation Area
Approximately 127,165 acres of modeled habitat occur in this conservation area, of which 110,090 acres are Existing Conservation Lands primarily owned by the National Park Service. Approximately 17,075 acres of habitat are not currently conserved and are primarily private lands. These are private lands within the National Park boundaries. The second large, known population of desert tortoises in the Plan Area occurs in this conservation area northwest of the town of Chiriaco Summit, in the National Park. Modeled habitat in this conservation area

extends from the Upper Mission Creek/Big Morongo Wash proposed conservation area in the northwest along the northeast side of the valley against the Little San Bernardino Mountains to southern JTNP. Occurrences are only known from the large population in southern JTNP. No occurrences are known from the span against the Little San Bernardino Mountains up to the Upper Mission Creek/Big Morongo Wash proposed conservation area. One occurrence is known from Long Canyon just inside the Upper Mission Creek/Big Morongo Wash proposed conservation area. Sixty occurrences of desert tortoise are known from southern JTNP, all from 1993 or later. This population extends south into the proposed Desert Tortoise and Linkage Conservation Area. Meyer and Lovich (2004) studied tortoises at a site south of Cottonwood Canyon. They found 12 adult and 12 immature or hatchling tortoises between 1997 and 2001. The desert tortoise surveys for the proposed Paradise Valley Project found an occurrence in the Park at the southern end of the of the Cottonwood Mountains 200 yards into the park.

Desert Tortoise and Linkage Conservation Area
Approximately 89,182 acres of modeled habitat are in this conservation area, of which 38,903 acres are on Existing Conservation Lands managed primarily by the BLM as multiple use lands. Approximately 50,2796 acres are not currently conserved and are primarily private lands. Interstate 10 runs bisect this Conservation Area, creating northern and southern sections. Tortoise usage of currently maintained culverts and undercrossings along Interstate 10 is unknown. Although information is not available to decipher the amount of vehicle related tortoise mortality along Interstate 10 in this area, the Interstate is likely a large source of past or current mortality.

CVAG gathered eight occurrences of desert tortoises from this area. Five of these are on the border of JTNP and this proposed conservation area and were seen as a result of surveys in JTNP. One occurrence is on the road to JTNP from the interstate. Two occurrences are south of Interstate 10. Twelve tortoises were found in surveys for the Paradise Valley project (though one was off-site 200 yards into JTNP). Most were in the southern foothills of the Cottonwood Mountains. One was in Shavers Valley approx 900m south from interstate 10. The last was in the northeastern Mecca Hills south of interstate 10 on boundary of proposed Mecca Hills/Orocopia Mountains Conservation Area.

Mecca Hills/Orocopia Mountains Conservation Area
Nearly the entire 112,275 acres of this conservation area is modeled habitat. The habitat is contiguous with the habitat in the proposed Desert Tortoise and Linkage Conservation Area. Approximately 86,334 acres of modeled habitat are on Existing Conservation Lands managed by the BLM. Approximately 71,350 acres of these 86,000 acres are Level 1 Existing Conservation Lands comprised of the Mecca Hills Wilderness Area and Orocopia Mountains Wilderness Area. Wilderness Areas are protected from OHV activity and habitat loss. Approximately 5,692 acres are in the Chuckwalla DWMA ACEC and the remaining 8,992 acres are BLM multiple-use lands. Approximately 26,241 acres in this proposed conservation area are not currently conserved, most of which are private lands. One occurrence is known from this conservation area, but the lack of occurrences is likely a reflection of lack of surveys and observers, rather than lack of tortoises.

Dos Palmas Conservation Area
Approximately 334 acres of modeled habitat occur in this conservation area, of which 317 acres are on Existing Conservation Lands managed by BLM at Level 2 in the Dos Palmas ACEC. Approximately 17 acres are not currently conserved and are private. This habitat is in the very north finger of this conservation area. No occurrences are known from this area.

Santa Rosa and San Jacinto Mountains Conservation Area
Approximately 125,694 acres of modeled habitat occur in this conservation area, of which 83,976 acres are on Existing Conservation Lands managed primarily by BLM, the Forest Service, the State Wildlife Conservation Board, the University of California Natural Reserve System, and local cities. Of the 41,718 acres not currently conserved, most are private lands.

This Conservation Area's modeled tortoise habitat consists of a mix of habitat types extending from the valley floor westward/upslope to 3,500 feet, the general elevational limit of tortoise. The slope of the terrain is variable consisting of canyon washes and very rugged topography, therefore not all modeled habitat would be accessible to tortoise even though the elevation may be below 3,500 feet. Fourteen occurrences of desert tortoise collected by CVAG are in this conservation area, plus multiple observations of sign (burrows). Eight tortoise occurrences are from Deep Canyon, in the central part of the conservation area. One occurrence is in the northern part of the conservation area in upper Chino Canyon. One occurrence is in the southern part of the conservation area at the mouth of Martinez Canyon. Five other occurrences are on the southwest side of the valley near various points of this conservation area but don't fall within the boundaries.

There is a belief that the tortoises within this Conservation Area are present as a result of historical releases of pet tortoises and therefore do not constitute a natural population. The Service is aware that tortoises were artificially introduced all over the Coachella and Imperial valleys in the 1960's and 1970's. Without DNA analysis the validity or falsehood of such claims can not be determined. Indian peoples in the area used tortoises so it appears that tortoises were in the area before modern settlement. Given the length of time they have been present and the documentation of a hatchling in Deep Canyon in 1980 (pers. comm. Jim Rorabaugh, USFWS), the population appears to have been reproducing in the Conservation Area. However, the population in the area must exist at low densities, otherwise more sightings would be documented.

The majority of tortoises documented in this Conservation Area are in or near Deep Canyon, south of Palm Desert. This population could be the densest one in the Conservation Area, however with a limited degree of survey effort there could be larger populations elsewhere in this Conservation Area. Wherever the tortoises may be, their movement is most likely limited to the eastern foothills of the San Anna and San Jacinto mountain ranges because the majority of the desert floor adjacent to this Conservation Area has been developed or is not part of the conservation design. Very few tortoises (3) have been observed in the western portions of this Conservation Area, potentially due to the ruggedness of the topography or simply the lack of survey effort in this Conservation Area.

Highway 74 bisects the Conservation Area near Long Canyon. There is an unknown quantity of undercrossings for tortoise along this stretch of highway. There are other roadways within this Conservation Area that bisect tortoise habitat, however the number of vehicle daily trips would be far less than a well traveled highway such as Highway 74.

The habitat model does not include Tribal Lands that occur in this area, because they are not subject to the Plan. As a result, the north central portion of the Conservation Area near Palm Canyon, takes on a checkerboard pattern of discontinuous legal sections of land. Whether the Reservation Lands within this Conservation Area will be preserved or developed is uncertain.

In summary, desert tortoise populations are poorly known in the area. A population in the windfarm in the proposed Stubbe and Cottonwood Canyons Conservation Area is the largest and best known of those on land subject to the permit. The extent and relative density of tortoises in the remainder of the foothills surrounding the valley is unknown.

Critical Habitat in the Action Area
Approximately 172,936 acres of the Chuckwalla Critical Habitat Unit is in the Plan Area. This critical habitat unit overlaps the Plan area in the east. It encompasses both sides of Interstate 10 starting on the eastern boundary of the Plan area to near Cactus City and then extends north along the foothills of the Little San Bernardino Mountains and ends at the northernmost extent of the proposed Desert Tortoise and Linkage Conservation Area. The eastern third of the proposed Mecca Hills/Orocopia Mountains Conservation Area is critical habitat. Nearly the entire proposed Desert Tortoise and Linkage Conservation Area east of Cactus City is critical habitat. Most of the proposed JTNP Conservation Area from west of Cottonwood Canyon up to a horizontal line at the northern extent of the proposed Desert Tortoise and Linkage Conservation Area is critical habitat. There is a strip of critical habitat that overlaps outside JTNP in the northwest finger of the proposed Desert Tortoise and Linkage Conservation Area.

The BLM Chuckwalla DWMA, designated in the Northern & Eastern Colorado Desert Coordinated Management Plan (NECO) by the BLM in 2002, encompasses most of the critical habitat in the plan area outside of JTNP. It also extends 5 miles west of Cactus City in the proposed Desert Tortoise and Linkage Conservation Area where the critical habitat does not. It does not encompass the strip of critical habitat in the northwest finger of the proposed Desert Tortoise and Linkage Conservation Area just outside of JTNP.

Approximately two thirds of the critical habitat in the Mecca Hills/Orocopia Mountains Conservation Area is in the Orocopia Mountains Wilderness Area. The remainder is east of the Orocopia Mountains Wilderness Area but is part of the Chuckwalla DWMA.

Factors Affecting the Species' Environment within the Action Area
In the past century the Mojave and Colorado Deserts have been invaded by several non-native species of annuals. These invasive plants have two effects on the desert tortoise: they increase wildfire frequency and they alter the annual plant community that tortoises feed on.

Proliferation of invasive plants has resulted in larger and more frequent fires in the deserts of the

southwest (Brooks and Esque 2002). In the Plan Area, the interface between the Colorado and Mojave deserts in the northwest part of the Plan Area around San Gorgonio Pass and Morongo Valley is a hotspot for fires in California deserts (Brooks and Esque 2002). The desert tortoise and Mojave and Colorado Deserts are not adapted to frequent fires and are negatively affected by fire. Fire may directly kill tortoises (Esque et al. 2003, Lovich and Daniels 2000) or may result in altered vegetation attributes (Esque et al. 2003). Since tortoises are thought to be selective of the vegetation they consume to maintain proper mineral balance (Oftedal 2001), fire-altered vegetation attributes may be undesirable for the desert tortoise. The alien grasses *Schismus* spp. (Mediterranean grass) and *Bromus rubens* (red brome) appear to be the primary facilitator of increased fire frequency because the dead plants may remain for many years and create a fuelbed for fire to cross between shrubs.

The invasion of invasive species has also changed the annual plant community that desert tortoises rely on for food. Non-native species are present in larger numbers than native species and usually form the bulk of the annual plant community biomass (Brooks 2000), likely because they out-compete native species (Brooks 2000). The primary non-native species of concern are Mediterranean grass or split grass (*Schismus barbatus* and *S. arbicus*), filaree (*Erodium cicutarium*), and red brome (*Bromus rubens*). Mediterranean grass is ubiquitous in the Mojave and Colorado Deserts where it occurs as a carpet covering the desert floor in wet years. Red brome is primarily confined to the Mojave Desert and also grows primarily under the canopy of shrubs like creosote, whereas Mediterranean grass grows in the open. Filaree, a forb in contrast to the two previous grasses, is ubiquitous in both deserts and has been present probably since the 1600s while the two grasses have only become widespread in this century (Brooks and Esque 2002). Mediterranean grass (*Schismus* spp.) has relatively low nutritional value to tortoises (Oftedal et. al. 2002) and is often bypassed by foraging juvenile desert tortoises despite its overwhelming availability (Oftedal et. al. 2002). Filaree may be a significant part of the diet, but is not a preferred food (Jennings 1993) and appears to be somewhat nutritious early in its phenology (Oftedal 2002). A nutritionally poor diet of invasive plants, especially grasses, may contribute to tortoises' susceptibility to URTD (Tracy et al. 2004, Jacobson et al. 1991). Red brome (*Bromus rubens*) was not eaten by the desert tortoise at all in one study (Avery and Neibergs 1997) but has been considered a major food item for tortoise (Oftedal 2002). Experimental thinning of Mediterranean grass and red brome resulted in higher densities, biomass, and species richness of native annuals in one experiment (Brooks 2000). Mediterranean grass and red brome likely out-compete native annuals because of faster uptake of water and nitrogen (Brooks 2000).

Saharan mustard (*Brassica tournefortii*) is a prolific species of concern on the floor of the Coachella Valley (Barrows 2005). Saharan mustard is less common and invasive on alluvial fans and rocky hill slopes (Sanders and Minnich 2000) where desert tortoise live, but given the scale and intensity of the Saharan mustard invasion on the valley floor, Saharan mustard may become more of a threat to tortoise habitat in the future.

Ravens have been known to prey on young tortoises (Boarman 2002). Ravens are thought to have increased in number in the Mojave Desert by 1500% in recent decades (Kristan and Boarman 2003). Urban development generally increases populations of ravens (Kristan and

Boarman 2003). While no data exists specific to the action area, ravens likely have increased in numbers in the action area as development has increased. Increased numbers of ravens likely increase mortality rates for young tortoises.

Upper Respiratory Tract Disease (URTD) is a disease that may be fatal to desert tortoises. URTD has not been found in the Whitewater Hills or Painted Hills (Lovich, pers. comm.), but it may be present nonetheless. The spread of URTD to wild tortoises from released captive tortoises or from outside the action area is a constant threat. URTD is caused by a species of Mycoplasma, which are primitive bacteria. Some strains appear to be more virulent and dangerous than others. URTD is thought to be exacerbated by the effect of a poor nutrition diet of non-native plants.

Highways and other roads may be a major source of mortality for desert tortoises. Boarman et al. (1997) found 39 dead tortoises in 2.5 years on a stretch of highway in California. No instances of mortality are known, but Interstate 10 and Highway 62 certainly pose a high risk to desert tortoises in the action area. High traffic roads also form a barrier to movement, thereby fragmenting populations. Culverts under Interstate 10 and Highway 62 are used to an unknown degree by desert tortoises. In some cases, tortoise fencing must be installed before tortoises will use culverts (Boarman et al. 1998). No tortoise fencing is in place in the Plan Area.

Off-highway vehicles (OHVs) may crush tortoises or their burrows. OHVs may degrade habitat by destroying vegetation. Illegal OHV activity occurs in many places in the Plan area.

Cattle grazing may have detrimental effects on desert tortoise. Grazing occurs in the action area in the Whitewater Grazing Allotment managed by the BLM which overlaps tortoise habitat in the Whitewater Hills and Painted Hills. Cattle have been shown to out-compete desert tortoise for certain important forage species (Avery 1998). Cattle may also be detrimental to tortoise by trampling burrows and nest sites (Avery 1998).

EFFECTS OF THE ACTION

Overview

Altogether 67,229 acres (28 percent of land subject to the permit) would be authorized for impacts. This includes land inside and outside of conservation areas, but most (50,272 acres) is outside conservation areas.

According to the Plan, 186 of 200 tortoise point occurrences would be conserved. The survey effort for tortoise within modeled habitat in the Plan area has been minimal and some data is relatively old. Many occurrences in the windfarm are multiple sightings of individuals. There has been a lack of survey effort throughout the majority of modeled tortoise habitat. Thus the point data for tortoises within the Plan area does not provide an accurate representation of the population size or location of tortoises throughout the Plan area. The use of this data to analyze the Plan's effects and make biological determinations is not sufficient. The following analysis of the Plan's effects on tortoises within the Plan area was thus determined by assuming occupancy of most modeled tortoise habitat, unless sufficient data was available. An analysis of the Plan's effects was therefore based on information supplied in the Plan, an extensive review of published

and unpublished literature, information from the California Natural Diversity Database and other databases, field visits by Service personnel, discussions with professional biologists, and our best collective professional judgment.

Outside of Conservation Areas

There would be approximately 50,272 acres of modeled habitat would not be included in any Conservation Areas and would thus be authorized for impacts. This acreage is primarily in two areas. One area is west of the currently developed portion of Desert Hot Springs on both sides of Highway 62. A large portion of this area is claimed by this city as part of their boundaries. One tortoise occurrence is known from this area. The second area is in the eastern end of the valley where Interstate 10 enters the land owned by the city of Coachella. One tortoise occurrence is known from outside the land owned by the city of Coachella in Thermal Canyon.

A total of 13 out of 197 occurrences of desert tortoise are outside of proposed Conservation Areas and are anticipated to be lost. Nine of these occurrences are on the southwest side of the valley against the San Jacinto and Santa Rosa Mountains. One is west of Desert Hot Springs and just east of Highway 62. Two are north of the proposed Whitewater Floodplain Conservation Area (these should have been considered a single occurrence). One is in Thermal Canyon just west of the proposed Desert Tortoise and Linkage Conservation Area south of Interstate 10. Given the mobility of this species, point data does not depict the current or future location of individual tortoises. However, this locational data can suggest habitat preferences and past usage and therefore indicate a strong correlation to where tortoises can be found.

Presence/absence and clearance surveys are not required in areas not modeled as tortoise habitat. Tortoises could conceivably be present, because some occurrences are outside modeled habitat. Required mitigation and minimization measures for construction don't apply to single-family residences, though tortoises could be present and harmed by such activities.

Inside Conservation Areas

Ten percent of private lands under per Local Permittee jurisdiction would be authorized for take in each conservation area (Section 4.3). The acreage proposed to be lost will be subject to the Conservation Objectives and Required Measures for each Conservation Area as described in Section 4 of the MSHCP, however, the exact location of the acreages to be lost are undetermined at this time.

Based on modeling, CVAG estimates there are 571,098 acres of habitat for the desert tortoise in the MSHCP Plan Area. Approximately 16,957 acres inside the conservation areas would be available for take over time. The location of lands to be taken is left to be determined over time. The Plan assumes Existing Conservation Lands will remain under conservation (see section in General Biological Opinion for discussion on Existing Conservation Lands).

Critical Habitat

Approximately 172,936 acres of the Chuckwalla Critical Habitat is in the Plan Area. The MSHCP would place all designated critical habitat in the Plan Area within the proposed Desert Tortoise and Linkage Conservation Area, the proposed JTNP Conservation Area, and the

proposed Mecca Hills/Orocopia Mountains Conservation Area. The Plan would comply with the existing Desert Tortoise Recovery Plan (USFWS 1994) and the BLM NECO plan.

Mitigation and Minimization Measures
Required mitigation measures are further explained in Section 4.4 of the Plan, as well as the specific requirements pertinent to each Conservation Area which are further explained in each applicable section. Required mitigation and minimization measures specific to the desert tortoise are generally outlined below.

Specific roads in Conservation Areas, where culverts or undercrossings are required to maintain Biological Corridors, are delineated in the Section 4.3 subsections on individual Conservation Areas
Within one (1) year of Permit issuance, the Wildlife Agencies and the MPA, in consultation with CVCC, shall develop survey protocols for those species for which a protocol is required.
Within Conservation Areas, the Permittees will require presence/absence surveys for desert tortoise for Development in modeled desert tortoise Habitat (this does not include single-family residences and any non-commercial accessory uses and structures, including but not limited to second units on an existing legal lot, or to Operations & Maintenance (O&M) of Covered Activities for Permittee infrastructure facilities).
If fresh sign is located, the Development area must be fenced with tortoise-proof fencing and a clearance survey conducted during the clearance window. All tortoises encountered will be moved from the Development site to a specified location.
Prior to issuance of the Permits, CVCC will develop a protocol for relocation and monitoring of desert tortoise, to be reviewed and approved by the Wildlife Agencies. Thereafter, the protocol will be revised as needed based on the results of monitoring and other information that becomes available.
For O&M activities in the Conservation Areas, the Permittees shall ensure that personnel conducting such activities are instructed to be alert for the presence of desert tortoise. If a tortoise is spotted, activities adjacent to the tortoise's location will be halted and the tortoise will be allowed to move away from the activity area. If the tortoise is not moving, it will be relocated by an Acceptable Biologist to nearby suitable Habitat and placed in the shade of a shrub. To the maximum extent Feasible, O&M activities will avoid the period from February 15 and October 31.
Two utility development protocols, inactive and active season, provide specific direction on site preparation and construction phases of utility projects in the Conservation Areas. The protocols include steps to be followed during the desert tortoise active and/or inactive season. The inactive season protocol must be used for utility maintenance or development within the November 1 to February 14 time frame; the active season protocol must be used for utility maintenance or development within the February 15 to October 31 time frame. Deviations from these time frames must be presented to the RMOC.

Core Habitat
Approximately 377,127 acres are proposed as Core Habitat for the tortoise (see Table 9-15 of the Plan document). The Plan states that Core Habitat is land on which the goal is to ensure persistence in the Plan Area of the species in question. Core Habitat is proposed to be

contiguous through most of the modeled habitat. Core Habitat spans from the northwest part of the Coachella Valley within the proposed Stubbe and Cottonwood Canyons Conservation Area and is unbroken (except for roads) through the north and northeast side of the valley to the Mecca Hills/Orocopia Mountains Conservation Area at the eastern end of the Plan area. The Core Habitat is in the following string of proposed conservation areas, from the Stubbe and Cottonwood Canyons in the northwest to the Mecca Hills/Orocopia Mountains in the southeast: Stubbe and Cottonwood Canyons, Whitewater Canyon, Upper Mission Creek/Big Morongo, JTNP, Desert Tortoise and Linkage, Mecca Hills/Orocopia Mountains. The Indio Hills/JTNP Linkage is also in the proposed Core Habitat, adjacent to proposed JTNP Conservation Area. Altogether, 104,740 acres of Core Habitat would be newly protected under the Plan (11,748 acres are authorized for impacts). The remainder of Core Habitat is on Existing Conservation Lands.

Core habitat is fragmented by I-10 and Highway 62. Biological corridors are necessary to maintain connections between these populations, but it is not known if current culverts and undercrossings are serving as biological corridors.

Other Conserved Habitat
Approximately 135,406 acres of modeled tortoise habitat in conservation areas is proposed as Other Conserved Habitat. Other Conserved Habitat is habitat that is not designated Core Habitat and hence there is no specific goal to maintain a viable tortoise population there, but the land is conserved for some other species or natural community. Other Conserved Habitat for the desert tortoise is present in the following proposed conservation areas: Cabazon, Stubbe and Cottonwood Canyons, Snow Creek/Windy Point, Whitewater Canyon, Highway 111/I-10, Whitewater Floodplain, Willow Hole, Long Canyon, West Deception, East Indio Hills, JTNP, Desert Tortoise and Linkage, Dos Palmas, and Santa Rosa & San Jacinto Mountains. The vast majority of Other Conserved Habitat is on the southwest side of the valley in the foothills of the San Jacinto and Santa Rosa Mountains. Altogether, 44,937 acres of Other Conserved Habitat would be newly conserved under the Plan (5,209 acres are authorized for impacts). The remainder of Other Conserved Habitat (85,260 acres) is on Existing Conservation Lands.

The Plan proposes "Biological Corridors and Linkages" that are intended to allow gene flow among populations in the Plan Area. Where the proposed Biological Corridors and Linkages cross roads, there are existing culverts or undercrossings associated with the specific roadway. Roads cause the majority of fragmentation and edge effect among tortoise populations, so the presence of culverts can provide a safer means of passage. Key biological corridors and linkages are accommodated by existing culverts at Stubbe Canyon Wash under I-10, culverts under Highway 62 in northern Riverside County, and culverts under I-10 between JTNP and the Orocopia Mountains. The scale of past use of these culverts by desert tortoise is unknown and hence their effectiveness as a linkage for the species is unknown. Culverts have been known to be used by desert tortoises, especially when fencing makes the road inaccessible (Boarman et al. 1998). Research describing the appropriate sizes, locations, orientations, etc., of corridors and linkages is not available. Thus corridor and linkage usage would need to be researched to establish the utility of such areas proposed in the Plan. Further discussion on roads and corridors takes place in the "road effects" section.

Monitoring and Adaptive Management
The Plan proposes eight adaptive management activities (Section 9.6.1.2) that could be required should biological monitoring indicate their necessity to ensure the tortoises persistence and long-term viability. Briefly, these activities are: 1) control raven predation, 2) control overgrazing, 3) control activities that crush or destroy burrows, 4) control illegal poaching, collection or harm, 5) control invasive species, 6) control wildfire with a fire management plan, 7) determine the need for tortoise fencing along Interstate 10 in Critical Habitat, 8) implement required avoidance, mitigation, and minimization measures.

Monitoring and adaptive management are anticipated to identify threats to the desert tortoise and impose management to minimize those threats. The Plan relies on monitoring to determine the threat of invasive plants, domestic animals, and raven predation. The Plan proposes to "control activities that may result in poaching, illegal collection, crushing of or disturbance to tortoises and tortoise burrows" (Section 9). The plan proposes to develop fire management plans "for Conservation Areas where desert tortoise Habitat may be impacted by fire, such as the significant population in the Whitewater Hills area" (Section 9). Tortoise fencing will be considered for areas along the Interstate 10 corridor in critical habitat. The monitoring techniques to be used to determine the state of these threats and the levels of threat which require management are not defined.

Road Effects
Direct effects from the operation of improved roadways will likely result from motor vehicles striking desert tortoises attempting to cross the roadway. The proposed Plan states that biological corridors or linkages will be maintained to allow gene flow among populations in the action area. However, the Plan also proposes to improve road segments and intersections, increase lanes, and to create new roads which could result in increased edge effects and a decrease in genetic exchange between tortoise subpopulations and metapopulations. The presence of culverts and bridges at wash crossings can provide a safer means of passage for tortoise. Culverts and bridges alone may not be enough to increase a tortoise's success in crossing the roadway, whereas the installation and maintenance of tortoise proof fencing would likely increase that success substantially.

Road improvements, including repairing/replacing culverts and bridge crossings, widening roadways from two to four or six lanes, reconfiguring highway interchanges and many other activities, can increase the direct effects and exacerbate existing indirect effects (Ashley and Robinson 1996). Increase in traffic intensity can also increase the indirect effects on wildlife. Several studies have quantified road kills of many different taxa, including birds, mammals, amphibians, and reptiles (Hansen 1982, Fuellhaas et al. 1989, Drews 1995). Mortality resulting from vehicle collisions with tortoises has been reported throughout the world (Goodman et al. 1994, Guyot and Clobert 1997, Lopez 1992, Lizana 1993, Kolodenko 1981). Mojave desert tortoise are included in the vehicle-caused mortality as shown by Boarman and Sazaki (1996) when they documented the presence of 118 Mojave desert tortoise carcasses along 28.8 km of roadway in west Mojave. The results represent a conservative estimate of 1 tortoise killed per 3.3 km of road per year. It is understood that different roadways possess different variables,

however fragmentation of populations and restriction of gene flow may increase with increases of traffic volume, width of highways, and time (Oxley et al. 1974, Nicholson 1978, Sargeant 1981).

Roads generally act as barriers as they inhibit dispersal and subsequent gene flow between subpopulations and metapopulations (Boarman et al. 1997). Changes in traffic intensity can alter the impact of roads. Hels and Buchwald (2001) suggest that slow moving amphibians have high road mortality that levels off at 100 percent for a traffic intensity of 5,000 vehicles/day. Faster moving amphibians reach a 100 percent probability of road mortality at 15,000 vehicles/day. Comparing the velocity at which a tortoise moves, approximately 2.4 m/minute, to the results in the Hels and Buchwald study, 100 percent mortality would be reached by tortoise attempting to cross a road which exceeded 25,000 vehicles/day.

Besides the mortality of tortoise from vehicle strikes, the effects of roads extend beyond the asphalt. Forman et al. (1997) suggest the "road effect zone" as 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, whether the road is a two lane or greater than a two lane roadway, the species present along the roadway, and a variety of ecological variables. It is suggested that for each species there is some threshold where the width of the "road effect zone" stabilizes. However, during extreme natural events, such as drought and fire, species may expand their home range into the "road effect zone". Research has shown that the "road effect zone" for tortoise can be present between 0.8 and 4 km from the roadway where tortoise population are depauperate and sign is drastically reduced or absent (Nicholson 1978, Boarman 1992, von Seckendorff Hoff and Marlow 1993). The distance and intensity of the population depletion may increase with the level of traffic and age of the road (Nicholson 1978). The proposed plan involves alterations to the road network within the plan area. Such alterations involve intersection improvements, increasing the number of lanes on existing roadways, increased vehicle trips per day, and new roads. The majority of these activity types are outside of modeled tortoise habitat; however, a few projects will affect modeled tortoise habitat, conservation areas and tortoise linkage areas.

The proposed plan contains road projects throughout the planning area. The majority of those projects which would affect the tortoise are Caltrans projects. Approximately half of the proposed Caltrans projects are adjacent to or within proposed conservation areas. Caltrans related road projects which result in impacts to tortoise habitat are proposed to be offset by habitat acquisition or funding. Caltrans would acquire and convey approximately 5,791 acres or provide the appropriate funds to purchase the acreage. Caltrans would also provide $7.6 million for the monitoring and management of the 5,791 acres. The majority of Caltrans projects would occur adjacent to or within conservation areas and include plans to add lanes to the roadway. The additional lanes would increase traffic intensity to levels that would exceed the 100 percent mortality threshold for tortoise crossing. Based on the conservation area design there are three conservation areas where new road projects resulting in increased traffic intensity would occur immediately adjacent to conservation areas frequented by tortoise. Implementing projects in those areas would result in 100 percent mortality for any tortoise which does not use the available undercrossings. The Stubbe and Cottonwood Canyon, Upper Mission Creek/Big

Morongo Canyon, and Desert Tortoise and Linkage conservation areas are the three primary conservation areas where tortoise movement could regularly occur after the Coachella Valley has developed as a result of the proposed Plan.

Boarman and Sazaki (1996) found that permanent fencing installed along both sides of roadways within habitat occupied by desert tortoises resulted in a significant reduction of desert tortoises killed or injured by vehicle strikes. Boarman and Sazaki (1996) also found that openings in fencing from vandalism, open gates, or other holes in the fence resulted in desert tortoises moving onto the roadway, increasing the likelihood of encountering a motor vehicle. Short segments of permanent fencing installed along both sides of the roadway within the proposed project limits may still allow tortoises to traverse around the ends of the permanent fencing into the roadway within the limits of the project footprint, even after completion of construction activities. Duda et al. (1999) tracked desert tortoise movement and found that 88 percent of desert tortoises move less than 600 feet in a day. Desert tortoises relocated from a project area can disperse four miles or more (Berry 1986). Boarman (1994) radio-tracked desert tortoises and found that tortoises can move between 0.5 and 4.3 linear miles over short periods of time. Burge (1977) found that desert tortoises travel up to 1,432 feet straight line distance often traveling in an oval shaped route. Mean distance traveled was 466 feet with a 38-foot variance. Fusari's (1982) and EnviroPlus' (1996) research suggests that desert tortoises will attempt to move through fencing when tortoises can see habitat on the other side of the fence. Desert tortoises that do encounter a fence will travel along the fence in search of the end. When the fence end is encountered, desert tortoises will often travel around the fence end and then travel perpendicular to the fence. Fusari (1982) also found that desert tortoises placed near a fence a year later appeared to have learned the location of the fence, culverts and fence ends and immediately head in a direction that will allow them to circumvent the fence by traveling through a culvert or around the end of the fence. Boarman and Sazaki (1996) also found that desert tortoises will use culverts to cross roads to access habitat on the other side of the roadway.

Key undercrossings occur under I-10 at Stubbe Canyon Wash (east and west), under I-10 and Highway 111 (Whitewater River), under Highway 62 from Mission Creek north to the county line, and under I-10 between JTNP and the Orocopia Mountains. Tortoise usage of these culverts is unknown and hence their effectiveness as means of safe passage for this species is unknown. Culverts usage by tortoise has been documented, especially when fencing makes the road inaccessible (Boarman et al. 1998). Tortoise fencing is not present within the planning area.

Indirect Effects

Raven, raccoon, skunk and domestic dog populations may increase with increasing urban development. Increased numbers of ravens would likely increase predation rates on juvenile tortoises. Increased numbers of raccoons, skunks and domestic dogs would likely increase predation rates on tortoise eggs.

Increased human population likely will increase human-caused wildfires. Increased human population may increase spread of non-native propagules by vehicles and clothing, thereby exacerbating the invasive species problem.

Table 2: Summary of Habitat within Conservation Areas Desert Tortoise

Conservation Area	***Total Acres of Habitat in Conserv. Area***	***Acres of Disturbance Authorized***	***Acres of Existing Conservation Lands***	***Remaining Acres to be Conserved***	***Total Acres to be Conserved in MSHCP Reserve System***	***Designation***
Cabazon	3,216	53	42	474 (2,647)[1]	516	Other Cons. Habitat
Stubbe and Cottonwood Canyons	5,735 / 44	253 / 1	3,206 / 37	2,276 / 6	5,482 / 43	Core / Other Cons. Habitat
Snow Creek/ Windy Point	1,559	127	290	1,142	1,432	Other Cons. Habitat
Whitewater Canyon	4,494 / 85	120 / 3	3,290 / 53	1,084 / 29	4,374 / 82	Core / Other Cons. Habitat
Highway 111/ I-10	389	39	0	350	350	Other Cons. Habitat
Whitewater Floodplain	1,110	80	307	723	1,030	Other Cons. Habitat
Upper Mission Creek/ Big Morongo Cyn	27,676	1,157[2]	17,106	9,413	26,519	Core Habitat
Willow Hole	36	4	0	32	32	Other Cons. Habitat
Long Canyon	506	N/A	102	(404)[1]	102	Other Cons. Habitat
West Deception	2,028	118	132	1,063 (715)[1]	1,195	Other Cons. Habitat
Indio Hills/ Joshua Tree National Park Linkage	10,308	859	1,714	7,735	9,449	Core Habitat
East Indio Hills	397	40	0	357	357	Other Cons. Habitat
Joshua Tree National Park	127,161 / 4	1,708 / 0	110,086 / 4	15,367 / 0	125,453 / 4	Core / Other Cons. Habitat
Desert Tortoise and Linkage	89,178 / 4	5,027 / 1	38,903 / 0	45,248 / 3	84,151 / 3	Core / Other Cons. Habitat

Conservation Area	***Total Acres of Habitat in Conserv. Area***	***Acres of Disturbance Authorized***	***Acres of Existing Conservation Lands***	***Remaining Acres to be Conserved***	***Total Acres to be Conserved in MSHCP Reserve System***	***Designation***
Mecca Hills/Orocopia Mountains	112,275	2,624	86,334	23,617	109,951	Core Habitat
Dos Palmas	334	2	317	15	332	Other Cons. Habitat
Santa Rosa & San Jacinto Mountains	125,694	4,741	83,976	36,977	120,953	Other Cons. Habitat
Total – All Habitat	*512,533*	*16,957*	*345,899*	*145,911 (3,766)* [1]	*491,810*	--
Total – Core Habitat	*377,127*	*11,748*	*260,639*	*104,740*	*365,379*	--
Total – Other Cons. Habitat	*135,406*	*5,209*	*85,260*	*41,171 (3,766)*[1]	*126,431*	--

[1] Numbers within parentheses are acres of Habitat in fluvial sand transport areas. The only Conservation Objective in this Conservation Area is to maintain fluvial sand transport. Habitat conservation is not an objective.

[2] Includes 291 acres within the Morongo Wash Special Provisions Area.

Effects Analysis of Conservation Areas

Cabazon Conservation Area

Based on Table 2 there are approximately 3,216 acres of habitat in this conservation area. Fifty three acres (2 percent) are proposed for take. There are 42 acres on Existing Conservation Lands managed by BLM with a total of 516 acres (16 percent) planned for conservation in this Conservation Area. The remaining 2,647 acres are within the fluvial sand transport system which will be maintained but not conserved.

The Cabazon Conservation Area is made up of a checkerboard pattern of preserve land intermixed with Reservation Land. An important feature of this Conservation Area is the wildlife corridor under Interstate 10 at Fornat Wash. The wildlife corridor is also subject to the checkerboard pattern of land ownership, therefore not all lands within this corridor are part of the Conservation Area. The presence of this Conservation Area could provide habitat for tortoise movement in and out of the area, but does not appear substantial enough in size and contiguity to accommodate a population. It is difficult to conclude whether or not this Conservation Area is substantial enough in size to accommodate a tortoise population particularly because of the uncertainties in the management of interspersed Reservation Lands. It is possible that portions

of the Conservation Area provide habitat for a population that extends outside of the Conservation Areas limits. This conservation area would function poorly because interspersed Reservation lands result in poor spatial contiguity of preserved lands.

The proposed Plan allows for the development of 53 acres within the Conservation Area, however the location of such development(s) is unknown. Whether the development occurs in the immediate area of the Fornat Wash undercrossing or elsewhere in the Conservation Area, the effects could have varying consequences. Adding on to existing development immediately northeast or southwest of the undercrossing would further reduce the utility of the undercrossing. In doing so, the amount of habitat available for tortoise movement would be reduced and development associated edge effects would be exacerbated.

At present, the width of the biological corridor (except for the undercrossing itself) appears to be less than 0.5 mile in width, substantially less than the 1-mile corridor width proposed as a minimum. With existing on- and off-ramps, a railroad, a small network of roads, and existing development immediately southwest and northeast of the undercrossing, increasing development in this area would further pinch the corridor width. Consequently, tortoise movement opportunities in an already convoluted and fragmented area would be further reduced.

Tortoise proof fencing is not proposed to appropriately direct tortoise to the undercrossing(s) and out of harms way. Average daily traffic on Interstate 10 between Apache Trail and Highway 111 is between 77,000 and 101,000 trips per day (www.dot.ca.gov). This amount already exceeds the threshold for tortoise mortality and any increase would only further guarantee 100 percent mortality of those individuals attempting to cross over the interstate. With the absence of a 1-mile corridor leading to the Fornat Wash undercrossing, the potential for development to further reduce the corridor size and the absence of tortoise proof fencing, tortoise movement would be further hindered if not completely halted.

Stubbe and Cottonwood Canyons Conservation Area
Based on Table 2 there are approximately 5,735 acres of Core Habitat in this conservation area. Existing Conservation Lands, consisting primarily of BLM land, comprise 3,206 acres of this Core Habitat. Approximately 2,529 acres are subject to the permit, of which 2,276 acres (90 percent) would be conserved in perpetuity. Approximately 44 acres are designated as Other Conserved Habitat, of which 37 acres is on Existing Conservation Lands and 6 acres will be conserved in perpetuity by the Permittees.

The culverts under Interstate-10 at West Stubbe and East Stubbe are very large (37 feet wide, 17 feet tall, 230 feet long and 55 feet wide, 15 feet tall, 243 feet long). These culverts are the I-10 undercrossings for a designated Biological Corridor in this conservation area. No data is available, but the possibility exists that these culverts would be used by desert tortoises. This is one of the few Biological Corridors that potentially connects the populations on the north side of San Gorgonio pass with populations on the south side of San Gorgonio pass. This culvert may used occasionally over decades and thus may provide for occasional gene flow, but will not provide a regularly used crossing point for tortoises.

Though 90% of the land subject to the permit in the Conservation Area will be protected, the specific parcels to be developed and conserved are not designated at this time. Development may be more likely to occur along the Interstate-10 corridor. If so, the potential exists for development to cut off the Biological Corridor of this Conservation Area. The required measure for development in section 6 will maintain some connectivity, but the overall connectivity is likely to decrease.

This conservation area would encompass most of the largest, most dense population of tortoises known in the Plan Area. This population is in the windfarms of the Whitewater Hills. This population may be a source for populations to the east, south and west. Because the final configuration of development is unknown, some connections with other populations could be cut off and without additions from the source populations, those isolated populations could become extirpated.

Tortoises will have to use one of several large undercrossings under Interstate 10 to travel from one side San Gorgonio Pass to the other to maintain biological connectivity between populations. To get to the undercrossing at Stubbe Wash, tortoises from the windfarm would have to get around the town of Verbena. It seems likely that most development in this conservation area will occur near Verbena, where there is already infrastructure to support development. Two tortoises have been seen on alluvial fan north of Verbena, but if this area is developed tortoises would have to circumnavigate the development and be threatened with various causes of mortality, decreasing the likelihood of gene flow. The extent that tortoises use the hills and Cottonwood Canyon north of Verbena and would travel through them to get around is unknown. Verbena potentially blocks the windfarm tortoise population from the Stubbe Wash undercrossings. The movement of tortoise across Interstate 10 would likely result in 100 percent mortality. An increase in vehicle trips per day along Interstate 10 is expected as a result of this plan. Given that the level of vehicle activity already exceeds the 100 percent mortality threshold for tortoise, an increase in traffic would only further guarantee that 100 percent of tortoise attempting to cross Interstate 10 would be killed. The installation of tortoise proof fencing along the interstate would provide direction to any tortoise or other species trying to travel to larger expanses of habitat on either side of the interstate.

There is existing development on both sides of the Stubbe Wash Biological Corridor. Dirt roads currently cross the Stubbe Wash Biological Corridor in several places and threaten the functionality of this Biological Corridor. There is also some Existing Use within the Corridor. These factors threaten the goal of maintaining a 1-mile wide corridor.

The next nearest undercrossing is the Whitewater River culvert. Tortoises would have to travel down very steep slopes into Whitewater Canyon or the south slope of the Whitewater Hills and it is not known if they are able to do that. There may be some passable gullies, but for the most part they are likely impassable.

Snow Creek/Windy Point Conservation Area
Approximately 1,559 acres of modeled habitat occur in this conservation area, of which 290 acres are on Existing Conservation Lands managed by the BLM. Of the 1,269 acres not

currently conserved, 1,142 acres would be conserved as Other Conserved Habitat under the Plan and 127 acres would be authorized for impacts.

Tortoise movement has not been studied or documented in this Conservation Area. With the documented presence of tortoises north of this Conservation Area within the Stubbe and Cottonwood Conservation Area, as well as tortoises south, within the Santa Rosa and San Jacinto Conservation Area, tortoise movement through this conservation is highly probable. The eastern portion of the Conservation Area is mostly absent of human presence, except for a large trail network. Tortoise entering from the east is highly unlikely given the restrictions of Interstate 10 abutting Windy Point and ongoing development on the east side of Windy Point. The only probable scenarios are tortoise entering from the south and west (Santa Rosa and San Jacinto Conservation Area) or from the north (Stubbe and Cottonwood and Whitewater Conservation Areas). Tortoise would need to cross both Interstate 10 and Highway 111 if entering from the north. However, both Interstate 10 and Highway 111 pose a threat to tortoise movement. With the absence of tortoise proof fencing and the high volume of vehicle traffic along each roadway, 100 percent of tortoises crossing over the roadways would be killed.

New development or the expansion of existing development could also result in direct adverse effects to tortoise within this Conservation Area. The only available place to safely cross both roadways in the east is at the Snow Creek and southern Whitewater River underpasses and in the west at Stubbe East and West. Development on the west side of Windy Point would hinder of preclude any potential movement to or from the north. The expansion of the windfarm in the western portion of this Conservation Area or the construction of any new developments within the vicinity of the windfarms would reduce tortoise and potentially reduce movement to and from the Stubbe and Cottonwood Canyon Conservation Area. These reductions would adversely effect genetic exchange, dispersal, and foraging opportunities.

The presence of strategically placed tortoise proof fencing and development would reduce the adverse effects to tortoise in this Conservation Area.

Whitewater Canyon Conservation Area
Approximately 4,494 acres of Core Habitat and 85 acres of Other Conserved Habitat are designated in this proposed conservation area. Approximately 3,290 acres of Core Habitat and 53 acres of Other Conserved Habitat are on Existing Conservation Lands. Approximately 1,204 acres of Core Habitat and 32 acres of Other Conserved Habitat are currently not conserved, but under the Plan 1,084 acres of Core Habitat and 29 acres of Other Conserved Habitat would be conserved by the Permittees. To meet the Conservation Objective of maintaining a potential linkage under Interstate 10, the existing bridge over the Whitewater River will be maintained at a minimum at its current size.

Highway 111/I-10 Conservation Area
Approximately 389 acres of Other Conserved Habitat are designated in this conservation area. Under the plan, 350 acres would be conserved by the Permittees, however the location of the conservation and development is not known. This conservation area occurs between Highway 111 and Interstate 10 and serves as part of a biological corridor connecting the tortoise

populations north of Interstate 10 to populations south of Interstate 10. Tortoise usage of this Conservation Area and the associated culverts is not known, however it is modeled as tortoise habitat and geographically it is one of few potential crossing sites.

Given the absence of tortoise proof fencing along either roadway and the high volume of traffic along each roadway, 100 percent mortality of tortoise crossing over is highly likely. Traffic volume along Interstate 10 exceeds 25,000 trips per day by almost four times. Combining the high traffic volume along Interstate 10 with the traffic counts up to 14,000 vehicles per day along Highway 111, every tortoise attempting to cross would likely be killed.

The Conservation Area's positioning between two high traffic roadways also results in high amounts of garbage collecting in the area, which can result in characteristically opportunistic and inquisitive tortoises being harmed or killed.

Whitewater Floodplain Conservation Area
Approximately 1,110 acres of modeled habitat occur in this conservation area, of which 307 acres are on Existing Conservation Lands. Approximately 723 acres would be conserved as Other Conserved Habitat under the Plan. This habitat is primarily in the western end of this conservation area, where habitat would be conserved to form a biological corridor between culverts under Interstate 10 and Highway 111.

Upper Mission Creek/Big Morongo Canyon Conservation Area
According to Table 2, approximately 27,676 acres of habitat occur in this conservation area. Approximately 1,157 acres (4 percent) are proposed for take. There are 17,106 acres of existing conservation land, primarily on BLM land, and approximately 9,413 acres remaining to be conserved for a total of 26,519 acres to be conserved.

Tortoise movement in this Conservation Area has not been studied. Given the low number of roads and development, tortoise movement throughout this Conservation Area is generally uninhibited in outlying areas west of Highway 62 and north and east of Desert Hot Springs. However, there are areas where movement is and as a result of the Plan will be hindered by the presence of roadways and increased vehicle traffic. If the annual average daily traffic increases between 25 (near the County line) and 75 percent (near Indian Avenue), tortoise movement from one side of Highway 62 to the other along this stretch of highway could result in 100 percent mortality of those individuals attempting to cross without using an underpass. In the northern portion of the Conservation Area, there are approximately five locations where tortoise can safely pass under Highway 62. As discussed in the *Road Effects* section, the sole presence of a culvert does not automatically result in tortoise usage and therefore a safe means of passage. With the absence of tortoise fencing along this highway and the increase in average daily trips as a result of this Plan and population increases elsewhere, the majority, if not 100 percent of tortoises would be killed when crossing over Highway 62 in this area. There are two culverts/bridges at Mission Creek which could allow for the movement of tortoises from one side to the other given that the proposed maintenance occurs. Widening projects will undergo the Joint Project Review Process set forth in Section 6.6.1.1 to determine the dimensions of the culverts or undercrossings based on site specific conditions and best available science. However,

without the aid of tortoise fencing along the northern stretch of Highway 62 the Plans effects on tortoise could increase their mortality.

Currently proposed land uses within the Upper Mission Creek/Big Morongo Canyon Conservation Area (CVAG, Figure 4-12e) may result in adverse effects to tortoise populations in the area. Specifically, proposed zoning at the Mission Creek-Highway 62 intersection could preclude tortoise movement. As proposed, it appears proposed zoning would allow for residential development on both sides of Highway 62 within and/or adjacent to Mission Creek's floodplain. Development of such kind would preclude the establishment of a 1-mile corridor along a corridor where tortoises have been observed. Future development in this area would further exacerbate habitat fragmentation and adverse anthropogenic effects. The potential increase of night time lighting along roadways and within new development adjacent to or within corridors and home ranges could hinder movement of tortoise. The presence of night time lighting has been shown to change the natural patterns of wildlife, including movement through corridors and undercrossings.

Willow Hole Conservation Area
Approximately 36 acres of modeled habitat occur in this conservation area, of which 32 acres would be conserved as Other Conserved Habitat.

Long Canyon Conservation Area
The primary purpose of this conservation area is to conserve fluvial transport, however, 506 acres of modeled desert tortoise habitat occur here, of which 102 acres are Existing Conservation Lands managed by the BLM. Of the 404 acres subject the permit, all 404 acres would be conserved as a fluvial transport area that may serve as desert tortoise habitat as well.

West Deception Conservation Area
The primary purpose of this area is to maintain fluvial transport, however, 2,028 acres of modeled habitat occur here, of which 132 acres is on Existing Conservation Lands managed by the BLM. Of the 1,896 acres not currently conserved, 1,063 acres would be conserved as Other Conserved Habitat and 715 acres would be conserved for fluvial transport.

Indio Hills/Joshua Tree National Park Linkage
Approximately 10,308 acres of modeled habitat occurs in this conservation area. All modeled habitat in this conservation area is east of Dillon Road. All modeled habitat in this conservation area is designated Core Habitat. It is contiguous with the Core Habitat in the JTNP Conservation Area. Approximately 1,714 acres of the modeled habitat in this conservation area is on Existing Conservation Lands managed by the BLM. Of the 8,594 acres not currently conserved, the Plan would conserve 7,735 acres.

East Indio Hills Conservation Area
Approximately 397 acres of modeled habitat occur in this conservation area, of which none are Existing Conservation Lands. Approximately 357 acres would be conserved under the Plan as Other Conserved Habitat.

Joshua Tree National Park Conservation Area
Approximately 127,161 acres of Core Habitat and 4 acres of Other Conserved Habitat would be designated in this conservation area, of which 110,086 acres of Core Habitat and 4 acres of Other Conserved Habitat are on Existing Conservation Lands most of which are managed by the National Park Service. Approximately 17,075 acres of Core Habitat are not currently conserved, of which 15,367 acres would be conserved under the Plan.

Desert Tortoise and Linkage Conservation Area
As shown in Table 2 approximately 89,178 acres of Core Habitat and 4 acres of Other Conserved Habitat would be designated in this conservation area. Approximately 38,903 acres of Core Habitat are on Existing Conservation Lands managed primarily by the BLM. Approximately 50,275 acres of Core Habitat and 4 acres of Other Conserved Habitat are not currently conserved, of which 45,248 acres of Core Habitat and 3 acres of Other Conserved Habitat would be conserved under the Plan. Interstate 10 runs through this conservation area and likely is a cause of mortality. Interstate 10 also fragments populations to the north and south. Five biological corridors are delineated by the Plan in this conservation area, which potentially allow wildlife movement through culverts under the interstate. A Required Measure for this conservation area is that culverts will be maintained at no less that their current size with soft bottoms to allow potential wildlife crossings. These linkages would potentially allow gene flow between desert tortoise populations north and south of the interstate.

The largest benefit of this conservation area is to promote connectivity across the Interstate 10 corridor between populations in Joshua Tree National Park and populations in the Mecca Hills, Orocopia Mountains and Chocolate Mountains. The land ownership near the interstate is in a checkerboard pattern of private and BLM lands. Development of private lands would fragment the associated habitat on BLM lands and block the movement between north and south populations. The Plan calls for maintenance of the five biological corridors across the interstate, so acquisition of private lands in the corridors should be a priority.

Degradation of habitat tends to occur near the interstate from off-road travel, interstate maintenance, and other factors. Tortoise populations living within a certain distance of I-10 have likely all suffered mortality over time. Gene flow across I-10 has likely been absent for many years. Tortoise fencing along I-10 would guide tortoises to safe culverts and keep them away from the traffic. The result would be recolonization of the "dead zone" and renewed gene flow across I-10.

Mecca Hills/Orocopia Mountains Conservation Area
As shown in Table 2 approximately 112,575 acres of modeled habitat occur in this conservation area, all of which would be designated Core Habitat under the Plan. The habitat is contiguous with the habitat in the proposed Desert Tortoise and Linkage Conservation Area. Approximately 86,334 acres of modeled habitat are on Existing Conservation Lands managed by the BLM. Of 26,241 acres not currently conserved, 23,617 acres would be conserved under the Plan.

This conservation area has no required measures specific to desert tortoise except for the land to be acquired and conserved (23,617 acres). Most of the land to be acquired is in the eastern part

of the conservation area. This land acquisition would promote connectivity of desert tortoise populations in the Plan Area with populations to the east and south.

Dos Palmas Conservation Area
Approximately 334 acres of modeled habitat occur in this conservation area, of which 317 acres are on Existing Conservation Lands managed by BLM. Of the 17 acres not currently conserved, 15 acres would be conserved as Other Conserved Habitat under the Plan.

Santa Rosa and San Jacinto Mountains Conservation Area
According to Table 2, approximately 125,694 acres of habitat occur in this conservation area. Approximately 4,741 acres (4 percent) are proposed for take. There are 83,976 acres of existing conservation land and approximately 63,977 acres remaining to be conserved for a total of 120,953 acres (96 percent) to be conserved.

The Conservation Area encompasses portions of the San Jacinto and Santa Rosa Mountains, which provides habitat for the tortoise on the lower slopes, foothills, and valley floor portions of the Conservation Area that have not been developed or adversely impacted to date.

Tortoise populations and their movement have not been studied in this Conservation Area, however their presence has been documented even with the low amount of survey effort. The population present in this Conservation Area is separated from other tortoise populations in the Plan Area by the presence of development and roadways. The valley floor is almost entirely developed along the toe of slope adjacent to the Santa Rosa and San Jacinto Mountain Ranges. Tortoise movement is therefore limited to the immediate foothills. Movement into existing populations elsewhere can only be achieved by navigating through and adjacent to human populated areas, crossing roadways, and locating undercrossings. The mortality resulting from the adjacent human population likely results in this population functioning as a "sink".

Critical Habitat
A portion of federally delineated critical habitat exists in the Plan Area. The plan would protect 97 percent of the Critical Habitat which is in accordance with the Recovery Plan.

CUMULATIVE EFFECTS
Desert tortoises will continue to be threatened by many factors. Disease, predation by domestic or feral cats and dogs, invasive exotic plants and wildfires, and climate change are ongoing, large-scale threats to desert tortoise which have largely progressed unchecked and have no simple, inexpensive solutions. Disease such as URTD is not currently known from the action area but may be present but undetected or introduced by a released pet tortoise or other means at any time. Domestic and feral cat and dog populations can be expected to increase in number as the human population in the action area increases. Cats and dogs may depredate tortoise eggs and tortoises. Raven populations are also expected to increase as the human population increases. Ravens pose a threat to hatchling turtles. Invasive exotic plants may not be the ideal food for desert tortoise and increase wildfire frequency. Climate change may change available habitat in subtle and diverse ways, some of which are likely detrimental to tortoises.

Invasive plants will continue to have an effect on desert tortoise in the Plan Area. Wildfire will likely continue at frequencies dangerous to desert tortoise or even increase. Wildfire can be expected to be a continuing problem in the northwest part of the action area that has been wildfire hotspot in the past and is also the location of significant population that has been subject to several wildfires already, causing mortality and injury to desert tortoises. The effect of invasive plants as a food item on the health of desert tortoise is likely to be negative. Invasive plants are crowding out and replacing native, more nutritious plants. A poor diet is thought to exacerbate disease. Though URTD is not currently known from the action area, it could arrive at any time.

A large project called the Paradise Valley Project is has published an NOP. This project would cover 10.5 square miles of desert tortoise habitat east of Coachella between JTNP and the Orocopia Mountains. This area is designated desert tortoise critical habitat and in the BLM Chuckwalla DWMA. This project alone would substantially consume a portion of the Conservation Area and Critical Habitat that the Plan would allow to be developed, leaving the Plan with little room for more development in the future.

The Agua Caliente Band of Cahuilla Indians is undertaking a Habitat Management Plan for all of their Tribal lands. The draft Plan and associated documents have been reviewed publicly. It is anticipated that the final Plan and associated environmental analysis will be complete in mid-2008 with permit issuance scheduled for late 2008. Although there will be habitat loss associated with that Plan, the overall net benefit to the species is positive.

CONCLUSION

After reviewing its current status, 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 Coachella Valley MSHCP is not likely to jeopardize the continued existence of the desert tortoise.

We reached this conclusion for several reasons. First, although we have detected declines in the number of the desert tortoise in various portions of its range, the general guidance provided by the Plan and the specific actions contained in the Plan will ensure that actions the Permittees take, fund, and authorize are not likely to reduce appreciably, either directly or indirectly, the likelihood of both the survival and recovery of the desert tortoise in the wild by reducing its reproduction, numbers, or distribution. Secondly, during the course of this consultation, we did not detect any cumulative effects that we would expect to reduce appreciably, either directly or indirectly, the likelihood of both the survival and recovery of the desert tortoise in the wild by reducing its reproduction, numbers, or distribution.

AMOUNT OR EXTENT OF TAKE

It is difficult to quantify the number of precise number of desert tortoise that will be impacted as a result of the proposed action over the 75-year permit term due to the large Plan Area. Therefore, the Service is quantifying the take as the number of acres of modeled habitat that will be impacted in the MSHCP Plan Area. We anticipate that up to 65,983 acres of modeled habitat within the Plan Area will become unsuitable for the desert tortoise as a result of the proposed

action. Additionally, a small, but undeterminable, number of desert tortoises are anticipated to be taken as a result of monitoring and management actions.

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Coachella Valley Fringe-toed Lizard (*Uma inornata*)

STATUS OF THE SPECIES

Species Legal/Listing Status

On September 25, 1980, the Coachella Valley fringe-toed lizard (fringe-toed lizard) was federally listed as endangered due to destruction/degradation of suitable habitat for developmental and agricultural purposes (45 *FR* 63812). Critical habitat was designated concurrently with the listing (*ibid.*). California also listed the fringe-toed lizard as threatened in 1980.

Critical Habitat Legal/Listing Status

In 1978, critical habitat was proposed for the fringe-toed lizard on about 170 square miles of the Coachella Valley (43 *FR* 44806, Schweik and Thomas 2003); this proposal was withdrawn by the Service in 1979 (43 FR 12382). Critical habitat was re-proposed in 1980 (45 *FR* 36038), and then later designated that same year with the listing of the species. The designation encompassed about 19 square miles (on approximately 11 percent of the acreage of the original proposal); the designated area consisted of suitable habitat within the Thousand Palms area and lands along the western Indio Hills that were known to be important sand source areas (45 *FR* 63812). When the designation was made, it was noted that sufficient data were available to propose critical habitat on only a portion of the remaining blowsand ecosystem in the Coachella Valley (45 *FR* 63812).

Species Description

The Coachella Valley fringe-toed lizard is in the family Phrynosomatidae. It is one of three fringe-toed lizard species found in the United States: the Mojave (*Uma scoparia*), the Colorado Desert (*U. notata*), and the Coachella Valley (*U. inornata*). The three species of fringe-toed lizards in the genus *Uma* have unique adaptations for sand dune habitats (Norris 1958, Carothers 1986, Luke 1986). Of the three, the Coachella Valley fringe-toed lizard has the most restricted range and is the most adversely affected by human activities.

The Coachella Valley fringe-toed lizard has a whitish or sand-colored back and belly, with a light pattern of eye-like markings that form shoulder stripes. They average 6 to 9 inches (15 to 23 centimeters) in total length and possess numerous morphological adaptations that protect the lizard's body from abrasion and exclude sand particles from body openings including: 1) nostrils that exclude sand and a U-shaped nasal passage, analogous to a kitchen sink trap, to trap sand particles if they do enter the nostril; trapped sand particles can then be blown out by a burst of air; 2) the snout is wedge-or shovel shaped, rather than blunt, to spread the sand as it dives into the substrate; 3) an elongated upper jaw that overlaps the lower jaw, allowing the lizard to dive into sand without filling its mouth; 4) fringed eyelids with a double seal to exclude sand; 5) flaps of skin that cover the ears when under sand; 6) smooth scales to reduce friction; and 7) elongated, fringed toes that increase foot surface area and traction for running over and swimming through sand (Norris 1958).

Distribution

The Coachella Valley fringe-toed lizard is endemic to the Coachella Valley of Riverside County and is only found associated with relatively large patches of aeolian (wind-blown) sand (England and Nelson 1976, England 1983). Historically it was found on the Valley floor from near Cabazon at the northwestern edge of its range, to near Thermal at the southeastern edge (CVAG 2005), a former overall range length of about 45 miles. Its distribution within the existing length (33 miles) of its range is now highly fragmented compared to historic conditions (Hedke *et al*. 2007).

The most important losses of fringe-toed lizard habitat have resulted from urban and agricultural growth in the Coachella Valley since 1945 (45 *FR* 63812). In 1940, the human population in the Coachella Valley was 12,000, and by 1970 it had risen to over 100,000 (*ibid*.). In 2000, the population of the upper (northwestern) half of the Coachella Valley numbered just under 159,000 permanent residents, with approximately another 100,000 seasonal (winter) residents (Minichiello 2004).

Much of the Coachella Valley floor was once a blowsand ecosystem (CVAG 2005; The Nature Conservancy 1985). In 1985, the Coachella Valley Fringe-toed Lizard Habitat Conservation Plan identified about half of the of the Valley floor as "undisturbed occupiable habitat" for the fringe-toed lizard (The Nature Conservancy 1985). Currently, most of the Valley floor no longer contains habitat for the species due to losses from development. Once-contiguous habitat across most of the Valley floor has been fragmented into an artificial patchwork of small isolated potential and currently suitable habitat areas in a landscape of now-inhospitable terrain of agriculture and urban development (GIS analysis based on 2005 aerial photos and CVAG mapping 2007; Hedke *et al*. 2007). The species is now restricted to five or six fragmented populations within a much-reduced range of viable habitat (CVAG 2007).

The historic (pre-European settlement) extent of fringe-toed lizard habitat is estimated to have been 130,000 (45 *FR* 63812) to 170,000 acres (The Nature Conservancy 1985). As urban and agricultural development of the Coachella Valley have progressed, fringe-toed lizard habitat decreased to about 63,000 acres in 1980 (45 *FR* 63812), and was estimated to be about 31,000 acres range-wide in 2000, by the CVAG MSHCP model for the species (Service GIS analysis based on CVAG mapping 2007). Based on these estimates, during the 20th century between 76 and 82 percent of fringe toed lizard habitat has been lost; similar loss figures were provided by Hammerson (2005), but Barrows (1996) estimated losses of even greater percentages. Substantial direct habitat losses have occurred since 2000 (Service files, GIS analysis based on 2005 aerial photos and CVAG mapping 2007).

CVAG estimates that approximately 31,293 acres of modeled fringe-toed lizard habitat occurs within the action area (Service GIS analysis based on CVAG mapping 2007) (The action area is the Coachella Valley floor and includes the entire range of the species.) About 4,088 acres (1,655 hectares) of CVAG-modeled habitat for the fringe toed lizard occur outside of the Plan Area, all of it on the Agua Caliente Indian Reservation.

It was reported in 2000 by the Service that only about 12,000 acres of the Valley-floor blowsand ecosystem continue to receive the naturally occurring blowsand (USFWS 2000b). Considering

all the factors above and our review of both potential and suitable habitat in the field and of aerial photos, we estimate that currently available suitable or potential habitat for the species range-wide consists of between 15,000 to 20,000 acres, with an undetermined lesser amount that has reasonable potential to remain or become suitable habitat for the fringe-toed lizard in the long-term based on current potential for fluvial and aeolian sand transport (e.g., areas that would continue to receive the naturally occurring blowsands) (Service GIS analysis based on historic and recent aerial photos and CVAG mapping 2007.

Conservation History
Pursuant to existing laws and regulations, a total of three habitat conservation plans (HCPs) have been developed for the species: 1) the Coachella Valley Fringe-toed Lizard Habitat Conservation Plan (CVFTL HCP), described below; 2) the CVMSHCP, the proposed action herein, and; 3) the Agua Caliente Band of Cahuilla Indians Tribal HCP, which is a draft HCP with permit processing ongoing. Associated with the CVFTL HCP and CVMSHCP, as well as project approvals per section 7 of the Endangered Species Act (ESA) and the California Environmental Quality Act, substantial acreages of habitat and ecosystem processes areas have been acquired in fee or set aside for the benefit of the fringe-toed lizard and the ecosystem it depends upon; lands have also already been acquired pursuant to the proposed CVMSHCP in anticipation of it being permitted. The Whitewater Floodplain Reserve was initially set aside through a Biological Opinion for the Coachella Valley Water District percolation ponds, and this Reserve is relied upon for mitigation/conservation for the species within the CVFTL HCP and CVMSHCP. The two other existing fringe-toed lizard reserves were established through a combination of the CVFTL HCP and the Bureau of Land Management (BLM) signing a Memorandum of Understanding, Implementing Agreement, and a Record of Decision associated with the reserves identified in the CVFTL HCP. Further details are provided below.

In 1984, BLM consulted with the Service on a right-of-way grant request from the Coachella Valley Water District (CVWD) for development of percolation ponds within the Whitewater River floodplain (BO 1-1-84-F-17). This project is described below in **Environmental Baseline,** *Fringe-toed Lizard-associated Consultations in the Action Area.* Approximately 1,170-acres of CVWD lands and 24 acres of BLM lands (1,194 acres total) of the Whitewater Reserve were protected as a result of this consultation.

In June 1984 the CVWD, BLM, and Service signed an "Agreement" that defined their roles and responsibilities for managing lands within the Whitewater River floodplain, including the Whitewater Floodplain Reserve and lands upstream (BLM 1995).

In 1985 a recovery plan for the Coachella Valley fringe-toed lizard was finalized (USFWS 1985). This species is currently rated as recovery priority number 5c, according to the FY 2005 recovery data call. This number indicates high threat and low recovery potential. The "c" indicates conflict with development or economic activity.

In 1986 the Coachella Valley Fringe-toed Lizard Habitat Conservation Plan (CVFTL HCP) (The Nature Conservancy 1985) was adopted. An "Agreement" to execute the CVFTL HCP was signed in April 1986 by the City of Coachella, City of Indio, City of Cathedral City, City of

Rancho Mirage, City of Palm Desert, City of Indian Wells, City of La Quinta, City of Desert Hot Springs, City of Palm Springs, The Nature Conservancy, and the County of Riverside. In April 1986 the CVFTL HCP was permitted by the Service (Permit No. PRT-698685).

The CVFTL HCP was the second HCP ever completed and the first HCP completed pursuant to Section 10(a)(1)(B) of the Act (under the 1982 amendments to the Act). As a result of the CVFTL HCP, a system of reserves was assembled to protect some of the remaining blowsand habitat for the fringe-toed lizard. These three reserves, currently called the Coachella Valley Preserve System, were mitigation for development covered by the CVFTL HCP, though the system of Reserves included a substantial acreage of lands that were already mitigation for other projects, as well as some existing BLM lands. The Coachella Valley Preserve System is a combination of Federal lands, Coachella Valley Water District mitigation lands (pre-CVFTL HCP), and private lands acquired with congressional appropriation monies and mitigation fees collected under the CVFTL HCP. Three amendments have been made to the CVFTL HCP to-date (1998, 1999, 2001): 1) the expansion of the prescribed uses of mitigation fees collected under the CVFTL HCP to include the acquisition of lands outside of the Reserve areas and to provide for protection of sand source and movement corridor lands outside of the Reserves (1998); 2) the transfer of management responsibilities for some Reserve lands from The Nature Conservancy to the Center for Natural Lands Management (1999); and 3) the removal of Section 10 permit coverage for incidental take from lands that are important sand source areas to the Thousand Palms Reserve and the Willow Hole/Edom Hill Reserve, the reinstatement of the $600 per acre fee to fund acquisition of sand sources areas, and the provision of a means for a determination by CDFG that the Federal permit for the Coachella Valley fringe-toed lizard was consistent with the California Endangered Species Act (2001).

The major local jurisdictions in the Coachella Valley, in coordination with the Service, BLM, and CDFG, developed and implemented the CVFTL HCP. The CVFTL HCP established conditions under which local jurisdictions would approve development in blowsand ecosystems outside the boundaries of the reserve system (The Nature Conservancy 1985). Private development in such areas was permitted upon payment of a mitigation fee. The mitigation fee was established to fund additional acquisitions and management of the reserve system.

To date, and undetermined number of acres have been acquired and an undetermined amount of funds have been spent pursuant to the CVFTL HCP and our 1986 permit. This data had not been provided by the applicants for the proposed Permit as of February 2008, but it is expected to be included as part of the permit surrender documents.

The Coachella Valley Preserve System consolidated by the CVFTL HCP includes three Reserves that provide protection for about 17,000 acres of land reported in 1985 to contain approximately 7,800 acres of blowsand (The Nature Conservancy 1985). The three existing reserves consist of the Whitewater Floodplain Reserve [reported in 1985 in the CVFTL HCP to support about 1,200 acres of fringe-toed lizard habitat (or about 16 percent of the reported blowsand acreage in the overall CVFTL HCP Preserve system)], Willow Hole/Edom Hill Reserve [reported to support about 1,400 acres of habitat (18 percent)], and the Thousand Palms Reserve [reported to support approximately 5,200 acres of habitat (66 percent)]. The CVFTL HCP estimated 5,201 acres

(2,100 hectares) of "occupiable habitat" in the Thousand Palms Reserve in 1985. Approximately 620 acres (250 hectares) of high-function dune habitat and 1,236 acres (500 hectares) of inter-dune habitat currently exist in the Thousand Palms Reserve (Barrows 2006). The CVFTL HCP estimated about 1,200 acres (486 hectares) of occupiable habitat in the Whitewater Floodplain Reserve in 1985 (The Nature Conservancy 1985). Approximately 287 acres (116 hectares) of occupiable habitat existed in the Whitewater Floodplain Reserve after a long drought ending in 2005, or about 24 percent of the habitat acreage estimated by the CVFTL HCP in 1986 (Service files, GIS analysis), however, this habitat is extremely dynamic with dramatic fluctuations in sand deposition after flood events.

In April 1986 BLM, Service, California Department of Fish and Game (CDFG), and The Nature Conservancy signed an "Implementing Agreement for Management" associated with the CVFTL HCP, that defined their roles and responsibilities for managing their respective lands within and surrounding the Coachella Valley Preserve System (70 *FR* 329, BLM 1995). In this Implementing Agreement all signatories agreed to "…carefully regulate, or forbid where necessary, activities which may be adverse to the conservation of the CVFTL, including but not limited to disturbance of blowsand and native vegetation, depletion of ground water, construction and grading, recreation use of off-road vehicles, hunting, and camping."

In January 1991 a Memorandum of Understanding (termed the "Coachella Valley Preserve System MOU") was signed by The Nature Conservancy, CDFG, California Department of Parks and Recreation, Service, and BLM regarding the management and protection of the Coachella Valley Preserve System (BLM 1995).

In March 2001 the City of Coachella, City of Indio, City of Cathedral City, City of Rancho Mirage, City of Palm Desert, City of Indian Wells, City of La Quinta, City of Palm Springs, County of Riverside, CVAG, the Coachella Valley Water District, CDFG, and the Center for Natural Lands Management entered into a Memorandum of Understanding (Service files, 2001 MOU), and subsequently CDFG made a determination pursuant to Section 2080.1 of the California Fish and Game Code ("Consistency Determination"), finding that the Service Section 10 Permit No. PRT-698685 authorizing take of fringe-toed lizards in combination with the mitigation provided in the 2001 MOU and other documents is consistent with the California Endangered Species Act.

The Serviced issued a Biological Opinion on the California Desert Conservation Area Plan Amendment for the Coachella Valley (CDCA Plan Amendment) in December 2002. Pursuant to a Record of Decision (ROD) by BLM under the CDCA Plan Amendment signed in December 2002, BLM is obligated to manage BLM lands consistent with the herein proposed CVMSHCP. The ROD for the CDCA Plan Amendment commits BLM to "Establish habitat conservation objectives for assessing compatible uses in eight vegetation community types and developing appropriate mitigation measures. (Approximately 95% of the public land base is to be managed consistent with the multi-species habitat conservation objectives established through the Coachella Valley Multiple Species Habitat Conservation Plan)" (BLM 2002b). The ROD also indicates: "To facilitate consistency with the goals and objectives of the CVMSHCP, the BLM established habitat conservation objectives for protecting sensitive species and their

habitats…These habitat objectives apply to all BLM-administered public lands that fall within the conservation area boundary established through the CVMSHCP. Future activities on public lands within the conservation area must achieve the habitat objectives either through avoidance or application of appropriate mitigation measures to be in conformance with the Coachella Valley Plan and consistent with the CVMSHCP" (BLM 2002b). Specifically, the CDCA Plan Amendment states: "For the 8 vegetation community types (Figure 2-4), the habitat conservation objectives outlined in Table 2-4 would be used to assess compatible uses and to develop appropriate mitigation measures within Conservation Areas on BLM-managed land" (BLM 2002a). The objectives in Table 2-4 state that BLM will "Conserve 99 percent of…" each vegetation community within Conservation Areas on BLM-managed land; these eight general "vegetation communities" are: sand dunes and sand fields, desert scrub communities, chaparral communities, desert alkali scrub, marsh communities, dry wash woodland and mesquite communities, riparian communities, and woodland and forest communities; these communities include all fringe-toed lizard habitat in Conservation Areas. In the CDCA Plan Amendment BLM defines "conserve" as the use of "all methods and procedures which are necessary to bring any endangered species or threatened species to the points at which the measures provided pursuant to the Endangered Species Act are no longer necessary" (BLM 2002a).

The 2001 MOU and Consistency Determination (noted above) were subsequently amended by another MOU signed in July 2006 (Service files, MOU 2006). The 2006 MOU stated: "During the term of this MOU, the Cities and the County shall submit all development projects proposed in the MSHCP Conservation Areas to the CVCC for the Interim Project Review process; and the Cities and the County shall use best efforts not to approve development in Conservation Areas that is determined through the Interim Project Review process to be inconsistent with the MSHCP Conservation Objectives." The 2006 MOU also raised the CVFTL HCP mitigation fees to an anticipated $2,000 to $3,000 per acre of development. The 2001 MOU, as amended, expired in August 2007. In August 2007, another MOU (Service files, MOU 2007) was signed that provided for extending the Consistency Determination until March 2008. The 2007 MOU incorporated the provisions of the 2006 MOU, with modifications/additions. The 2007 MOU required: a) acquisition of 100 acres of land to protect fringe-toed lizard habitat and sand source/transport areas; b) a financial audit of the CVFTL HCP fees collected and associated acres approved for construction, by January 2007; c) continued payment of fees per the CVFTL HCP; d) submission of an draft of an Implementation Manual for the CVMSHCP by October 2007; e) public projects to pay CVFTL fees; f) provision of a Rough-Step analysis for the fringe-toed lizard; and g) "The Cities and County shall implement, to the extent allowed by law, through the Interim Review Project Review Process, all of the conservation measures and provisions in the attached Appendix A, which excerpts those measures that apply to CVFTL from the Final Recirculated MSHCP dated September 2007."

Federal, State, and private grants/monies have also funded acquisition of fringe-toed lizard habitat and ecosystem processes lands essential to the species. Pursuant to all the above noted conservation efforts, a total of approximately 5,999 acres of CVAG-modeled fringe-toed lizard habitat are considered Existing Conservation Lands by CVAG (2007).

BLM, Riverside County, and the local jurisdictions in the Coachella Valley have increased

compliance with existing trespass laws through increased enforcement of illegal OHV use in fringe-toed lizard habitat in recent years. Other essential habitat and sand source lands for the fringe-toed lizard are expected to be protected under the proposed Agua Caliente Band of Cahuilla Indians Tribal HCP in the future.

Habitat Affinities

The Coachella Valley fringe-toed lizard is endemic to the blowsand ecosystems of the Coachella Valley and is adapted for living in fine wind-blown sand. Historically it was found from near sea level up to around 1,600 feet elevation (Stebbins 1985). General types of blowsand deposits to which the fringe-toed lizards are restricted include sandy plains, sand hummocks, and dune systems. The sand dunes/hummocks/plains of the Coachella Valley are associated with the high winds that almost continually blow through the area, and consist of fine sand that is eroded and transported by the wind and accumulates in various locations where the wind is slowed by geologic features (such as drainages) or vegetation (such as individual creosote shrubs or stands of mesquite). The viability of the habitat for the fringe-toed lizard is typically dependent upon a continuous or periodic sand source that comes from flood deposition of sediments upwind (Simons, Li, and Assoc. 1997). Deeper sand deposits with more topographic relief are apparently preferred by the species over flatter sand sheets. These lizards also apparently prefer areas with sand grains from 0.004 to 0.02 inches (0.1 to 0.5 millimeters) in size (Stebbins 1944; Simons, Li and Assoc. 1996; Griffiths *et al.* 2002b).

As winds move down the Coachella Valley from the northwest, the wind energy lowers (where the Valley is wider, the winds are slower); over centuries dune deposits in the Valley were formed as aeolian sand deposition exceeded aeolian sand erosion (net gain) in that area over time. Blowsand dependent species such as fringe-toed lizards fully rely on the areas where aeolian sand has been deposited. Fringe-toed lizards live, or historically lived, in both the relatively permanent dunes (such as The Big Dune and the dunes in the Thousand Palms area) as well as in the somewhat temporary dunes, sheets, and hummocks within aeolian transition areas. Fringe-toed lizards typically live in these aeolian transition areas at least as long as they have sand deposits; periodic inputs of aeolian sand (such as a sufficiently big pulse every decade) into these aeolian transition areas keep portions of the blowsand ecosystems functioning. For example, the blowsand habitat areas within the Whitewater Floodplain Conservation Area require periodic sand inputs so, maintenance of these periodic large pulses of aeolian sand transport are essential to maintain the ecological function of the area for the fringe-toed lizard.

Life History

The fringe-toed lizard hibernates below ground, between November and February/March, when the daytime temperatures are predominantly below its activity range of body temperature (The Nature Conservancy 1985). Turner *et al.* (1981) found fringe-toed lizards to be active when ambient temperatures were between 22 to 39 degrees Celsius, and ground surface temperatures were between 37 to 58 degrees Celsius. During the hottest times of the year, when the surface temperatures may reach or exceed the lethal limit for the species, the lizard escapes from the heat by "swimming" or burrowing beneath the sand and restricts its activities to the early morning and late afternoon hours (USFWS 2000b).

Reproduction occurs in the spring (typically beginning in March), shortly after adults emerge from winter dormancy, and extends through mid-August. Courtship lasts until the end of May. A few weeks after mating, females dig burrows and deposit two to four eggs that hatch between June and early October (Thelander 1994). Sexual maturity is reached after two years, adults breed for several years, and the life expectancy for the fringe-toed lizard is about five years (The Nature Conservancy 1985). Courtship lasts until the end of May. A few weeks after mating, females dig burrows and deposit two to four eggs that hatch between June and early October (Thelander 1994).

The food habits of the lizard are not well studied, but the species is known to be omnivorous. Some researchers report differences in food habits by population (area), with one population eating a high proportion of vegetable matter and another mostly animal matter. Studies document that the lizards feed on small insects, such as ants and bees, along with leaves, buds, or seeds from native plants that grow in the Coachella Valley. During wetter years, they feed more often on flowers and plant-dwelling arthropods. During drier years, they resort more often to leaves and ants (Durtsche 1987, Durtsche 1995).

Horchar (1992) estimated average home range size on the Whitewater Floodplain Reserve as 0.04 acre (0.1 hectare) for adult males and 0.02 acre (0.04 hectare) for adult females.

Ecosystem Processes

Sand transport systems that maintain the ecosystems this species depends upon are composed of sand source areas, fluvial transport zones, fluvial deposition/aeolian erosion areas, wind transport corridors, and aeolian sand deposition areas. The process begins with fluvial erosion of sands from source areas, followed by transport of those sands to downstream fluvial deposition areas. The frequency and magnitude of these fluvial processes are driven by precipitation patterns in the involved watersheds, and are thus affected by drought. Piechota *et al.* (2004) evaluated historical streamflow records and tree ring data for the Upper Colorado River Basin. Tree ring data from the Basin indicate that more severe droughts have occurred in the past, and the 1999-2004 drought in the Upper Colorado River Basin was the seventh worst in an approximately 500 year record. Based on the tree ring data, the largest drought in the Basin occurred at the end of the 16th century and lasted for at least 20 years (Piechota *et al*. 2004). Tree ring data for southern California indicate that during the past 600 years, "dry" periods have averaged more than twelve years in length and intervening "wet" ones were about 10 years in duration (Tevis 1958). This regional tree ring data is relevant to the Coachella Valley, as Lancaster *et al*. (1993) noted that the major variations in precipitation in the Coachella Valley region generally parallel those observed in many areas throughout the southwestern U.S. Some observers have forecasted periods of 20-30 years of protracted drought for the Coachella Valley region in the foreseeable future, partially in response to expected future climate patterns (Griffiths et al. 2002a, Schmidt and Webb 2001). If such protracted drought periods occur, the delivery of fluvial sand to the northern Coachella Valley deposition areas (most notably the Whitewater River floodplain system), essential to blowsand transport processes, will be substantially reduced because of the decrease in flood occurrence (Griffiths *et al*. 2002b).

The fine sand that fringe-toed lizards inhabit is ultimately supplied by the wind. The Coachella

Valley is very windy with prevailing unidirectional winds that come from the west through the San Gorgonio Pass. Winds are stronger in the western part of the Valley and weaker/slower in the more open eastern portions of the Valley. During rain-storm events, sand and other sediments are eroded from canyons and hillsides surrounding the Valley and deposited by flood flows onto alluvial plains and floodplains (e.g., Whitewater River floodplain downstream of Windy Point) (Lancaster *et al.* 1993, Griffiths *et al.* 2002b). In subsequent months or years, sand and smaller particles on the ground surface of these plains are entrained and transported by the wind (Griffiths *et al.* 2002b). Wind transport sorts the sediments into finer and heavier components, as finer particles are carried farther and faster, while larger sands drop out sooner (Griffiths *et al.* 2002b).

It should be understood that blowsands are moved by the wind very close to the ground surface, versus smaller particles (e.g., dust) that billow high in the air. Because aeolian mass movement of sand particles occurs within 5 feet (1.5 meters) of the ground, a typical building effectively traps sands and significantly affects the pattern of sand transport (Simons, Li and Assoc. 1997). The billowing dust clouds observed more than a few feet above ground during high-wind events in the Coachella Valley do not contain a significant amount of sand (Sharp 1964). Shrubs, topographic features, and structures slow the wind near the ground surface, causing sand to drop out and accumulate, and dunes and hummocks to form near these features (Simons, Li and Assoc. 1997, Griffiths *et al.* 2002b).

Depending on the amount of entrained sand (in the aeolian transport supply from upwind) and wind speeds, sand accumulations dynamically increase and decrease over time (Griffiths *et al.* 2002b). When the sand supply from upwind is heavy, temporary accumulations of blowsand build up, often lasting for years or decades (Griffiths *et al.* 2002b). Without supplementation of additional blowsand transported from areas upwind (such as when relatively recent fluvial sediment deposit surface supplies dwindle during extended droughts/periods without stormflows), the winds erode blowsands from these temporary aeolian accumulations faster than it is replaced; this depletes or eliminates the dunes or hummocks and gradually degrades fringe-toed lizard habitat (Simons, Li and Assoc. 1996, Griffiths *et al.* 2002b). Areas without input of sand become "armored" as the larger sediments that are not typically carried by the wind remain and the finer sands blow away (Griffiths *et al.* 2002b). Some blowsand habitat areas become depleted of blowsand periodically in the natural ebb and flow of climate conditions. Other areas become unnaturally depleted periodically or in the long-term, due to artificial conditions (such as a blocked sand transport corridor) affecting the supply of sand; this is usually combined with natural climate patterns. Nevertheless, whether depletions are primarily naturally or artificially-caused, these areas of depleted blowsands do not provide habitat for the fringe-toed lizard during the period they remain devoid of blowsand; therefore, maintenance of these ecosystem processes is essential to sustaining sufficient area of habitat for the species.

Turner *et al.* (1984) provided empirical evidence that sand barriers negatively affect the lizard populations in otherwise unaltered habitat because such obstructions prevent or greatly reduce the movement of blowsand, an essential component of lizard habitat. They found that population densities on three plots immediately upwind from windbreaks ranged from 2 to 18 lizards per acre (4.4 to 45 per hectare), while densities on plot downwind from the windbreaks were 0 to 0.2

lizard per acre (0 to 0.4 per hectare). As a result, Turner *et al.* (1984) concluded that the blowsand ecological process was indispensable to lizard survival. Unless the sand source corridors are protected, essential sand transport zones will likely be obstructed and the blowsand habitat within the Conservation Areas will likely continue to degrade at an accelerating rate that matches the growth of upwind urban areas (Simons, Li, and Assoc. 1997).

Near the Banning Fault in the Willow Hole Conservation Area, sand dunes form where wind-blown sand is trapped by the mesquite vegetation (USGS 2004). The mesquite traps blowing sand over time, creating habitat for fringe-toed lizards in the form of dunes associated with the mesquite hummocks (Griffiths *et al.* 2002b). Historically (e.g., 1950's), relatively large areas of mesquite hummocks occurred in what is now the Thousand Palms Reserve (Lancaster *et al*. 1993, CVAG 2005, USFWS 1998). Mesquite hummocks present historically may have played an important role in dune formation on the Thousand Palms Reserve (Barrows 1996), as they locally slowed the wind causing blowsands to drop out and accumulate. When they were alive and foliaged, these mesquite stands helped anchor the dunes/hummocks of the Thousand Palms Reserve (Griffiths *et al.* 2002b, Simons, Li, and Assoc. 1997).

Genetics

Trépanier and Murphy (2001) analyzed nine populations of Coachella Valley fringe-toed lizards using mitochondrial DNA and found them to be nearly identical. They found the species to be most similar to its nearby congener, the Colorado Desert fringe-toed lizard. They found genetic differences among the nine Coachella Valley fringe-toed lizard populations to be considerably less than genetic differences among populations of the Colorado Desert fringe-toed lizard (*Uma notata*), indicating a relatively recent genetic isolation of each Coachella Valley fringe-toed lizard population. Trépanier and Murphy (2001) also noted that the entire *U. inornata* species has genetic variation similar to single populations of *U. notata* or *U. scoparia* (Mojave fringe-toed lizard), thus indicating that historical genetic variation was likely low in the Coachella Valley fringe-toed lizard, perhaps due to a genetic bottleneck or founder effect.

Hedtke *et al.* (2007) used microsatellite loci to examine rangewide population structure and interpopulation gene flow in the Coachella Valley fringe-toed lizard. Their results indicate low population differentiation consistent with high gene flow, recent colonization and range expansion, and/or frequent local extirpation/recolonization events. They also found high historical gene flow among populations and current isolation of remaining populations (Hedtke *et al.* 2007). They suggested that "conservation planning for this species should include monitoring of potential deleterious effects that may result from reduction in gene flow, such as inbreeding and loss of genetic variation, to ensure maintenance of ecological and evolutionary population processes adequate for long-term survival of the species" (Hedtke *et al.* 2007).

Population fluctuations:

Coachella Valley fringe-toed lizard populations range-wide fluctuate periodically to very low densities and absolute numbers (Muth 1987, 1991; Muth and Fisher 1991; Barrows 1996, 2006; Chen *et al.* 2006). Range-wide habitat loss and fragmentation has resulted in recent isolation of remnant fringe-toed lizard populations (Hedke *et al*. 2007). The effect this reduction and fragmentation of habitat will have on the genetic variability and long-term evolutionary

persistence of *U. inornata* populations depends in part on the historical rates of gene flow among these populations and the degree of population genetic diversity, since gene flow has little effect if diversity is low. (Hedtke *et al*. 2007).

Within the Reserves, the fringe-toed lizard numbers (census or effective population sizes) are unknown. Average census population numbers have been loosely estimated for the Whitewater Floodplain Reserve and Thousand Palms Reserve based on variable density data and the amount of occupiable or potential habitat (CVAG 2007). Since 1985, studies have revealed that this species is subject to large fluctuations in population size (Barrows 2006). These fluctuations would not likely be a threat to the fringe-toed lizard but for the artificial loss and fragmentation of remaining habitats that have reduced the overall scale/size of populations and likely eliminated potential migration between them.

The census population in the Whitewater River floodplain is expected to increase over the next few years of because of increased blowsand inputs/improved habitat conditions following recent flood flow sediment deposition. Nevertheless, the next extended (12 years or longer) drought likely will again depopulate the Whitewater River floodplain, regardless of any genetic factors.

Barrows (2006) contends that the relatively natural fringe-toed lizard population fluctuations that the species is subject to make it difficult to set a population threshold for short-term management actions in the reserve areas. The large population fluctuations, combined with the limited census population monitoring data available for these artificially small and isolated populations, have made it difficult to determine the status of the species over the last 20 years. In developing the Plan, CVAG utilized habitat models as surrogates for the lacking empirical data on the distribution or population size of the fringe-toed lizard, as well as to predict conservation and management actions (Ball *et al.* 2005). These habitat models are derived by species experts, who in constructing these models tended to rely more on experience than empirical data.

Very little census population data is available for the Willow Hole, Edom Hill, or Snow Creek areas. Based on available habitat in each of these areas, all populations are likely smaller than the Thousand Palms population. Large population fluctuations were likely a normal part of this species' natural history. However, low ebbs (fluctuations) of the populations pose a major threat to the fringe-toed lizard, because of the smaller absolute patch and population sizes (compared to historic numbers). The historic extensive habitat of The Big Dune likely functioned as a "super" core area for the fringe-toed lizard, providing a large effective population size reservoir. The Big Dune likely provided dispersing fringe-toed lizards to extirpated areas in the historically unfragmented Valley, thus, buffering the negative effects of population fluctuations during extended droughts.

Large population fluctuations experienced by the isolated remaining populations of fringe-toed lizards, make the species susceptible to local extirpations in all existing and future reserves, particularly during the expected low population ebbs.

Little is currently known about fringe-toed lizard populations outside the reserve system consolidated by the existing CVFTL HCP, other than wind-blown sand habitats suitable for the

lizard continue to decline as a result of conversion to development uses. Relative unknowns include population size and density, fluctuations in population size and density, and reproductive rates. It is also unknown what constitutes a significant barrier to fringe-toed lizard movement and/or reproduction.

Past studies have shown that population size and age structure can vary greatly. The average number of fringe-toed lizards that survive from year to year is apparently greater than expected for a lizard of its size (Muth 1991). It has been determined that the largest home range detected for male and female lizards is approximately 11, 500 and 4,700 square feet (1070 and 437 square meters), respectively (Horchar 1992). For both sexes, larger lizards exhibited larger home ranges (Horchar 1992).

Considering the current combination of artificial habitat fragmentation and sand transport degradation that has occurred in the Valley (outlined below), and the natural periodic variations in fringe-toed lizard populations that occur (also outlined below), we expect that several important remaining fringe-toed lizard populations periodically drop to census population numbers in the low thousands of individuals or less.

Population studies indicate that population densities of fringe-toed lizards can vary widely, and fringe-toed lizard densities are likely to be influenced by important habitat features, such as sand compaction and patch size (Turner *et al.* 1981, 1984), as well as depth and width of blowsand available at the ground surface in a given area and time. Turner *et al.* (1981) estimated the density of fringe-toed lizards in seven study plots to range from 1.8 to 18.2 lizards per acre. A long-term demographic study by Muth and Fisher (unpublished data, 1985-2003; pers. comm.) revealed density variations among years from 7 to 60 per acre at the Whitewater Floodplain Reserve. Importantly, Mark Fisher noted a very low density of approximately 1 lizard per 5.6 acres (2.3 hectares) in an occupied portion of the Whitewater Floodplain Conservation Area during the period of relatively low sand transport/depleted sand conditions that preceded the winter of 2004/2005 within that system (Mark Fisher, pers. comm., 2006). Considering that approximately one thousand acres or less of suitable habitat likely would be extant in the proposed Whitewater Floodplain Conservation Area after periodic expected droughts over a decade long (as noted below), this reported density of 0.2 lizards per acre translates into a population that has, and would in the future, periodically drop to a census population in the hundreds of individuals.

Given the number fluctuations identified for this species that are attributable to variations in the extent of habitat as discussed above, fringe-toed lizards are expected to be close to current carrying capacity in suitable habitat areas based on current level of habitat function. Habitat is limited in actual space as well as in the ecological processes that supply the periodic inputs of sand necessary to maintain fringe-toed lizard habitat function. As habitat is lost to development a concomitant linear loss in individuals and population sizes occurs. It is possible that a substantial extant number of individual lizards occur within the remaining undeveloped portions of The Big Dune, but recent occupancy data for this area is extremely limited. One site within The Big Dune was noted to be occupied by at least 6 lizards during the last decade (Hedtke *et al.* 2007).

To date, fringe-toed lizard monitoring efforts have provided minimal data on range-wide population trends. Long-term indices of population density are available for the Thousand Palms Reserve, but not for the rest of the Coachella Valley. This trend information, gathered between 1986 and 2002, indicates that fringe-toed lizard numbers fluctuate with annual rainfall amounts (Barrows 1996, 2006; Chen *et al*. 2006). Lizard numbers fell to nearly undetectable levels in drought years in the few areas (Thousand Palms Reserve and Whitewater Floodplain Reserve) that were monitored (Barrows 1996, 2006; Chen *et al*. 2006). Some minimal data on population numbers and only basic data on population trends have been acquired for small portions of the Coachella Valley Reserve system through the monitoring efforts to date. Some monitoring efforts have documented fluctuations in population densities that are related to availability of basic resources, such as food and loose sand (e.g., (Barrows 1996, 2006; Chen *et al*. 2006).

Populations in most areas of the Coachella Valley likely fluctuate with environmental variations and/or natural fluctuations in habitat function (Barrows 1996). Often the basic causal factors of sand stabilization and depletion, and related local population declines, are essentially natural (even if they are significantly modified by the artificial conditions created by development of the Valley over the last several decades). Most (if not all) populations of fringe-toed lizards were historically connected to other populations periodically, and likely functioned as a metapopulation (Hedtke *et al*. 2007, a metapopulation is group of spatially separated populations of the same species, each maintained or recolonized by dispersers from nearby populations, see, for example, Hanski and Simberloff 1997). With the natural diversity of ecosystems in the Valley, historic local fringe-toed lizard declines (such as during a drought) were not likely equal across the entire species range, as the causes for local declines were unlikely to be of equal strength across the range (CVAG 2005). As such, it is very likely that source populations of fringe-toed lizards historically remained extant to re-colonize spatially connected areas where fringe-toed lizard populations declined to zero (Hedtke *et al.* 2007). Once favorable ecosystem conditions returned (such as a new pulse of aeolian sand following flood-related sediment deposition upwind), it is expected that fringe-toed lizards re-invaded those naturally restored habitat areas where local extirpations had occurred. Thus, immigrants from one population likely re-colonized habitat areas which were left open by the extirpation of another population. The substantial fragmentation between almost all remaining fringe-toed lizard populations in the Valley makes these natural population fluctuations important, as a high potential exists for these populations to fluctuate to zero with no potential for natural recolonization.

Despite almost 20 years of monitoring by various parties, the population trends and parameters of the species remain largely unknown. We do not have reliable estimates of what the population size is inside or outside any of the reserves, nor do we know how widely those population sizes have fluctuated (or how close various populations may have come to extirpation). We do know that a linear relationship exists between the amount/function of habitat that is extant at any time and the ultimate number (and status) of lizards, and that habitat continues to be directly and permanently lost. As such, population numbers must be considered to be declining appreciably as available habitat has been declining extensively over time.

Threats

Urbanization and agricultural development in the Coachella Valley has significantly affected the blowsand ecosystem that the fringe-toed lizard depends upon, and new development is expected to continue these impacts. Development has occurred directly on sand fields and in wind corridors, and has blocked aeolian transport of sand (Simons, Li, and Assoc. 1997). As the Coachella Valley continues to urbanize, there is increasing concern as to whether sand sources and aeolian corridors are adequately protected; future structures and landscaping in these corridors could block or impede blowsand transport (Simons, Li, and Assoc. 1997).

The most common threats facing imperiled species in the U.S. are habitat degradation/loss and invasive species (Wilcove *et al.* 1998), and these are the main threats for the fringe-toed lizard. This species currently exists as relatively small populations occurring in a small area of southern California; the vast majority of the blowsand habitat for the species has been lost or highly degraded by urbanization and associated development. The best remaining habitat (and the ecological processes that support it) is partially protected in reserves and a national wildlife refuge, but significant direct or indirect threats to remaining habitat continue. The species' small historical range is now much reduced due to agricultural and urban development, with reports of 76 to 95 percent of its habitat having been lost, as noted above. Much of the remaining habitat has been degraded, and some historic habitat has been lost to stabilization of dunes by planted windbreaks. For example, structures erected within the sand transport corridor areas and the establishment of non-native plant species, such as tamarisk (*Tamarix ramosissima*) and athel (*T. aphylla*) trees, have partially or fully stabilized a large portion of the once free moving sand deposits in the Valley, preventing the continued replenishment of substantial areas of the blowsand habitat which the lizard relies on for its survival. Dense populations of Saharan mustard (*Brassica tournefortii*) have recently (or periodically) invaded the Snow Creek and Thousand Palms areas; these plant invasions coincide with high rainfall events and stabilize the soils within sand source and transport zones, at least temporarily, and thus reduce or otherwise modify aeolian sand transport to downwind depositional areas.

Several aspects of fringe-toed lizard ecology and behavior contribute to the species' sensitivity to habitat loss and degradation, including the following: 1) the fringe-toed lizard is currently distributed over a small area; 2) fringe-toed lizards are found on the Coachella Valley floor where the majority of residential and agricultural development typically occurs; 3) fringe-toed lizards are susceptible to a variety of predators, many of which occur at elevated levels near agriculture or urban areas; and 4) fringe-toed lizards inhabit the most arid portion of the Sonoran Desert, in which drought is likely an important natural factor in population dynamics.

Three reserves currently exist for the species range-wide: Thousand Palms Reserve, Whitewater Floodplain Reserve, and Willow Hole/Edom Hill Reserve. The fringe-toed lizard populations within these reserves are not fully protected from existing and future threats. The most important threats to the fringe-toed lizard are artificial: habitat loss, habitat fragmentation/isolation, small population sizes, invasive species, and degradation ecosystem processes that support the blowsand ecosystem that the lizard depends upon. The resultant threat is that the synergistic combination of these factors would interact such that likely most or all remaining (now artificially isolated) populations would decline to zero in the foreseeable future as part of otherwise natural population cycles (particularly associated with droughts), with no potential for

natural re-establishment.

Periodic decade-plus-long droughts, longer in duration than the one that occurred from 1993 to 2005, are predicted in the Valley in the foreseeable future based on past climate history gathered from tree ring data (e.g., see Piechota *et al.* 2004; Stahle *et al*. 2000; Tarboton 1995; Goodrich 2007; McKelvey and Johnston 1992). As such, these expected droughts are a primary threat to the species, considering its artificially fragmented remaining habitat and the closely related natural population fluctuations described above.

Future Complementary Conservation
Several acquisition efforts for conservation purposes are ongoing or expected to occur in the future in the Valley, somewhat unrelated to the proposed Plan and permit (unrelated from a section 7 aspect). These acquisition programs are currently independent of the proposed CVMSHCP planning efforts, though they will be coordinated with it in the future. In most cases these programs would complement the proposed implementation of the CVMSHCP. In the case of public agencies (e.g., State and Federal), the goal of these acquisition programs is typically to consolidate public ownerships and improve management. Other anticipated complementary conservation efforts expected include acquisitions by non-profit organizations and Tribal acquisition/management/legal protection of land for conservation purposes inside and outside of Reservation boundaries (outside and inside the proposed Plan Area), in areas that are in and/or adjacent to the proposed Conservation Areas, including conservation of blowsand ecosystems (habitat as well as sand source/transport areas) that support fringe-toed lizards. Specifically, a portion of the mitigation expected for impacts to the fringe-toed lizard under the proposed Agua Caliente Band of Cahuilla Indians Tribal HCP would likely occur within the CVAG-proposed Conservation Areas. Relative to the proposed Conservation Areas that support fringe-toed lizards, complementary conservation acquisitions are expected within and/or adjacent to the Edom Hill, Santa Rosa and San Jacinto Mountains, Thousand Palms, Whitewater Floodplain, and Snow Creek/Windy Point Conservation Areas. The expected acreages of blowsand ecosystem that would be protected or enhanced with these efforts are undetermined. See Section 4.2.1 of the proposed Plan for more information.

Critical Habitat Description and Distribution
This biological opinion does not rely on the regulatory definition of "destruction or adverse modification" of critical habitat at 50 CFR 402.02. Instead, we have relied upon the statute and the August 6, 2004, Ninth Circuit Court of Appeals decision in Gifford Pinchot Task force v. U.S. Fish and Wildlife Service (No. 03-35279) to complete the following analysis with respect to critical habitat.

Critical habitat was designated on suitable habitat within the Thousand Palms area, and on lands within the Thousand Palms Canyon watershed and canyons/alluvial fans along the southern flank of the western Indio Hills (much of this area later became part of the Coachella Valley Preserve System). Most of the Thousand Palms watershed and the canyon/alluvial fan lands designated as critical habitat do not contain suitable habitat, but are important to the continuing the geological processes necessary for blowsand ecosystem functioning, including the generation and maintenance of sand dunes and related blowsand habitats required by the fringe-toed lizard.

Critical habitat was designated on a total of approximately 11,789 acres, all of which occurs within the CVAG Plan Area. About 4,280 acres of the critical habitat were modeled by CVAG as habitat for the species. Approximately 7,509 acres of designated critical habitat was not modeled as suitable or potential habitat by CVAG; most of these acres are those lands noted above that are essential for ecosystem processes that support habitat. A portion of these 7,509 acres is developed (see Environmental Baseline below). Primary constituent elements for fringe-toed lizard were not listed in the final rule designating critical habitat (45 *FR* 63812). The final rule describes the features of critical habitat for the fringe-toed lizard as follows (45 *FR* 63812):

The area of CH south of Ramon Road and north of Interstate Highway 10 is the only area that has been studied with sufficient intensity to provide adequate information on the density of fringe-toed lizards, approximately four per acre, and the physical and biological components of the habitat essential for the survival and recovery of the species. The portion of the recommended Critical Habitat generally north/northwest of Ramon Road is an area that has been identified as the source of 50 percent of the windblown sand for the area to the south of Ramon Road. The remaining 50 percent of the wind-blown sand enters the area from Thousand Palms Canyon, in the northeast portion of the CH, to the north of Ramon Road. A source of wind-blown sand is essential to maintain the high mesquite dunes and creosote bush sand hummocks south of Ramon Road that constitute the best known habitat of the Coachella Valley fringe-toed lizard. The main sources of blow-sand in the Coachella Valley are the Whitewater River and Thousand Palms Canyon. The predominant winds, which sometimes reach 90 mph, blow from the northwest and move the fine sand down the valley towards the southeast. Three general types of blow-sand deposits occur in a mosaic pattern across the Coachella Valley: sandy plains, sand hummocks, and mesquite dunes. The Coachella Valley fringe-toed lizard is restricted to these habitats. Sand hummocks (small sand deposits two to five feet high), which form on the leeward side of bushes, are the most common type of blow-sand deposits in the Coachella Valley comprising about 60 percent of the fringe-toed lizard habitat (England and Nelson 1976).

Synopsis of Status

The fringe-toed lizard is endemic to the Coachella Valley. Most of the historic habitat for the species has been lost due to development. The distribution of the species is now restricted to five or six fragmented populations within an artificially much-reduced range and acreage of viable habitat (CVAG 2007). Once-contiguous habitat across most of the Valley floor has been fragmented into a patchwork of small isolated potential and currently suitable habitat areas within a landscape of now-inhospitable terrain.

Coachella Valley fringe-toed lizards have extant populations on the established reserves where monitoring has been conducted for two decades. The fringe-toed lizard populations within the study plots on the Whitewater Floodplain Reserve declined to very low numbers/densities due to the drought and sand depletion conditions of 1993-2005, whereas the population numbers within the Thousand Palms Reserve declined similarly, but apparently not to such low densities during the same period. The basic status of the species within the remainder of the range of the species, (mostly made of The Big Dune, Snow Creek, and Willow Hole areas), is essentially unknown, though the amount of potential habitat is known and is limited in extent.

The species status has continued to decline over the last few decades since listing, commensurate with losses of habitat and ecosystem processes, and threats facing the species have increased in magnitude and have become substantially more imminent and better understood (Barrows 1996, 2006; CVAG 2005, 2007; Hedke *et al*. 2007; Service files, GIS analysis based on 2005 aerial photos and CVAG mapping 2007). Although, three isolated reserves currently exist for the species (Thousand Palms Reserve, Whitewater Floodplain Reserve, and Willow Hole/Edom Hill Reserve), these reserves do not provide sufficient protection of habitat or ecosystem processes necessary to sustain the species (see **Environmental Baseline** below). The continued direct loss of habitat, conversion of habitat, disturbance and fragmentation of existing habitat, and the substantial loss or degradation of sand sources necessary to sustain remaining habitat combined with the natural population cycles of this species, makes its survival tenuous in the long-term if conservation planning efforts are not implemented.

ENVIRONMENTAL BASELINE

Status of the Species in the Action Area

The Coachella Valley fringe-toed lizard is endemic to the action area and nearly endemic to the Plan Area. Its survival is totally dependent upon undeveloped lands within the Plan Area and the Agua Caliente Indian Reservation. Coachella Valley fringe-toed lizard population estimates are not currently possible range-wide (with substantial accuracy) because data are not available. As noted above, historically 130,000 (45 *FR* 63812) to 170,000 acres (The Nature Conservancy 1985) of habitat for the Coachella Valley fringe-toed lizard was present throughout the Valley floor (range-wide). CVAG has modeled approximately 31,294 acres of fringe-toed lizard habitat within the action area (27,206 acres in the Plan Area). The action area includes the total range of the species and this acreage appears to be a substantial over-estimation of suitable and potential habitat since it includes areas needed for ecosystem processes. As noted above in **Status of the Species,** we estimate that the fringe-toed lizard's currently available suitable or potential habitat range-wide is approximately 15,000 to 20,000 acres.

The majority of the lizard's historic habitat has been eliminated or degraded due to the direct and indirect effects of development. More than 75 percent of the historically available habitat has been directly converted to urban development or agricultural uses, and most of the remaining undeveloped potential or former habitat has been substantially degraded or eliminated by the reduction or elimination of sand sources and transport. Off-highway vehicle use and invasive plant species also have contributed to the degradation of the remaining potential habitat to a lesser extent. Structures, percolation ponds, utility substations, spoil piles, levees, road fill, and/or tree windrows have been erected/constructed/planted within most of the remaining sand transport corridors. These features reduce or prevent the replenishment of sand to remaining dunes and other blowsand features upon which the lizard relies, by stabilizing, re-directing, confining, and/or blocking the wind-blown flow of sand down the Valley.

Populations of Saharan mustard have recently (with in the last 100 years) invaded many of the established Reserve areas within the Plan Area. In wet years, this invasive mustard occurs in dense stands and stabilizes soils and reduces aeolian sand transport to downwind depositional areas, at least temporarily.

Drought conditions and associated natural sand depletion cycles are expected to cause temporary lizard population declines. Although these conditions are periodic and natural (and are those under which the species evolved), they are problematic when combined with the synergistic effects of the current artificial conditions of small patch and population sizes, fragmentation, species invasions, modified fluvial/aeolian regimes, and loss of core areas and connectivity. No blowsand areas exist in the Coachella Valley where these synergistic effects do not exist. Thus, natural drought conditions substantially threaten all remaining fringe-toed lizard populations.

Drought conditions in the region over last couple centuries have resulted in extended periods (10 years or more) of relatively minor or nonexistent stormflows through the main drainages of the Valley, with concomitantly minor levels of recent fluvial sedimentation, de-armoring and vegetation loss within the various drainages that are key to the blowsand ecosystem. With the almost constant winds in the Valley, less sand was delivered to most blowsand habitat than eroded away during extended drought conditions, resulting in a net depletion of the blowsand necessary to sustain lizard habitat across large areas (CVAG 2007). This is especially evident in the existing Whitewater Floodplain Reserve (and proposed Whitewater Floodplain Conservation Area), where no substantial dunes exist, and unconsolidated sand deposits are shallow and generally transitory.

Agricultural Development
Conversion to agriculture has eliminated substantial areas of fringe-toed lizard habitat; agricultural development has occurred primarily in the lower (southeastern) half of the Coachella Valley, though expansive areas of agriculture historically occurred in blowsand areas/suitable habitat near Thousand Palms (based on historic aerial photos). Limited new agricultural development around Indio and southward adjacent to the Salton Sea (within the southeastern edge of the species current range) has occurred. The current rate of new agricultural development is relatively slow due to limitations on irrigation water. Densities of some fringe-toed lizard predators are expected to be elevated near agricultural lands (Flat-tailed Horned Lizard Interagency Coordinating Committee 2003); relatively high densities of predators (e.g., squirrels, common raven, American kestrel, and loggerhead shrike) have likely resulted in elevated predation on fringe-toed lizards in adjacent undeveloped lands.

Urbanization
Urban development has resulted in substantial direct losses of fringe-toed lizard habitat, as well as habitat degradation caused by a variety of urban-associated activities. Much of the urban development on the Coachella Valley floor has occurred either on former agricultural lands that were originally suitable habitat, or on extant suitable fringe-toed lizard habitat. Direct impacts to fringe-toed lizard habitat and the lizards themselves have come from activities such as construction of commercial and residential buildings, landscaping for yards, parks, and golf courses, and road construction. Indirect effects of urbanization on adjacent fringe-toed lizard habitat include trail proliferation, increased OHV use, spread of non-native invasive vegetation, and trash/debris dumping. Predators, such as common ravens, American kestrels, and domestic dogs and cats, also increase in and adjacent to urban areas (Bolster and Nicol 1989), probably resulting in increased predation rates on fringe-toed lizards in remaining adjacent habitat.

Off-highway Vehicle Use

Over the past 20 years, numerous bibliographies (e.g., Webb and Wilshire 1983) and literature reviews (e.g., Berry 1996, Ouren *et al.* 2007) on the effects of OHV activity have been published. In 1983, Webb and Wilshire (1983) published a somewhat comprehensive analysis on the impacts and management of OHVs in arid regions. Legal use of OHVs within fringe toed lizard habitat within the action area is very limited. Substantial illegal OHV activity occurs in many areas of the Coachella Valley. It is somewhat curbed by law enforcement, signing, fencing, and public information and education.

OHV use typically damages roots, stems and entire individual plants (Hall 1980), reduces the reproductive output of those that survive, and changes dune structure. Ongoing vehicle use likely changes the basic properties of nearby soils and adversely affects its stability and ability to support natural vegetation (Webb *et al.* 1978). Vehicle traffic can have a long-lasting impact on mobile sand dunes, manifested by a lack of vegetation (BLM 2003). Though some of the effects listed below likely do not relate to sand dune substrates, our review of OHV impact studies indicates that general effects on soils include: (1) reduced soil moisture for most soil types, (2) increased surface strength for most soil types but reduced surface strength for sandy soils, (3) increased bulk density of soils to depths of 3 feet or more, (4) reduced infiltration rates; (5) reduced porosity and permeability of soils, (6) changes in the insulating characteristics of soils (extending the diurnal temperature range), (7) reduced organic carbon content, (8) increased runoff, and (9) increased rates of erosion (Webb *et al.* 1978, Adams *et al.* 1982). The extent and degree of impact depends on factors such as type of soil, type of vehicle, amount of use, degree of slope, topography, and vegetation. We expect the most significant effects to dune sands as they pertain to fringe-toed lizards include (1) de-stabilization of slopes and swales, (2) reduced soil moisture after rainfall events as well as quicker and untimely drying, and (3) changes in the insulating characteristics of soils.

The biotic and abiotic factors necessary to maintain normal ecological functions and existing population levels have likely been subject to degradation by OHVs in most fringe-toed lizard habitat areas in the action area. Decreases in plant cover will generally decrease protection of fringe-toed lizards from predators and shelter from solar heating and wind, and likely reduces sand accumulation and retention under plants. The adverse effects of OHV damage to plant and animal communities has been documented in dune environments, where species richness and biomass at several trophic levels (plants, invertebrates, reptiles, and mammals) experienced substantial losses in areas with moderate to heavy OHV-use (Luckenbach and Bury 1983; Carpelan 1995). Some of this damage may result from engine noise. Brattstrom and Bondello (1983) found that: 1) conditions in desert environments make many desert vertebrates especially sensitive to OHV noise; and 2) OHVs in the California desert adversely affected certain vertebrates causing permanent hearing loss, a decrease in the ability to detect predators, and/or the emergence of aberrant behavior exposing the animal to higher risk of mortality. It has been shown that prolonged noise can adversely affect some lizards (e.g., desert iguana, Mojave fringe-toed lizard) (Bondello 1976; Brattstrom and Bondello 1983), and Bury *et al.* (1977) demonstrated that OHV noise can damage the hearing of some desert scrub vertebrates. However, it is not known whether vehicle noise at levels and durations that have occurred in the

Coachella Valley has likely negatively affected fringe-toed lizards and/or populations.

The current state of knowledge of the impacts of OHV use on the fringe-toed lizards is incomplete. In addition to the indirect effects noted above, fringe-toed lizards have likely been killed directly by being run over, either above ground or while burrowed below the sand surface. Burrowed fringe-toed lizards are relatively shallow; thus, traveling vehicles probably crush fringe-toed lizards burrowed in sands directly underneath. Bury *et al.* (1977) found reduced abundance, biomass, density, and diversity of reptiles (and other vertebrates) in heavily used parts of OHV open areas.

Mining

Sand and gravel mining has occurred in the past and continues within the San Gorgonio River floodplain (near Interstate-10), at the western edge of the Plan Area. As is typical of mining within a floodplain (e.g., see Collins and Dunne 1990; Mount 1995), this mining has likely reduced the fluvial sediment loads downstream in the Whitewater River floodplain during periodic larger stormflow events. A levee currently exists around most of the current mining activity in the San Gorgonio River; this levee will prevent fluvial processes impacts from future mining, if this levee remains intact during large storm flows and prevents future flood surface flows from accessing the River's former floodplain within the mine. Because of existing artificial barriers to sand movements (windrows, urban development, etc.) within the Valley, the reduced fluvial sediment load effects from past mining have mainly affected the remaining blowsand ecosystems in the Snow Creek and Whitewater River floodplain areas.

Surrounded by the proposed Whitewater River Floodplain Conservation Area, the existing Garnet Pit (Garnet Rock Pit: RCL00129; 91-33-0031) is within the former floodplain of the Whitewater River and is within the City of Palm Springs (sections 26 and 29, T3S R4E). This active pit is controlled/operated by Granite Construction (Riverside County 2006). The pit is directly downwind of more than a linear mile of the current channel of the Whitewater River adjacent to CVWD's percolation ponds. Because it is downwind of this channel, much of the sand that is flood-deposited in this channel stretch and is later eroded by high winds, blows into the mine site. Most of this sand remains onsite or is commercially transferred offsite. No appreciable amount of blowsand entering the mine site is expected to reach blowsand habitat for the lizard. Thus, this mine site is a sink for an undetermined amount of blowsand of the Whitewater River.

Substantial excavation within the Garnet Pit has occurred off Granite's parcel and into the existing Whitewater Floodplain Reserve (and proposed Whitewater Floodplain Conservation Area) on lands owned by CVWD (section 26). Additional to the excavations, substantial debris/rubble piles have been created, and a levee has been constructed, within the Whitewater Floodplain Reserve and floodway of the Whitewater River. According to the State Mining Geology Board (SMGB 2003b) "Granite… indicates that excavation activities have extended southward from the Granite parcel onto the CVWD parcel…According to the April 25, 2002, letter from the Coachella Valley Water District, '…[G]ranite is not permitted to excavate on district-owned land,…'" On December 21, 2001, the Garnet Pit was inspected by staff under contract to the SMGB (SMGB 2003b): according to the SMGB "As noted at that time, the mine

had been operated outside the scope of its approved reclamation plan" (SMGB 2003b). On March 14, 2002, the SMGB issued the operator a Notice to Correct (SMGB 2003b). According to the SMGB, Granite proposed in 2003 to wait until 2038 to refill the excavated portions of CVWD/Reserve lands (SMGB 2003a). The combination of excavations, debris piles, and the constructed levee are currently having substantial direct and indirect adverse effects on the blowsand ecosystem and fringe-toed lizards in Whitewater River area. The constructed levee extends approximately a half mile into the Whitewater Floodplain Reserve. These effects are most pronounced in the footprint of these features on CVWD/Reserve lands, and indirectly in the areas downstream and in the wind-shadow of the debris piles and levee. Downwind from the levee, a significant area of potential fringe-toed lizard habitat within the Whitewater Floodplain Reserve is currently starved of blowsand as a result of the levee and debris, and thus highly degrading or eliminating it as habitat. Removal of Granite's unauthorized levee on CVWD/Reserve lands would allow passive restoration of much of this degraded habitat. Granite has recently committed to fill the excavation that occurred, as well remove most of the associated debris piles and levee, on CVWD/Whitewater Floodplain Reserve land; this work is expected to be completed within the next year, after remaining permitting issues for the fill and debris/levee removal work are resolved (Service files, Catherine Vos, Granite Construction representative, pers. comm. at the CVAG Interim Project Review for the "Granite Construction/CVWD Reclamation Project", August 21, 2007; letter from Gary Johnson, Granite Construction, to Steve Robbins, CVWD, September 25, 2007).

The existing Yeager Mine/Quarry in the Thousand Palms area (section 5 and 32, T4S R6E) operated by Yeager/Skanska, apparently consists of two mines: the BLM Thousand Palms mine (Service files, RCL00150; 91-33-0067; Cal Mine ID #91-33-0067; BLM contract CA-26430), which is "Expired Under Reclamation" (Riverside County 2005), is approximately 50 acres in size and located in section 32; and the Thousand Palms mine (Service files, SMP00198, 91-33-0086) which is "Active" (Riverside County 2005) in section 5. The mine in section 5 is downstream of the apparently expired mine on BLM lands. Approximately 70-95 acres of mined area occurs within fringe-toed lizard designated critical habitat, of the approximately 133-acre mine in section 5. The large portion of the Yeager Mine/Quarry occurs within the floodplain (or former floodplain) of what is likely the most important drainage (an unnamed wash) for fluvial processes ultimately supplying sand to the existing Thousand Palms Reserve and proposed Thousand Palms Conservation Area. More information on these mines is provided below in *Fringe-toed Lizard-associated Consultations in the Action Area.*

Coachella Valley Preserve System

The Coachella Valley Preserve System was dedicated in 1986 and is made up of three separate units (Reserves), totaling over 20,000 acres. These three separate Reserves are remnants of the sand dune ecosystems that were already artificially isolated by the surrounding development that occurred in the four decades preceding establishment of the Preserve. Two of these Reserves are made up of lands that were already partially protected when the CVFTL HCP was permitted and implemented in 1986: the Whitewater Floodplain Reserve was previously set aside as mitigation for CVWD percolation pond projects in the Whitewater River, and the Willow Hole/Edom Hill Reserve was predominately existing BLM land. Each of the three Reserves largely relies on separate sand sources and transport process zones; these sand sources and processes are not

currently sufficiently protected on any of these reserves, particularly due to past (and expected future) developments. The Preserve System was assembled under the CVFTL HCP to help mitigate development on fringe-toed lizard habitat on other lands of the Valley that were more valuable for development, particularly The Big Dune.

Table FTL-1. Current Land Ownership in the CVFTL HCP Reserves (Coachella Valley Preserve System) (per CVAG 2007)

Entity	***Thousand Palms Reserve (acres owned)***	***Willow Hole/Edom Hill Reserve (acres owned)***	***Whitewater Floodplain Reserve (acres owned)***	***Total Acres***
BLM	9,928	1,824	24	**11,776**
CNLM	----	160	----	**160**
CVMC	----	135	----	**135**
CVWD	113	----	1,170	**1,283**
DFG	695	----	----	**695**
Private	186	167	----	**353**
State Parks	2,207	----	----	**2,207**
TNC	875	----	----	**875**
USFWS	3,616	----	----	**3,616**
Total	**17,620**	**2,286**	**1,194**	**21,100**

Fringe-toed Lizard CVMSHCP Modeled "Core Areas"
Within modeled fringe-toed lizard habitat, CVAG also modeled Core Habitat within Conservation Areas. Of the 11,840 acres of Core Habitat modeled for the lizard by CVAG, approximately 40 acres were mapped as Existing Uses (parcels with at least some development).

MSHCP Core Habitat for the fringe-toed lizard is mapped within the existing Thousand Palms Reserve (within the Thousand Palms Conservation Area), the Willow Hole-Edom Hill Reserve (described separately below within the Willow Hole and the Edom Hill Conservation Areas), and the Whitewater Floodplain Reserve (within the Whitewater Floodplain Conservation Area). Additional Core Habitat is mapped in the Snow Creek/Windy Point Conservation Area (see Section 4 of the CVMSHCP for more details on these Conservation Areas). The existing Thousand Palms Reserve established by the CVFTL HCP totals 17,651 acres (not all of which is fringe-toed lizard habitat) and is located south of the central portion of the Indio Hills. The Willow Hole-Edom Hill Reserve is located at the west end of the Indio Hills and is 2,027 acres in size. Ownership within this reserve area consists of BLM (1,869 acres), Coachella Valley Mountains Conservancy (117 acres), and private land (41 acres). The Whitewater Floodplain Reserve is located south of Interstate 10 and east of Indian Avenue, and includes approximately 1,316 acres of BLM and CVWD land. Although these Reserve areas are in geographically suitable locations and supported appropriate habitat for the lizard, the current status of these reserve areas is more tenuous given existing threats to the sand sources and transport processes.

Three of the four core areas (within proposed Conservation Areas) for the Coachella Valley fringe-toed lizard in the CVMSHCP consist largely of land that was previously afforded protection through the CVFTL HCP and consultations with BLM. After the establishment of a preserve system by the CVFTL HCP in 1986, studies indicated that the original preserve system failed to sufficiently protect the sand sources and sand transport corridors necessary to sustain the three existing reserves in the long-term. For example, fluvially deposited sands in the Mission Creek and Morongo Wash floodplains are eroded by aeolian processes, then carried by strong unidirectional winds and deposited within the Willow Hole/Edom Hill Reserve (Griffiths *et al*. 2002b). The sand transport corridor for the existing Willow Hole/Edom Hill Reserve is not protected and has been partially blocked by housing development and the planting/irrigation of tamarisk/athel trees. This sand transport corridor encompasses several square miles upwind the Willow Hole/Edom Hill area.

Upwind of the established Thousand Palms Reserve and within the larger (surrounding) proposed Thousand Palms Conservation Area is the upwind sand source/sand transport corridor area, consisting of several thousand acres, that is essential to maintaining the blowsand habitat for the fringe-toed lizard within the Reserve and Conservation Area. A large portion of the lands that provide (or provided) this sand source or the intervening sand transport corridor have been developed. Development of lands that provide source sands removes otherwise available surface area necessary for aeolian sand erosion; the ground surface must be exposed for the wind to entrain sand from surface sediments.

Development also greatly slows or stops sand transport. About 90 percent of the sediment grains (by weight) in the Valley travel by wind within 25 inches (0.6 meter) of the ground (Sharp 1964). Urban development (with its walls, structures, landscaping, and fences) within a sand transport corridor effectively occludes most sand transport across the width of that development, because they are barriers to the flow path and significantly alter the flow mechanics and sand transport pattern (Simons, Li and Assoc. 1997). The historic contribution of aeolian sand from the Whitewater River floodplain to the Thousand Palms sand transport corridor has now been essentially cutoff by urban development and the tamarisk windbreaks along the Union Pacific Railroad and Interstate 10. In and adjacent to Sections 7 and 8 (upwind of the Thousand Palms Reserve and within the proposed Thousand Palm Conservation Area), existing urban development has constrained the sand transport corridor to about 25 to 50 percent of its historical width, further exacerbating the sand supply deficit to the Reserve and proposed Conservation Area. Arguably, under current conditions more than half of the otherwise expected natural sand supply to the mapped Core Habitat within the proposed Thousand Palms Conservation Area has been eliminated by development upwind. Similarly, the existing Whitewater Floodplain Reserve (within the Coachella Valley Preserve System) did not protect enough of the lands that provide the essential sand sources (fluvial deposition processes and areas) and sand transport corridors necessary to sustain the blowsand ecosystem of this existing reserve in the long-term.

Following approval of the CVFTL HCP in 1986, the City of Cathedral City and the County of Riverside changed the zoning on many of the parcels within the Willow Hole and Thousand Palms sand transport corridors, resulting in rezoning to substantially higher potential and actual development densities. Because higher development densities are directly related to increased

development-caused "capping" of sand source lands and the blocking of wind sand transport corridors, this City and County rezoning further exacerbated the conservation planning problems associated with maintaining the sand source areas and sand transport corridors. The zoning for low density development that existed in 1986 would have continued to allow a substantial amount of sand to be eroded and transported downwind from source areas to downwind blowsand ecosystems on the Reserve and within the proposed Conservation Areas.

Snow Creek/Windy Point Conservation Area
The Snow Creek/Windy Point Conservation Area totals approximately 2,940 acres. This proposed Conservation Area would protect a major area of blowsand at the western edge of the Plan Area. The Snow Creek/Windy Point Conservation Area proposed by CVAG contains 1,374 acres of CVAG modeled habitat for the fringe-toed lizard. Of this total, approximately 70 acres of CVAG modeled lizard habitat is controlled by BLM and designated by CVAG as Existing Conservation Land. The remainder is predominately private land currently without legal protection. The source of aeolian sand for this area is primarily the upwind portions of the San Gorgonio River. The fluvial sand supply to this Conservation Area has probably been considerably reduced by past and ongoing sand and gravel mining upstream on the San Gorgonio River floodplain, but the blowsand ecosystem within the Conservation Area likely remains functional in the long-term even with the reduced sand input.

The Snow Creek/Windy Point Conservation Area currently is heavily affected by invasive plants, notably Saharan mustard. These invasive plants have significantly increased the stabilization of soils within the Conservation Area and periodically reduced or slowed aeolian sand transport. These plants likely compete with and reduce the biological productivity of native plants, and likely affect wildlife by altering the availability of forage plants and the characteristics of the ecosystem structure (Cal-IPC 2005; Brooks 2005). In addition, some of these plants likely increase the potential for fire (Sanders and Minnich 2000; Cal-IPC 2005; Brooks 2005). Dense stands of Saharan mustard in the Coachella Valley appear to suppress native wildflowers; because of its quick growth and flowering following rains, Saharan mustard appears to monopolize available soil moisture as it builds canopy and matures seed well before many native species have begun to flower (Sanders and Minnich 2000).

In addition to the presence of invasive plants, this Conservation Area has been and continues to be subject to substantial illegal OHV activity that has resulted in the alteration/degradation (at least temporarily) of much of the lizard habitat in the Conservation Area (as described above). The multiple OHV routes (trails) within the sloped portions of the blowsand ecosystem within the Conservation Area are currently visible from miles away. One major OHV access point into the Snow Creek/Windy Point Conservation Area, in the past and currently, is through BLM lands near Windy Point (through section 24, T3S, R3E) into other portions of the Conservation Area. Other OHV access points include unfenced/un-gated trails and tracks off of public roads within and near the Conservation Area. Due to the substantial OHV use, the ecological function of the proposed Snow Creek/Windy Point Conservation Area for fringe-toed lizards is currently degraded. Although it was the intention of BLM's CDCA Plan Amendment (and the associated Terms and Conditions within our Biological Opinion for BLM's action) to manage this and other areas, including specific management and enforcement activities of patrolling and blocking OHV

access, these efforts to date have been ineffective in controlling illegal OHV activity in this area.

Whitewater Floodplain Conservation Area
The Whitewater Floodplain Conservation Area includes most of the fluvial deposition area and much of the aeolian transport zone of the Whitewater River floodway and floodplain system south of Interstate-10. The Conservation Area includes the existing Whitewater Floodplain Reserve, and additional lands east and southeast of the existing Reserve on the west and east sides of Gene Autry Trail, south and east of CVWD's groundwater recharge basins, the Garnet Hill area north of the existing Reserve, and CVMSHCP proposed Biological Corridor and sand transport areas south of I-10 along Mission Creek, and Willow washes, which provide connectivity for some species (though not likely fringe-toed lizards) in this area to the Willow Hole Conservation Area north of I-10. To the northwest of this Conservation Area is the Whitewater Canyon Conservation Area. To the west is the Highway 111/I-10 Conservation Area. The Whitewater Floodplain Conservation Area connects to the Snow Creek/Windy Point Conservation Area near Windy Point, where the San Gorgonio River joins the Whitewater River. The Whitewater Floodplain Conservation Area contains a total of approximately 7,370 acres.

The Conservation Area contains most of the main fluvial deposition area for Whitewater River floodplain, and much of the aeolian transport zone of the historic blowsand ecosystem based on the Whitewater River. This Conservation Area does not (nor do any of the proposed Conservation Areas) contain any portion of the historic main aeolian deposition area for the Whitewater River, The Big Dune.

The blowsand ecosystem of the Whitewater River floodplain includes fluvial (sediments moved by water flows) and aeolian (sediments moved by wind) components. Sediments, most importantly sand, is fluvially deposited (and existing deposits exposed) during stormwater flows within the floodway and portions of the floodplain of the Whitewater River. Much of this sand is dropped (fluvially deposited) where storm flows slow down; in this case much of it is fluvially deposited in the wide portions of the floodplain/floodway downstream of Windy Point and upstream of Section 6 (T4S R5E) of the Agua Caliente Indian Reservation. The consistent winds down the Coachella Valley (northwest to southeast) move those sediments sand-sized and smaller that are exposed on the ground surface. The winds at the upper end (northwestern) of the Valley are strongest (where the Valley is narrow) and thus have the highest potential to move the larger (sand sized) sediments in quantity. Sediments that are not exposed (not at the ground surface) are not picked up by the wind. Aeolian sand movement is slowed (or even stopped) by vegetation or other similar features (berms, fences, buildings, windrows, etc. that slow the wind near the ground surface), as this sand movement happens close to the ground. Over a period of years following a moderate or larger fluvial deposition event (such as typically occurs about once a decade in the Valley), a large amount (a spike of sand quantity over time) of sand is blown from these fluvial deposition areas into, and eventually through, the aeolian transition areas. The last substantial drought period, which ended the winter of 2004-2005, involved an extended period with little fluvial deposition in the Whitewater River floodway or floodplain (upwind and within the Conservation Area). During this drought period most of the surface sand deposits within these aeolian transition areas were eroded by the consistent winds and blown downwind. Most of this aeolian sand traversing this portion of the Whitewater Floodplain used to end up in

The Big Dune, but relatively recent urban development now intercedes between these transition areas and The Big Dune; the sand that reaches this interceding development predominately ends up at this downwind edge, or is removed from within the developed area. Much of The Big Dune is now developed as described above, and no appreciable aeolian sand is expected to reach the remaining portions of the Big Dune. Given this fragmentation and isolation, no part of the Big Dune was included in the Conservation Area, although some habitat (including occupied habitat) likely still exists there.

The Whitewater Floodplain Conservation Area consists of 5,586 acres of CVAG modeled habitat for the fringe-toed lizard. Of this total, about 2,500 acres (approximately 45 percent) of fringe-toed lizard modeled habitat are considered Existing Conservation Lands controlled by BLM or CVWD. Our estimates, based on field reviews and aerial photos, indicated that about 1,000 acres of habitat suitable for fringe-toed lizards in the Whitewater Floodplain Conservation Area was extant in early 2005; large areas of modeled habitat (approximately 4,500 acres) were found to be devoid of substantial blowsand deposits and were thus unsuitable at that time. Some of these areas are expected to become periodically suitable with the input of new aeolian sand in the months/years following the stormflow-generated fluvial events that deposited sands upwind during the winter of 2004/2005. Other large areas of CVAG modeled habitat are not expected to become suitable habitat in the predicted future, even following larger fluvial deposition events, as these areas are not downwind of expected fluvial deposition areas under current floodplain conditions, based on mapping by Griffiths *et al.* (2002b). Pursuant to Service field and GIS analysis (including CVAG 2007 mapping, historic and recent aerial photos, and mapping from Griffiths *et al*. 2002b), we expect that about 1,195 acres of the Whitewater Floodplain Conservation Area is potential mid- or high-function habitat for the fringe-toed lizard.

The Whitewater Floodplain Reserve (within the larger surrounding proposed Whitewater Conservation Area) was thought by some researchers to have a sustainable aeolian sand sources (Meek and Wasklewicz 1993), while others (e.g., Griffiths *et al.* 2002b) questioned whether the Whitewater Floodplain Reserve will have a sufficient recurrent sand supply for survival of the fringe-toed lizard, because of the fluvial and aeolian disruptions associated with the percolation ponds upstream (see General Effects of the Action, Sand Transport above) on the highly episodic sediment deposition from the Whitewater River. Some additional artificial adverse effects to fluvial and aeolian processes result from debris stockpiles and levees (on CVWD lands within the Whitewater Reserve) associated with Garnet Pit Mine.

In addition to the issues noted above, past and present OHV activity within the boundaries of the proposed Whitewater River Conservation Area likely degrades suitable habitat for the fringe-toed lizard. Within and adjacent Section 19 and 24, T3S R4E, of the Whitewater Floodplain Conservation Area, CVWD and BLM control lands where OHVs in the past and currently gain access to proposed Conservation Area lands (including the adjacent Snow Creek Conservation Areas) important to the ecosystem upon which the fringe-toed lizard depends (Tyler Grant, Pete Sorensen, and Jon Avery, pers. observ.).

Willow Hole Conservation Area
The Willow Hole Conservation Area includes: the portions of the Mission Creek flood channel

and Morongo Wash south of the City of Desert Hot Springs; the Mission Creek and Morongo Wash sand fluvial depositional areas and aeolian sand transport areas, generally from Mission Creek on the west to Flattop Mountain on the east; and blowsand ecosystem areas along the San Andreas Fault and at Stebbins' Dune south of Varner Road and west of Date Palm Drive. The Conservation Area also includes the existing Willow Hole Reserve. This Conservation Area is bounded in part on the north by the Upper Mission Creek/Big Morongo Canyon Conservation Area and the Long Canyon Conservation Area. It is bounded on the east by the Edom Hill Conservation Area. To the south it is connected by existing culverts under I-10 to the Whitewater Floodplain Conservation Area. The Willow Hole Conservation Area consists of a total of approximately 5,770 acres for the Coachella Valley fringe-toed lizard.

The Willow Hole Conservation Area contains 1,754 acres of CVAG-modeled habitat for the fringe-toed lizard (897 acres of Core Habitat /857 acres of Other Conserved Habitat). Of this total, about 157 acres are considered Existing Conservation Lands and are controlled by BLM or the Coachella Valley Mountains Conservancy. The predominant watercourses that provide the aeolian sand source for the existing Willow Hole Reserve are Mission Creek and Morongo Wash.

The blowsand ecosystems Willow Hole Conservation Area receive aeolian sand from the fluvial deposits within the floodplains of Morongo Wash and Mission Creek to the west of the Indio Hills (Weaver 1981, Meek and Wasklewicz 1993). Griffiths *et al.* (2002b) stated that fluvial sediment from the Mission-Morongo depositional plain is transported by strong winds to the hummocks of Willow Hole (and Edom Hill). In addition, during intense storm events, these aeolian deposits on Edom Hill are recycled as fluvial sediment into Willow Hole.

The Willow Hole Conservation Area is subject to fragmentation as a result of roads, including Palm Drive, Mountain View Drive, and Varner Road. The roads likely reduce the lizard movement between habitat patches and cause roadkill of lizards. Additionally, like the Snow Creek/Windy Point Conservation Area, the Willow Hole Conservation Area is subject to illegal OHV activity. OHV activity has occurred in the past and continues within and across BLM lands in the Willow Hole Conservation Area, providing access to the adjacent Existing Conservation Lands and significant portions of the remainder of the Conservation Area. Thus, a portion of the proposed Conservation Area as been and would continue to be compromised relative to fringe-toed lizards by OHV activities, unless intervention occurs. Although it was the intention of BLM's CDCA Plan Amendment and the associated Terms and Conditions within the Biological Opinion to manage these areas, it appears that those management and enforcement activities such as patrolling and blocking access have been unsuccessful. Field visits by Service staff (Jon Avery, December 19, 2005) noted substantial recent OHV tracks traversing blowsands of the BLM lands within the Willow Hole Conservation Area.

The zone between the Morongo Wash and Mission Creek fluvial depositional area (downstream of the Banning Fault) and the Willow Hole area itself, is the most important aeolian sand transport corridor that supports the fringe-toed lizard habitat in the Willow Hole area (Griffiths *et al.* 2002b). The ecological processes in this area are mostly intact, although some development has occurred in this corridor.

Edom Hill Conservation Area
Reportedly, little evidence exists of recent aeolian activity northwest of the Edom Hill Reserve, which suggests these deposits may have slowly accumulated over thousands of years (Meek and Wasklewicz 1993). The present apparent immobility of sands and protection of deposits from wind within small valleys suggest to some researchers that the small acreage of sands in this area could remain long-term (Meek and Wasklewicz 1993).

Thousand Palms Conservation Area
The Thousand Palms Conservation Area consists of 3,948 acres of CVAG- modeled habitat for the fringe-toed lizard. Of this total, 3,037 acres are Existing Conservation Lands that are controlled by BLM, CDFG, the Service, State Parks, and the Center for Natural Lands Management, and The Nature Conservancy. The existing Thousand Palms Reserve, established by the Coachella Valley fringe-toed lizard HCP, totals 17,651 acres and is located south of the central portion of the Indio Hills. The Reserve includes the Coachella Valley Ecological Reserve lands owned by CDFG.

The Thousand Palms Reserve (surrounded by the larger proposed Thousand Palms Conservation Area) in the north-central portion of the Valley contains the largest amount of known remaining contiguous extant habitat for the species and likely contains the most robust population of the species. The CVFTL HCP estimated 5,201 acres (2,100 hectares) of occupiable habitat in this Reserve in 1985. Approximately 620 acres (250 hectares) of high-function dune habitat currently occurs in the area (Barrows 2006). Fringe-toed lizards are often found in sandy inter-dune areas, likely providing value to dispersing individuals or functioning as connections between dunes that would otherwise be isolated. Approximately 1,236 acres (500 hectares) of inter-dune habitat (Barrows 2006) currently exist in the Thousand Palms Reserve. The apparent decline in habitat area (estimated as 5,200 acres/2,100 hectares in 1985, to 1,850 acres/750 hectares in 2000) by approximately 64 percent likely resulted from improved estimates of habitat in the Reserve and from a reduction in habitat over time due to sand depletion caused by aeolian erosion of blowsand from the Reserve between 1985 and 2000.

The dunes within the Thousand Palms Reserve likely formed from large storms events in the Indio Hills in approximately 1890 and 1938 (Lancaster *et al.* 1993). These storm events likely caused large alluvial fan sediment depositional/erosional events on alluvial fans upwind of the Reserve (Lancaster *et al.* 1993). The surface sands on these alluvial fans were then entrained by the wind and blown down to the Reserve, creating the dunes (Lancaster *et al.* 1993). The fluvial and aeolian processes that created the Thousand Palms dunes were likely episodic and not part of a static, continuing phenomenon; nevertheless, continued smaller inputs of sand help maintain these dunes (Lancaster *et al.* 1993).

In the 1990's, geologists studied a time series (1939-1995) of aerial photographs of the dunes and sand transport corridor in the Thousand Palms Reserve area (Lancaster *et al.* 1993). Based on the rate of dune movement, they predicted that the dunes will move off the Thousand Palms Reserve (and Thousand Palms Conservation Area) within 50 years.

Large areas of mesquite hummocks have disappeared that were clearly visible within the Thousand Palms Reserve and environs in historic photographs (Simons, Li and Assoc. 1996). Mesquite hummocks present historically likely played an important role in dune formation and retention on the Thousand Palms, as they locally slowed the wind, causing blowsands to drop out and accumulate on the Reserve (Barrows 1996, Griffiths *et al.* 2002b, Simons, Li and Assoc. 1997, The Nature Conservancy 1985).

Saharan mustard has substantially invaded the Thousand Palms Reserve and was estimated to cover about 40 percent of sampled sand fields in the Thousand Palms Reserve in 2005, whereas active dunes apparently had much less cover of Saharan mustard (about 5 percent) (Cameron Barrows, pers. comm. with Tyler Grant 2006). The ecological effects of this invasive vegetation likely include degradation of suitable habitat available for the Coachella Valley fringe-toed lizard. Saharan mustard has reportedly been in the Coachella Valley since the 1920's, but since the 1980's it has greatly increased its range and dominance (Brooks 2005; Sanders and Minnich 2000). Some researchers expect that it will further expand its dominance within the region it currently occupies (Brooks 2005).

Critical Habitat in the Action Area

As noted above, critical habitat was designated in 1980 on approximately 11,789 acres, all of which occurs within the CVAG Plan Area. Approximately 10,380 acres of critical habitat occur within CVAG's proposed Conservation Areas, of which about 4,280 acres are modeled habitat for the lizard. (Service files, GIS analysis of CVAG 2007 mapping and 2005 aerial photos), leaving 1,409 acres of critical habitat that fall outside of proposed Conservation Areas in the Plan.

As determined by our GIS analysis of available data, approximately 646 acres of area within the critical habitat boundary had been developed as of 2005. Of these 646 acres, 227 acres are within the proposed Thousand Palms Conservation Area, and 419 acres fall outside of proposed Conservation Areas.

Approximately 198 acres within the critical habitat boundary (and within a proposed Conservation Area) were mapped by CVAG as Existing Uses; Existing Uses were mapped on a whole parcel basis and only within proposed Conservation Areas (this designation indicates that as least a portion of a subject parcel is substantially developed, such as a house or business structure). Based on our GIS analysis of 2005 aerial photos, of the 198 acres mapped as Existing Uses within critical habitat, approximately 136 acres (69 percent) were developed and 61 acres (39 percent) remained undeveloped and are potential habitat for the fringe-toed lizard.

Approximately 4,445 acres of fringe-toed lizard critical habitat are on private lands. As noted above, the Thousand Palms Conservation Area is the only Conservation Area where fringe-toed lizard critical habitat is designated. Of the lands that are critical habitat, privately-owned, and modeled fringe-toed lizard habitat, about 870 acres are within a Conservation Area, and approximately 339 acres occur outside a Conservation Area. About 3,236 acres are fringe-toed lizard critical habitat, private, and not modeled habitat for fringe-lizard; of this, about 2,188 acres occur in a Conservation Area, and about 1,048 acres are not in Conservation Area. Of the 2,188

acres of critical habitat within the Conservation Area that is private but not modeled habitat for the fringe-toed lizard, 1,941acres are modeled habitat for the Palm Springs pocket mouse, Mecca aster, or both.

The Big Dune

The Big Dune, historically and as late as the 1990's contained the largest contiguous area of blowsand and dunes (and likely fringe-toed lizard habitat) in the Coachella Valley (Service files, GIS analysis of historic photos and recent aerial photos). In the late 1970's the sand sources and transport processes that contributed sand to much of the remaining portions of The Big Dune were still somewhat intact, but by 1985 (the date of the CVFTL HCP) urban development had cut off almost all of the sand supply to remaining portions of The Big Dune. The Big Dune contained the deepest and most extensive sand deposits in the Coachella Valley; remaining undeveloped portions of The Big Dune still contain deep blowsand supplies.

Prior to development in the Valley, The Big Dune covered about 24,010 acres (Service files, GIS analysis of historic photos). Within the boundaries what was historically The Big Dune, CVAG modeled approximately 7,923 acres of remaining habitat for the fringe-toed lizard, with 5,957 acres within CVAG's Plan Area (Service files, GIS analysis of CVAG mapping and 2005 aerial photos). Our review of 2005 aerial photos of the Valley indicated a total of approximately 4,929 acres of remaining undeveloped (open) modeled habitat in The Big Dune, of which approximately 3,193 acres are within CVAG's Plan Area and about 1,736 acres on the Agua Caliente Indian Reservation. Approximately 2,994 acres of modeled habitat for the fringe-toed lizard within The Big Dune was developed as of 2005 (2,764 acres within the Plan Area and 230 acres on Reservation lands) (Service GIS analysis of CVAG mapping and 2005 aerial photos). The 4,929 acres of remaining undeveloped modeled habitat on The Big Dune (Plan Area and Reservation lands combined) amounts to approximately 21 percent of The Big Dune's original 24,000-acre extent.

Other Areas Outside of Conservation Areas

Outside of The Big Dune and the proposed Conservation Areas, other local small populations of fringe-toed lizards probably occur in the Valley. Due to fragmentation and loss of ecosystem processes, these sites are likely not large enough to support populations through the long-term. Thus, these sites are not considered to be important for habitat conservation. Occupied sites likely would have value for salvage of individuals.

Fringe-toed Lizard-associated Consultations in the Action Area

Several section 7 consultations with the BLM and Army Corps of Engineers that are important to Coachella Valley fringe-toed lizards were concluded over the last few decades. In 1982, BLM consulted with us on 12 wind energy development projects on public lands in the San Gorgornio Pass/Coachella Valley Wind Energy Resource Study Area (1-1-82-F-114). Per BLM's approvals under this action, thousands of wind turbines were approved for construction on leased BLM parcels. The term of these leases is 30 years; these leases run until the year 2013 (The Nature Conservancy 1985). Many of these wind turbines (and associated buildings, access roads, transmission lines) were built within sand source and/or sand transport zones important to the lizard and the ecosystem it depends upon, particularly within Whitewater River floodplain and

Edom Hill BLM parcels. Minimization and mitigation measures implemented by the applicants and/or BLM were limited. Notably, many of the wind turbines developed per this action on BLM lands in sections 20, 22, and 28 (in T3S, R4E) in the Whitewater River floodplain are placed on levees associated with CVWD's percolation ponds and the remaining adjacent channel of the Whitewater River. Associated additional turbines have been placed on adjacent CVWD parcels in locations associated with important ecosystem processes supporting fringe-toed lizard habitat, particularly fluvial sediment transport and deposition and aeolian sand erosion and transport.

In 1984, BLM consulted with us on right-of-way grant request from CVWD for development of percolation ponds within the Whitewater River floodplain, between Highway 111, the Southern Pacific Railroad line, and Indian Avenue (USFWS 1984: Biological Opinion 1-1-84-F-17). The purpose of this project is to gather and spread Whitewater River flows and imported Colorado River water for groundwater recharge. The stated term of the project is 30 years (1984-2014). The project as approved by BLM was to cover 2,900 acres, of which 1,450 acres were BLM lands, with the remainder on CVWD lands; fewer acres (900) were ultimately utilized for the action. A total of 38 north-south dikes were proposed (approximately 20 dikes were ultimately constructed), each approximately 87 feet wide and 450 feet apart. A dike was also constructed along the northerly edge and east of the spreading facilities/percolations ponds to protect the ponds from flood damage, reducing the available floodplain of the River and concentrating and increasing the velocities of flood flows and moving sediment deposition farther downstream (Griffiths *et al.* 2000b). The project utilized on-site material to construct the dikes/levees.

The BO for the percolation ponds acknowledged that indirect effects of the down-valley transport and deposition of sand by wind and water were not fully understood: the supposition in the BO was that the project would not affect wind transport of sand east of Indian Avenue (Service files, USFWS 1984). The BO also acknowledged that if all floodwaters are trapped by the percolation ponds there would be an effect on water transport of sand, and that the potential indirect effects of the project "are of significance to the fringe-toed lizard because the lands lying to the east of Indian Avenue are good habitat." The BO found that the project as proposed would jeopardize the continued existence of the fringe-toed lizard, and provided a reasonable and prudent alternative that stipulated that 1,218 acres of CVWD lands immediately east of Indian Avenue to be conserved and managed for the CVFTL for the life of the project (30 years), "then reassessed" by BLM and the Service at the end of the lease in year 2014. This BO also stipulated that illegal use of the area by off-road vehicles should not be allowed and should be controlled by the best possible means. Our BO provided an incidental take statement that only exempted take of lizards on 236 acres of habitat to be disturbed by construction. Approximately 1,170-acres of CVWD lands and 24 acres of BLM lands (1,194 acres total) of the Whitewater Reserve were protected as a result of this consultation (these same lands were later incorporated into the conservation strategy under the CVFTL HCP).

In 1997 we delivered a draft Biological Opinion to the Army Corps of Engineers (ACOE) for an action involving a proposed expansion of the Yeager Mine in Thousand Palms (sections 5 and 32, T4S R6E; Cal Mine ID #91-33-0067; APNs 647-440-003, 647-040-001, 648-050-008; BLM contract CA-26430). This draft BO [Biological Opinion on the E.L. Yeager Construction

Company, Inc., Application (97-00229-RRS) to Mine Sand and Gravel at Two Nearby Sites Within and Adjacent to an Unnamed Wash Near the City of Thousand Palms, in the Unincorporated Riverside County California] found that the proposed action would jeopardize the Coachella Valley fringe-toed lizard and adversely modify critical habitat for the fringe-toed lizard. After the Army Corps received this draft BO, the applicant withdrew their application. Currently, the applicant appears to have an asphalt plant, rock sorting and crushing operation, and accepts asphault and concrete for recycling within a portion of APN 648-050-008. Our 1997 draft BO noted that ongoing activities included the stockpiling of sand, asphalt, concrete, and other sorted aggregates within the primary wash channel that runs through the mine within section 5, and that this stockpiling had severely constricted the wash channel and obstructed drainage off the property.

In 2000 we completed a consultation with the ACOE on the Whitewater River/Thousand Palms Flood Control Project (BO 1-6-00-F-46). See Table FTL-2 (USACOE Flood Control Project). This consultation included the fringe-toed lizard and its designated critical habitat. Through the Fish and Wildlife Coordination Act process, we informally consulted with the ACOE this project from 1992 to 2000. Our concerns regarding project alternatives were documented in our Planning Aid Report dated February 1998 and our Draft Fish and Wildlife Coordination Act Report dated August 1999. Our GIS analysis estimated that the project would disturb or reduce flooding (fluvial sand transport) on approximately 4,217 acres, of which: 904 acres are critical habitat for the lizard, 420 acres are modeled habitat for the lizard, 139 acres are within the proposed Thousand Palms Conservation Area, and 69 acres are existing conserved land (Service GIS analysis based on CVAG 2007 mapping, 2005 aerial photos, and Service-estimated project footprint and flooding changes). This project is currently unbuilt and a substantial amount of development has occurred within the footprint of the approved levee alignments and it is undetermined what effect this development will have on the project. The project description from BO 1-6-00-F-46 notes the following information:

The proposed project is located near the community of Thousand Palms. The project consists of four levees designed to provide 100-year flood protection to the Federal Emergency Management Agency (FEMA) flood hazard zone between the Indio Hills and Interstate 10. This area is subject to flooding from flows emanating from Thousand Palms Canyon and the southwestern slopes of the Indio Hills. In addition to the right-of-way acreage for levee construction the proposed project would require the acquisition of an additional [551 acres] 223 hectares of floodway. This land, located between the "Transmission Corridor" and "Wind Corridor" levees, would be purchased by the Corps and CVWD, the local sponsor for the proposed project, in perpetuity to prevent flow along the levees from damaging private property. The Wind Corridor and "Cook Street" levees would be set back approximately [500 feet] 152 meters from the existing Coachella Valley Preserve (Thousand Palms Reserve) boundary to assure the 100-year flows are not increased on the Preserve and that scour is not induced on the Preserve as a result of the levee. Detailed modeling that will be accomplished in a later design phase will determine whether a wider setback would be required, or whether the levees could safely be placed closer to the Preserve. Flows from the Indio Hills would be allowed to flow naturally toward the Transmission Corridor Levee. This levee would divert water and sediment to the [551-acre] 223 hectare floodway in the wind corridor. An energy dissipator would be

provided at the end of this levee, as well as the other three levees. The energy dissipators would greatly reduce the flow velocities and depths, spread the flow out onto the alluvial fan, and induce deposition of the fluvially-transported sediment into the floodway and wind corridor.

At the downstream, or southern end of the [551-acre] 223 hectare floodway, the flows would be intercepted by the two Wind Corridor Levees and continue southeasterly to the end of the lower levee. At that point, the diverted flows would join uncontrolled riverine flows that are conveyed along the north side of Interstate 10 freeway. The combined runoff would then be intercepted by the Cook Street Levee, located along the southwestern and southern boundaries of the Preserve. The proposed project would protect from flooding approximately [1,650 acres] 688 hectares of undeveloped [in 2000] alluvial fan, and about [1,100 acres] 445 hectares of developed [in 2000] property. This does not include areas that would remain subject to riverine flooding from Long Canyon and Morongo Wash. This would disturb directly and isolate a total of 904 acres (366 hectares) of designated critical habitat from fluvial and aeolian processes (although some 200 acres (≈ 80 hectares) is already developed). Approximately [2,600 acres] 1,052 hectares north of the Transmission Corridor Levee would remain unprotected from alluvial flooding. Sand that accumulates along the levees would be removed periodically (approximately every five years or after major flood events) and spread within the wind corridor where it would be available for aeolian transport to the Preserve. An adaptive management plan would be enacted to maximize the amount of sand transport to the Preserve. Preserve management would continue to monitor habitat functions and dune characteristics. These agencies would meet with the CVWD as needed to assess habitat quality on the Preserve and determine if any changes to the manual transport system are required. Approximately 13 hectares of the wind corridor will be purchased as mitigation for impacts to desert scrub and creosote hummock habitats in lieu of paying tortoise habitat conservation fees. This is in addition to the [551 acres] 223 hectares of the wind corridor that would be purchased and set aside as a floodway. This preservation will be designed to substantially benefit blowsand-dependent species that rely on the large quantity of sand in the wind corridor. Small populations of these species that may occur in the wind corridor would also directly benefit from the proposed habitat preservation. As currently designed, a [500-foot] 152 meter minimum floodway would be purchased along the northern edge of each levee, that could also be used for maintenance access.

In 2004 we completed a programmatic consultation with the Federal Highway Administration (FHWA) and CalTrans on the fringe-toed lizard with a BO entitled "Programmatic Biological Opinion for Five Interchanges and Associated Arterial Improvement Projects along Interstate 10 and the Tiered Biological Opinion for the Palm Drive/Gene Autry Trail - Interstate 10 Interchange Improvement Project in Eastern Riverside County, California" (1-6-04-F-3282.4; EA: 08-455800). In this consultation FHWA, CalTrans, CDFG, and the Service developed an approach for avoiding, minimizing, and offsetting direct and indirect effects to listed species from improvements to interchanges and their associated arterial streets along I-10 in the Coachella Valley, and for impacts for a Palm Drive widening project and a Ramon Road improvement project. As part of this consultation, CalTrans finalized the *Conservation Plan Addressing the Direct, Indirect, and Cumulative Effects of Interstate 10 Coachella Valley Interchange Projects*. This *Conservation Plan* outlines the conservation strategy developed for the programmatic consultation, including a commitment by CalTrans and FHWA to purchase

1,795 acres of land to augment existing blowsand ecosystem/wildlife reserves in Valley. The primary purpose of the action was to improve traffic flow at interchanges along I-10 through the Coachella Valley. This consultation was programmatic because it intended to cover interrelated projects by establishing conservation measures, including a conservation banking protocol, based on avoidance and minimization measures developed to reduce both direct and indirect effects to threatened, endangered, and sensitive species in the action area for each project. At the programmatic level, BO 1-6-04-F-3282.4 developed the protocol for covering improvements to five I-10 interchanges and their associated arterial streets up to the next logical termini. At the project level, this same BO addressed the I-10 Palm Drive/Gene Autry Trail Interchange Improvement Project.

Management
Under the existing CVFTL HCP, the primary management actions performed to date for fringe-toed lizards have ranged from control efforts directed at invasive plant species and limiting OHV access, to directing scientific, educational, and recreational uses. Tamarisk (*Tamarix ramosissima*) and athel (*T. aphylla*) eradication programs were completed within Thousand Palms Canyon and further south within the Valley-floor portions of the Thousand Palms Reserve, respectively.

Within the Willow Hole-Edom Hill Reserve, the BLM lands have been designated as an Area of Critical Environmental Concern (ACEC) and these ACEC lands are classified as Class "Limited" in the CDCA Plan. Pursuant to management objectives under the CDCA Plan, the BLM has implemented measures directed at controlling deleterious activities such as OHV use, and has installed perimeter fencing of these lands to reduce OHV activity.

The existing reserves encompass only a fraction of the area needed to protect sufficient existing habitat. The existing protected lands and current regulatory mechanisms do not sufficiently protect the ecosystem process areas essential to rejuvenating/maintaining the potential/suitable habitat within these reserves. Additionally, many of these existing habitat areas (such as Willow Hole and Snow Creek) remain largely unprotected from frequent OHV use, despite fencing and enforcement efforts. Inadequate management resources are currently available to effectively combat invasive species. Some enhancement of existing habitats has occurred in the Thousand Palms and Whitewater Floodplain reserves, including sand fencing to artificially retain additional blowsands.

Monitoring
Thousand Palms Reserve: Monitoring began in the Thousand Palms Reserve in 1986 using a transect methodology (Barrows pers. comm., 1986-2005); this consisted of recording the number of fringe-toed lizards observed along a 3,300-foot (1,000-meter) transect that was 33 feet (10 meters) wide. Researchers walked this transect at least six times a year (from 1986-2002) and the average number of fringe-toed lizards observed was calculated each time. The average number of lizards observed was used as an index of population size. A second transect was established in 1990 and was surveyed until 2002.

Monitoring results from the transects in the Thousand Palms Reserve reveal large annual

fluctuations in the population index for the fringe-toed lizard, primarily correlated with yearly precipitation (Barrows 2006). Similar fluctuations associated with variability in precipitation have been seen in the Whitewater Floodplain Reserve. The population index (survey numbers) in the Thousand Palms Reserve declined drastically during droughts over the last two decades, but the population index rebounded during wetter years (Barrows 2006). During droughts, population (survey count) numbers within the Thousand Palms Reserve dropped to levels where fringe-toed lizards were undetectable using the aforementioned transect methodology. This transect methodology did not have the sensitivity to determine densities or estimate census population sizes.

Whitewater Floodplain Reserve: A similar transect was established on the Whitewater Floodplain Reserve in 1988. However, by 1995, blowsand had eroded off (by aeolian erosion and not replaced by aeolian deposition from upwind) this portion of the Reserve, and no fringe-toed lizards were detected in this area during the next 3 years. Because this portion of the Reserve was not expected to receive additional blowsand in the foreseeable future due to artificial changes to fluvial sand deposition, this transect was abandoned and a new transect was established within the Reserve in 1998. This new transect was similarly monitored until 2002.

Mark-recapture monitoring methodology also has been used in the Whitewater Floodplain Reserve: a 5.6-acre (2.3-hectare) plot in the center of the Reserve has been intensively sampled for fringe-toed lizards using mark-recapture methods since 1985 (Barrows *et al.* 1995; Muth and Fisher pers. comm., 1986-2005). From 1985 to 2005, the population was sampled annually within the plot, and the results progressively dropped from a high density to a very low density of fringe-toed lizards. When monitoring began on the plot in 1985, over 200 adult fringe-toed lizards were detected. During a drought from 1985 to 1990, the number detected dropped to 11 adults. The number detected rebounded to 143 fringe-toed lizards on the plot in 1996. Extended drought conditions from 1993 to 2005 resulted in a decrease in the number of lizards again. By 2005, only one adult fringe-toed lizard was detected on the plot (Mark Fisher, pers. comm., 2006).

Based on aerial photography, ground-truthing, and expert opinion, CFWO staff calculated that in 2005 less than 500 acres (200 hectares) of suitable habitat existed on the Whitewater Floodplain Reserve, and that roughly 1,000 acres (400 hectares) of suitable habitat existed in the Whitewater Floodplain area (including habitat areas inside and outside of the Reserve). At a density of one fringe-toed lizard per 5.6 acres (the density in 2005 in the test plot), CFWO staff estimated that approximately 90 fringe-toed lizards inhabited the Reserve and that approximately 180 fringe-toed lizards inhabited the entire Whitewater Floodplain in 2005. However, a few small patches of habitat likely supported higher densities of fringe-toed lizards than the monitored plot. Consequently, CFWO staff estimated that the entire population on the Whitewater River floodplain probably dropped below 300 fringe-toed lizards in 2005.

In 2005 and 2006, habitat conditions in portions of the Whitewater River floodplain improved due to an influx of aeolian blowsand deposits (following the winter 2004-2005 flood-borne sediment deposits upwind), but the population numbers on the 5.6-acre plot increased to only six adult fringe-toed lizards in 2006.

In 2006, a study of fringe-toed lizard occupancy rates (percentage of sites occupied; MacKenzie *et al.* 2006) was conducted by CFWO staff of areas within or adjacent to the proposed CVMSHCP Whitewater Floodplain Conservation Area (Grant and Groom, in prep). In this study, fringe-toed lizards were only found in two of 50 study plots within CVAG-modeled fringe-toed lizard habitat [randomly placed 1.2-acre (0.5-hectare) plots]. The two plots where fringe-toed lizards were detected in the study were not in the Whitewater Floodplain Reserve (in other words, not in an existing protected area). One of these plots would potentially be protected under the proposed CVMSHCP. The second occupied plot was found outside the CVMSHCP-proposed Whitewater Floodplain Conservation Area, on lands controlled by the City of Palm Springs, adjacent to the Palm Springs train station. This alternative monitoring methodology conducted by CFWO-staff supported the results of the mark-recapture study; both studies found extreme population declines in the Whitewater River floodplain area. These fluctuations are expected to be more extreme (than those in Thousand Palms) during extended droughts because of the extreme degradation of the fluvial and aeolian processes that would otherwise support blowsand habitat during extended droughts in the Whitewater Floodplain area.

Willow Hole/Edom Hill Reserve: The Willow Hole/Edom Hill Reserve has two separate discontinuous reserve areas, one at Willow Hole and one at the northern base of Edom Hill to the east. A monitoring transect was established in Willow Hole in 1988, and it was monitored until 2002. The mean number of lizards detected varied from 0 to 6 lizards per transect during this period, with the low count occurring in 2001 and the high counts occurring in 1992 and 1993.

Within the Edom Hill portion of the Reserve, sand patches are too small for these same types of transects utilized elsewhere for the fringe-toed lizard, so patches were surveyed for basic presence of fringe-toed lizards in 1993 and again in 2004, 2005, and 2006. At Edom Hill, fringed-toed lizards typically inhabit relatively small pockets of dune habitat. Monitoring has shown that fringe-toed lizards have become extirpated in some of these small patches during droughts, but some of these patches were re-colonized from nearby extant patches in subsequent wet years. Minimal monitoring has occurred on this Reserve; therefore, little data exists on the status of this population.

MSHCP: In 2003, a new monitoring program was initiated in preparation for the proposed CVMSHCP (CCB 2005, Barrows *et al.* 2005). As a replacement for the previous transects described above, this new program established transects in the three existing reserves and within the proposed Conservation Areas of the CVMSHCP. This monitoring program was designed to monitor several species concurrently and was not tailored specifically for the fringe-toed lizard. In this monitoring program, tracks of the animals of interest are counted on 330-foot (100-meter) transects. Counting tracks has a higher probability of accurately detecting the presence of fringe-toed lizards and, thus, will likely give more definitive results at lower population levels. The reliability of such track identification is currently undetermined.

EFFECTS OF THE ACTION

Evaluation Assumptions:

The Plan-described Existing Conservation Lands controlled by the Permittees (cities, County,

CVWD, etc.), and those controlled by organizations (The Nature Conservancy, CNLM, etc.), that were set aside or designated for conservation associated with the CVFTL HCP, will be protected by an appropriate legal instrument in perpetuity, such as a conservation easement held by Service-approved third party consistent with California Civil Code 815 et seq., within 6 months of issuance of our herein contemplated Section 10 permit. These lands will be protected and retained in a natural condition, ecologically-beneficial to the fringe-toed lizard.

The Plan-described Existing Conservation Lands controlled by BLM, Service, or CDFG, that were set aside or designated for conservation in association with the CVFTL HCP or section 7 consultations on federal actions on fringe-toed lizards, will be conserved in perpetuity by these respective agencies, or by any organization/agencies that that are given control over these lands from these agencies. These lands will be protected and retained in a natural condition, ecologically-beneficial to the fringe-toed lizard.

BLM will enter into an MOU or MOA (or some equivalent) with the CVCC, prior to issuance of the proposed Section 10 permit from the Service that will ensure BLM's management of the lands they control within the proposed Conservation Areas is consistent with the goals and objectives of the CVMSHCP, for the life of the Plan. Beyond the life of the Plan, BLM, the State, and the Service will provide basic ecological management for their respective Plan-described Existing Conservation Lands in perpetuity.

Activities on BLM lands within the Plan Area, notably substantially improved control of OHV trespass across BLM lands will be addressed through the section 7 consultation process on the CDCA, and re-initiation of consultation on previous BLM actions where appropriate.

Future development activities on Agua Caliente Indian Reservation lands within the Valley's blowsand natural communities will include substantial and commensurate offsetting mitigation in the form of conservation of important blowsand ecosystem lands in the Valley (on and off Reservation), whether or not a HCP developed by the Tribe and associated section 10 permit is in place and being implemented. It is also assumed that the vast majority of currently undeveloped portion of Section 6, T4S R5E, on the Agua Caliente Indian Reservation will be conserved for the fringe-toed lizard.

Associated with the general and specific objectives and measures in the Plan, CVAG would maintain groundwater or soil water in the proposed Conservation Areas subject to their Water Management Plan and commitments made relative to the Coachella Canal Lining Project, at sufficient levels to maintain at least 222 acres of mesquite hummocks (with alive, functional, and sustainably reproducing mesquite plants) within those Reserve Areas in perpetuity.

Any flood damage reduction facilities constructed in the future that are related to the planned Whitewater Flood Control Project (which, as analyzed in our Biological Opinion, would consist of a series of levees to provide flood damage reduction for portions of the Thousand Palms community and I-10 areas) in the Thousand Palms area would be developed consistent with the designs, potential impacts, and conservation analyzed in our Biological Opinion on the Whitewater River/Thousand Palms Flood Control Project (1-06-00-F-46). Any related project contracts, approvals, or funding by the Army Corps of Engineers, County of Riverside, and/or CVWD would be consistent with Biological Opinion 1-06-00-F-46. Any inconsistencies with planned activities and Biological Opinion 1-06-00-F-46 will be addressed through the section 7 consultation process, including re-initiation of consultation by the Army Corps of Engineers where appropriate.

CVWD would deposit sand removed from their groundwater recharge basins (percolation ponds)

in the Whitewater River floodplain into the Whitewater Floodplain Conservation Area (see Required Measures for Conservation Areas below) during maintenance operations, in locations on proposed Reserve lands, and in a manner, such that downwind suitable habitat for the Coachella Valley fringe-toed lizard would receive appreciable inputs of aeolian sand from the deposits.

State, Federal, and local agencies will develop and implement a law enforcement agreement(s) to facilitate improved control of ecologically harmful illegal activities (such as illegal dumping and OHV use) occurring within and adjacent to Conservation Areas that support the fringe-toed lizard and the ecosystem it depends upon.

All Covered Activities, including any ministerial or vested projects if they would receive coverage under our proposed permit, would be subject to the conditions and measures of the proposed Plan.

It is expected that maintenance of fluvial sand transport capacity (Section 4.4 of the CVMSHCP, Fluvial Sand Transport) is equivalent in meaning to "no net loss" of this capacity compared to current conditions, pursuant to maintaining fluvial (and ultimately aeolian processes) erosion/transport/deposition important to the blowsand ecosystems of the action area. As such, fluvial processes in areas that are important to fringe-toed lizard modeled habitat within Conservation Areas and section 6, T4S R5E (adjacent to the Whitewater Floodplain Conservation Area), are expected to be protected by the proposed Plan from adverse changes that could otherwise result from Covered Activities.

Non-Permitees, notably the City of Desert Hot Springs, Mission Springs Water District, Palm Springs School District, Metropolitan Water District, and Desert Water Agency, will not rely on the conservation that would be provided by the proposed Plan as offsetting or minimizing any environmental impacts of actions locally approved by these agencies. Pursuant to the California Environmental Quality Act, future development activities within and/or affecting blowsand natural communities approved by these agencies will include substantial and commensurate offsetting mitigation in the form of conservation of important blowsand ecosystem lands in the Valley.

Surrender of the Coachella Valley Fringe-toed Lizard HCP

The development of the proposed CVMSHCP was, in part, contemplated to address the short-comings of the CVFTL HCP that were discovered during its implementation, particularly the need for protection of essential sand source and transport areas that support important habitat areas. The CVMSHCP, as proposed, would subsume the CVFTL HCP, within 6 months of issuance of the herein contemplated Section 10 permit from the Service or sooner. Consistent with the process of subsuming the existing CVFTL HCP permit we issued in 1986, the jurisdictions that have received take authorization for the Coachella Valley fringe-toed lizard pursuant to the CVFTL HCP would surrender the Section 10 incidental take permit [per 50 CFR 13.26 and 17.22(a)(7)]. The Service would then prepare a finding document, noting whether the permit obligations of the CVFTL HCP have been met and whether the Service can cancel the existing permit. If an new incidental take permit with coverage for fringe-toed lizard is issued as proposed herein, these same jurisdictions (Permittees) would need to comply with Section 6.6.1.3 of the proposed CVMSHCP (specifications and requirements for relinquishment of CVFTL incidental take permit) in order for Section 10 permit coverage of Coachella Valley fringe-toed lizard to be valid (and continue under the proposed Plan). The City of Desert Hot

Springs, a non-Permittee under the proposed Plan, would be expected to surrender the existing CVFTL incidental take permit and not have coverage for the fringe-toed lizard under either Plan, but would remain subject to the requirements under the Act.

The proposed Plan includes the following associated measures and requirements:
Within six months of the issuance of the proposed Section 10 permit from the Service, the CVFTL HCP incidental take permit would be relinquished as described in Section 16.2 of the IA.
Within six months of the issuance of the proposed Section 10 permit from the Service, CVCC would obtain an appropriate legal instrument guaranteeing protection in perpetuity to the non state and federal lands in the CVFTL Preserve system acquired with CVFTL mitigation fees.
Prior to surrender of the CVFTL HCP incidental take permit, CVWD would conserve the 1,200 acres it owns in the CVFTL HCP Whitewater Floodplain Reserve (part of the proposed Whitewater Floodplain Conservation Area) in perpetuity as part of the MSHCP Reserve System, by recording an appropriate legal instrument.
The CVCC would implement the Monitoring and Management Programs, on the above lands in perpetuity.
The CVCC would assume responsibility for the current CVFTL HCP endowment (approximately $3,200,000), which would be incorporated into the proposed MSHCP endowment and specifically earmarked to ensure funding for the Monitoring and Management of the CVFTL and its associated habitat, in perpetuity.
Within 3 months of issuance of the proposed Section 10 permit from the Service, the applicable Local Permittees would provide a final accounting of all local mitigation funds collected pursuant to the CVFTL HCP, the take and conservation that occurred pursuant to the CVFTL HCP, the funds collected pursuant to the October 4, 2000, MOU between the cities, the County, CNLM, CDFG, and the Service regarding measures to minimize take of the fringe-toed lizard, and the take and conservation that occurred pursuant to that MOU. As part of the final report, all biological data collected over the life of the permit would be submitted to the Service.

To date, the acreage of land acquisitions for conservation/mitigation, as required under the stipulations of the existing CVFTL HCP, is (per our understanding) consistent with the covered impact acreage that has occurred. However, these conservation lands are not, as yet, protected in perpetuity by an appropriate legal instrument that would assure their conservation; the CVFTL HCP is ambiguous as to the required long-term legal protection required of these conservation lands. Additionally, the protection afforded to the Whitewater Floodplain Reserve under the BLM/CVWD percolation pond BO was not permanent, as the percolations ponds are temporary, and the project and conservation are to be reassessed by BLM and the Service in the year 2014 (note that Whitewater Reserve later became part of the Coachella Valley Preserve System, as part of the conservation/mitigation under the CVFTL HCP). Also, a portion of the mitigation lands of the Whitewater Reserve has been adversely affected by apparent trespass by Granite Construction (or its predecessors that controlled the adjacent Garnet Mine) into the conserved land of the Reserve, in the form of earth moving, deposition of debris piles, and construction of a levee near the Garnett Pit east of Indian Avenue. As of the date of this BO, most of this trespass is proposed to be removed by Granite in near future.

As noted above, the proposed Plan would require the CVCC to obtain legal protection in perpetuity for the non-state and non-federal lands in the Coachella Valley Preserve System acquired with CVFTL mitigation fees. It would also require CVWD to provide perpetual legal protection to the CVFTL HCP Whitewater Floodplain Reserve lands it controls. As such, the non-Federal/non-State conservation lands set aside or utilized as mitigation for the CVFTL HCP would get legal protection in perpetuity under the proposed Plan. Also, as noted above, it is assumed that all State and Federal lands in the Coachella Valley Preserve System would be conserved in perpetuity. Thus, the CVFTL HCP conservation/mitigation lands are expected to be protected in perpetuity.

Mitigation and Minimization Measures
Under the proposed Plan (MSHCP Table 4-114):
27,070 acres of fringe-toed lizard CVAG modeled habitat exist in the Plan Area (including federal lands).
22,500 acres of fringe-toed lizard CVAG modeled habitat in the Plan Area would be subject to the proposed permit (this number excludes federal lands).
355 acres of fringe-toed lizard CVAG modeled habitat are on federal lands outside of Conservation Areas in the Plan Area.
12,903 acres of fringe-toed lizard CVAG modeled habitat are proposed to be authorized for impacts outside of Plan Conservation Areas.
778 acres of fringe-toed lizard CVAG modeled habitat are proposed to be authorized for impacts inside of Plan Conservation Areas.
13,681 acres (total) of fringe-toed lizard CVAG modeled habitat are proposed to be authorized for loss under the MSHCP in the Plan Area.
5,999 acres of fringe-toed lizard CVAG modeled habitat are within Existing Conservation Lands (currently conserved) within the Conservation Areas.
6,999 acres of fringe-toed lizard CVAG modeled habitat would be conserved by CVAG per the proposed Plan.
12,998 acres (total) of fringe-toed lizard CVAG modeled habitat that would be conserved in the MSHCP Reserve System (Existing Conservation Lands plus CVAG's remaining conservation; this is the total acreage of conservation that would exist in the Plan's Conservation Areas, if the Plan is implemented as proposed).

Per the habitat modeling performed by CVAG, approximately 27,070 acres of fringe-toed lizard habitat exists in the Plan Area. The Service completed its own analysis of these habitats to identify the extent of impacts in areas outside the Conservation Areas and within critical habitat. Our GIS analysis indicated that approximately 27,206 acres of CVAG-modeled habitat for the lizard still exists in the Plan Area. Such minor differences are not unexpected for mapping on this scale. For consistency with the Plan, we have used its figures for the authorizations associated with our Permit. As proposed, the Plan and our section 10 permit would cover/authorize the direct loss of up to 13,681 acres of fringe-toed lizard modeled habitat in the Plan Area. As proposed, a total of approximately 12,998 acres of fringe-toed lizard modeled habitat (about 48 percent of existing CVAG modeled habitat in the Plan Area) would remain in the Conservation Areas after Plan implementation; per our assumptions above, combined with the protections proposed in the Plan, we expect that this 12,998 acres of CVAG-modeled habitat

would be conserved and legally protected in perpetuity.

The Plan proposes to conserve about 6,999 acres of CVAG modeled fringe-toed lizard habitat that currently have no protection; these lands currently have no legal conservation protection and are under various levels of threats from development and other activities (such as OHVs). The proposed Plan would protect approximately 90 percent of the CVAG modeled fringe-toed lizard habitat that occurs on private lands that are within proposed Conservation Areas. The Plan would not protect any private lands that are outside the proposed Conservation Areas.

As proposed, the proposed section 10 permit and Plan would allow Covered Activity-associated (mostly development-related) direct losses to about 52 percent of the remaining CVAG modeled fringe-toed lizard habitat in the Plan Area. The losses and mitigation (as noted above) would result in a mitigation ratio (Plan-caused new conservation to impact acreages) of about 0.51 to 1 (0.51 acres conserved for each acre subject to proposed impacts; 6,999/13,681 = 0.51), considering that the Plan proposes to protect about 6,999 acres of modeled habitat. The proposed permit and Plan would theoretically allow the development-associated loss of almost all of the fringe toed lizard habitat remaining in the Plan Area that is outside of any proposed Conservation Areas on non-federal lands, through proposed Covered Activities by permitees, those under their control, or those parties that have signed valid certificates of inclusion (COI). Since it is expected that some project proponents in the Plan Area will not be under the control of the proposed Permittees or those that would attain COIs, their actions would not be Covered Activities, and the impacts and mitigation from these actions would be cumulative effects (see Cumulative Effects below: these actions by non-Permitees would likely result in conservation of an undetermined acreage of lands within the Plan Area outside of Conservation Areas).

In approving development under the proposed Plan, Local Permittees and those under their control (such as those issued grading permits by Local Permittees), as well as signatories to Certificates of Inclusion would be required under and by the Plan and IA to comply with the following sections of the Plan: (1) Conservation Area Objectives and Required Measures in Section 4.3; (2) Avoidance, Minimization, and Mitigation Measures in Section 4.4; (3) Land Use Adjacency Guidelines in Section 4.5; (4) Joint Project Review Process in Section 6.6.1.1, and; (5) Species Conservation Goals and Objectives in Section 9.6.2.1. Collectively, the measures described in these five sections of the proposed Plan are intended to evaluate, restrict, and reconfigure development proposals to be consistent with the Plan.

Urban Development

As depicted in Table 4-114 in the Plan, 778 acres of CVAG-modeled fringe-toed lizard habitat would be authorized for loss by the proposed section 10 permit and Plan inside the proposed Conservation Areas (except as noted below; also see East Indio Hills Conservation Area), and up to 12,903 acres would be authorized for loss outside of the proposed Conservation Areas, for a total potential loss of approximately 13,681 acres (again, except as noted below) of CVAG-modeled fringe-toed lizard habitat. The lack of predictability about the type and location of the future development that would occur under the Plan requires that the analysis herein under section 7 of the Act be done at a programmatic scale, considering the range of potential development scenarios that could occur; analysis of site specific effects are not possible because

sufficient detail was not provided in the Plan to assess potential effects in discrete areas. Thus, this analysis is structured to programmatically assess foreseeable impacts in the Plan Area. Most of these losses would occur through urban and commercial development.

Required Measures for the Conservation Areas (Section 4.3)
Coachella Valley fringe-toed lizard "Core Habitat" (as mapped by CVAG) occurs in the proposed Willow Hole, Snow Creek/Windy Point, Thousand Palms, and Whitewater Floodplain Conservation Areas. Fringe-toed lizard "Other Conserved Habitat" (as mapped by CVAG) occurs in the proposed Willow Hole, Edom Hill, Thousand Palms, East Indio Hills, and Santa Rosa and San Jacinto Mountains Conservation Areas. All of these Conservation Areas contain a set of standard Required Measures (some of which are relevant to fringe-toed lizards) that must be satisfied in the local Permittee approval of proposed development projects (Covered Activities) under the proposed Plan.

The Conservation Areas that include at least some CVAG mapped fringe-toed lizard habitat consist of a total of approximately 262,370 acres (total area of all natural communities and all species habitats combined). Each contains some (CVAG designated) Core Habitat or Other Conserved Habitat for the fringe-toed lizard, or both. All CVAG-modeled fringe-toed lizard habitat in proposed Conservation Areas totals about 13,776 acres. Of these, 13,776 acres, approximately 12,998 acres (approximately 94 percent) would remain conserved after Plan implementation (this would be made up of Existing Conservation Lands, plus lands that would be conserved as a result of the Plan). Per the flexibility provided by East Indio Hills Conservation Area Required Measure #1 (as described below) that would allow the loss of approximately 100 additional acres. Thus, the loss authorized within the Conservation Areas would not exceed 878 acres, and the conservation achieved in those areas would total at least 6,899 acres.

The following table (MSHCP Table 9-16) reflects the existing acreages, proposed acreage losses, and proposed conservation that would occur under the Plan in each Conservation Area with fringe-toed lizard habitat.

Table 9-16: Summary of Habitat within Conservation Areas
Coachella Valley Fringe-Toed Lizard

Conserva-tion Area	***Total Acres of Habitat in Conserv. Area***	***Acres of Distur-bance Authorized***	***Acres of Existing Conserva-tion Lands***	***Remaining Acres to be Conserved***	***Total Acres to be Conserved in MSHCP Reserve System***	***Designation***
Snow Creek/ Windy Point	1,374	130	70	1,174	1,244	Core Habitat

Conserva-tion Area	***Total Acres of Habitat in Conserv. Area***	***Acres of Distur-bance Authorized***	***Acres of Existing Conserva-tion Lands***	***Remaining Acres to be Conserved***	***Total Acres to be Conserved in MSHCP Reserve System***	***Designation***
White-water Floodplain	5,617	309	2,532	2,777	5,309	Core Habitat
Willow Hole	897 / 857	74 / 86	157 / 0	666 / 771	823 / 771	Core / Other Cons. Habitat
Edom Hill	120	6	58	56	114	Other Cons. Habitat
Thousand Palms	3,962 / 3	93 / 0	3,035 / 2	834 / 1	3,869 / 3	Core / Other Cons. Habitat
East Indio Hills	824	70	123	631	754	Other Cons. Habitat
Santa Rosa & San Jacinto Mountains	122	10	22	90	112	Other Cons. Habitat
Total – All Habitat	*13,776*	*778*	*5,999*	*6,999*	*12,998*	--
Total – Core Habitat	*11,850*	*606*	*5,794*	*5,451*	*11,245*	--
Total – Other Cons. Habitat	*1,926*	*172*	*205*	*1,549*	*1,754*	--

All of the Conservation Areas have specific Conservation Objectives and Required Measures that identify the conservation obligations of the Permittees and specific constraints on the construction, operation and/or maintenance of covered facilities. Some also require specific measures in regards to development that are summarized below. For the complete discussion of the Conservation Objectives and Required Measures, please see Section 4.3 of the Plan.

Snow Creek Conservation Area
Of the 1,374 acres of CVAG modeled fringe-toed lizard habitat occurring in this Conservation Area, approximately 1,244 acres (approximately 91 percent) would remain conserved after Plan implementation (existing conservation lands plus lands that would be conserved by the Plan). Of the 1,304 acres of currently unconserved CVAG modeled fringe-toed lizard habitat in the

Conservation Area, the Plan would protect 1,174 acres (90 percent). The proposed permit and Plan would authorize the loss of 130 acres of CVAG modeled fringe-toed lizard habitat in the Conservation Area. The Conservation Area provides CVAG designated Core Habitat for the Coachella Valley fringe-toed lizard.

For the purposes conserving of biological corridors and linkages in the Snow Creek area, the Plan proposes to maintain connections between areas south of I-10 (Snow Creek and the adjacent San Jacinto Mountains) and areas north of I-10 (the San Gorgonio Wilderness and Whitewater Canyon ACEC in the San Bernardino Mountains) through two noted biological corridors: Stubbe and Cottonwood Canyons, and the Whitewater River (MSHCP Section 4.3.3). The corridors are proposed to be maintained so as to continue to provide sand transport via Stubbe Canyon Wash and the Whitewater River, and retain connectivity to help maintain predator-prey relationships in the Snow Creek area and provide for large mammal movement between the San Jacinto and San Bernardino mountains.

Whitewater Floodplain Conservation Area
Of the 5,617 acres of CVAG modeled fringe-toed lizard habitat occurring in this Conservation Area, approximately 5,309 acres (approximately 94 percent) would remain conserved after Plan implementation (existing conservation lands plus lands that would be conserved by the Plan). Of the 3,085 acres of currently unconserved CVAG modeled fringe-toed lizard habitat in the Conservation Area, the Plan would protect 2,777 acres (90 percent). The proposed permit and Plan would authorize the loss of 309 acres of CVAG modeled fringe-toed lizard habitat in the Conservation Area. The Conservation Area provides CVAG designated Core Habitat for the Coachella Valley fringe-toed lizard.

The Plan identifies potential road widening within this Conservation Area. If the road widening occurs, it will be implemented so as to maintain the current fluvial and aeolian sand transport capacity across the roads. Widened culverts or undercrossings would be provided to maintain the ability for fringe-toed lizards as well as other species to move across the widened road safely.

CVWD is required to deposit sand removed from the percolation ponds during maintenance operations in the fluvial and aeolian sand transport area on available Reserve lands as determined in consultation with the RMOC.

Willow Hole Conservation Area
Of the 1,754 acres of CVAG modeled fringe-toed lizard habitat (897 acres of Core Habitat and 857 acres of Other Conserved Habitat) occurring in this Conservation Area, approximately 1,594 acres (approximately 91 percent) would remain conserved after Plan implementation (existing conservation lands plus lands that would be conserved by the Plan). Of the 1,597 acres of currently unconserved CVAG modeled fringe-toed lizard habitat (740 acres of Core Habitat and 857 acres of Other Conserved Habitat) in the Conservation Area, the Plan would protect 1,437 acres (90 percent: 666 acres of Core Habitat/771 acres of Other Conserved Habitat). The proposed permit and Plan would authorize the loss of 160 acres of CVAG modeled fringe-toed lizard habitat (74 acres of Core Habitat/86 acres of Other Conserved Habitat) in the Conservation Area.

The Plan identifies potential road widening to four lanes within this conservation area. If the road widening occurs beyond two lanes then widened culverts or undercrossings in the Willow Hole Conservation Area would be provided to maintain the ability for wildlife movement. This would involve installing a wide culvert or bridge under the existing roadway to be used as a corridor by fringe-toed lizards as well as other species.

In addition to the infrastructure-related measures, this Conservation Area requires more general development measures as defined below. A Conservation to Development ratio of 9:1 shall be maintained within the portion of the following sections (portions within the Conservation Area): the north half of Section 24, T3S R4E north half of Section 19, T3S R5E; within the portion of the south half of the northwest quarter of Section 20, T3S R5E; and within a portion of the northwest quarter of Section 29, T3S R5E, to maintain the functionality of the fluvial and aeolian sand transport systems. If it appears that the ratio may not be maintained, the appropriate Local Permittee(s) will meet with the Wildlife Agencies and identify additional means that will be implemented to achieve these goals and objectives, including an accelerated acquisition program and/or Development standards to maintain fluvial sand transport. The requirements for Development in floodplains also help ensure that sand transport capacity is maintained. A Conservation to Development ratio of 9:1 shall be maintained within the south half of the south half of Section 28, T3S R5E to maintain the functionality of the aeolian sand transport system and the Biological Corridor. If it appears that the ratio may not be maintained, the appropriate Local Permittee(s) will meet with the Wildlife Agencies and identify additional means that will be implemented to achieve these goals and objectives, including an accelerated acquisition program and/or Development standards to maintain aeolian sand transport capacity and Development standards to restrict fencing that would impede wildlife movement.

Edom Hill Conservation Area
Of the 120 acres of CVAG modeled fringe-toed lizard habitat (Other Conserved Habitat) occurring in this Conservation Area, approximately 114 acres (95 percent) would remain conserved after Plan implementation (existing conservation lands plus lands that would be conserved by the Plan). Of the 62 acres of currently unconserved CVAG modeled fringe-toed lizard habitat in the Conservation Area, the Plan would protect 56 acres (90 percent). The proposed permit and Plan would authorize the loss of 5 acres of CVAG modeled fringe-toed lizard habitat in the Conservation Area.

Thousand Palms Conservation Area
Of the 3,965 acres of CVAG modeled fringe-toed lizard habitat (3,962 acres of Core Habitat and 3 acres of Other Conserved Habitat) occurring in this Conservation Area, approximately 3,872 acres (over 97 percent) would remain conserved after Plan implementation (existing conservation lands plus lands that would be conserved by the Plan). Of the 928 acres of currently unconserved CVAG modeled fringe-toed lizard habitat in the Conservation Area, the Plan would protect 835 acres (approximately 90 percent). The proposed permit and Plan would authorize the loss of 93 acres of CVAG modeled fringe-toed lizard habitat in the Conservation Area.

Development in this Conservation Area poses some special challenges, and specific Required Measures have been developed to address these issues. Special Site Planning Standards apply in those portions of Sections 7 and 8, T4S R6E, located in the Conservation Area and with a Rural Residential general plan land use designation as of June 2004. It is estimated that the implementation of the standards would conserve over 80 percent of the vacant parcels as of June 2004. To implement these standards the Board of Supervisors must approve an overlay zone. The standards are described below

Site Planning Standard 1: Development on the property shall not impede water-borne sand transport across the parcel in its natural direction of flow. A drainage plan for the site shall be required and demonstrate that natural flows onto the parcel shall be conveyed offsite in the natural pre-disturbance direction of flow. Water-borne sediments shall not be artificially retained onsite.

Site Planning Standard 2: Development shall be limited to 50 percent of the parcel for parcels smaller than 4 acres in size. Development shall be limited to 2 acres on parcels 4 acres or larger in size. The portion of each parcel that is not developed shall be permanently conserved as natural open space through conveyance of fee title or conservation easement, or through deed restriction prior to issuance of any grading permit. The owner will be compensated by CVCC for the market value of the portion of the parcel required to be conserved. The portion of the site to be conserved shall be determined consistent with attainment of Site Planning Standard 1 and the maximization of aeolian sand transport relative to adjacent parcels to the extent Feasible. This portion of the property shall not be fenced.

Site Planning Standard 3: Onsite driveways shall be at grade, without gutters, curbs, berms, or other elevated areas that may impede or divert the passage of water-borne or wind-borne sand.

CVCC shall continue the acquisition of vacant parcels in those portions of Sections 7 and 8, T4S R6E, located in the Conservation Area at market value from willing sellers as a high priority so long as vacant parcels remain. CVCC shall maintain $500,000 available at all times for acquisitions in Sections 7 and 8 until all vacant land has been acquired or developed consistent with the Conservation Objectives and Required Measures.

CVCC and the County shall develop and implement a land exchange program within Sections 7 and 8, T4S R6E, which will maximize attainment of the Conservation Objectives by encouraging Development to occur in the least sensitive portions of the sections or outside the Conservation Area. CVCC and the County shall consult with the Wildlife Agencies and ISAs to determine the least sensitive portions of the area and the highest priority parcels for Conservation. As appropriate, the land exchange program will include incentives to encourage landowners to exchange parcels with high priority for Conservation for parcels in the least sensitive portions of the sections or outside the Conservation Area.

A Conservation to Development ratio of 9:1 shall be maintained within Section 21, T4S R6E, south of Ramon Road to maintain the functionality of the fluvial and aeolian sand transport systems. If it appears that the ratio may not be maintained, the appropriate Local Permittee(s)

will meet with the Wildlife Agencies and identify additional means that will be implemented to achieve these objectives, including an accelerated acquisition program and/or Development standards to maintain fluvial and aeolian sand transport. The requirements for Development in floodplains also help ensure that sand transport capacity is maintained.

East Indio Hills Conservation Area
Of the 824 acres of CVAG modeled fringe-toed lizard habitat (Other Conserved Habitat) occurring in this Conservation Area, approximately 754 acres (approximately 91 percent) would remain conserved after Plan implementation (existing conservation lands plus lands that would be conserved by the Plan). Of the 701 acres of currently unconserved CVAG modeled fringe-toed lizard habitat in the Conservation Area, the Plan states that is would protect 631 acres (90 percent). Certain lands under the jurisdiction of the City of Indio (parcels north of the Coachella Canal in Sections 2 and 11, T5S R7E) have been given special consideration in this Conservation Area, and their Conservation Objectives are subject to revision without amendment if the lands identified in Required Measure #1 cannot be conserved. Approximately 100 acres are anticipated to be affected. Therefore, per the flexibility provided by Required Measure #1, the total conservation in this Conservation Area actually may be 654 acres (79 percent). Of the currently unconserved lands within the Conservation Area, the total conserved as a result of the Plan actually may be 531 acres (about 76 percent), as per Required Measure #1. The proposed permit and Plan would authorize the loss of approximately 70 acres, or potentially up to 170 acres, of CVAG modeled fringe-toed lizard habitat in the Conservation Area.

Santa Rosa and San Jacinto Mountains Conservation Area
Of the 122 acres of CVAG modeled fringe-toed lizard habitat (Other Conserved Habitat) occurring in this Conservation Area, approximately 112 acres (approximately 82 percent) would remain conserved after Plan implementation (existing conservation lands plus lands that would be conserved by the Plan). Of the 100 acres of currently unconserved CVAG modeled fringe-toed lizard habitat in the Conservation Area, the Plan would protect 90 acres (90 percent). The proposed permit and Plan would authorize the loss of 10 acres of CVAG modeled fringe-toed lizard habitat in the Conservation Area.

<u>Avoidance, Minimization, and Mitigation Measures (Section 4.4)</u>
The following two proposed Measures of the CVMSHCP would likely affect fringe-toed lizards; per the proposed Plan, they would not apply to single-family homes and any non-commercial accessory uses and structures, including but not limited to second units on an existing legal lot. These proposed Measures would be implemented in addition to Conservation Area specific measures described in the Conservation Area subsections in Section 4.3 of the Plan:

Fluvial Sand Transport.
Activities, including O&M of facilities and construction of permitted new projects, in fluvial sand transport areas in the Cabazon, Stubbe and Cottonwood Canyons, Snow Creek/Windy Point, Whitewater Canyon, Whitewater Floodplain, Upper Mission Creek/Big Morongo Canyon, Mission Creek/Morongo Wash, Willow Hole, Long Canyon, Edom Hill, Thousand Palms, West Deception Canyon, and Indio Hills/Joshua Tree National Park Linkage Conservation Areas will be conducted in a manner to maintain the fluvial sand transport capacity of the system.

Mesquite Hummocks and Mesquite Bosque Natural Communities.
This measure does not apply to single-family residences and any non-commercial accessory uses and structures including but not limited to second units on an existing legal lot, or to O&M of Covered Activities. Construction activities in the Cabazon, Willow Hole, Thousand Palms, Indio Hills Palms, East Indio Hills, Dos Palmas, Coachella Valley Stormwater Channel and Delta, and Santa Rosa and San Jacinto Mountains Conservation Areas will avoid mesquite hummocks and mesquite bosque to the maximum extent Feasible.

Without Permit Terms and Conditions: It is expected that all Covered Activities in Conservation Areas (including any ministerial or vested projects, if they would receive Section 10 permit coverage under the proposed Plan), outside of single-family homes and any non-commercial accessory uses and structures (and O&M of Covered Activities for the second Measure), would be subject to these Measures.

Note that the required maintenance of the fluvial sand transport capacity does not directly transfer to other ecological processes, such as aeolian sand transport capacity. As such, the fluvial sand transport measure above would not protect against proposed Covered Activities potentially adversely affecting aeolian erosion of sources sands, aeolian transport of sands across transitional areas (some of which may be fringe-toed lizard habitat), or the aeolian deposition of sands within blowsand habitat. Within the Cabazon Conservation Area, the potential protection of fluvial processes that would be provided by the Plan relies on local General Plans that are likely to change over the term of the proposed Permit; as such, this potential protection is uncertain in the long-term.

It is expected that maintenance of fluvial sand transport capacity is equivalent in meaning to no net loss of this capacity (as noted in the assumptions above). As such, fluvial transport and deposition of sediments in areas that are important to fringe-toed lizard modeled habitat in Conservation Areas (and Section 6, T4S R5E), are expected to be protected from adverse changes that could otherwise result from proposed Covered Activities.

With Permit Terms and Conditions: A Permit Term and Condition has been incorporated into the Permit to clarify the meaning of "maximum extent Feasible." The Permit Term and Condition will minimize the ambiguity as to the level at which Permittees will perform obligations noted within the Plan, as compared to the discretion otherwise provided within the Plan by the phrase "maximum extent Feasible." If a Permittee determines that performing an obligation related to fringe-toed lizard that the Plan otherwise denotes would be performed to the maximum extent Feasible is not, in fact, Feasible, that Permittee shall meet with the Service to determine what substitute measures the Permittee will provide or perform to achieve ecologically equivalent conservation through the meet-and-confer process identified in the Implementing Agreement.

<u>Land Use Adjacency Guidelines (Section 4.5)</u>
The stated purpose of Land Use Adjacency Guidelines in the proposed Plan is to avoid or minimize indirect effects from development adjacent to or within the proposed Conservation

Areas. "Adjacent" within the proposed Plan means sharing a common boundary with any parcel in a Conservation Area. The potential indirect effects into natural areas associated with adjacent development include noise, nighttime lighting, runoff and drainage (surface water and contaminants), irrigation/fertilizer/pesticide overspray, intrusion of people into natural areas, dumping (trash and yard waste), the introduction/propagation/enhancement of non-native plants and non-native animals (such as dogs, cats, mice, rats), and the modification of natural predator-prey ratios. Some of these types of edge effects would also be partially addressed through proposed reserve management activities such as fencing, wherever it would occur. The proposed Land Use Adjacency Guidelines in the Plan would be considered by the Permittees in their review of individual public and private Development projects adjacent to or within the Conservation Areas, with the goal of minimizing edge effects, and would be "implemented where applicable."

Without Permit Terms and Conditions: Coachella Valley fringe-toed lizards have been, and would be in the future, subject to substantial direct losses of habitat, as well as significant indirect effects from adjacent land uses. Adjacent land uses often redirect and/or concentrate fluvial erosion/transport/deposition of sediments and/or block/impede aeolian sand erosion and transport by capping erodible sediments with structures that also can block movement to depositional areas downwind.

Adjacent land uses, from proposed Covered Activities, typically would provide artificial perches (such as street lights, power-lines, fences, landscaping trees, etc.) for normal bird predators of fringe-toed lizards, such as loggerhead shrikes, common ravens, and American kestrels. These features substantially (artificially) increase the number and height of naturally available predator perches suitable for detecting prey near a particular site (Kay *et al.* 1994, Reinert 1984, Askham 1990); most of the effects of these artificial perches would likely be within 100 meters of each perch. Enhanced perches are expected to result in increased bird predation pressures on fringe-toed lizards directly and on the ecosystem they depend upon.

Artificial lighting, particularly in combination with the provision of additional perches, may subject fringe-toed lizards or the other species of its ecosystem with increased predation by crepuscular and/or night-foraging avian species.

Adjacent land uses involving irrigation are expected to potentially enhance non-native ant populations within blowsand ecosystems, with likely negative ecological effects for fringe-toed lizards.

Stormwater and urban runoff systems associated with future-constructed roads and urban/commercial development would typically be expected to convey stormwater and landscaping/urban runoff water, contaminants (toxins, fertilizers, pesticides, animal and yard waste, vehicle fluids, etc.), invasive plant propagules, fine sediments, and other constituents into Conservation Areas; this runoff would likely degrade or harm biological resources or ecosystem processes, including those dependent upon by fringe-toed lizards, within adjacent Conservation Area lands.

Adjacent land uses involving proposed Covered Activities would include residential, infrastructure, and commercial-related activities. Some of these activities would generate significant noise into adjacent natural areas; typically impacts to sensitive animals would be expected to occur at noise levels at and above thresholds between 60 to 90 dBA (decibels, "A" scale or weighted) L_{eq} hourly, for many vertebrate species subject to continuous noise sources, and at higher noise energy levels for impulse noises. Many diurnal species and carnivores use sound in advertising displays and dominance interactions; many nocturnal species use sound in detecting prey, predators, or conspecifics (e.g. see Strasser and Dixon 1986); and many anurans and nocturnal animals use sound in communication (Larkin *et al.* 1996). Typical noise generators include operation of roadways and the utilization of machinery and heavy equipment (see, for example, Larkin *et al.* 1996). Some blasting would possibly occur as proposed Covered Activities, but no blasting would likely occur within a mile of any occupied fringe-toed lizard habitat (as blasting would likely occur in the mountains and canyons, rather than the Valley-floor); as such, any noise-related impacts from blasting on fringe-toed lizards would be expected to be minor and infrequent. Although many songbirds (Dooling 1982) and terrestrial mammals (Fay 1988) have audiograms similar to those of humans, many other species of animals do not. It is undetermined what sensitivities Coachella Valley fringe-toed lizards have to noise. For instance, disturbances (such as noise) often cause increases in respiration rate in lizards, which appears to be a benign effect (Larkin *et al.* 1996). But lizards that breathe rapidly do not eat (Avery 1993). Brattstrom and Bondello (1983) reported "temporary threshold shifts" in hearing of Mojave fringe-toed lizards and kangaroo rats after 500-second exposures to ORV (dune buggy) sounds at 95 dBA. An indirect physiological measure of hearing suggested to the authors that "dune buggy sounds are inherently damaging to the hearing sensitivity of Mojave fringe-toed lizards." Additionally, the lizards appeared to be vulnerable to noise-induced temporary threshold shift even when buried beneath shallow layers of sand (Brattstrom and Bondello 1983).

The Plan proposes to implement the Land Use Adjacency Guidelines (Section 4.5.4.) as follows: "Proposed Development adjacent to or within a Conservation Area that generates noise in excess of 75 dBA Leq hourly shall incorporate setbacks, berms, or walls, as appropriate, to minimize the effects of noise on the adjacent Conservation Area in accordance with the guidelines to be included in the Implementation Manual.." Based on the information in the Plan, it is unknown where noise levels per this standard would be measured from (e.g., at edge of Conservation Area, 2 feet from noise sources, etc.). Unless this standard would be measured very close to the noise generator, this proposed threshold of 75 dBA hourly is well above the level expected to be protective of the ecosystems upon which the fringe-toed lizard depends. As such, this high threshold noise, at which point minimization measures would begin to be initiated, would provide little protection or conservation for the fringe-toed lizard or the ecosystem it depends upon.

With Permit Terms and Conditions: A Permit Term and Condition has been included in the Permit that ensures compliance with the Land Use Agency Guidelines through the CVCC's Land Manager. This Permit Term and Condition is necessary to minimize the potential for adverse impacts to essential ecosystem processes that likely would otherwise occur from indirect effects of development-related activities on parcels within or adjacent to Conservation Areas. An additional Permit Term and Condition is included to provide Service review of and concurrence

on the Implementation Manual so that concerns are addressed such that the Plan minimizes the effects of adjacent land uses to the maximum extent practicable.

Other Mitigation and Minimization Measures
The stated Conservation Objectives of the Plan (Table 4-116) for the fringe-toed lizard are:

Ensure conservation of Core Habitat within four Conservation Areas.

Protect Other Conserved Habitat in three Conservation Areas from a range of environmental conditions within which this species occurs, to provide for population fluctuation and genetic diversity.

Ensure conservation of Essential Ecological Processes including sand source/transport systems, necessary to maintain Core Habitat for this lizard.

Maintain Biological Corridors and Linkages to ensure connectivity for fringe-toed lizard to move between Conservation Areas.

Implement biological monitoring and Adaptive Management to ensure Conservation of this species.

The Plan summarizes the avoidance, minimization and mitigation measures that would be provided for the fringe-toed lizard (Table 4-116) as follows:

Permittees will protect and manage 6,999 acres of modeled habitat together with Existing Conservation Land for a total of 12,998 acres conserved, including 11,245 acres of Core Habitat.

The Conservation Areas would protect the Core Habitat areas from Snow Creek to the Thousand Palms Reserve. Other Conserved Habitat from a range of environmental conditions within which this lizard is known to occur will be protected in from Willow Hole to the East Indio Hills.

The Reserve System will incorporate and protect additional sand source /sand transport areas for Snow Creek/Windy Point, Willow Hole, the White-water Floodplain, Edom Hill, and the Thousand Palms Conservation Areas.

Management and Monitoring activities to ensure Conservation of this species, including control of activities that degrade its habitat and data to describe distribution, abundance, and habitat of this species.

The measures proposed in the CVMSHCP are intended to protect substantial blocks of existing suitable or potential habitat within identified Conservation Areas that support the Coachella Valley fringe-toed lizard. A total of 6,999 acres of CVAG-modeled fringe-toed lizard habitat are proposed to be conserved throughout the Conservation Areas as a result of the Plan. Specifically, the proposed CVMSHCP would protect four areas of Core Habitat (as modeled) within Snow Creek/Windy Point (1,174 acres), Whitewater Floodplain (2,777 acres), Willow

Hole (666 acres), and Thousand Palms (834 acres) Conservation Areas. Additionally, the CVMSHCP proposes to protect Other Conserved Habitat in Willow Hole (771 acres), Edom Hill (56 acres), Thousand Palms (1 acre), East Indio Hills (631 acres), and Santa Rosa and San Jacinto (90 acres) Conservation Areas. Protection of the sand source/transport systems for specific blowsand ecosystems is also intended to be achieved as part of Plan, so as to maintain modeled habitat within the Snow Creek/Windy Point, Willow Hole, the Whitewater Floodplain, and the Thousand Palms Conservation Areas. Biological corridors and linkages associated with Conservation Areas that include this species would be maintained, as described in Section 4.0 of the CVMSHCP. These corridors and linkages would not provide for appreciable movement of fringe-toed lizards between the Core populations slated to be conserved by the Plan, as these corridors and linkages encompass substantial stretches that do not meet the specific habitat requirements of the fringe-toed lizard (although other Covered Species may be addressed adequately); the exception to this may be the Snow Creek/Windy Point and Whitewater Floodplain Conservation Areas, where some movement of fringe-toed lizards between Conservation Areas may occur across more than 3 miles of what is currently mostly non-habitat when small portions episodically become suitable following fluvial deposition events in the San Gorgonio and Whitewater River floodplains.

It is anticipated that approximately 90 percent of private land that has been modeled as lizard habitat within the Conservation Areas would be conserved per the Plan. Conversely, approximately 10 percent of modeled lizard habitat on private lands within each Conservation Area would be subject to losses under the Plan and Permit. The ultimate configuration of the Reserve System is unknown at this time, as the configuration is mostly subject to development approvals of the various local Permittees (consistent with the Plan). Reserve System configuration would be subject to the Conservation Objectives and Required Measures established in Section 4.0 of the CVMSHCP for each Conservation Area.

Without Permit Terms and Conditions
The Monitoring and Adaptive Management Program proposes to evaluate the importance of human-caused and natural factors that affect population fluctuations. The Plan notes that understanding how certain environmental stressors influence populations will assist the Land Managers in making informed decisions. The CVMSHCP proposes landscape-level and habitat-level monitoring to determine factors for substrate stabilization and sand depletion in Coachella Valley fringe-toed lizard habitat.

Pursuant to adaptive management for the lizard, the Plan states (Section 8.4.1.2):
In a fragmented landscape such as the Coachella Valley, local extirpations can increase the risk of overall extinction by reducing the number of protected populations. The evolutionary forces at work during a natural population decline are processes that are desirable to maintain. These benefits may be lost either if managers react too quickly and natural selection has not had an opportunity to operate, or if they react too late and the species becomes extirpated. Determining the time to act will be a challenge. Atkinson *et al.* (2004) address the challenges of determining the thresholds for management action (See page 38-39) but emphasize the opportunity to take advantage of extreme circumstances (e.g., extreme drought, 500-year flood events) to learn more about system function.

The above proposed strategy in the CVMSHCP does not assure that the fringe-toed lizard would be managed to maintain minimum viable populations in any of the Conservation Areas. The CVMSHCP management strategy does not include determining minimum viable populations sizes, nor does it contemplate specific management intervention if populations of the lizard drop below those determined thresholds, regardless of the cause.

With Permit Terms and Conditions
We anticipate that the approach outline in the proposed Permit Term and Condition below will ensure management of this species for long-term viability (i.e., sustainability), and thus will ensure viable populations are maintained in Core Habitats over the term of the Permit. The Permit Term and Condition requires a comprehensive management strategy for this species to be developed that assesses population status in Core Habitat areas to determine the nature and scale of management actions that will be required to ensure long-term viability of the population in the Plan Area.

Sand fencing to reduce the rate of sand loss on the downwind side of the reserves is suggested as an effective method to reduce sand depletion in the Plan, but it also is not assured under the Plan. While sand fencing likely is effective, it also is likely to require significant maintenance and/or frequent replacement and should not take the place of the natural sand stabilizers such as mesquite hummocks, where appropriate.

In the spring of 2005, the seasonal rains caused the Saharan mustard to expand considerably in the Thousand Palms Conservation Area, resulting in thick vegetation cover over much of the lizard habitat. The CVMSHCP proposes to Adaptively Manage invasive vegetation by researching cause and effect dynamics, duration of effects, and control methodologies prior to taking management actions. A focused research effort is proposed to address invasive vegetation when it is identified as a possible stressor to Covered Species. Although the CVMSHCP states that seed production of the invasives may actually enhance harvester ant populations that provide food for the fringe-toed lizards (C. Barrows, pers. comm. 2006), it seems that proliferation of the invasive species, by stabilizing sand substrates, may have profound effects on the lizard by limiting or precluding the ability to move within the sands upon which it depends for its survival. While researching the existing invasive plant problems is likely warranted, invasive plants are likely a problem for fringe-toed lizards in the proposed Conservation Areas and control of invasives in the short-term would be appropriate in an adaptive management approach.

To address the lack of stated commitment to specific management actions relative to these issues, we have incorporated Permit Terms and Conditions to ensure that appropriate management actions are taken in a timely fashion.

Direct and Indirect Effects
Because of the interrelationship between the processes that create/support habitat and the habitat itself (i.e., some areas shift between being process-only areas to being both process and habitat areas), we have not separated direct and indirect effects into separate analyses.

The entire Plan Area includes approximately 27,070 acres of modeled habitat (Service files, as modeled by CVAG) for the Coachella Valley fringe-toed lizard. As noted above, we consider this acreage an over-estimate of available suitable habitat. Of this acreage of modeled habitat, approximately 22,500 acres would be subject to our proposed Section 10 permit (in other words, are non-Federal lands) (Table 4-114 of the CVMSHCP). Approximately 12,903 acres of the modeled habitat (57 percent of the lands that would be subject to our Permit) in the Plan Area are outside the proposed Conservation Areas; it is anticipated that most of these lands would be lost, predominately due to CVMSHCP Covered Activities (with the remainder to be lost or conserved through other planning and approval processes).

An additional 778-878 acres of this species' modeled habitat would be subject to direct loss inside of the proposed Conservation Areas as summarized above (see also Table 9-16 and Section 4.3.15 of the CVMSHCP). The location or configuration of where these losses would occur is not known. However, the Covered Activities that would cause these losses within Conservation Areas would be subject to the Conservation Objectives and Required Measures for each Conservation Area, as described in Section 4.3 of the CVMSHCP.

The direct effects of the proposed action would result from implementation of the proposed Covered Activities (please see Description of the Proposed Action/Covered Activities Section of the Biological Opinion). Many of the proposed Covered Activities, such as grading and construction activities, would directly injure or kill Coachella Valley fringe-toed lizards. Many of the proposed covered activities would destroy or directly alter the species habitat, making it unsuitable for the species.

The most important indirect effects to the fringe-toed lizard that would result from the proposed MSHCP would primarily stem from Covered Activities that would impede fluvial erosion/transport/deposition or aeolian erosion/transport/deposition of sand in areas that are upwind of suitable habitat for the fringe-toed lizard. As noted above, almost all (if not all) remaining fringe-toed lizard habitat relies on periodic inputs of blowsand. Covered Activities that would disrupt these fluvial or aeolian processes would concomitantly disrupt the periodic supply of blowsand to remaining fringe-toed lizard habitat. While some limited Covered Activities may increase the supply of appropriate blowsand to downwind ecosystems (such as certain types of disturbance to surface soils and vegetation), proposed Covered Activities occurring in important sand source/transport zones could cause a net reduction in sand supply to remaining habitat and these activities would reduce the input of sand that sustains dune habitat necessary for fringe-toed lizard habitat.

Outside of the Conservation Areas

The proposed loss of up to 12,903 acres of CVAG modeled Coachella Valley fringe-toed lizard habitat outside of the Conservation Areas and within the Plan Area would result from proposed Covered Activities, particularly development and associated infrastructure, construction of roads, etc. It is not expected that all 12,903 acres would be lost to proposed Covered Activities: some of this habitat would be lost to activities that are not covered (see Cumulative Effects below), and an undetermined portion of these areas are expected to be protected through mitigation for non-Plan-related activities in the Plan Area and through mitigation for activities outside the Plan

Area. The Plan would not cause the protection of any lands outside of the proposed Conservation Areas

Most of the fringe-toed lizard modeled habitat outside of the Conservation Areas consists of relatively disjunct, small patches of suitable or potential habitat where the sand source/transport system has been compromised. Most of this land is fragmented and has a limited or no ability to provide for long-term conservation of the lizard. The fragmented blocks of habitat are more susceptible to edge effects, including mortality on roads, predation by feral animals, and natural predators attracted to urban features.

The largest habitat patches outside of the proposed Conservation Areas that are anticipated to be lost during Plan implementation include those remaining on The Big Dune. About 3,193 acres of modeled habitat on The Big Dune would be lost through the CVMSHCP Covered Activities. The Big Dune was determined to be highly fragmented by the CVMSHCP and subject to edge effects due to development and major roadways within the area. The CVMSHCP Planning Team determined that Essential Ecological Processes, predominantly sand transport, were no longer intact there, although some habitat (including occupied habitat) likely still exists there. The potential for occupancy by fringe-toed lizards of portions of The Big Dune is high, and salvage and translocation of these individuals is feasible. Therefore, as a Term and Condition of this Permit, the Permittees shall develop a translocation strategy for the species that includes consideration of salvage and translocation of individuals from development sites on lands outside the Conservation Areas with appropriate blowsand habitat for fringe-toed lizards.

Inside of the Conservation Areas

The Plan delineated Conservation Areas for the lizard based on Core Habitat was considered by the CVMSHCP authors as: 1) large enough to support a viable population of the species independent of other core habitat areas; 2) not fragmented by development, including roads; 3) containing only lightly traveled two-lane roads that have limited potential for expansion; 4) having intact Essential Ecological Processes, including sand source and sand delivery systems; and 5) providing suitable areas to act as refugia in the event of large-scale flood events or other extreme conditions (climate change, extended drought) (CVAG 2007).

Turner *et al.* (1984) provides empirical evidence (see Threats above) that sand barriers negatively affect the lizard populations in otherwise unaltered habitat because such obstructions prevent or greatly reduce the movement of blowsand, a vital component of lizard habitat. As a result, Turner *et al.* (1984) concluded that the blowsand ecological process was indispensable to lizard survival. Thus, additional development within sand source/transport areas in the designated Existing Uses and development within the 9:1 Conservation to Development Ratio Areas need to be designed/configured to ensure that the fluvial and aeolian sand transport systems are maintained in addition to the absolute limits on development. As terms and conditions of the permit, additional development in the Existing Use areas and development in the 9:1 areas shall require an analysis of conservation potential for these parcels, configuration relative to fluvial and aeolian sand transport processes and application of all appropriate site planning standards to ensure these processes are maintained.

An accounting of baseline lands that have been altered or lost since the establishment of the baseline in 1996 will be deducted from the anticipated 10 percent loss allowed within the Conservation Areas as part of the initial reporting effort under the Plan. To ensure that the actual land disturbance will fall within the amount that has been authorized, CVCC will be required to calculate the acreage of any parcel as disturbance at the time of the development approval for the parcel through the Joint Project Review. Undeveloped portions of parcels in Conservation Areas on which development is approved shall only count towards meeting the Conservation Objectives if the undeveloped portion of the parcel is permanently protected through an appropriate Legal Instrument that allows monitoring and management. Regular calculations of the "rough step" status will ensure that the conservation requirements and disturbance limits are being adhered to through the Joint Project Review.

Snow Creek/Windy Point Conservation Area
Under the Plan, approximately 1,174 acres of modeled fringe-toed lizard habitat is proposed to be conserved and 130 acres is anticipated to be lost to development within the Snow Creek/Windy Point Conservation Area. An additional 70 acres of modeled fringe-toed lizard habitat controlled by BLM land is mapped as Existing Conservation Lands.

The main ongoing adverse effects to the lizard within the Snow Creek/Windy Point Conservation Area are from invasive plants and OHV activity, as little development has occurred within habitat areas or sand transport zones. The CVMSHCP states that actions to control and manage impacts that degrade fringe-toed lizard habitat resulting from OHV use and other human disturbance may be needed to ensure persistence of species in the Plan Area. OHV activity is an ongoing problem that continues to degrade much of the habitat within this Conservation Area and likely results in direct mortality to the lizards, and controlling OHV activities is likely an essential management action that needs to be ensured. The Plan has identified this as an ongoing management concern that will be addressed by the CVCC and the Reserve Management Committees. Also, CVCC is actively pursuing a Memorandum of Understanding (MOU) with BLM to ensure cooperative management and enforcement relative to this issue.

Invasive plants have stabilized the soils in many areas and reduced aeolian sand transport to habitat areas within the Snow Creek/Windy Point Conservation Area. The CVMSHCP currently anticipates that a weeding program would only be initiated on Existing Conserved lands once it is determined likely to be a stressor to a Covered Species (other than the invasives identified for ongoing management in Section 8.2.4.1). The invasive plant problem appears to be persisting within this Conservation Area. A Permit Term and Condition is included to require prompt action by the Permittees to address this ongoing problem.

Whitewater Floodplain Conservation Area
Within the Whitewater Floodplain Conservation Area, 2,777 acres of modeled fringe-toed lizard habitat is proposed to be conserved and 309 acres is anticipated to be lost to development. About 2,532 acres of modeled fringe-toed lizard habitat are classified as Existing Conservation Lands in the Whitewater Floodplain Conservation Area. The Existing Conservation Lands are controlled or owned by BLM and CVWD and would be included in the CVMSHCP Reserve System.

Two main roads, Indian Avenue and Gene Autry Trail, bisect the fringe-toed modeled habitat within the Whitewater Floodplain Conservation Area. These roads run north-south, perpendicular to Interstate 10. While fringe-toed lizards may be able to cross these roads as they currently exist, lizards near these roads are likely subject to some mortality and increased edge effects. Widening these roads is planned and would likely increase roadkill mortality and edge effects. Currently, the roads are limited to two lanes, but are contemplated to be expanded to six lanes at some point in the future. The CVMSHCP provides that when these roads are expanded to six lanes, or by year 2038 (whichever comes first), underpasses for wildlife crossing and fluvial and aeolian sand transport would be incorporated such that the total sand transport capacity would be maintained. A provision of wildlife corridors when these roads undergo any widening (to three to five lanes) may be essential for the fringe-toed lizard before 2038 and should be considered as part of the adaptive management for this Conservation Area.

As stated in Section 4.3.6 of the Plan, "The groundwater recharge ponds west of Indian Avenue are in the path of the fluvial flows of the Whitewater River, and their presence has restricted flows to a narrower deposition area, which has affected the extent of suitable habitat" within the Whitewater Floodplain Conservation Area. The recharge ponds (percolation ponds) trap sediment when water from the Colorado River Aqueduct is released into the Whitewater River approximately one mile north of Interstate 10 and flows down the river channel to the percolation ponds. Most of the modeled habitat south and east of the percolation ponds has become armored and is expected to remain that way under current floodplain conditions, even following mid-sized flood events). This necessitates Permit Terms and Conditions to prioritize use of the Management Contingency Fund to address this issue and to identify specific management actions that will enhance habitat in the Core Habitat areas.

In the Whitewater River floodplain it is imperative to maintain the sand transport necessary to support lizard's habitat requirements within the Conservation Area if it is to be considered a core population. Thus, to ensure the long-term survival of the lizard, specific actions will be needed over time within the Whitewater River floodplain. The management actions should include: (1) enhancing/restoring more natural patterns of fluvial sediment deposition to provide a longer-term and more broadly distributed sediment source for aeolian sand transport and (2) enhancing aeolian deposition to improve habitat function in the downwind portions of the Conservation Area. Aeolian deposition also shall be enhanced/restored through removal of all mining/dumping-related piles/levees/pits on CVWD and/or Reserve System lands within T3S, R4E, Section 26, with restoration to original (historic) ground surface elevations. Any necessary features or structures (such as a levee for flood damage reduction) associated with the pits, facilities, and/or activities of the Granite mine within adjacent Section 23 shall be off of CVWD and/or Reserve lands.

Barriers to sand movement within sand transport corridors negatively affect Coachella Valley fringe-toed lizard populations in otherwise suitable habitat because such obstructions greatly reduce the movement of blowsand, a vital component of lizard habitat. The Required Measures within the Whitewater Floodplain Conservation Area do not eliminate this threat. Thus, any future development in the Whitewater Floodplain Conservation Area near Gene Autry Trail should be configured to avoid or minimize downwind/stream effects to the fluvial and aeolian

processes. Under a Permit Term and Condition that provides for Service review of and concurrence with the Implementation Manual, the Service will work with the Permittees to develop guidance that will minimize degradation of aeolian sand deposition patterns and wildlife movement in this area by: a) designing/requiring all future structures to maximize sand passage and minimize downwind/stream adverse effects; b) clustering any new development along Gene Autry Trail to the northern edge of the conservation area along the railroad tracks, or in the downwind sand shadow of any upwind development such that no areas to be conserved under this Plan/permit or others are subject to reduced Aeolian sand transport and/or deposition ; and c) requiring coordination with the Agua Caliente Tribe to complementarily achieve wildlife movement across MSHCP and Tribal Reserve lands within their respective Plan Areas in Section 6 (Tribal: T4S R5E) and Sections 31 (MSHCP: T3S R5E) and 36 (MSHCP: T3S R4E) east of Gene Autry Trail.

Willow Hole Conservation Area

The Willow Hole Conservation Area includes approximately 1,754 acres of modeled habitat for the fringe-toed lizard. Of this total, about 1,437 acres of both Core and Other Conserved Habitat are proposed to be conserved through the implementation of the CVMSHCP. There are 157 acres classified as Existing Conservation Lands in the Willow Hole Conservation Area (for total conservation of 1,594 acres here), and 160 acres are anticipated to be lost.

The Morongo Wash supplies sand from the west, and the Willow Hole and Long Canyon watersheds drain through the area from north to south. Morongo Creek carries sediment originating in the Little San Bernardino Mountains in Morongo Canyon. Long Canyon also originates in the Little San Bernardino Mountains. The Willow Hole watershed originates in the western Indio Hills and acts to redeposit sand into the Willow Hole area after being carried out by prevailing winds. Additionally, aerial photographs reveal that the Morongo Wash source is augmented by sediment from Mission Creek, which has the San Bernardino Mountains as its source.

The CVMSHCP Planning Team considered Willow Hole as Core Habitat because its sand source is discrete from other sources, and Willow Hole's geographic location in the Coachella Valley makes it intermediate climatically to the Whitewater Floodplain Conservation Area and the Thousand Palms Conservation Area. The availability of multiple habitat patches within the Willow Hole Conservation Area could be beneficial in the event of a population crash from stochastic or climatic events.

Within the Willow Hole Conservation Area there are 125 acres of mesquite hummocks. Without the support of the mesquite hummocks to sustain the dune system within this Conservation Area, the long-term viability of Willow Hole for the Coachella Valley fringe-toed lizard is not foreseeable. Thus, the Plan needs to provide adequate conservation of mesquite hummocks. The anticipated conservation of 98 acres is imperative. The proposed loss of 11 acres of mesquite hummocks in the Conservation Area is to be avoided to the maximum extent feasible (Plan Section 4.4).

Thousand Palms Conservation Area

Within the Thousand Palms Conservation Area, 835 acres of modeled fringe-toed lizard habitat is proposed to be conserved and 93 acres is anticipated to be lost. About 3,037 acres of modeled Coachella Valley fringe-toed lizard habitat are classified as Existing Conservation Lands in the Thousand Palms Conservation Area. The Existing Conservation Lands are controlled or owned by BLM, State Parks, TNC, CDFG, and the Service and are anticipated to be included in the CVMSHCP Reserve System.

The Site Planning Standards in T4S, R6E, Sections 7 and 8, located in the Thousand Palms Conservation Area alone do not provide adequate direction to address the needs of the lizard within this conservation area and to provide adequate coverage. Maintaining what remains of the sand transport corridor is essential for Thousand Palms ability to support the largest population of the lizard throughout the species range, so the measures must address sand transport specifically enough that land owners can understand and follow these constraints. Aeolian sand transport relative to adjacent parcels must be maximized to achieve lizard conservation by configuring the development and open space on each parcel in the context of the open space on neighboring parcels to maximize aeolian sand transport across sections 7 and 8. These requirements need to apply to all development in sections 7 and 8, regardless of the zoning. A Permit Term and Condition is included that requires site planning standards for industrial development.

The 9:1 Conservation:Development Ratio areas for the Thousand Palms Conservation Area are a key component to achieving habitat conservation in this Conservation Area. Local Permittees shall ensure that the 9:1 ratio is adhered to at the appropriate scale. Development standards established in the Implementation Manual shall be applied to all development in the Conservation Area that includes a conservation easement or other Legal Instrument so that through the combination of rough step requirements and site planning standards, the fluvial and aeolian sand transport are maintained.

Other Conserved Habitat

Within the Plan Area, the Other Conserved Habitat identified for the fringe-toed lizard totals 1,926 acres. Of this total 172 will be lost due to Plan Covered Activities, and 1,549 acres are proposed to be conserved within five conservation areas. Other Conserved Habitat within the Conservation Areas remaining to be conserved ranges from 1 to 771 acres. Although some of the Other Conserved Habitat within the Conservation Areas could support the lizard, little is known about the status of the species within these areas. Furthermore, the Conservation Areas such as East Indio Hills and the Santa Rosa and San Jacinto Mountains are disjunct from any Core Habitat areas.

Critical Habitat

As stated above, about 12,000 acres of critical habitat were designated in 1980. Sufficient data to propose critical habitat was noted as available for only a portion of the remaining blowsand ecosystem in the Coachella Valley within the rule designating critical habitat (45 *FR* 63812). Critical habitat for this species does not occur outside the Plan Area. Approximately 10,357 acres of fringe-toed lizard critical habitat occurs within the Thousand Palms Conservation Area (it does not occur within any other proposed Conservation Areas). Because limits specific to

critical habitat are not present in the proposed Plan, an undetermined amount of critical habitat would be conserved and managed within this Conservation Area under the Plan, although approximately 7,125 acres (59 percent of the total) are currently conserved (BLM, California Dept of Parks and Rec., CVWD, The Nature Conservancy, USFWS, and Wildlife Conservation Board).

Pursuant to a completed consultation with the ACOE on the Whitewater River/Thousand Palms Flood Control Project (see Environmental Baseline, *Fringe-toed Lizard-associated Consultations in the Action Area* above*),* approximately 904 acres of critical habitat would be directly lost or subject to substantially modified flood regimes (i.e., a substantially modified sand transport system). As such, this unbuilt, but approved project is responsible for approximately 904 acres of direct or indirect impacts to critical habitat (approximately 200 acres of which is already developed). Approximately 139 acres of the project's direct or indirect flood regime impacts would occur within the Thousand Palms Conservation Area.

Additionally, approximately 646 acres of critical habitat are already developed as of 2005, of which 227 acres are within the Thousand Palms Conservation Area and 419 acres are outside of any Conservation Areas (Service GIS analysis of 2005 aerial photos).

Approximately 4,445 acres (37 percent) of fringe-toed lizard critical habitat are on private lands; of this, approximately 3,058 acres occur within the Thousand Palms Conservation Area. About 870 acres are critical habitat, private, in a Conservation Area, and fringe-toed lizard modeled habitat; of this, theoretically, a maximum of 93 acres of fringe-toed lizard modeled habitat loss (proposed to be lost under the Plan within the whole Thousand Palms Conservation Area) could occur within these 870 acres. About 3,236 acres of critical habitat are private and not modeled habitat for fringe-lizard; of this, about 2,188 acres occur in a Conservation Area, and about 1,048 acres are not in a Conservation Area. However, we anticipate that at least 765 acres of this area outside the Conservation Area will be disturbed or isolated from sand transport processes (and approximately 200 acres is already developed) as a result of the above flood control project. Thus, on the order of 283 acres of critical habitat outside of the Conservation Area would be solely attributable to Covered Activities under the Plan.

As noted above, approximately 2,188 acres are critical habitat, private, in a Conservation Area, and not fringe-toed lizard modeled habitat. Analysis of the potential impacts and conservation of this critical habitat area (the portion that is not fringe-toed lizard modeled habitat) under the proposed Plan is complicated; because the Plan proposes no specific limits or requirements for critical habitat, potential losses from proposed Covered Activities on these critical habitat lands would be limited predominately by impact limits proposed by the Plan for Covered Species besides the fringe-toed lizard, as well as by limits proposed for Covered Natural Communities. For example, of the 2,188 acres that are critical habitat, private, in a Conservation Area, and not fringe-toed lizard modeled habitat, approximately 1,477 acres are modeled habitat for the Palm Springs pocket mouse; theoretically, a maximum of 556 acres of Palm Springs pocket mouse modeled habitat loss (proposed to be lost under the Plan within the whole Thousand Palms Conservation Area) could occur within this 1,477 acres. These 556 acres of loss is not likely to occur within critical habitat, even if it is theoretically possible. In another example, of the 2,188

acres that are critical habitat, private, in a Conservation Area, and not fringe-toed lizard modeled habitat, approximately 543 acres are modeled habitat for *Xylorhiza cognata* (Mecca aster); theoretically, a maximum of 297 acres of Mecca aster modeled habitat loss (proposed to be lost within the whole Thousand Palms Conservation Area) could occur within this 543 acres. Considering that several other Covered Species and Covered Natural Communities (desert dry wash woodland, Sonoran creosote bush scrub, Sonoran mixed woody & succulent scrub, etc.) overlap within this 2,188 acres, with similar limits on losses as above per the Plan (to about 10 percent of the private lands within each of these natural communities within the *whole* Conservation Area), we expect that a cumulative total of less than 25 percent (550 acres) of these critical habitat lands would be lost (including the approximately 416 acres mapped by CVAG as Existing Uses, Urban, or Quarry) under the proposed Plan.

In summary, we expect a theoretical maximum loss of 93 acres of the approximately 870 acres that are critical habitat, private, in a Conservation Area, and fringe-toed lizard modeled habitat. Also, we expect a maximum loss of 550 acres of the approximately 2,188 acres that are critical habitat, private, in a Conservation Area, and not fringe-toed lizard modeled habitat. Thus, considering the Plan would conserve the remainder (pursuant to the requirements for conservation for Covered Species and Natural Communities), we expect at theoretical minimum of 2,400 acres ([2,188-550] + [870-93] = 2,415 acres) of critical habitat to be newly conserved by the Plan.

About 1,431 acres of critical habitat are outside of any Conservation Area. Most of this area would likely be lost through the proposed Plan Covered Activities; the remainder would likely be subject to separate permitting/consultation processes (please see **Cumulative Effects** below) where some conservation may occur. Much of this portion of critical habitat (outside of any Conservation Area) has already been subject to the County's development approval process, has entitlements, or has been developed (the last date of the aerial photos used in this Service GIS analysis of critical habitat is 2005).

Of the 1,431 acres of critical habitat that are outside of any Conservation Area, approximately 1,387 acres are on private lands and 44 acres are public lands. Of this 1,387 acres, approximately 330 acres are modeled fringe-toed lizard habitat and about 1,048 acres are not fringe-toed lizard modeled habitat. These 330 acres are critical habitat, private, outside of any proposed Conservation Area, and are modeled fringe-toed lizard habitat. These lands mostly occur in sections 21 and 35; T4S R6E. Existing development upwind, some of it very recent, has degraded the sand transport corridor leading into these lands. The portions of critical habitat without a supply of sand are not be expected to viable in the long-term.

There are 1,048 acres that are: critical habitat, private, outside of any Conservation Area, and not modeled habitat for the fringe-toed lizard. These lands are predominately in sections 7, 8, 17, 15, 21, and 22 (T4S R6E); mostly south and west of the proposed Thousand Palms Conservation Area, or surrounded by it. Where these lands are surrounded by the Thousand Palms Conservation Area (but not within it), future Covered Activities (development) would either occur in: 1) areas already shielded by existing development upwind (the southern portion of these lands in section 15, section 22), with minimal additional effects to the degraded sand

transport corridor, or; 2) areas that are currently a viable part of sand transport corridor (northern portion of these lands within section 15) with concomitant effects (shielding) to downwind blowsand areas. The subject lands within sections 7, 8, 17, and 21 are in an artificially degraded portion of sand transport corridor, as existing development (two rows of houses) directly downwind has substantially blocked major portions of the sand transport corridor. Restoration of the sand transport corridor in most of these areas of degraded sand transport corridor would require removal of one to three rows of homes.

The proposed Plan addresses aeolian and fluvial sand transport in critical habitat inside portions of the Thousand Palms Conservation Area by establishing Site Planning Standards for Sections 7 and 8 (T4S R6E). The intention of these standards for development of individual parcels would be to continue fluvial and aeolian sand transport at the west edge of the Conservation Area. A 9:1 conservation to development ratio would be maintained within Section 21 (T4S R6E) south of Ramon Road per the requirements of the Plan. Under the Plan, acquisition by the CVCC would be a priority within sections 7, 8, and 21.

Although undetermined, we roughly estimate that as much as 2,000 acres (about 17 percent of the total) of critical habitat for the fringe-toed lizard would be lost under the proposed Plan (some small portion of this is already lost to development or severe disturbance). It is undetermined where these losses would occur within the Proposed Conservation Areas. As much as 421 acres of this loss could be fringe-toed lizard modeled habitat, pursuant to the limits to habitat loss specified under the Plan. We estimate that about 8,597 acres of critical habitat are currently conserved (existing conservation). We estimate that the proposed Plan would conserve at least 2,400 acres more, with an undetermined additional amount to be conserved pursuant to other permitting or conservation processes. Thus, we expect that more than 9,500 acres (more than 80 percent) of fringe-toed lizard critical habitat ultimately would be conserved at the end of Plan implementation (considering existing conservation, conservation as a result of the Plan, and expected future conservation by others).

Although as much as 2,000 acres of critical habitat would be lost under the Plan, most of these areas, as noted in the analysis above, are of marginal importance as habitat or to sustaining ecological function of the fringe-toed lizard habitat within the critical habitat boundaries. This is particularly evident when considering the impacts of the Whitewater River/Thousand Palms Flood Control Project (noted above) and the amount of existing development within critical habitat. See FTL- 2. It is also important to consider the new conservation of at least 2,400 acres of critical habitat provided by the Plan, and the 7,125 acres of existing conservation, in these remaining critical habitat areas. The Permit Terms and Conditions would likely result in further enhanced ecosystem processes and habitat function within the critical habitat areas that ultimately are conserved, compared to conditions that would exist with the Plan alone. The Plan and Permit Terms and Conditions ensure that the specific areas within the critical habitat boundaries, on which are found those features essential to the conservation of the fringe-toed lizard, would be managed and conserved.

CUMULATIVE EFFECTS

It is expected that an undetermined amount of fringe-toed lizard habitat and ecosystem processes

areas within the action area, on non-federal lands, both inside or outside of any proposed Conservation Areas, would be subject to impacts by parties that are not under the control of proposed permitees or parties without Certificates of Inclusions (such as some local water agencies or school districts); most of these parties would likely engage ESA permitting/consultation processes separate from the subject Plan. As part of these permitting/consultation processes for these actions, we expect that minimization and mitigation measures will result in an undetermined acreage of legal protection and management of fringe-toed lizard suitable habitat in the Plan Area outside of proposed Conservation Areas. To the extent that these actions are not subject to section 10 permitting or consultation, these impacts would remain cumulative to the effects of action proposed herein.

Additionally, pursuant to impacts from actions unrelated to any HCP, we expect that some of the mitigation for expected impacts to the blowsand ecosystem on Valley-floor Reservation lands (which are outside the Plan Area), will occur inside the Plan Area and outside of proposed Conservation Areas; this mitigation would likely occur on lands near the proposed Whitewater Floodplain and Thousand Palms Conservation Areas, where additional conservation would significantly benefit the fringe-toed lizard. Additional mitigation is expected to occur within the Reservation, particularly within Section 6 (T4S R5E).

It is anticipated that some continued degradation of fringe-toed lizard habitat within the action area will occur resulting from OHV use, illegal dumping, and invasive plants. The level of illegal dumping and OHV use (and impacts) in the Valley is expected to substantially decrease over time (compared to existing) as a portion of the remaining open lands are developed, and as greater control is gained over trespass and dumping by land managers (through presence and reporting, as well as fencing and blockading of access routes) and local law enforcement. It is likely that some invasive plants already introduced into the Valley will increase in area/density and ecological impact, partially as a result of human activities such as disturbance from OHV use, construction/maintenance/agricultural equipment, and equestrian use (a large portion of these activities are not Covered Activities and will remain cumulative to the effects of the proposed action); continuation of ongoing control efforts (some of which will be unrelated to the Plan, such as activities by Tribes and non-permittees) will likely reduce the ecological influence of other invasive plants. New introductions of invasive plants during the proposed permit term are likely with undetermined effects. It is expected that many of the cumulative human activities that would propagate and/or increase impacts from invasive plants will receive future permitting or consultation (such as maintenance activities by non-permittees), with a resultant decrease in ecological effects.

Artificially enhanced predator populations, such as pets and meso-predators (raccoons, etc.) associated with developments that are not Covered Activities, will likely result in appreciable cumulative effects to the fringe-toed lizard where suitable habitat remains adjacent or nearby. It is expected over time that increased animal control activities in the Valley, combined and partially associated with likely conversion of many adjacent neighborhoods from rural to more suburban characteristics, will reduce the potential influence of uncontrolled or feral dogs on the fringe-toed lizard, but the expected continued fragmentation of remaining fringe-toed lizard habitat in the action area will likely reduce the normal effectiveness of coyotes controlling pet

(domestic cats) and meso-predator numbers (Crooks and Soule 1999) in some areas.

New and existing above-ground power and communication lines that are not covered under the proposed Plan, will provide artificial perches for birds that prey upon the lizards within the Conservation Areas and in remaining occupied areas outside of Conservation Areas, thus enhancing predation on fringe-toed lizards. We expect that operations and maintenance of all power and communication lines in the Valley will eventually be subject to permitting or consultation (after which their effects would no longer be cumulative to the subject action considered herein). We also expect that many power and communication lines within and adjacent to occupied habitat areas will eventually be placed underground, with the subsequent elimination of the associated artificial perches.

Other essential habitat and sand source lands for the fringe-toed lizard are expected to be protected under the proposed Agua Caliente Band of Cahuilla Indians Tribal HCP in the future. The Agua Caliente Band of Cahuilla Indians is undertaking a HCP for all of their Tribal lands. The draft Plan and associated documents have been reviewed publicly. It is anticipated that the final Plan and associated environmental analysis will be complete in mid-2008 with a permit decision scheduled for late 2008. Because issuance of that permit is a Federal action, an analysis of the impacts of that Plan will be completed in the required section 7 process. As noted in *Future Complementary Conservation* above, a portion of the mitigation expected for impacts to the fringe-toed lizard under the proposed Agua Caliente Band of Cahuilla Indians Tribal HCP likely would occur within the CVAG-proposed Conservation Areas; this Tribal HCP mitigation would be complementary conservation to the mitigation required under the CVAG Plan. Additionally, most of Section 6 (T4S R5E) is expected to be conserved for the fringe-toed lizard under the Tribal HCP.

CONCLUSION

Substantial portions of the Plan Area are essential to continued existence of the Coachella Valley fringe-toed lizard. A total of 6,999 acres of Coachella Valley fringe-toed lizard modeled habitat, areas that are currently unprotected, are proposed to be conserved in perpetuity under the Plan. This conservation would be provided under the Plan to mitigate the loss of up to 13,681 acres of modeled habitat that would result from proposed Covered Activities throughout the Plan Area. In addition to the proposed mitigation lands, the Conservation Areas contain Existing Conservation Lands (5,999 acres of fringe-toed lizard modeled habitat) that would augment the reserve design of the Plan, and complement the Reserve System. As such, a total of 12,998 acres would be conserved between the Existing Conservation Lands and the proposed mitigation lands. Additional to this, more than 650 acres of blowsand habitat are expected to be conserved as mitigation for future unrelated Tribal activities in the Valley (none of the Tribes in the Coachella Valley are Permittees in the proposed action). Also, a significant, but undetermined additional amount of conservation of fringe-toed lizard habitat is expected to occur from acquisition and management of currently unprotected lands provided by the Service, the State, and conservation organizations. Lastly, an undetermined, but potentially considerable, amount of additional mitigation is likely to occur for unrelated future and ongoing activities by non-permittees to the proposed Plan (such as water districts, school districts, utilities, railroads, and Federal agencies). Thus, more than 14,000 acres of modeled or suitable habitat ultimately would be expected to be

conserved in Valley (range-wide for the species) at the end of the proposed 75-year permit term; no occupied habitat would be expected to remain extant range-wide outside of these conserved areas at the end of this term. This estimated 14,000 acres of modeled habitat represents about 45 percent of the currently remaining CVAG-modeled habitat available range-wide.

Similar to the conservation of habitat noted above, the proposed Plan would provide protection of some of the non-habitat areas that provide fluvial and aeolian processes that support remaining blowsand habitat. Considering the conservation that would be provided by the Plan and others (noted above), combined with the implementation of the permit conditions described, all areas essential to the continued existence of the species that provide important fluvial and aeolian processes (to the remaining fringe-toed lizard habitat likely to be conserved in the future) would be protected or adequately managed during and beyond the permit term.

At most, 4,088 acres of modeled habitat likely occurs (range-wide) outside of the Plan Area, all on Agua Caliente Indian Reservation lands (Service files, GIS analysis). With 27,206 acres of fringe-toed lizard CVAG-modeled habitat occurring in the Plan Area (which we consider to be a substantial over-estimate of suitable habitat), a total of 31,294 acres of CVAG modeled-habitat occurs range-wide for the species (Service files, GIS analysis). The proposed Conservation Areas include about half of the fringe-toed lizard suitable or modeled habitat currently remaining range-wide. Considering that the fringe-toed lizard is endemic to the action area, the 14,000-plus acres of fringe-toed lizard modeled habitat that would be expected to remain in the action area at the end of Plan implementation would contain the entire future range of the species. Although the percentage of fringe-toed lizard modeled Habitat that could be lost to development within the next 75 years appears to be substantial, evaluation of the impacts requires an assessment of the poor quality of this Habitat. The actual reduction in Habitat value is expected to be considerably less than indicated by the raw acreage numbers because: Conserved Habitat areas are large enough to contain self-sustaining populations of fringe- toed lizards and incorporate key Habitat elements, including sandy substrates and intact sand transport system.

Take within the Conservation Areas would not eliminate or significantly impact any core populations. Conservation Objectives require any approved development within Conservation Areas to ensure protection of Core Habitat. As a result of implementing the Conservation Objectives to protect Habitat for this species and provide for connectivity, the Plan would not sever connections between any significant populations. Habitat areas are adequately connected to each other to allow genetic exchange. Biological Corridors and Linkages would be conserved to provide Habitat connectivity from Cabazon and Snow Creek to the east end of the Indio Hills. Potential Development would not adversely impact the Essential Ecological Processes needed to maintain currently viable Habitat. Conservation Areas were carefully designed to incorporate the sand source and sand transport systems. Lands in the MSHCP Reserve System would be managed and monitored to address significant edge effect problems, potential loss of Habitat from introduction of exotic species, and other stressors to this species.

We expect that with proper implementation of the Plan and the permit conditions described above providing for the conservation and management of habitat and maintenance of sand transport corridors in proposed Conservation Areas, the survival of the species range-wide would

be likely for the permit term. Implementation of the avoidance, minimization, and mitigation measures identified in the Plan combined with the noted permit conditions will extensively reduce impacts to this species that likely would otherwise occur. We anticipate that the Coachella Valley fringe-toed lizard populations and habitat will be monitored and managed in perpetuity pursuant to the Plan.

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 with permit conditions, is not likely to jeopardize the continued existence of the Coachella Valley fringe-toed lizard, and it is not likely to result in the destruction or adverse modification of critical habitat for the Coachella Valley fringe-toed lizard. We reached this conclusion because habitat areas and ecosystem processes essential to the continued existence of the species in the Plan Area are likely to be conserved and managed for the Coachella Valley fringe-toed lizard in perpetuity; this, combined with other actions likely to occur in the action area, would result in habitat areas and ecosystem processes essential to the species' continued existence range-wide being adequately conserved and managed. Thus, impacts to this species and its modeled habitat, when viewed in conjunction with the protection and management within the MSHCP Conservation Areas, 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 impossible to closely quantify the number of Coachella Valley fringe-toed lizards that would be taken as a result of the action over the proposed 75-year permit term, due to the large Plan Area, the programmatic nature of the Plan and Covered Activities, the natural population fluctuations (and density fluctuations) expected across the range of the species over time, difficulty in detecting the species, and the lack of detailed monitoring information available on almost all potentially occupied sites in the Plan Area. Therefore, take is quantified herein as the maximum number of acres of modeled habitat that would be subject to direct impacts from proposed Covered Activities in the CVMSHCP Plan Area.

We anticipate that less than a theoretical maximum of 13,681 acres of CVAG-modeled habitat, all within the Plan Area, would be directly lost for the fringe-toed lizard as a result of the proposed action. Between 778 to 878 acres of modeled habitat are anticipated to be directly lost inside the proposed Conservation Areas, and less than 12,903 acres of modeled habitat would be directly lost outside of the Conservation Areas as a result of the proposed action. Because these areas of CVAG-modeled habitat are already mapped and quantified, this figure is the most useable measure of incidental take for the species from the proposed Plan. We anticipate the proposed action will affect the Coachella Valley fringe-toed lizard as described in the analysis above, including the loss of no more than 51 percent of the modeled habitat in the Plan Area, and no more than 44 percent of the CVAG-modeled habitat rangewide.

As noted above in Status of the Species and Environmental Baseline, we expect that suitable habitat is likely substantially less than the acreage modeled as habitat by CVAG, and occupied habitat may occur on as little as 20 percent of the modeled habitat noted in some areas (see

Environmental Baseline), considering many areas mapped as modeled habitat are developed and many others areas would only periodically be occupied by the species or would not be suitable for the species in the future due to changes in ecosystem processes. The actual acreage of occupied habitat to be directly lost per the proposed action is likely to be less than, and could be considerably less than, the 13,681 acres of modeled habitat noted above).

It is expected that almost all lizards on a site would be lost through mortality, whenever a site occupied by fringe-toed lizard is cleared, graded, and developed pursuant to proposed Covered Activities. Considering the range of acreages noted above, and that fringe-toed lizard densities within occupied fringe-toed lizard habitat range from 0.4 to 60 individuals per acre (as discussed above), any estimated range of individuals impacted would not be meaningful at this scale.

A very small, but currently undeterminable, number of Coachella Valley fringe-toed lizards would likely be taken as a result of proposed monitoring and management actions.

Take from the above would likely be in the forms of capture, direct injury, harm and death.

PERMIT CONDITIONS

The following Permit Conditions have been identified through our analysis as being necessary and appropriate for coverage of this species in the Permit:

CVCC and the Land Manager, through the land management program, shall identify and document implementation compliance with the Land Use Adjacency Guidelines and work with the landowners and appropriate jurisdictions to address these concerns. This information shall be included in the Annual Report to the Wildlife Agencies and the Permittees.

Certain measures are identified in the Plan as obligations to be performed to the "maximum extent Feasible". If the applicable Permittee determines that performing an obligation to the extent described in the Plan is not Feasible, the meet and confer process as described in 23.6 A-D of the Implementing Agreement shall be followed.

The CVCC, after coordination with its Implementation Manual Subcommittee, shall provide the Implementation Manual for review and concurrence by the Wildlife Agencies prior to its finalization and distribution to the Permittees.

Use of the Management Contingency Fund under Section 8 of the Plan shall include addressing the following sand-dependant species priorities: 1) funding of activities addressed in Special Permit Term and Condition #26; 2) development and implementation of an invasive species management plan that assesses the status of and threats from invasive species, identifies knowledge gaps, and addresses control of invasive plant species (e.g, Saharan mustard) in Snow Creek/Windy Point, Thousand Palms, Whitewater Floodplain, and Willow Hole Conservation Areas; and, 3) funding of other sand-dependent species/habitat related Special Permit Terms and Conditions. The invasive species management plan shall be developed within 3 years of Permit issuance in coordination with the Wildlife Agencies; this management plan shall be implemented beginning in year 4 post-Permit issuance. The Management Contingency Fund may supplement, but not replace, the Monitoring and Management Program budget.

Within 3 years of permit issuance a translocation policy for sand dependent species shall be developed by the CVCC that complies with State and Federal laws, policies and regulations. This

policy will address the potential need for translocation (e.g. to maintain genetic diversity). Known areas of high concentrations of species that are disturbed or developed could be targeted for possible salvage or for use in scientific studies.

A Conservation to Development ratio of 9:1 within the Willow Hole Conservation Area shall be maintained within each of the following areas: 1) the east half of the southwest quarter, and the east half of the east half of the west half of the southwest quarter, and east half of the west half of the southwest quarter, of Section 12, T3S R4E; 2) the east half of the east half of the southeast quarter, and the west half of the west half of the southeast quarter, and the west half of the east half of the west half of the southeast quarter of Section12, T3S R4E as shown in Figure 4-13f of the Plan; 3) the northwest quarter of Section 19, T3S R5E; 4) the portion of the northeast quarter of Section 19, T3S R5E that is in the Conservation Area; 5) the portion of the northern half of Section 20, T3S R5E as depicted in Figure 4-13f of the Plan; 6) the portion of the north half of Section 24, T3S R4E that is in the Willow Hole Conservation Area; 7) the portion of the southern quarter of Section 28, T3S R5E as depicted in Figure 4-13f; and 8) the east half of the northwest quarter within the Willow Hole Conservation Area, and the west half of the west half of the northeast quarter, and the east half of the west half of the northeast quarter (except those portions north of Varner road) of Section 29, T3S R5E.

CVCC shall conduct a Joint Project Review for proposed single family homes in the 9:1 areas to identify applicable measures needed to meet Conservation Area and Covered Species Goals and Objectives of the Plan. If a Conservation Easement is offered over a parcel or a portion of a parcel in the 9:1 areas identified in Condition number 22, CVCC shall condition the acceptance of any easement to meet the Site Planning Standards described under Required Measure 3 in Section 4.3.11 of the Plan (with the exception of the first four sentences of Site Planning Standard 2).

New development that requires a discretionary permit from a Permittee which expands an Existing Use and results in new disturbance shall be subject to MSHCP requirements. Any authorized disturbance of Natural Communities and Covered Species modeled habitat shall count toward the amount of disturbance authorized under the Plan since the Covered Species habitat and Natural Communities on these lands were not addressed or included in the amount of anticipated disturbance authorized under the Plan.

CVCC shall conduct an accounting of authorized disturbance approved by the Permittees since November 1996. As may be determined by said accounting, any authorized disturbance acreage shall be deducted from the anticipated 10 percent disturbance allowed within the Conservation Areas as part of the Year 1 Annual Report under the Plan.

When a project is analyzed under the Joint Project Review Process, the authorized disturbance shall be calculated upon completion of the Joint Project Review Process and shall be deducted from the acreage of disturbance authorized for each Permittee at the time the Permittee issues a grading or building permit. Disturbance associated with public projects identified in Section 7 of the Plan shall not be counted against the disturbance authorization of the affected Permittee.

Undeveloped portions of parcels in Conservation Areas on which development is approved shall count towards meeting the Conservation Objectives only when the undeveloped portion of the parcel is legally described and is permanently protected through an appropriate Legal Instrument that allows long-term monitoring and management in perpetuity. When these requirements are met, the conserved part of the parcel shall be counted in the rough-step calculations. Review of development projects and accounting shall occur in accordance with the Joint Project Review

Process and the Implementation Manual and shall be included in the Annual Report. Prioritization of the Monitoring Program shall include a focus on the development of scientifically valid, repeatable survey techniques that will support population estimation and determination of distribution for the Coachella Valley giant sand-treader cricket, Coachella Valley Jerusalem cricket, desert pupfish, Coachella Valley fringe-toed lizard, flat-tailed horned lizard, Coachella Valley round-tailed ground squirrel, and Palm Springs pocket mouse in the Plan Area (particularly in the Core Habitats) over the term of the Permit. These techniques shall be developed in coordination with the Wildlife Agencies prior to their implementation. The CVCC shall ensure that any monitoring and management of these species that are implemented through joint funding by multiple Permittees are coordinated to allow for comparison across the Plan Area and through time in support of the effectiveness monitoring and adaptive management requirements of the Plan.

For Coachella Valley Fringe-toed Lizard, Coachella Valley Round-tailed Ground Squirrel, Palm Springs Pocket Mouse, and Coachella Valley Milk-vetch, to ensure that a minimum of three (3) viable populations (long-term persistence of self-sustaining populations) within Core Habitat for these species is maintained, or if necessary re-established and maintained, the following measures shall be implemented:

The CVCC shall manage and enhance modeled Core Habitats for these species to provide for persistent and sustainable populations and essential ecological processes, including broader patterns of sand transport and deposition in the Whitewater Floodplain and maintenance of sand transport and deposition in all Core Habitats to the maximum extent practicable (e.g., sand fencing as appropriate in any of the Conservation Areas and restoring mesquite in Thousand Palms Conservation Area) to achieve the Conservation Objectives for these species in the Plan.

The CVCC shall assess the animal species identified above to determine the presence of persistent and sustainable populations and essential ecological processes within the Core Habitats. This assessment shall be completed within 3 years of Permit issuance using methods developed jointly by the CVCC and Wildlife Agencies.

Specific studies shall be conducted as part of the baseline monitoring for the Coachella Valley milkvetch to assess: viability and extent of seed bank, substrate affinities, micro-habitat requirements, seed dispersal, pollination ecology, and impacts of invasive species within the Core Habitat areas to ensure that the appropriate measures to support long-term conservation of this species are identified. These studies shall be completed within 5 years of Permit issuance using methods developed jointly by the CVCC and Wildlife Agencies.

The CVCC shall develop long-term management strategies for each of these species that identify specific monitoring approaches (e.g., the use of probabilistic population estimates, relativistic population indices, and/or assessments of effective population size) and management actions (including actions to address habitat as described in a) above) that will be implemented and a specific time line for implementation to ensure a minimum of 3 viable populations including adequate distribution to support long-term viability of the populations within Core Habitat areas. These management strategies shall be completed and provided to the Wildlife Agencies for their concurrence within 5 years of Permit issuance for the animal species and 7 years for the CV milkvetch.

Within 6 months of their completion, implementation of the measures associated with the management strategies shall begin through incorporation into the applicable Reserve Management Unit Plan(s) and Adaptive Management Program. Any changes to the Covered

Species and Natural Communities Conservation Goals and Objectives and Required Measures for the Conservation Areas that include Core Habitat for each of the species identified above shall be submitted to the Wildlife Agencies for review and approval within 8 years of permit issuance and incorporated into the Joint Project Review process as appropriate.
In T4S R6E Section 8 in the Thousand Palms Conservation Area, the Site Planning Standards described under Required Measure 3 of the Plan, also shall apply to lands with a Light Industrial general plan land use designation (with the exception of the first two sentences of Site Planning Standard 2).

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Flat-tailed horned lizard (*Phrynosoma mcallii*)

STATUS OF THE SPECIES

Legal/Listing Status

The flat-tailed horned lizard has been designated as a State Species of Special Concern by the CDFG and is listed as a threatened species in Mexico. The flat-tailed horned lizard has been proposed as a threatened species under the Endangered Species Act several times.

Our consideration of the status of this species has had a tumultuous history, primarily conducted within the context of the courts. In 1982, we identified the flat-tailed horned lizard as a category 2 candidate species for listing under the Act (47 FR 58454). Service regulations defined category 2 candidate species as "taxa for which information in the possession of the Service indicated that proposing to list as endangered or threatened was possibly appropriate, but for which sufficient data on biological vulnerability and threats were not currently available to support proposed rules." In 1989, we elevated the species to category 1 status (54 FR 554). Category 1 (note: categories are no longer used to differentiate among candidate species) included species "for which the Service had on file sufficient information on biological vulnerability and threat(s) to support issuance of a proposed rule." Subsequently, on November 29, 1993, we published a proposed rule to list the flat-tailed horned lizard as a threatened species pursuant to the Act (58 FR 62624).

On July 15, 1997, we issued a final decision to withdraw the proposed rule to list the flat-tailed horned lizard as a threatened species (62 FR 37852). We based the withdrawal on three factors: (1) Population trend data did not conclusively demonstrate significant population declines; (2) some of the threats to the flat-tailed horned lizard habitat had grown less serious since the proposed rule was issued; and (3) we expected that a recently approved conservation agreement would reduce threats.

Six months following our withdrawal of the proposed listing rule, the Defenders of Wildlife filed a lawsuit challenging our decision. On June 16, 1999, the District Court for the Southern District of California granted summary judgment in our favor upholding our decision not to list the flat-tailed horned lizard. However, on July 31, 2001, the Ninth Circuit Court of Appeals reversed the lower court's ruling and directed the District Court to remand the matter back to us for further consideration in accordance with the legal standards outlined in its opinion. The case was remanded back to us because (1) the withdrawal did not expressly consider whether the flat-tailed horned lizard is likely to become an endangered species within the foreseeable future in a significant portion of its range; and (2) the withdrawal did not "address the lizard's viability in a site-specific manner with regard to the putative benefits of the Conservation Agreement."

On October 24, 2001, the District Court ordered us to reinstate the previously effective proposed listing rule and render a final listing determination within 12 months in compliance with the mandate of the Ninth Circuit Court's order. Accordingly, we published a notice on December 26, 2001, announcing the reinstatement of the 1993 proposed listing of the flat-tailed horned lizard

as threatened and the opening of a 120-day public comment period on the reinstated proposed rule (66 FR 66384).

On January 3, 2003, we again issued a decision to withdraw the proposed rule to list the flat-tailed horned lizard as a threatened species (68 FR 331). We found the lizard to be in danger of extirpation in the Coachella Valley however, based on the best available information, the Coachella Valley population did not meet the regulatory definition of Distinct Vertebrate Population segment. We concluded in the 2003 analysis, that the flat-tailed horned lizard populations on either side of the Imperial Valley/Salton Sea and in Arizona were not likely to become endangered in the foreseeable future.

The Tucson Herpetological Society and others filed another lawsuit challenging our January 2003 withdrawal. On August 30, 2005, the U.S. District Court for the District of Arizona set aside our withdrawal of the proposed rule to list the flat-tailed horned lizard as a threatened species on the grounds that our withdrawal violated the Endangered Species Act because it failed to determine whether the lost historical habitat for the flat-tailed horned lizard was a significant portion of the species' range. On December 7, 2005, we published a Federal Register Notice vacating the January 2003 withdrawal and restoring proposed status to the flat-tailed horned lizard based on the 1993 proposed rule (70 FR 72776). On June 26, 2006, we published a Federal Register Notice withdrawing the proposal to list the flat-tailed horned lizard as threatened (71 FR 36745). We found that the lost historical habitat was not a significant portion of the range and thus the species was not endangered (extirpated) in a significant portion of the range.

Conservation Agreement

In June of 1997, seven Federal and State agencies signed a Flat-Tailed Horned Lizard Conservation Agreement to implement a Flat-tailed Horned Lizard Rangewide Management Strategy. The purpose of the Rangewide Management Strategy was to provide a framework for conserving sufficient habitat to maintain several viable populations of the flat-tailed horned lizard throughout the range of the species in the United States. The Rangewide Management Strategy was developed by an interagency working group over a two-year period. As part of the Conservation Agreement, agencies delineated specific areas under their jurisdiction as Management Areas (MAs). The MAs comprise 485,000 acres, including 37,600 acres of private inholdings, of flat-tailed horned lizard habitat managed by signatories of the Conservation Agreement within five MAs. The five MAs are the Borrego Badlands, West Mesa, Yuha Desert, East Mesa, and the Yuma Desert. These managed areas are believed to represent approximately 40 percent of flat-tailed horned lizard habitat remaining in the United States.

The five MAs were designed to identify large areas of public land where flat-tailed horned lizards have been found, as well as to include most flat-tailed horned lizard habitat identified as key areas in previous studies (Turner *et al.* 1980, Turner and Medica 1982, Rorabaugh *et al.* 1987, Foreman 1997). MAs were proposed based on accepted principles of preserve design, utilizing the best information available at the time (FTHL ICC 2002). Furthermore, the MAs were delineated to include areas as large as possible, while avoiding extensive, existing and predicted management conflicts (e.g., OHV open areas). The MAs are meant to be the core areas

for maintaining self-sustaining populations of flat-tailed horned lizards in the U.S. (FTHL-ICC 2003).

Ocotillo Wells State Vehicle Recreation Area (SVRA) was designated as a Research Area under the Conservation Agreement. Research on flat-tailed horned lizards is funded and encouraged there.

Species Description

The flat-tailed horned lizard was first described by Hallowell in 1852 as *Anota mcallii* after U.S. Army Colonel George A. M'Call (Funk 1981). The flat-tailed horned lizard is a small phrynosomatid lizard that reaches a maximum adult body length of 3.3 inches (8.4 centimeters) (Muth and Fisher 1992). The flat-tailed horned lizard has a dorso-ventrally flattened body; long, broad flattened tail; and dagger-like head spines common to horned lizards of the genus *Phrynosoma.* The species is cryptic in color, ranging from pale gray to light rust brown dorsally, and white or cream ventrally. Males have enlarged postanal scales; females do not. The flat-tailed horned lizard can be distinguished from the only other horned lizard known to occur within its range, the desert horned lizard (*Phrynosoma platyrhinos*), by its dark vertebral stripe, two rows of fringed scales on each side of the body, lack of external ear openings, and unmarked white ventral surface in most individuals (Foreman 1997). Apparent hybrids between the two species, exhibiting a mix of morphological characteristics, have been observed in the vicinity of Ocotillo, California (Stebbins 1985), and southeast of Yuma, Arizona (K. Young, Utah State University, pers. comm. 2002). Genetic analysis has confirmed hybridization in Arizona (Mendelson *et al*. 2004, Mulcahy *et al*. 2006).

Distribution

The flat-tailed horned lizard is endemic to the Sonoran Desert in southern California, southwestern Arizona, and adjoining portions of Sonora and Baja California, Mexico (Turner and Medica 1982). Within California, the flat-tailed horned lizard ranges from the Coachella Valley, the northernmost extent of its range, south along both sides of the Salton Sea and Imperial Valley. On the west side of the Salton Sea and Imperial Valley, the species ranges into the Borrego Valley, Ocotillo Wells area, West Mesa, and the Yuha Desert (Yuha Basin). On the east side of Imperial Valley, the species occurs in the vicinity of the Dos Palmas Area of Critical Environmental Concern, but predominantly occurs in East Mesa and in areas adjoining the Algodones Dunes (i.e., Imperial Sand Dunes, Glamis Sand Dunes). In Arizona, the flat-tailed horned lizard is found in the Yuma Desert south of the Gila River and west of the Gila and Butler Mountains (Rorabaugh *et al*. 1987). The flat-tailed horned lizard is patchily distributed throughout its range, and was once recorded at 1,706 feet (520 meters) above sea level, but is more commonly found below 820 feet (250 meters) in areas with flat-to-modest slopes (Turner *et al*. 1980).

The range of the flat-tailed horned lizard extends into Mexico from the international border in the Yuha Desert in California, south to Laguna Salada in Baja California, and from the international border in the Yuma Desert in Arizona, south and east through the Pinacate Region to the sandy plains around Puerto Penasco and Bahia de San Jorge, Sonora (Johnson and Spicer 1985, Gonzales-Romero and Alvarez-Cardenas 1989).

A portion of the historical range of the flat-tailed horned lizard was periodically inundated by the Colorado River. This ancient lake is known as Lake Cahuilla. At its fullest extent to 39 feet in elevation, Lake Cahuilla covered half of the Coachella Valley, the agricultural areas of the Imperial Valley, and a relatively smaller area in adjacent Mexico. The lake filled and evaporated 4 times from 700 to 1580 AD (Waters 1983). Before agriculture, the vegetation of the lakebed was predominantly saltbush (Parish 1914).

Flat-tailed horned lizard habitat is discontinuous across the species range and is also fragmented in the United States by the Salton Sea, Colorado River, East Highline Canal, Coachella Canal, All American Canal, and large-scale agricultural and urban development, primarily in the Imperial Valley and the Coachella Valley. Interstates 8 and 10 and smaller roadways may also act as barriers to lizard movement. Due to this habitat fragmentation and existing geographic barriers, the distribution of flat-tailed horned lizards in the United States appears to be currently divided on a broad scale into at least five geographically discrete populations: four in California and one in Arizona. The four populations in California are located:

(1) in the Coachella Valley (are further subdivided by I-10 as well as other roads);
(2) on the west side of the Salton Sea/Imperial Valley (further subdivided by I-8);
(3) on the east side of the Imperial Valley east of the East Highline Canal;
(4) in the Dos Palmas area.

A portion of the historical range of the flat-tailed horned lizard has been modified by agricultural, urban, and industrial development and no longer supports the species. Flat-tailed horned lizard populations, however, persist on public lands in several desert areas that receive limited protection under the Rangewide Management Strategy, as well as protected reserve land in Coachella Valley and unprotected private desert land.

The historic range of the flat-tailed horned lizard has been estimated by Hodges (1997), and by the ICC in the flat-tailed horned lizard Rangewide Management Strategy (2003). Within the Coachella Valley, the Scientific Advisory Group has provided estimates of the current range of the species.

Hodges (1997) estimated that the flat-tailed horned lizard historically occupied up to 2,419,200 acres (979,037 hectares) of habitat in Arizona and California prior to agricultural or urban development of either the Coachella or Imperial Valleys. Approximately 51 percent (1,243,340 acres (503,173 hectares)) of this historical habitat remains in the United States, with about 140,300 acres (56,770 hectares) in Arizona and 1,103,040 acres (446,390 hectares) in California (Hodges 1997). The Salton Sea trough could arguably be considered ephemeral historical habitat, present at some points and absent at others, as the area changed through time and was periodically inundated with water (historic Lake Cahuilla). Hodges (1997) included the Salton Sea as historical habitat. If the area the Salton Sea currently occupies is not considered historical habitat, then approximately 57 percent (1,376,525 acres (557,072 hectares)) of historical habitat remains in the United States.

Estimates of Flat-tailed Horned Lizard Range

	United States		Coachella (subset of U.S figure)		Rangewide Total	
	Historic (acres)	Current (acres)	Historic (acres)	Current (acres)	Historic (acres)	Current (acres)
Hodges (1997)	2,419,200	1,243,341	N/A	N/A	N/A	N/A
ICC (2003)	2,606,468	1,199,345	413,900	40,030	6,183,647	3,962,543
CVAG (2005)	N/A	N/A	444,160	40,030	N/A	N/A

In 2003, the revised Rangewide Management Strategy (FTHL ICC 2003) attempted to refine estimates of the historical and current range of the species. Range delineations were based on habitat (rockier areas where it was generally known flat-tailed horned lizards did not live were excluded), known localities, and elevation limits (flat-tailed horned lizards have rarely been found above 750 feet altitude). There were some differences from the Hodges (1997) estimate, such as excluding the area east of the Algodones Dunes which Hodges (1997) included. The Coachella Valley area was delineated by the 750-foot altitude rule and so is probably an overestimate of historical habitat there. In the revised Rangewide Management Strategy, the historical range of the flat-tailed horned lizard within the United States is estimated as 2,606,468 acres, approximately 187,268 acres more than the range estimated by Hodges (1997). The current range in the United States is estimated to be 1,199,343 acres (485,357 hectares) by the revised Rangewide Management Strategy, thus approximately 46 percent of historic flat-tailed horned lizard habitat remains in the United States.

Of the estimated historical range, 413,900 acres (6.7 percent) was in Riverside County (Coachella Valley). The current range within the Coachella Valley is estimated at 40,030 acres (1 percent of the total current range and 3 percent of the range in the United States).

The current range for the flat-tailed horned lizard was estimated by using GIS information to eliminate areas from the historical range now converted to agriculture, urban areas and other anthropogenic disturbances. For the Coachella Valley specifically, the habitat model for the flat-tailed horned lizard was obtained from CVAG in 2002 and used to delineate the current range in the Coachella Valley. The habitat model for the Coachella Valley contains many small parcels of land in which flat-tailed horned lizards may already be extirpated or in which they cannot be expected to maintain viable populations. These pieces were, however, included in the current range of the flat-tailed horned lizard, which was estimated to be 3,962,543 acres in the U.S. and Mexico.

Johnson and Spicer (1985) estimated that in 1981 approximately 59 percent of the species range occurred in Mexico, with the majority of the range in Mexico occurring in the state of Sonora. However, the distribution of the species in Mexico is poorly understood because few surveys have been conducted to determine where the species occurs there (CEDO 2002). In Sonora, about 14 percent of the habitat was estimated to be threatened by urban, agricultural or

recreational use, and habitat degradation in 1981 (Johnson and Spicer 1985). In Baja California, considerable habitat loss has occurred in the Mexicali Valley, where urban and agricultural development extends from Mexicali to the Colorado River (Johnson and Spicer 1985, Foreman 1997).

Approximately 60 percent of the species' range in Mexico is located within two areas provided with protection by the Mexican government: (1) the Upper Gulf of California and Colorado Delta Biosphere Reserve, and (2) the Pinacate and Gran Desierto de Altar Biosphere Reserve (CEDO 2002). The National Park of Pinacate is an area administered by the Mexican government with use restrictions similar to those in a national park in the United States. The Pinacate area is primarily a volcanic zone within which flat-tailed horned lizard habitat is probably limited to the sandy perimeters of Volcan Pinacate. The Upper Gulf of California Biosphere Reserve includes flat-tailed horned lizard habitat in the vicinity of the Colorado River Delta in Sonora, Mexico.

Genetics
Because flat-tailed horned lizard populations are separated by major barriers to movement, genetic differences between populations may exist. To measure the genetic diversity of flat-tailed horned lizard populations in relationship to current patterns of fragmentation, a genetic analysis of the flat-tailed horned lizard and the desert horned lizard was conducted (Mendelson *et al.* 2004, Mulcahy *et al.* 2006). Populations were sampled in Coachella Valley, East Mesa, West Mesa, Ocotillo Wells State Vehicle Recreation Area, the Yuha Desert, the Yuma Desert, and Gran Desierto in Mexico. Sequences were also obtained from individual lizards from the southwest side of Laguna Salada valley in Mexico, north of Borrego Springs, and the southeast part of the range in Mexico. Mitochondrial DNA sequences were obtained of the ND4 gene from a total of 84 flat-tailed horned lizards.

Thirty unique haplotypes of flat-tailed horned lizards were recovered. Unique haplotypes were identified in Coachella Valley (3 unique haplotypes), Yuha Basin (4 unique haplotypes), Ocotillo Wells SVRA (6 unique haplotypes), East Mesa (1 unique haplotype), Gran Desierto Mexico (3 unique haplotypes), and Yuma (7 unique haplotypes). One shared haplotype was recovered from every location where more than one sample was taken. Uncorrected pair-wise sequence divergence within *P. mcallii* ranged from 0-2.2%. Most individual sequences could be divided into two clades corresponding to each side of the Colorado River. The analysis indicates that the species expanded into its current range in past millennia and then developed unique haplotypes in each area it populated. The data are indicative of a relatively deep but incomplete divergence within an otherwise moderate-level range of variation among populations of flat-tailed horned lizard. Low levels of population-endemic haplotypes exist.

The flat-tailed horned lizard was found to be hybridizing with a subspecies of the desert horned lizard (*Phrynosoma platyrhinos goodei)* in the Yuma Desert. Mendelson *et al.* (2004) suggest that *P. p. goodei* is a full species and treat the matter further in Mulcahy *et al.* (2006).

Habitat Affinities
The flat-tailed horned lizard is most commonly found in sandy flats and valleys in a creosote

(*Larrea tridentata*) and white bursage (*Ambrosia dumosa*) plant association (Turner *et al*. 1980, Muth and Fisher 1992, Foreman 1997). Turner *et al*. (1980) stated the best habitats are generally low-relief areas with surface soils of fine packed sand or pavement, overlain with loose, fine sand. Flat-tailed horned lizards are also known to occur at the edges of vegetated sand dunes, on barren clay soils, and sparse saltbush communities, but Turner *et al*. (1980) suspected that these recorded occurrences were actually individuals that had dispersed from more suitable habitats. Within a creosote plant community in West Mesa, California, Muth and Fisher (1992) found that flat-tailed horned lizards preferred sandy substrates with white bursage and Emory dalea (*Psorothamnus emoryi*), and avoided creosote and *Tiquilia plicata*. In Arizona, Rorabaugh *et al*. (1987) found flat-tailed horned lizard abundance correlated with big galleta grass (*Hilaria rigida*) and sandy substrates, but suggested that the presence of sandy substrates were more important than that of big galleta grass. Beauchamp *et al.* (1998) described flat-tailed horned lizards occupying mud hills and gravelly flats. Grant (2005) found the percent cover of sand on mark-recapture plots to be positively correlated with flat-tailed horned lizard abundance in a variance components analysis. Grant (2005) also found the number of black harvester ant (*Messor pergandei*) nests to be positively correlated with flat-tailed horned lizard abundance. Grant (2005) found no measurable effect of the percent of the surface covered in vehicle tracks and the percent of the surface under the canopy of perennials on the variance in flat-tailed horned lizard abundance among plots.

Life History

Greater than 95 percent of the diet by prey item of flat-tailed horned lizards consists of ants of the genera *Messor*, *Pogonomyrmex*, *Conomyrma*, and *Myrmecocystus* (Turner and Medica 1982, Pianka and Parker 1975). *Messor pergandei* and *Pogonomyrmex* spp. are harvester ants that collect seeds of plants for food. Harvester ants are much larger than *Conomyrma* and *Myrmecocystus* and hence are probably more important prey sources. Flat-tailed horned lizards are oviparous (egg-laying), early maturing, and may produce multiple clutches within a breeding season (Howard 1974). Flat-tailed horned lizards produce relatively small egg clutches (N = 31; mean clutch size = 4.7; range = 3 to 7; Howard 1974), compared to most other horned lizards (Pianka and Parker 1975). The first cohort hatches in July to August (Muth and Fisher 1992; Young and Young 2000) in years of adequate rainfall. Approximately 50 mm of rainfall in the previous September to May is enough to cause the first cohort to appear in July or August (Grant 2005). Generally a second cohort then appears in the fall (Muth and Fisher 1992). In drier years, only one cohort is produced that emerges in the fall (e.g. Setser 2004, Muth and Fisher 1992). Hatchlings from the first cohort may reach sexual maturity after their first winter season, whereas hatchlings born later may require an additional growing season to mature (Howard 1974, Young and Young 2000). Flat-tailed horned lizards can live up to at least 6 years in the wild (FTHL ICC 2003), and up to 9 years in captivity (Baur 1986). In the Yuma Desert, few lizards were found to live longer than 4 years (FTHL-ICC 2003).

Flat-tailed horned lizards can have relatively large home ranges (Foreman 1997). Muth and Fisher (1992) found the mean home range for lizards (N = 22) was 2.7 hectares (6.7 acres) from a minimum of 19 locations in West Mesa. In the Yuma Desert of Arizona, Young and Young (2000) found mean home ranges for males differed between drought and wet years, while those of females did not. The mean home range for males was 6.2 acres (2.5 hectares) during a dry

year versus 25.5 acres (10.3 hectares) during a wet year. Female mean home ranges were smaller at 3.2 acres (1.3 hectares) and 4.7 acres (1.9 hectares) in dry and wet years, respectively (Young and Young 2000). Movement is likely restricted in dry years to conserve energy. Young and Young (2000) noted a wide variation in movement patterns, with a few home ranges estimated at greater than 85 acres (34.4 hectares). At Ocotillo Wells SVRA, home ranges were generally smaller in 1999 and 2000, both low rainfall years. The average 95 percent fixed kernel home range estimate of females was 1.4 acres (0.56 hectares) and of males was 2.47 acres (1.0 hectares; Setser 2004).

Flat-tailed horned lizards generally lie close to the ground and remain motionless when approached (Wone 1995). Individuals may also bury themselves in loose sand if it is available (Norris 1949). More rarely they may flee. Their propensity to remain motionless and bury themselves in the sand, along with their cryptic coloration and flattened body, make them very difficult to find in the field (Foreman 1997) and increase their susceptibility to vehicle strikes. During the summer, flat-tailed horned lizards escape extreme surface temperatures by retreating to burrows (Rorabaugh 1994, Young and Young 2000). Burrows are usually constructed by the lizards themselves and may be used once or many times.

Adult flat-tailed horned lizards are reported to be obligatory hibernators (Mayhew 1965), although individuals have been noted on the surface during January and February (Eric Hollenbeck, Ocotillo Wells SVRA biologist, pers. comm. 2002). Hibernation may begin as early as October and end as late as March (Muth and Fisher 1992). Individual lizards may hibernate for many months or as short as one week (Muth and Fisher 1992, Grant 2005). The date at which flat-tailed horned lizards enter hibernation in the fall depends on the size and weight of the lizard. Larger, heavier lizards begin hibernation sooner (Grant 2005, Grant and Doherty 2006). Hibernation burrows are constructed by the lizards themselves rather than using burrows constructed by other animals and are within 10 centimeters (3.9 inches) of the surface (Muth and Fisher 1992). Mayhew (1965) found that the majority of lizards hibernated within 5 centimeters (2.0 inches) of the surface. The greatest depth recorded was 20 centimeters (7.9 inches) below the surface. Grant (2005) found the median depth of hibernating lizards (N = 31) to be 5 cm to the center of the dorsum. While most adults apparently hibernate during winter months, some juveniles may remain active (Muth and Fisher 1992, Grant 2005).

Population Trends

Information concerning size and dynamics of flat-tailed horned lizard populations has increased greatly in recent years. From 1979 to 2001, population trends were monitored using scat counts and lizards observed along transects (Wright 2003). Different methods of transect selection, numbers and experience of observers, numbers of repetitions, and lengths and shapes of transects have been used from year to year (Wright 2002).

Methodologies that rely on scat counts to assess the relative abundance of flat-tailed horned lizards are confounded by several potential limitations (Wright 2002). Wright (2002) states that while differences in scat abundance could indicate differences in lizard abundance, the observed decline in the rate at which scat is found could also be a result of an increase in OHV activity resulting in crushed or buried scat, lower deposition rates, greater wind eradication, different

observers, or additional factors. Furthermore, the use of scat counts does not account for variations in lizard activity, misidentification of scat from other species, variability in scat production due to fluctuating food resources, weather conditions that affect scat production or longevity in the field, observer differences, and small sample sizes (Muth and Fisher 1992, Rorabaugh 1994). Consequently, scat abundance may not be closely correlated with lizard abundance under varying conditions (Rorabaugh 1994, Beauchamp *et al*. 1998). In addition, the use of a relative index, such as scat counts, to indicate population trends are not reliable due to uncorrected bias that exists (discussed further below). Relative index techniques assume that any changes or differences in survey results are proportional to true changes or differences in the populations of interest (Thompson *et al*. 1998). Thus, due to the significant limitations of scat count data, we consider the use of scat count information useful primarily in determining the presence and distribution of flat-tailed horned lizards in areas where desert horned lizards do not occur.

Two measures of abundance trends (i.e., lizards detected per 10 hours, and lizards per transect) used between 1979 and 2001 for the East Mesa, West Mesa, and Yuha Basin, did not include scat data (Wright 2002). No statistically significant trends were found in the rate at which lizards were detected or the number of lizards per transect on any of the areas from 1979 to 2001 (Wright 2002). The measure of lizards per transect has inherent error due to differences in transect lengths surveyed among years. More importantly, the methodologies used between 1979 and 2001 have varied and the data have not incorporated detection probabilities (Thompson *et al*. 1998). Because flat-tailed horned lizards are very difficult to find in the field due to their cryptic coloration and behavioral characteristics, incorporating the probability of detecting them into survey results is very important.

Detectability is a common source of bias that is ignored for relative index techniques, such as the techniques used to collect the data between 1979 and 2001. Numerous factors may affect the detectability of animals within selected sampling plots. These include physical structure and cover, weather, individual behavior, and survey methodology. However, it is possible that differences in relative abundance found using uncorrected data may result from only a difference in detectability of animals between areas or within the same area across time (Thompson *et al*. 1998). Uncorrected bias could seriously affect the validity and usefulness of data in indicating abundance trends (Thompson *et al*. 1998).

The Bureau of Land Management (BLM) recently estimated the population size on three Management Areas (MAs) by using capture-mark-recapture (CMR) techniques incorporating detection probabilities (see Thompson *et al*. 1998, Williams *et al*. 2002). Grant (2005) analyzed the BLM flat-tailed horned lizard mark-recapture data from four summer monitoring surveys of three Management Areas: the Yuha Basin MA in 2002, the East Mesa MA in 2003, the West Mesa MA in 2003, and the Yuha Basin MA again in 2004. The East Mesa MA was estimated to have 42,619 (95 percent CI = 19,704 to 67,639) adult lizards (over 65 mm snout-to-vent length) in 2003 and the Yuha Basin MA in 2002 was estimated to have 25,514 adult lizards (95 percent confidence interval = 12,761 to 38,970). The West Mesa MA was estimated to have 10,849 adult lizards (95 percent confidence interval = 3,213 to 23,486). The Yuha Basin in 2004 was estimated to have 73,017 adult lizards (95 percent confidence interval = 4,837 to 163,635). The

West Mesa MA survey and the Yuha Basin MA survey of 2004 were based on sparse data, hence the large confidence intervals. No trend can be inferred from the two years of data in the Yuha Basin MA because the confidence intervals overlap.

Young *et al.* (2004) surveyed the Yuma Desert MA using CMR and estimated a population of 25,855 (95 percent confidence interval = 16,390 to 43,951). A concurrent survey using distance sampling with a trapping web estimated a population of 16,328 adult lizards (95 percent CI 8,378 to 31,794); however, the data were ill-conditioned. The trapping web methodology is probably unsuitable because daily movements of flat-tailed horned lizards are too large relative to practical trapping web sizes.

Hollenbeck (2004) surveyed the Ocotillo Wells Research Area in 2003. The Ocotillo Wells Research Area is the Ocotillo Wells SVRA, an area open to OHV recreation. He estimated 19,222 lizards (95 percent confidence interval 18,870 to 26,752) in 2003. A similar survey completed in 2005 (Eric Hollenbeck, pers. comm.) estimated 24,345 adult lizards (95 percent confidence interval 14,328 – 69,922) and 37,085 young-of-the-year (95 percent confidence interval 22,165 – 74,811).

The Flat-tailed Horned Lizard Rangewide Management Strategy was revised in 2003 and CMR methodology was adopted as the standard for abundance and trend monitoring (FTHL ICC 2003). Presence/absence surveys in the framework of occupancy estimation (Mackenzie *et al.* 2003) were adopted for distribution monitoring (FTHL ICC 2003). A new monitoring plan using CMR and occupancy has been circulated for comments and is meant to form the basis of monitoring for years to come. In the Coachella Valley, CMR has been conducted on the Dos Palmas Area of Critical Environmental Concern (M. Massar, Palm Springs, CA, BLM Biologist, pers. comm. 2005) in which flat-tailed horned lizards were found on 3 of 10 plots. These 3 plots were all east of the powerline road which runs northwest to southwest through the area. Relative to the marsh and creek, they were south and east. Desert horned lizards were found north and east of the marsh and creek.

In the Coachella Valley, flat-tailed horned lizards have been monitored by counting tracks on belt transects from 2002 to 2005 (CCB 2005). These counts are used as an index of the true population. Using tracks as an index introduces several problems. Identification of tracks to species is difficult for inexperienced technicians. Also, like any index, it has a detection probability issue. The probability of finding a track present on a transect may not be 100 percent. A larger potential problem with using track abundance on transects as an index of the population size, is that the probability of tracks being present on a transect depends as much on the amount of distance lizards are moving each day as it does on the size of the population that may use the transect area. Home range area of flat-tailed horned lizards and the daily distance moved by flat-tailed horned lizards have been shown to vary widely between wet and dry years in Arizona (Young and Young 2000). Thus, in a wet year, there may be more tracks simply because lizards may be moving more. As lizards expand their home range, more lizards may encounter the transect that wouldn't have encountered it during a dry year.

Based on the track monitoring in the Coachella Valley, which has limitations as described above,

it appears that flat-tailed horned lizard numbers in Coachella Valley declined for several years but mostly recovered in 2006. The abundance index for flat-tailed horned lizards is the mean number of trackways (a set of tracks laid down by one lizard) per transect. This index has dropped each year from nearly 1 in 2002 to approximately 0.1 in 2005 (CCB 2005). Anecdotally, Dr. Cameron Barrows could find 10 flat-tailed horned lizards on the Coachella Valley Preserve in an hour in 2002 but in 2005 was lucky to find one in an hour (C. Barrows, pers. comm. 2006). In 2006, the index had returned to nearly 0.7. Such wide fluctuations make it difficult to determine the status of the species. The critical time period is at the low ebb of population size, when the population could fluctuate too low to recover. It is unknown how near this point the population reached in 2005.

Threats

Rangewide threats to the flat-tailed horned lizard include: urban development, agricultural development, OHV activity, energy developments, military activities, introduction of non-native plants, pesticide use, and habitat degradation due to Border Patrol and illegal drive-through traffic along the United States–Mexico border.

Urban and agricultural development is responsible for extensive loss of flat-tailed horned lizard habitat. The Coachella Valley, Imperial Valley, Mexicali Valley and the area around Yuma, Arizona are the major areas of agricultural development. Urban growth is continuing in the Coachella Valley, Imperial Valley, and Yuma, Arizona.

OHV activity occurs at varying intensities throughout most remaining areas supporting flat-tailed horned lizard habitat. Use guidelines within all of the flat-tailed horned lizard Management Areas recognized in the Rangewide Management Strategy allow OHV use on existing or designated routes; however legal use is restricted to such routes in these areas. Four areas open to unrestricted OHV use in California are within the range of the flat-tailed horned lizard: Plaster City Open Area, Superstition Hills Open Area, Imperial Sand Dunes Recreation Area; and Ocotillo Wells SVRA. Together, the four Open Areas comprise approximately 247,100 acres which is 25 percent of the approximately 988,400 acres of habitat remaining in California. Illegal OHV recreation is difficult to quantify, but occurs to some degree in many areas inside the MAs. Recreational use of off-highway vehicle open areas has increased substantially since the 1980's and is expected to continue to increase in the future. Visitation at California SVRAs, of which Ocotillo Wells SVRA is the largest, increased by 52 percent between 1982 and 2000 (CDPR 2002). The number of registered OHVs in California has increased by 108 percent since 1980 (CDPR 2002). While some research has demonstrated flat-tailed horned lizard fatalities associated with vehicle use (Muth and Fisher 1992), the degree of impact to flat-tailed horned lizard populations is not known. Grant (2005) found that hibernating flat-tailed horned lizards suffer low levels of mortality due to OHVs, but quantification of direct effects of OHVs on active (non-hibernating) lizards has yet to be undertaken. OHVs likely also degrade habitat by destroying native plants which produce seeds which are the main food for the harvester ants *Messor pergandei* and *Pogonomyrmex* spp.

Numerous energy developments have recently been constructed or are proposed for construction within the California desert, primarily on BLM lands in Imperial County. Energy developments

can result in surface disturbance that modifies flat-tailed horned lizard habitat.

The Department of the Navy administers land in flat-tailed horned lizard habitat in Arizona and California. In California, the Navy has several bombing practice targets for Navy jets. The bombs used are generally dummy bombs with only a small charge that releases smoke to verify the strike. The impact of low-flying, very loud aircraft has not been studied. The operations and maintenance of these targets likely has some level of effect. However, the military lands are off-limits to the public.

Invasive plants pose a threat to flat-tailed horned lizard habitat and adversely affect flat-tailed horned lizards. Invasive plants such as *Schismus* spp. increase fire frequency. After a fire, invasive plants are the primary colonizers, which encourages fire even more (Brooks and Esque 2002). Sonoran Desert vegetation is not fire-adapted. An area of East Mesa burned several years ago, and most of the creosote was killed. It is now dominated by relatively thick invasive plants.

Invasive plants also pose a threat to the flat-tailed horned lizard because flat-tailed horned lizards are found in areas with a high percentage of bare ground. Thick herbage is difficult for them to move through because of their wide bodies (Newbold 2005), perhaps making them more susceptible to predators. Additionally, thick invasive plants shrink their field of view, making it more difficult to find prey. Invasive plant seeds may not be the ideal food resource for the ants that flat-tailed horned lizards prey on. Saharan mustard was estimated to cover 39.5 percent of sampled sand fields in the Coachella Valley Preserve in 2005 (Barrows 2005). The extent of invasive plant coverage in flat-tailed horned lizard habitat throughout their range has not been measured, but is likely increasing.

Pesticides used in agriculture are known to kill individual surface-foraging harvester ants, though colonies seem to recover quickly from a single treatment (FTHL ICC 2003). The chronic effects of pesticide drift are unknown and difficult to quantify. Foreman (1997) stated that the effects of applying broad-spectrum insecticide to desert scrub communities over many years are potentially many and complex. Pesticide/herbicide drift from croplands also has the potential to adversely affect plant communities adjacent to agricultural areas. Although some pesticide drift is likely leaving agricultural areas and entering adjacent desert lands, the magnitude and effects of this drift have not been measured.

In Imperial and Yuma County, Border Patrol is highly active in patrolling the international border to intercept illegal immigration. The Border Patrol has no restrictions on desert access and can drive off-road. The border area is enduring impacts from Border Patrol traffic as well as associated illegal immigrant drive-throughs.

A more detailed analysis of these threats can be found in the Flat-tailed Horned Lizard Rangewide Management Strategy (FTHL ICC 2003), which is hereby incorporated by reference.

Synopsis of Status
Recent data indicate that relatively large flat-tailed horned lizard populations persist in the East

Mesa, Yuha Basin and Yuma Desert MAs and the Ocotillo Wells SVRA. The West Mesa MA also supports a lesser population of approximately 10,000 lizards. The species appears to be persisting in the MAs, which include 40 percent of the remaining range in the United States. However, no trend data for these areas is available. Data for populations outside of MAs are also lacking, but they may be declining due to continued habitat loss and effects of OHVs. Currently the lizard is afforded protection under a Conservation Agreement that entails implementation of the Flat-tailed Horned Lizard Rangewide Management Strategy. The Management Strategy established the five MAs (West Mesa, East Mesa, Yuha Basin, Yuma Desert, Borrego Badlands) with the goal of maintaining viable populations of flat-tailed horned lizards. If this voluntary management strategy continues to be implemented in the long-term, it is likely that the flat-tailed horned lizard will persist in designated Flat-tailed Horned Lizard Management Areas. The management strategy does not designate a management area in the Coachella Valley, but the proposed MSHCP would establish and manage a reserve system for the flat-tailed horned lizard and numerous other species.

ENVIRONMENTAL BASELINE

Historically, the flat-tailed horned lizard probably ranged throughout most of the Coachella Valley floor at elevations below approximately 750 ft above sea level. Much of this historic habitat is now lost. By one estimate, 84 percent of habitat has been lost from historic conditions in the Coachella Valley (K. Nicol, pers. comm., as cited in CVAG 2007). The Geographic Information Systems (GIS) files from the 2003 Rangewide Management Strategy revision used the 750-foot altitude rule and estimated 413,900 acres of historical habitat in the Plan Area. As discussed above, this is certainly an overestimate because of unsuitable areas below 750 feet. The Plan cites the number of 694 square miles (444,160 acres) in the Plan Area. Another estimate of extent of historical habitat in the Valley is 214,540 acres (K. Barrows, pers. comm., 2005). The exact amount of historical habitat will never be known, but it is certainly severely reduced. The MSHCP modeled 37,587 acres of current habit in the Plan Area. In addition, we estimate that approximately 2,444 acres of Reservation Lands on the "Big Dune" and in Section 6 south of the proposed Whitewater Floodplain Conservation Area currently constitute habitat (these lands are not part of the plan, however). By these estimates, current habitat (40,030 acres) is approximately 10 to 20 percent of the estimated historical habitat in the Plan Area. However, the occupied habitat is probably much lower than the modeled habitat. The Core Habitat is only 4,148 acres.

Specific localities where flat-tailed lizards have been found include the "Big Dune," the Whitewater Floodplain, and the Coachella Valley Preserve. One locality from 1995 is known from the proposed East Indio Hills Conservation Area. Two recent localities (1997 and 1998) are southwest of the proposed East Indio Hills Conservation Area, but not included in that proposed Conservation Area. Since 1995, the flat-tailed horned lizard has been documented within the Coachella Valley Preserve, the central valley floor (Big Dune), near the Whitewater Floodplain, and near and in the proposed East Indio Hills Conservation Area. Occurrences in all areas except the Coachella Valley Preserve are incidental sightings and not the product of systematic surveys.

Approximately 75 percent of the extant flat-tailed horned lizard habitat in and adjacent to the

Plan Area is either private land or Tribal land and subject to development in the near future. An area with the largest amount of remaining habitat outside the Coachella Valley Reserve System is the Big Dune area between Palm Springs and Indian Wells, south of Interstate 10. However, this area is fragmented with major roads and new development (e.g., residential housing, shopping centers, Agua Caliente Casino, and California State University of San Bernardino Extension) and is increasingly subject to new development because of its central location within the Coachella Valley.

The Coachella Valley population of flat-tailed horned lizards is the northernmost extent of the species range. Peripheral populations such as the Coachella Valley flat-tailed horned lizard population may have value to the evolutionary potential of species because they are more likely to be genetically divergent. They are more likely to have genetic adaptations that would be beneficial during future large-scale changes. Peripheral populations are more likely to be the site of future speciation events as well. Thus peripheral populations may be of relatively high value to the species despite their size (Lesica and Allendorf 1995).

Status of the Species in the Action Area

Species Distribution Within the Action Area

Species distribution was determined by CVAG through habitat models, flat-tailed horned lizard occurrences and scientific judgment. The CVAG habitat model for the flat-tailed horned lizard modeled "predicted" and "potential" habitat. Unless otherwise stated, the two categories were combined for this analysis because it has been recognized that flat-tailed horned lizards occupy more varied habitats than was previously thought (e.g., Beachamp *et al.* 1998), and some areas in the action area have not been surveyed adequately to demonstrate absence of flat-tailed horned lizards. Some recorded occurrences were not included within the CVAG habitat model. Such occurrences suggest the possibility that the modeled habitat did not capture all flat-tailed horned lizard populations.

Seemingly anomalous lizard sightings may be sightings of lizards dispersing or traveling through the area after being displaced. A single sighting may also occur in areas through which flat-tailed horned lizards are willing to travel (i.e., corridors) or at the periphery of the species' range. They may also be mis-identified desert horned lizards. Or a single sighting may be part of an unknown flat-tailed horned lizard population. Questionable habitat areas where a flat-tailed horned lizard occurrence has been documented should undergo a systematic survey to determine occupancy of the area.

Approximately 37,587 acres of modeled habitat for flat-tailed horned lizards remains in the Plan Area. An additional 2,444 acres of habitat on Indian Reservation Lands are clearly flat-tailed horned lizard habitat, but are not in the Plan Area and were not modeled as habitat. Approximately 31,019 acres of the modeled habitat are subject to the permit; the remainder (6,568 acres) are Federal lands.

Based on analyses by the ICC and CVAG, the flat-tailed horned lizard has lost at least 80 to 90 percent of the historic habitat within the CVMSHCP planning area. The remaining flat-tailed horned lizard habitat within the action area is extremely fragmented by highways, surface roads,

and development. Approximately 15 percent of the remaining habitat lies within Dos Palmas, which supports a population that is disjunct from any other populations within the Coachella Valley.

Six proposed conservation areas currently or may support flat-tailed horned lizards: Whitewater Floodplain, Willow Hole, Edom Hill, Thousand Palms, East Indio Hills, and Dos Palmas.

The northwestern-most habitat area within the action area is the proposed Whitewater Floodplain Conservation Area; however, only one unsubstantiated record of flat-tailed horned lizard presence has been obtained in recent years, despite regular presence of herpetologists Dr. Allan Muth and Dr. Mark Fisher in the proposed conservation area. The proposed Whitewater Floodplain Conservation Area has 5,489 acres modeled as flat-tailed horned lizard habitat, however sand transport constraints have affected the habitat quality within much of the Whitewater Floodplain Conservation Area. Sand is only supplied to northern areas of the floodplain. This may be one factor in the apparent disappearance of flat-tailed horned lizards from this area. The proposed Whitewater Floodplain Conservation Area is separated from the nearby proposed Willow Hole Conservation Area to the northeast by Interstate 10, and the Union Pacific Railroad tamarisk windrow. These two areas currently have minimal connectivity via Mission Creek under interstate 10. However, the Plan provides for a biological corridor via Salvia Wash and the associated crossings under Interstate 10 and the railroad, once the plugged culvert under the railroad is replaced with a bridge of unknown dimensions. This corridor would potentially allow movement between the Whitewater Floodplain and Willow Hole.

Flat-tailed horned lizards were observed in the proposed Willow Hole Conservation Area in 1978 (CVAG 2007), though none have been seen on annual Coachella Valley fringe-toed lizard transects there since they were started in 1986 (CVAG 2007). The proposed Willow Hole Conservation Area contains 1,722 acres of modeled habitat. The proposed Willow Hole Conservation Area is adjacent to the proposed Edom Hill Conservation Area. No flat-tailed horned lizards have been observed in the proposed Edom Hill Conservation Area, though it contains 276 acres of modeled habitat. The habitat in the proposed Edom Hill Conservation Area and the proposed Willow Hole Conservation Area are broadly connected and thus comprise a single habitat patch. The flat-tailed horned lizard habitat in the proposed Willow Hole/ Edom Hill Conservation Areas is potentially connected with the Thousand Palms population of flat-tailed horned lizards through the sandy swales distributed across the Indio Hills.

The proposed Thousand Palms Conservation Area contains 4,327 acres of modeled habitat and the best studied population of flat-tailed horned lizards in the valley. The population here is far and away the largest in the Plan area. Southeast of the proposed Thousand Palms Conservation Area is the East Indio Hills Conservation Area. The flat-tailed horned lizard habitat in these two conservation areas may already be separated by development, though a linkage appears possible along the base of the Indio Hills.

The proposed East Indio Hills Conservation Area contains 757 acres of modeled habitat. One flat-tailed horned lizard was found in the proposed East Indio Hills Conservation Area in 1995, and two were found outside the proposed Conservation Area to the southwest.

Proposed Conservation Area	Predicted + Potential Modeled Habitat (acres)
Dos Palmas	5,537
Whitewater Floodplain	5,489
Thousand Palms	4,327
Willow Hole	1,722
East Indo Hills	645
Edom Hill	276
Long Canyon	110
Upper Mission Creek/Big Morongo Cyn.	96
Santa Rosa/San Jacinto Mtns.	76
Snow Creek/Windy Point	20

Southwest of the Coachella Valley Preserve some remnant patches of habitat remain on the Big Dune. Historically, all of the Big Dune was likely habitat for flat-tailed horned lizards. CVAG reports "archived" occurrences of flat-tailed horned lizards on the Big Dune, most of which are now developed. Currently 6,621 acres of land on the Big Dune remain undeveloped. Remnant flat-tailed horned lizard populations likely persist there. The Big Dune is isolated from other habitat areas by Interstate 10 and development.

Approximately 28 miles to the southeast from the proposed East Indio Hills Conservation Area is the proposed Dos Palmas Conservation Area. These two habitat areas are separated by extensive agricultural development, and a report cited in CVAG (2007) reports that no corridor for flat-tailed horned lizard exists. An extant population of flat-tailed horned lizards was verified in the proposed Dos Palmas Conservation Area in the summer of 2005 when surveys were conducted in the Dos Palmas Area of Critical Concern (ACEC) by the Bureau of Land Management (M. Massar, Palm Springs, CA, BLM Biologist, pers. comm. 2005). Modeled habitat encompasses 5,537 acres (14.5 percent of modeled habitat in the Plan Area); however, the flat-tailed horned lizard population appears to be largely confined to an area of approximately 537 acres, based on the mark-recapture study and further evaluation of the habitat model. It may be a much larger area depending on how accurate the habitat model is. The Dos Palmas population of flat-tailed horned lizards is also likely disjunct from flat-tailed horned lizard populations to the south. Flat-tailed horned lizards were not found west and north of Dos Palmas marsh and creek, but they were found in a small habitat patch of approximately 537 acres between the creek and the mountains to the east. A substantial amount of the Desert Sink Scrub community occurs in the proposed Dos Palmas Conservation Area and a portion was modeled as flat-tailed horned lizard habitat. Desert Sink Scrub is not generally considered to be good habitat for flat-tailed horned lizards. To arrive at the figure of 537 acres we found the area of modeled flat-tailed horned lizard habitat in the Sonoran Creosote Bush Scrub east and south of the marsh, creek bed, and Desert Sink Scrub. Sonoran Creosote Bush Scrub exists to the west and north of the marsh, creek bed and Desert Sink Scrub, but the BLM found only desert horned lizards there. Approximately 300 acres of this habitat are BLM land and 223 acres lie on private land. Dos Palmas currently doesn't have the development pressure that other areas in the Plan Area have.

Species Reproduction Within the Action Area
No information specific to the action area is known about reproduction of the flat-tailed horned lizard. Reproduction is assumed to occur as described above in the Life History section.

Species Abundance Within the Action Area
Because of a reduction in distribution and available habitat, particularly from losses of suitable habitat due to agricultural and urban development, and possibly habitat function, flat-tailed horned lizard abundance within the Coachella Valley has substantially declined over historical numbers. The largest population appears to be in the Coachella Valley Preserve. The proposed Dos Palmas Conservation Area may hold the next largest population. There is a large amount of land in the Whitewater Floodplain that supported flat-tailed horned lizards in the past, but now that population may be small or extirpated. Populations in the proposed Willow Hole, Edom Hill and East Indio Hills Conservation Areas are probably small, if extant. There is a large amount of undeveloped land on the Big Dune (6,621 acres), but edge effects and fragmentation have been substantial and may have affected flat-tailed horned lizard abundance.

The Coachella Valley Preserve has had the most research conducted on flat-tailed horned lizards, and baseline monitoring has been conducted there (CCB 2005). An abundance index for flat-tailed horned lizards has been measured there from 2002 to 2005. The index is the mean number of trackways (a set of tracks laid down by one lizard) per transect. This index has dropped each year from nearly 1 in 2002 to approximately 0.1 in 2005 (CCB 2005). Anecdotally, Dr. Cameron Barrows could find 10 flat-tailed horned lizards on the Coachella Valley Preserve in an hour in 2002 but in 2005 was lucky to find one in an hour (C. Barrows, pers. comm. 2006). For both indices to drop by an order of magnitude adds to the concern. Fortunately the index rebounded to 0.65 in 2006 from 0.1 in 2005 (C. Barrows, pers. comm., 2006). Flat-tailed horned lizard populations appear to oscillate according to precipitation patterns, but apparent declines of an order of magnitude have not been noted elsewhere. However, different methods are also used elsewhere and so are not perfectly comparable. Population fluctuations may be exacerbated by anthropogenic effects. Additionally, other FTHL populations are large enough to suffer localized extinctions that can be repopulated in better years. Coachella Valley populations are isolated from other populations that could repopulate the habitat if the local population were to go extinct. Additionally, there are genetic consequences to the "bottleneck" caused by a severe decline in numbers. How low the population can drop before it cannot recover is unknown.

Species Status Within the Action Area
Within the action area the flat-tailed horned lizard is fairing poorly. Urban development and agriculture have replaced most historical habitat in the Plan Area. In addition, development has blocked sand sources and sand transport and has likely rendered areas less habitable to flat-tailed horned lizards.

The remaining habitat in the Coachella Valley cannot support a large population and as populations decrease in size, there are consequences to long-term viability. A genetically viable population avoids inbreeding depression and retains its ability to adapt in the face of change. Genetic viability may be especially important to species in light of expected climate change. A

population size of 5,000-50,000 is suggested as necessary to maintain genetic variability for short-term evolutionary potential, and a population size of 500 is suggested as necessary to avoid inbreeding depression (Frankham *et al.* 2004). Using a conservative estimate of 0.4 adults per acre (1 adult lizard per hectare, taken from density estimates in other parts of its range), 1,660 lizards would currently be extant in the Plan's proposed Core Habitat (4,148 acres (1,679 hectares)). A population of 5,000 would require 1.2 adult lizards per acre (3 per hectare), a density it probably reaches during good years in the best habitat areas, but it certainly drops below that level during low population ebbs. (Available density estimates for flat-tailed horned lizards in the Coachella Valley are difficult to use for these purposes because they do not distinguish between adults and juveniles and appear to not control for lack of geographical closure). Thus, based on the best theory available on this subject, the small populations of flat-tailed horned lizards in the Coachella Valley may be hampered in their ability to adapt to future changes such as climate change.

Similarly, we conservatively estimate 215 adult lizards on the 537 acres of modeled habitat in Dos Palmas. A population of this size may be vulnerable to inbreeding depression, and a stochastic event could extirpate it.

The current habitat in the Plan Area (37,587 acres) represents 1 percent of the current range in the U.S. and Mexico (4.0 million acres) estimated in the Rangewide Management Strategy (FTHL ICC 2003). However, the Rangewide Management Strategy didn't estimate habitat to the fine scale that the MSHCP did. If it did, the proportion which the Coachella Valley habitat is of the entire range for the species would increase slightly. On the other hand, judging from the CVAG flat-tailed horned lizard model and aerial photographs from 2003, some of the area modeled as flat-tailed horned lizard habitat is already lost to development in the Big Dune. In summary, 1 percent is probably a fair estimate and is accurate enough for most purposes.

In addition to loss of habitat, extant populations of flat-tailed horned lizards in the Coachella Valley appear to fluctuate widely, as described previously. From 2002 to 2005, flat-tailed horned lizard numbers appeared to be declining, though this trend reversed in 2006. The decline was correlated with successively increasing rainfall levels from 2002 to 2005. The unusually high precipitation may have had multiple effects on the flat-tailed horned lizard, such as increasing cover of invasive Saharan mustard and decreasing ant populations. Alternatively, they may have been more difficult to detect in wetter years. The population appeared to rebound in 2006 when rainfall levels decreased. A widely fluctuating population is more likely to become extirpated at a low ebb than a population the remains steady.

Flat-tailed horned lizards have lost a comparatively larger percentage of habitat in the Plan Area than in other parts of their range. Development has replaced habitat and interruption/disruption of sand source and transport has rendered other habitat less suitable or unsuitable. In areas that still constitute habitat, flat-tailed horned lizard numbers fluctuate widely.

Factors Affecting the Species' Environment within the Action Area
A number of factors such as interruption of sand transport, invasive plant invasion, fragmentation, OHV activity, edge effects associated with roads and urban development, and

habitat conversion adversely affect the flat-tailed horned lizard in the Plan Area. Many of the issues regarding sand source and sand transport facing the other sand-dwelling species in the MSHCP also face the flat-tailed horned lizard. These issues are addressed in detail in the General Section of the Biological Opinion on sand source and transport.

Invasive plants pose a threat to the flat-tailed horned lizard because flat-tailed horned lizards are found in areas with a high percentage of bare ground. Thick herbage is difficult for them to move through because of their wide bodies (Newbold 2005), perhaps making them more susceptible to predators. Additionally, thick invasive plants shrink their field of view, making it more difficult to avoid predators and find prey. Invasive plant seeds may not be a suitable food resource for the ants that flat-tailed horned lizards prey on. Saharan mustard, an invasive plant, was estimated to cover 39.5 percent of sand fields sampled in the Coachella Valley Preserve in 2005 (C. Barrows, pers. comm.).

Roads may be especially deadly as flat-tailed horned lizards are inclined to freeze rather than run in the face of danger and are difficult to see and avoid. Busy roads may be impassable to flat-tailed horned lizards. Busy roads fragment the habitat remaining in the Coachella Valley.

Flat-tailed horned lizards may be particularly susceptible to edge effects. Barrows *et al.* (2006) found flat-tailed horned lizards to be severely reduced nearer the edge of the Coachella Valley Preserve. Loggerhead shrikes (*Lanius ludovicianus*) and American kestrels (*Falco sparverius*) use powerlines or urban landscape trees to nest in and hunt from at the edges of flat-tailed horned lizard habitat (CCB 2005, Young and Young 2000). Feral cats and dogs contribute to flat-tailed horned lizard losses, as do children, since flat-tailed horned lizards are easier to capture than other lizards once found.

OHV trespass occurs in the proposed Whitewater Floodplain, Willow Hole, and Edom Hill Conservation Areas. OHV traffic may not kill hibernating flat-tailed horned lizards, but lizards on the surface can be killed, and the indirect effects of OHVs are poorly known (Grant 2005). Coachella Valley Water District owns land within Section 19 of the Whitewater Floodplain Conservation Area where the OHVs have access. To adequately conserve this conservation area, OHV activity needs to be controlled and the effects of these activities managed.

Climate change may affect habitat in the Coachella Valley. Habitat may become unable to support flat-tailed horned lizards, and new habitat may become available in the future. The sum effect is difficult to predict because the extent that the climate will change is unknown. Rainfall patterns could change, rendering habitat too dry or wet to continue to support flat-tailed horned lizards. The Plan makes no provision for redesignation of habitat should climate change in the next 75 years make it necessary, but habitat linkages and corridors were provided to allow species movement.

Pesticide use in agricultural fields has been considered a threat to the ants flat-tailed horned lizards prey on. Pesticide use is prohibited in Management Areas designated for the flat-tailed horned lizard conservation agreement and rangewide management strategy (FTHL ICC 2003 and references therein). Pesticides kill individual harvester ants, but since the entire colony is never

outside, one treatment does not eliminate a colony. In fact, the benefits of living near agricultural fields may outweigh the disadvantages for black harvester ants (*Messor pergandei*). Black harvester ants were found in greater densities nearer agricultural fields and urban areas in Arizona (Young and Young 2004). However, flat-tailed horned lizards were found more often away from agricultural fields and urban development (Young and Young 2004). Agricultural areas seem to harbor more predators on their edges, especially round-tailed ground squirrels (*Spermophilus tereticaudus*), which probably affects nearby flat-tailed horned lizard populations.

EFFECTS OF THE ACTION

The proposed action would permit the loss of over half of the modeled flat-tailed horned lizard predicted and potential habitat within the Plan Area. Approximately 19,282 acres of flat-tailed horned lizard habitat in the Plan Area could be lost, which represents 51 percent of the total habitat in the Plan Area (37,587 acres). Some of the habitat that could be lost is in small, fragmented patches of little value to flat-tailed horned lizards. As much as 3,500 acres of modeled habitat outside the Conservation Areas is in patches of 100 acres or less. Anything of 100 acres or less is almost certainly unable to support a population of flat-tailed horned lizards in the long-term. However, other areas that could be lost could be of high value to flat-tailed horned lizards. At least 8,000 acres of habitat on the Big Dune, that is contiguous, though fragmented by roads, would be lost.

The proposed action would conserve 9,597 acres of flat-tailed horned lizard habitat that currently have no protection (31 percent of land subject to the permit). The action would also continue existing protection of 7,514 acres that are currently protected under Existing Conservation Lands. A total of 17,111 acres (46 percent of the flat-tailed horned lizard habitat within the Plan area) would benefit from ongoing and future protection and management. The proposed action would provide for monitoring and management actions on conserved lands intended to benefit flat-tailed horned lizards.

Mitigation and Minimization Measures

The Plan designates one Core Habitat area (areas that can maintain self-sustaining populations). The Plan commits to establishing two more self-sustaining populations, if feasible. One population is extant in the proposed Dos Palmas conservation area, though whether it is self-sustaining in the long-term is unknown. Establishment of a third population would require reintroduction of flat-tailed horned lizards to another conservation area such as the proposed Willow Hole or Whitewater Floodplain Conservation Area. Re-introductions to re-establish populations for conservation purposes have met with varied success in the past (Dodd and Seigel 1991, Burke 1991, Fischer and Lindenmayer 2000). Experimental relocation has been tested on a few flat-tailed horned lizards in Arizona. Against expectations, survival of relocated flat-tailed horned lizards was significantly higher than control lizards (Painter *et al.* 2007). However, survival rates were very low in both groups, likely because transmitters make lizards more visible to predators. Relocation of flat-tailed horned lizards may be required to re-establish a population in the proposed Whitewater Floodplain Conservation Area. A new influx of sand has likely made it better habitat for flat-tailed horned lizards. In the past, it would have been recolonized by adjacent populations, but now there are not adjacent populations from which to recruit. Re-establishing a flat-tailed horned lizard population in the Whitewater Floodplain or

elsewhere, while potentially possible, may not be easily accomplished. Re-establishment of a population will also be difficult if the original threat that extirpated the population is not removed. On the Whitewater Floodplain, the threat is likely the depletion of blowsand and food supplies by drought.

Approximately 9,597 acres of modeled habitat would eventually be added to the MSHCP Reserve System under the Plan, in addition to Existing Conservation Lands. Modeled habitat that would be protected under the Plan are in the following proposed Conservation Areas: Dos Palmas (3,631 acres), Whitewater Floodplain (2,684 acres), Willow Hole (1,432 acres), Thousand Palms (963 acres), East Indio Hills (520 acres), Edom Hill (248 acres), Upper Mission Creek/Big Morongo Canyon (86 acres), Santa Rosa and San Jacinto Mountains (19 acres), and Snowy Creek/Windy Point (14 acres). These numbers reflect the plan to conserve approximately 90 percent of land subject to the permit that has been modeled as lizard habitat within each Conservation Area. Thus, approximately 10 percent of habitat on non-federal lands within each Conservation Area would be subject to loss (these losses are already incorporated into the numbers above). Although the majority of the private lands would be conserved within a given Conservation Area, the ultimate configuration of the proposed Reserve System is unknown at this time. Reserve System configuration would be subject to the proposed Conservation Objectives and Required Measures established in Section 4.0 of the MSHCP for each Conservation Area. Species Goals and Objectives are detailed in Section 9.0 of the MSHCP and would be considered as individual projects would be run through the Joint Project Review Process. Core Habitat would be protected more than other areas in Conservation Areas, however. The Plan proposes to maintain viable populations in Core Habitat areas; no such commitment is made for Other Conserved Habitat. The MSHCP anticipates the loss of 96 acres (2 percent) of the designated Core Habitat (4,131 acres). Within Conservation Areas, the Plan would allow loss of 832 acres (3 percent) of predicted habitat and 252 acres (4 percent) of potential habitat.

Urban Development

Direct Effects

Suitable habitat within the Plan Area that is not proposed to be conserved is expected to be lost through proposed Covered Activities, predominantly urban development. Within the Plan Area, flat-tailed horned lizards in areas that would not be conserved would be expected to perish during development of the land. Of 31,019 acres of modeled predicted and potential habitat on land subject to the permit, 18,218 acres (59 percent) are outside proposed conservation areas and are authorized for take. Within proposed conservation areas, 1,064 acres are authorized for take. In sum, a total of 19,282 acres are authorized for take, which is 62 percent of the land subject to the permit.

In general, loss of habitat is assumed to be linearly related to the loss of individual flat-tailed horned lizards. Most lizards would be killed during construction and those that escaped would likely perish from predation or other sources of mortality.

CVAG has 21 recent occurrences and six “archived” occurrences for the flat-tailed horned lizard. The “archived” occurrences occur on the Big Dune, and most are already covered by

development. Twelve of the 21 extant occurrences of flat-tailed horned lizards would be inside conservation areas – three in the proposed Dos Palmas Conservation Area, seven in the proposed Thousand Palms Conservation Area, and two in the Whitewater Floodplain Conservation Area. Current populations that are at least sustainable in the short-term exist in Thousand Palms and Dos Palmas Conservation Areas, but there is apparently no longer a population on the Whitewater Floodplain Conservation Area.

Nine of the 21 extant occurrences would not be conserved in a conservation area and would be subject to take. The occurrences subject to take are from various locations such as just outside the proposed Dos Palmas Conservation Area, on the edges of the Indio Hills, near the airport in Palm Springs, on Windy Point, on Flat Top Mountain and one on the Big Dune. Most of these are either peripheral to important populations (such as just outside Dos Palmas Conservation Area) or probably do not represent populations that are sustainable in the long term. The exception is the population on the Big Dune. There may be a remnant population on the Big Dune, simply because of the size of remaining habitat. Road effects have probably substantially reduced this population, however. The occurrence near the airport is now covered with development, the occurrence at Windy Point is questionable or at least unlikely to represent a population, and none have been seen on Flat Top Mountain since 1978. The occurrences on the edges of the Indio Hills are also somewhat inexplicable, but may represent a small remnant population persisting at the base of the Indio Hills where sand accumulates.

Indirect Effects

Indirect effects include edge effects on flat-tailed horned lizards from existing and future development. Road mortality may increase as a result of the Plan and increased predation from wild and domestic animals would also likely result. As discussed above, the sand source and transport, though partially preserved in some areas, would continue to be degraded in others (see Effects section of General Biological Opinion). Off-highway vehicle activity also would likely increase because of an increased population.

The proposed Land Use Adjacency Guidelines are intended to minimize edge effects from parcels adjacent to conservation areas. The plan enumerates invasive plants that are not permitted on adjacent lands. Barriers must be erected to minimize unauthorized public access and ingress of domestic cats and dogs. Land Use Adjacency Guidelines are particularly important for this species because flat-tailed horned lizards appear to be particularly susceptible to edge effects (CCB 2005). A threat to this species is avian predators (American kestrels, loggerhead shrikes, ravens, roadrunners (*Geococcyx californianus*) that nest and perch on adjacent anthropogenic structures such as telephone poles, ornamental palm trees, and fences. From there, they hunt in flat-tailed horned lizard habitat. The decline in abundance of flat-tailed horned lizards near edges is attributed to this increased predation pressure (CCB 2005). This edge effect effectively reduces the size of the conservation areas and creates a sink that may drain populations.

The spread of weeds such as Saharan mustard may degrade quality of habitat. Flat-tailed horned lizards occupy areas with high percent cover of bare ground. Weeds create high-cover areas that become unfit for flat-tailed horned lizards. In 2005, unusually high rainfall levels created dense

cover of Saharan mustard on most of the Coachella Valley Preserve. It seems likely the mustard explosion contributed to the further decline of flat-tailed horned lizard numbers in 2005. Weed control may be required to maintain habitat of sufficient quality to maintain a viable population. Control of weeds would be implemented through monitoring and adaptive management.

Off-highway vehicle activities continue illegally in some areas, such as in the proposed Willow Hole and Whitewater Floodplain Conservation Areas. OHVs can crush lizards and degrade habitat.

Monitoring and Adaptive Management Plan
The purpose of the monitoring and adaptive management plan would be to provide the information and management necessary to maintain self-sustaining populations of flat-tailed horned lizards in the Plan Area. Monitoring would inform management, and management would be performed in a specifically defined adaptive management process.

Proposed management
The Plan specifically lists some management activities that may be required to ensure that flat-tailed horned lizard populations persist. These include, briefly:
1. Manage impacts from roads and off-highway vehicle use.
2. Manage human access to occupied habitat.
3. Install perimeter fencing (fencing would be low to avoid encouraging predators) to keep lizards in Conservation Areas and away from roads.
4. Manage invasive species.
5. Manage impacts to harvester ants, such as aerial pesticide spraying.

Implementation of these measures is dependent on monitoring results (Section 9.6.3.2, see also Section 8.1.1). If monitoring results show that any of these factors are a having an effect that threatens the persistence of the species, adaptive management would be used to implement measures to control these factors. The Plan seems to indicate that statistically or biologically significant monitoring results would need to be obtained before any management would be implemented (see Section 8.1.1). The thresholds that would trigger management action are not identified, but Section 8.4.1.3.3 and Section 8.1.1 says they would be developed through the adaptive management process.

A specific management goal is to establish 2 more self-sustaining populations of flat-tailed horned lizards, if feasible. The locations where these new or restored populations would be established have not been detailed. Presumably they would be attempted at Dos Palmas Conservation Area, Willow Hole Conservation Area, or Whitewater Floodplain Conservation Area. Neither has the source animals for the new populations been identified. We assume that appropriate consideration of genetics would be taken. Furthermore, we also assume that the current population would not be endangered by removal of individuals for relocation.

Proposed monitoring
Baseline monitoring and development of methods for monitoring have already begun (CCB 2005). Baseline monitoring of the flat-tailed horned lizard has primarily focused on indices of

abundance and indices of threats and drivers identified in a conceptual model. Under this approach, monitoring of population trends using an index is tightly coupled with monitoring of population drivers. Baseline species-level monitoring of the flat-tailed horned lizard to date has consisted of counting tracks on transects on the Coachella Valley Preserve.

However, within 5 years of Permit issuance, the size of the flat-tailed horned lizard population in the Thousand Palms Conservation Area would be estimated (p. 8-56). The methodology used would be the mark-recapture protocol adopted by the Flat-tailed Horned Lizard Interagency Coordinating Committee or another method consistent with the Scientific Principles (Section 8.3.2). Further population estimates may be conducted at intervals to be determined by the need for information under different environmental conditions.

Management analysis

The potential management actions are a nearly comprehensive list of known threats to flat-tailed horned lizards and cover most management that is likely to be necessary in the next few decades. Adaptive management and monitoring should identify new threats as they appear. Potential management of predators is not specifically listed, though predation is a known factor and is mentioned in Section 9.6.3.2. It is not clear why potential management of predation is not listed with the other potential management actions. We assume that management of predation through various means (removal of nesting sites, potential relocation of individuals, etc.) is still a viable management option and is not precluded by the Plan.

Requiring statistically or biologically significant monitoring results before management is implemented is not prudent. The fluctuating populations, and complexity of the systems, make statistically significant results difficult to achieve. Thus, the probability of a Type II error, where an important decline in likelihood of persistence of the species in the Plan area is not detected, is likely to be very high. For example, after a few seasons of field work trying to detect the effect of invasive species on flat-tailed horned lizards, it may become apparent that the effect is difficult or impossible to establish, because of the noise in the data or cost needed to conclusively demonstrate an effect. The effect may not be detectable until the population has reached seriously low level or even unrecoverable level. In such a case, a reasonable management effort could be initiated, in the appropriate monitoring and adaptive management context. If large numbers of invasive species continue to cover the Conservation Areas, it seems reasonable to assume that they are having a negative effect, based simply on the fact that flat-tailed horned lizards prefer open space and that the habitat structure is very different from the natural structure. Thus some management of invasive species would likely be prudent. Monitoring and adaptive management may not be able to detect all threats and mitigate them in time if an excessive burden of proof is required of the monitoring.

Establishment of one or two more self-sustaining populations would increase the probability that the species would survive in the Plan Area under virtually any threat scenario.

Monitoring analysis

Problems with indices were discussed above. In particular, they give no estimate of the absolute population size, the correlation with absolute population size is unknown and likely variable, and

they don't account for detection probability. The same methodology has been used to monitor the Coachella Valley fringe-toed lizard. The index has proven inadequate at providing the information necessary to inform management. The index dropped to zero in several cases, yet the populations rebounded. Thus the index does not provide the information necessary to determine how precarious the species' situation is at low ebbs.

The main problem is tracks as an index of the size of the population. The probability of tracks being present on a transect could be dependent just as strongly on distance of daily movement and the size of home ranges as on actual population sizes. Daily movement and home range size are known to vary between wet and dry years (Young and Young 2000). The index of flat-tailed horned lizard abundance based on mean number of lizards found per transect was compared to mark-recapture data collected in the same area to evaluate the relationship between the index and the true abundance (CCB 2005). Two out of three years had statistically significant relationships between the index and the mark-recapture data, however the sample sizes were small (n=5), and the regression lines were strongly influenced by outliers. The regression line for the year that was not significant was not shown. The report cites some unexplained factor as the cause for the lack of significance in the third year. Unexplained factors are the very reason why detection probability must be estimated. Further, an evaluation of the validity of the mark-recapture estimates used to compare to the indices is not possible because the specific methods for generating the mark-recapture estimates are not detailed. These results support the argument that indices are of limited utility, especially when methods incorporating detection probability are available. The skills of all involved should be exploited for conservation purposes.

The Plan indicates that estimates of population size using mark-recapture or similar methodology would be conducted as well. These estimates would provide a better indication of the status of the population and likelihood of persistence, especially when conducted over varying environmental conditions.

Summary

The proposed Plan provides reasonably competent direction for monitoring and adaptive management, but not all details can be anticipated beforehand and much would depend on how the monitoring and adaptive management is implemented. We assume the implementation of the monitoring and adaptive management plan would strictly adhere to the guidance in the Plan. The extra pressures of edge effects and invasive species may buffered by management to prevent pressures that would push a naturally low population to extinction. Populations are expected to increase in numbers again if anthropogenic factors are effectively managed.

CHANGED CIRCUMSTANCES

We have discussed above that the species undergoes population cycles that appear to be related to changes in precipitation, changes in vegetative cover (largely associated with invasive species), and/or other abiotic or biotic factors. Given this situation, the changed circumstances of drought, fire, or invasion by new invasive species are likely to exacerbate the lack of sustainability of these populations further. This reinforces the need for rigorous monitoring techniques combined with decisive management action.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

The Agua Caliente Band of Cahuilla Indians is undertaking a Habitat Management Plan for all of their Tribal lands. The draft Plan and associated documents have been reviewed publicly. It is anticipated that the final Plan and associated environmental analysis will be complete in mid-2008 with permit issuance scheduled for late 2008. Although there will be habitat loss associated with that Plan, the overall net benefit to the species is positive.

CONCLUSION

The proposed MSHCP would provide for the continued existence of the flat-tailed horned lizard in the Coachella Valley. The area is already highly modified so it is questionable whether the species will persist in the valley, but the likelihood for their future persistence is enhanced by the added protection of 9,597 acres afforded by the Plan. A total of 17,111 acres (46 percent of the modeled flat-tailed horned lizard habitat within the Plan area) would benefit from ongoing and future protection and management. Populations in the Coachella Valley appear to be declining for reasons that are not completely understood and current monitoring is not adequate for detecting population trends. The full potential of the adaptive management process and the most powerful monitoring and analytical methods would be needed to ensure the persistence of the flat-tailed horned lizard in the plan area. The plan would provide the best possible opportunity to implement the needed monitoring and management.

After reviewing the current status of this species, environmental baseline for the action area, effects of the proposed action, and cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the flat-tailed horned lizard. Loss of the Coachella Valley population would have a negligible on the status of the species as a whole, since it makes up approximately 1 percent of the current range of the flat-tailed horned lizard. Persistence of the species in the Plan area is likely only with effective Plan implementation.

AMOUNT OR EXTENT OF TAKE

It is difficult to quantify the precise number of flat-tailed horned lizards that would be taken as a result of the proposed action over the 75-year Permit term due to the large Plan Area. Therefore, the Service is quantifying the take as the number of acres of modeled habitat that would be lost in the Plan Area and the current estimated number of occurrences that would be lost as a result of the proposed action. We anticipate that up to 17,562 acres of predicted modeled habitat and 1,720 acres of potential modeled habitat within the Plan Area would become unsuitable for the flat-tailed horned lizard as a result of the proposed action. Nine of 21 occurrences would be lost. Additionally, a small, but undeterminable number of flat-tailed horned lizards are anticipated to be taken as a result of monitoring and management actions.

CONSERVATION RECOMMENDATION

1. Due the occurrence of flat-tailed horned lizards within the Dos Palmas Conservation Area, we recommend that CVCC focus one of the two populations proposed to be established within Conservation Areas in and around flat-tailed lizard modeled habitat in T8S R11E Sections 24 and 25. Surveys should be conducted to determine the extent of the population in the Dos Palmas Conservation Area and a Core Habitat area designated based on the survey results, which would then be managed as Core Habitat with the accompanying goal of maintaining a self-sustaining population through Monitoring and Adaptive Management.

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BIRDS

Yuma clapper rail (*Rallus longirostris yumanensis*)

STATUS OF THE SPECIES

Legal/Listing Status

On March 11, 1967, the Service listed the Yuma clapper rail as an endangered species (32 FR 4001). The Yuma clapper rail is afforded protection under the MBTA. The State of California added the bird to its list of endangered wildlife in May of 1971 (U. S. Fish and Wildlife Service (Service); USFWS 1983). This species is a State threatened species, a State Fully Protected Species, and has been designated as a Species of Special Concern by California Department of Fish and Game (CDFG). The Yuma Clapper Rail Recovery Plan was approved in 1983 and provides background information on the species and identifies new or ongoing tasks necessary to achieve recovery of this species. This includes the long-term preservation of habitat in breeding and wintering areas of the United States and Mexico, and maintenance of suitable flows throughout the lower Colorado River. Many of the currently occupied breeding sites in the United States are on State and Federal lands that are protected and managed for wildlife. However, adequate water supplies are needed to assure the long-term availability of this habitat. Wintering areas and needs are not well known and require further study before habitat preservation needs can be determined. Many of the Mexican breeding sites are located in the Rio Colorado Delta area and require adequate flows in the lower Colorado River for long-term use by Yuma clapper rails.

Species Description

The Yuma clapper rail is one of seven clapper rail (*Rallus longirostris*) subspecies presently recognized in the western United States and the Pacific Coast of Mexico (American Ornithologists Union; AOU 1957), and it is one of three subspecies of federally endangered western clapper rail populations. The Yuma clapper rail is the size of a crow, with long, gray-brown legs and toes. The orange bill is long, thin, and slightly down-curved. The head, neck, and breast are gray-brown, and the back feathers are darker brown with gray centers. Both the flanks and the undertail covert feathers are distinctly marked with alternate black and white bars. Males and females are similar in plumage coloration. Compared with the other dozen or so described subspecies, its plumage is less richly colored (paler, with more olive and gray tones) and its bill more slender (Dickey 1923). The body is laterally compressed, the tail and wings are noticeably short, and legs are large and strong, adaptations that allow birds to run through dense weeds or swim underwater to avoid danger.

Distribution

The Yuma clapper rail occurs primarily in the lower Colorado River Valley in California, Arizona, and Mexico and is a fairly common summer resident from Topock Marsh south to Yuma in the U.S. and at the Colorado River Delta in Mexico. There are also populations of this subspecies at the Salton Sea in California, and along the Gila and Salt Rivers to Picacho

Reservoir and Blue Point in central Arizona (Rosenberg *et al.* 1991). In recent years, individual clapper rails have been heard at Laughlin Bay and Las Vegas Wash in southern Nevada (Nevada Division of Wildlife; NDOW 1998). Population centers for this subspecies include Imperial Wildlife Management Area (Wister Unit), Sonny Bono Salton Sea National Wildlife Refuge (NWR), Imperial NWR, Cibola NWR, Mittry Lake, West Pond, Bill Williams Delta, Topock Gorge, and Topock Marsh. The Service (1983) estimated a total of 1,700 to 2,000 individuals throughout the range of the subspecies. Between 1990 and 1999, call counts conducted throughout the subspecies range in the U.S. have recorded 600 to 1,000 individuals. In 1985, Anderson and Ohmart (1985) estimated a population size of 750 birds along the Colorado River north of the international boundary. A substantial population of Yuma clapper rails exists in the Colorado River Delta in Mexico. Eddleman (1989) estimated that 450 to 970 rails inhabited this area in 1987. Piest and Campoy (1998) reported a total of 240 birds responding to taped calls in the Cienega de Santa Clara region of the Delta. These counts are only estimates of the minimum number of birds present. The population is probably higher than these counts show, since up to 40 percent of the birds may not respond in call surveys (Piest and Campoy 1998). Based on the call count surveys, the population of Yuma clapper rails in the U.S. appears stable (Service unpublished data). The range of the Yuma clapper rail has been expanding over the past 25 years, and the population may be increasing (Ohmart and Smith 1973; Monson and Phillips 1981; Rosenberg *et al.* 1991; McKernan and Braden 1999). A recent genetic analysis showed that this subspecies is outbred; population numbers of the Yuma clapper rail have not become low enough to reduce genetic diversity (Bureau of Land Management; BLM 2001).

Habitat Affinities

Yuma clapper rail habitat is characterized by cattail (*Typha*), bulrush (*Scirpus*), or tule stands, and shallow, slow-moving water near high ground. Cattail and bulrush stands are often dissected by narrow channels of flowing water that may be covered by downed vegetation. These open channels are important for foraging. Rails commonly use areas with low stem densities and little residual vegetation. They are also found in the ecotone between emergent vegetation and higher ground, such as the shoreline, channel edge, or hummocks in a marsh. In studies conducted along the lower Colorado River, rails were found to use areas far from a vegetative edge during early winter (Conway *et al.* 1993). The depth of water used by clapper rails also varied with season, with shallower water used during the breeding season, and water of moderate depth used during the winter. Although clapper rails are often found in larger stands of vegetation, they have also been found to use patches of habitat within agricultural drains (Bennett and Ohmart 1978).

Life History

Clapper rails prey upon a variety of small invertebrate and fish species that inhabit marshy areas. The Yuma clapper rail has a diverse diet. It has been documented to feed on a variety of invertebrates and some vegetation. Included in its diet are crayfish, fresh water prawns, weevils, isopods, clams, water beetles, leeches, damselfly nymphs, small fish, tadpoles, seeds, and twigs. Based on the available information, crayfish of the genera *Procambarus* and *Oropectus* appear to make up the majority of its food intake along the Colorado River (Ohmart and Tomlinson 1977). Similar crustaceans are taken at the Salton Sea, and the abundance of these animals may be a better predictor of rail population densities than vegetation (Anderson and Ohmart 1985; Patton

et al. 2003). Reported rail densities vary widely. Bennett and Ohmart (1978) reported rail densities in the Imperial Valley of 0.9 to 6.3 rails/10 hectares (3.9 to 27.4 acres/rail). Todd (1986) reported range size in Mittry Lake averaged 2.5 acres/rail (5.0 acres/pair). In that same study Todd determined that the range size along the Gila River was 0.3 to 9.0 acres. Anderson and Ohmart (1985) reported a home range size of 18.5 acres/pair.

The Yuma clapper rail establishes territories beginning in February and breeds from March to July in marshes along the Colorado River from the Nevada/California border south to the Colorado River Delta region in Mexico. Chicks generally fledge by mid-September (Eddleman and Conway 1998). The Yuma clapper rail builds its nest on a raised platform of vegetation concealed in dense marsh vegetation (Patton *et al.* 2003). Males may build multiple nests, and the female chooses one for egg-laying. Alternate nests are used as platforms for loafing, preening, and as brood platforms, but may also be useful for incubation if predators or high water disturb the primary nest (Eddleman and Conway 1994). Populations of this species occur in the Palo Verde and Imperial valleys. This subspecies is partially migratory, with many birds wintering in brackish marshes along the Gulf of California but some remain on their breeding grounds throughout the year (BLM 2001). Yuma clapper rails are found around the Salton Sea, and in agricultural drains and canals that support marsh vegetation (i.e., cattail, giant bulrush, alkali bulrush, and common reed). This subspecies breeds only in the lower Colorado River Valley and in the Salton Sink, the latter area holding about 40 percent of the United States population (Setmire *et al.* 1990). The breeding site for the largest population of the Yuma clapper rail in the United States is at the Wister unit of the CDFG Imperial Wildlife Area, near the Salton Sea. The sea's elevation is important to the Yuma clapper rail (U.S. Department of Interior; USDOI 1998) as clapper rails use shallow freshwater habitat that has formed at the mouths of many of the inflows to the Salton Sea. Yuma clapper rails avoid deeper water because it increases juvenile mortality (CDFG 1991).

Population Trends

The Yuma clapper rail apparently expanded its range in the early 1900's in response to changes in the vegetation along the Colorado River. Damming and associated changes in hydrology induced vegetation changes in some areas that favored rails. At the same time, damming and diversion of the Colorado River reduced the amount of water flowing into the Colorado River Delta, and reduced the availability of rail habitats in the Delta. Approximately two-thirds of the formerly extensive marshlands of the Delta disappeared following completion of Hoover Dam (Sykes 1937).

Threats

Yuma clapper rail habitat has been further affected by channelization, fill, dredging projects, bank stabilization, and water management practices along the Colorado River. Three Fingers Lake and Davis Lake were lost as Yuma clapper rail habitat from river channelization (USFWS 1983), but recently may have been reconnected to the river (Lesley Fitzpatrick, Service, pers. comm.). Cibola Lake experienced marsh destruction when channelization work was completed for that stretch of the river, but it has been subject to ongoing restoration efforts (Lesley Fitzpatrick, Service, pers. comm.). Rail habitat has also been adversely affected by the spread of salt cedar (*Tamarisk ramosissima*). Salt cedar consumes an unusually high amount of water,

which results in reduced wetland areas for vegetation preferred by the rail. The Cienaga de Santa Clara is on protected lands, but the water supply is not secure. This water is irrigation flows that are discharged to the Cienaga in order to meet Minute 242 salinity requirements for the Colorado River in our treaty with Mexico. Should these flows be reclaimed and treated, the flows to the Cienaga are likely to be significantly reduced (USFWS 2006), thus likely reducing or eliminating the wetland vegetation that supports this rail population.

Another threat to the Yuma clapper rail is environmental contamination due to selenium. High selenium levels have been documented in crayfish, a primary prey of clapper rails, and some adult birds and eggs. Other threats to the Yuma clapper rail include mosquito abatement activities, agricultural activities, development, and the displacement of native habitats by exotic vegetation (CDFG 1991).

Synopsis of Status
While numbers of Yuma clapper rails in the United States have been relatively stable over the last ten years at 500 to 900 birds, the reclassification criterion of a stable population of 700-1,000 birds for ten years has not been met as the total number of birds exceeded 700 in only five of those years (USFWS unpublished data). Counts in the Cienaga de Santa Clara have ranged from 93-243 (with estimates as high as 3,000+ for the entire marsh), but the future of this habitat has not been secured.

ENVIRONMENTAL BASELINE
Status of the Species in the Action Area
In California this species nests along the lower Colorado River, in wetlands along the All American Canal, the Imperial Valley, the upper end of the Salton Sea at the Whitewater River delta, and Salt Creek (NatureServe 2001). Hydroelectric dams along the Colorado River have apparently increased the amount of marsh habitat, and population numbers of the Yuma clapper rail may have increased expanding the range northward in response to the increase in available habitat (BLM 2001). Also, habitat was expanded through the creation of the Salton Sea in the early 1900s. The population along the lower Colorado River was estimated in the 1980's at 550-750 in the U.S. and 200 in Mexico (NatureServe 2001). The action area includes the northern portion of the Salton Basin range of the species.

In the Salton Basin, the principal concentrations of Yuma clapper rails are at the south end of the Salton Sea near the New and Alamo River mouths, at the Sonny Bono Salton Sea NWR, and at the Wister Unit of the Imperial Wildlife Management Area. The Colorado River population includes nesting areas at Imperial NWR, Cibola NWR, Mittry Lake, West Pond, Bill Williams Delta, Topock Gorge, and Topock Marsh. As many of these areas occur on state reserve or NWR lands, these state and federal properties will continue to have a major role in the long-term conservation of this species. Continued access to adequate water to maintain these habitats will be a key factor in the long-term management of the Yuma clapper rail.

Between 1995 and 2002, an average of 306 rails were counted around the Salton Sea, and an average of 276 were counted in the same period along the lower Colorado River corridor (USFWS, unpublished data). The Imperial Valley population represents over 40 percent of the

entire U.S. population of this species (Point Reyes Bird Observatory 1999; USFWS 1999; Lesley Fitzpatrick, Service, pers. comm.). Despite representing a sizeable proportion of the subspecies' population, overall numbers at the Salton Sea are modest (Patten *et al.* 2003). For example, only 279 were located during extensive surveys in 1999 (Shuford *et al.* 2000). Principal regional sites are the Wister Unit of the Imperial Wildlife Area, Unit 1 of the Sonny Bono Salton Sea NWR, and adjacent marshes around the New River. Yuma clapper rails have been found outside these refuge areas also. Between 1995 and 2002, a range of 3 to 42 (average of 20) clapper rails were counted outside the refuges (Service unpublished data). This includes the Trifolium 1 and Holtville Main irrigation drains in the Imperial Valley (Steve Johnson, Sonny Bono Salton Sea NWR, pers comm.; Hurlbert *et al*. 1997). A maximum count in the Holtville Main drain at one time was 5 pairs and 2 individuals (Service unpublished data). This particular drain is unusual for its length (17.8 miles) and extent of vegetation (Hurlbert *et al.* 1997), and it may be more likely than most drains in the IID system to provide habitat for Yuma clapper rails given those characteristics. In 1994, 2 pairs and 2 single rails were heard calling in the Bruchard drain during breeding season surveys (Ken Sturm, Sonny Bono Salton Sea NWR, pers. comm.).

In the surveys completed in 2004 and 2005, a total of 444 and 523 (respectively) clapper rails were tallied for the Imperial Valley. In 2006 the numbers dropped to 407 for the Imperial Valley, with a more typical (based on the previous ten years of surveys) tally for the Sonny Bono Salton Sea NWR of 95. Numbers outside the refuges dropped to one to three rails in those years, but numbers at the Sonny Bono Salton Sea NWR reached a high of 203 in 2004. The Wister Unit of Imperial Wildlife Area had its highest count in ten years in 2005 with 334 Yuma clapper rails counted. A total of eight localities have been identified within the Coachella Valley Water District (CVWD) system, with six occurring along the Coachella Valley Storm Channel (CVSC).

Factors Affecting the Species' Environment within the Action Area
With the recent completion of the Quantification Settlement Agreement, there will be changes in the IID system that could impact Yuma clapper rails. We anticipate that one Yuma clapper rail clutch may be lost in the IID system as a result of increased selenium concentrations within the drain system. Created habitat will assist in offsetting this impact, but the created habitat (current requirements call for 73 acres) will need to be surveyed for rails annually (or less frequently once established). The protocol surveys require the use of taped rail calls and thus harassment of those rails that come to occupy the created habitat will occur. Management of the created marsh (e.g., burning or harvesting vegetation) may harm rails through the temporary degradation of their habitat. This will occur approximately every three or four years, and the benefits to habitat quality should outweigh the temporary impacts.

Habitats used by clapper rails will be affected by the lining of the All American and Coachella Canals, but these impacts will be mitigated by creating additional habitats in wetland areas that will remain after the lining projects are complete. The Salton Sea elevation is expected to go down with the ongoing water transfers between Imperial Irrigation District (IID) and Metropolitan Water District of Southern California and with the San Diego County Water Authority. Ongoing operations and maintenance activities in the drains within the IID system also may affect habitat quality for clapper rails.

Management and Monitoring
The majority of the rails in the Salton Basin are found on the Sonny Bono Salton Sea NWR and at the Wister Unit of the Imperial Wildlife Management Area. These two facilities managed specific wetland cells for the Yuma clapper rail. Management includes the provision of adequate water to keep the cells in flowing, shallow water year-round with a dense cover of emergent vegetation throughout most of the cells. These facilities conduct annual surveys using a taped-call protocol to estimate the number of rails using the ponds during the breeding season. Vegetation is managed (usually burned) on an as-needed basis to ensure that the ponds do not become choked with senescent vegetation. This occurs at an interval of three to seven years. Outside of these managed areas, surveys occur in some areas related to specific project activities (e.g., surveys for rails at mitigation sites along the All American and Coachella Canals). Clapper rails were identified in the course of previous survey efforts in the drains conducted by the Service and IID, but these surveys were study-based efforts that are not planned to be repeated. Active management for this species is not conducted outside the context of the state and federal wildlife facilities.

EFFECTS OF THE ACTION

Mitigation and Minimization Measures
The Plan calls for the creation of 66 acres of freshwater emergent marsh habitat to offset the impacts to habitat in the CVWD drains. The Plan also calls for no net loss of wetlands in other areas; areas that are disturbed will be replaced at 2:1. Such losses are to be limited to less than or equal to 10 percent of the existing habitat. Pre-activity surveys would be conducted in appropriate habitat, and activities that might result in disturbance of the rails in occupied habitat would be scheduled outside the breeding season. CVWD has agreed to monitor selenium concentrations in the drains with the implementation of their Water Management Plan (WMP). This would provide for an evaluation of the risk to clapper rails associated with this constituent, and adaptive management as needed.

Direct Effects
The increased flow in the CVSC may result in an expansion of the marsh habitat at its mouth. However, increased concentrations of TDS and selenium may degrade the overall quality of the habitat. Because of the uncertainties associated with the magnitude of these changes, it is not possible to quantify impacts to the Yuma clapper rail. The net effect is anticipated to be small.

Agricultural drains support limited use by clapper rails. High-quality habitat for Yuma clapper rails consists of mature stands of dense or moderately dense cattails intersected by water channels. Clapper rails breed, forage, and find cover in this type of habitat. Clapper rails have also been reported using areas of common reed, although nesting is uncertain and density is lower than in cattail marshes. The CVWD drainage system is estimated to contain about 25 acres of clapper rail habitat, and the Coachella Valley Storm Channel contains approximately 41 acres. The vegetation characteristics of the drains (e.g., linear configuration and isolated patches of vegetation) suggest the drains provide poor quality habitat for clapper rails. Home range sizes vary greatly; values of 0.3 to 27.4 acres/rail have been reported. However, in most cases the drains are unlikely to support a block of vegetation this size, which further suggests that habitat in the drains is of limited quality to clapper rails. Breeding has not been verified in the drains,

but clapper rails have been documented in surveys of drains in the Imperial Valley during the breeding season, suggesting that some breeding is occurring in drain habitats.

Sediment and mechanical vegetation removal from the drains and the pilot channel of the Coachella Valley Storm Channel generally occurs on an annual basis. These activities could result in the take of Yuma clapper rails if the appropriate vegetation characteristics have developed to support their use of these areas. The extent of appropriate habitat in the CVWD system is on the order of 66 acres spread across the Coachella Valley Storm Channel and the 22 primary drains. Given that individual patches of habitat tend to be small, the number of Yuma clapper rails anticipated to be using the drains and thus impacted by these activities is likely to be low (i.e., on the order of five rails or rail pairs). The existing mosaic of vegetation within the system will continue to exist as no changes in maintenance practices are required by the WMP, but the actual location of habitat patches will move over time. As mentioned previously, CVWD has committed to creating 66 acres of marsh habitat using low-selenium water to replace the habitat impacted by covered activities. A plan detailing the implementation of this measure is to be provided to the Wildlife Agencies within two years of permit issuance. CVWD also has committed to "pre-action" surveys to identify and avoid areas currently occupied by this species. They will develop a Maintenance Plan within one year of permit issuance that considers the needs of the covered species including the Yuma clapper rail that may include modifications to their maintenance schedule and/or practices to reduce the potential for incidental take.

Road widening and road maintenance activities covered by the Plan have the potential to disturb rails if these activities occur in close proximity to occupied habitat. Because the Plan calls for pre-activity surveys in areas that might be occupied, these activities can be scheduled to occur outside the breeding season thus minimizing the potential for impacts. Operation and maintenance of the Coachella Canal, the operation of ALERT stations, and trail use at the State Recreation Area are not considered likely to result in adverse impacts.

Indirect Effects

The Yuma clapper rail is know to use drain habitat with the appropriate vegetative cover in the Coachella Valley, and it may be affected by WMP-related changes within the drains. These changes fall into two basic types: loss/degradation of vegetation as a result of changes in flows and/or increases in salinity of the drain flows and impacts to Yuma clapper rail reproduction resulting from increases in drain water selenium concentrations.

Flow/Salinity Effects

Much of the vegetation in the drainage system is tamarisk and common reed. These species are tolerant of a wide range of conditions. As such, they would adjust to flow changes in the drains, and their occurrence and distribution would not change substantially. Cattails and other wetland plants used as habitat by clapper rails are limited. Cattails are concentrated in the bottoms of drains. Because of the steep drain sides, little difference in the distribution of cattails would occur with higher flow volumes. If drains were wetter for longer periods of time, minor, temporary changes in the extent of cattails would potentially occur. Although such changes could not be quantified, they are believed to be small and within the range of historic variability of flows within the system.

By increasing the amount of Colorado River water used relative to groundwater, the CVWD WMP would increase salinity in the drains. Cattails are sensitive to salinity levels. Growth is best when water salinity is less than 3 g/L (3,000 ppm). Salinity levels of 3 to 5 g/L stunt the growth of cattails. Above 5 g/L (5,000 ppm), growth and survival of cattails are limited. The total amount of cattail vegetation with good growing conditions could potentially be reduced, but this impact is expected to be small given the change in average TDS concentration will increase from 2,000 mg/L to only 2,800 mg/L.

Selenium Effects

Predictions of selenium concentrations in bird eggs can be predicted based on water concentrations using the black-necked stilt model developed by Skorupa (1998). Further, based on information provided in Seiler *et al*. (2003), it is possible to estimate the probability of egg failure associated with modeled egg selenium concentrations. Based on the modeling completed for CVWD's WMP, clapper rails also could be impacted through exposure to slightly higher concentrations of selenium (on the order of 10 µg/L) in the drains that may result from implementation of CVWD's WMP. The probability of eggs failing to hatch in association with the modeled drain selenium concentrations is approximately 4 percent. CVWD has proposed to implement regular monitoring of selenium concentrations in the Coachella Valley Storm Channel and the drains to determine the magnitude of actual magnitude of those changes over time. Provided they fall within the predicted increase, and given the anticipated use of the available vegetation in the Coachella Valley Storm channel and the primary drains (estimated at 5 rails or pairs), this probability of failure would be anticipated to result in a single clutch affected by eggs failing to hatch once every five years. CVWD has committed to creating 66 acres of marsh habitat using low-selenium water to replace the habitat impacted by covered activities. Within two years of permit issuance, CVWD will submit to the Service and CDFG a plan for their approval detailing the location, water source, monitoring and management responsibilities, and funding for this measure. Because this is anticipated to be higher quality habitat than the habitat present in the Coachella Valley Storm Channel and the drains (larger blocks with less potential for edge effects and lower selenium concentrations), this should offset impacts associated with the covered activities in those areas. Monitoring of selenium in the drains would indicate whether concentrations increase beyond our expectations and thus warrant additional study and/or adaptive management to minimize the potential for adverse effects.

Management and Monitoring

We anticipate some impacts associated with the rail mitigation. Clapper rails that come to occupy the created marsh and existing habitats will be harassed during the protocol surveys required for monitoring. Some clapper rails could also be harmed as a result of the need to carry out management actions (e.g., burning) to maintain the long-term health of the created marsh and the existing marsh habitats. Such disturbances will be temporary, infrequent (approximately every third or fourth year), and will result in an overall increase in habitat quality as based on rail management experience at the Sonny Bono Salton Sea NWR and at the Wister Unit of the Imperial Wildlife Management Area.

Management of the mitigation area(s) for exotics could include reductions in the numbers of

crayfish, an exotic species that has become an important prey species for the Yuma clapper rail. The Plan includes an evaluation of this management action and identifies the potential need to enhance other prey items for this species. This will need to be incorporated into the management strategy for the habitat in a specific way if this approach is to offset the impacts of crayfish control.

Changed Circumstances

The Changed Circumstances that are likely to affect the California black rail are drought, fire, and invasion by new exotic species. Drought may reduce the flows through areas of existing habitat and/or reduce the volume of water available for created habitat. The need to maintain flows through the created habitat is a firm commitment in the Plan and as such should dictate that guaranteeing adequate flows for sustainability would be of the highest priority for CVWD. Drought may affect the rails using the irrigation drains, but this is likely to be ameliorated by the fact that water is imported into the Coachella Valley for use in agriculture. Based on the agreements associated with the Quantification Settlement Agreement and the operation of the lower Colorado River in drought conditions, CVWD is unlikely to be subject to major reductions in access to Colorado River water such that water for their 66 acre obligation cannot be met and drainwater flows cease in the Coachella Valley drains. The maintenance of flows adequate to sustain the existing marsh at Dos Palmas is an environmental commitment required by the Coachella Canal lining project. Project documents indicate that water could be taken from the Coachella Canal to meet these obligations if the remaining groundwater is not adequate for this purpose. As stated above, CVWD will continue to receive Colorado River water even in drought conditions such that Plan and lining project water obligations should continue to be met.

Unintended fire in the desert environment could spread to rail habitat in wetlands, particularly in the Dos Palmas area given the existing access to off-road vehicle users. The preventive measures identified in the Plan will assist in reducing the risk of spread of fires from the desert to the marsh. In addition, controlled burning is likely to be a tool in the long-term management of the marsh vegetation communities. The management strategies that will be developed for the existing habitats and the design and management plan for created habitat should incorporate this potential need such that burns can be appropriately controlled to optimize vegetation health and maintain refuge areas for the occupants. Proper controls and configurations will reduce the risk of wildfire spreading into these areas and establish appropriate site-specific response actions. Wildlife Agency oversight should ensure that these tasks are completely appropriately and in a timely fashion.

Various disturbances, including fire, can result in the establishment of new exotic species within rail habitats. The most likely impact associated with exotic species is the invasion of an exotic plant that changes the structural characteristics of the marsh communities. The Plan area already has exotic plant species that warrant monitoring and management, and this management should afford the opportunity to identify and address new exotic plants relatively quickly before major invasions become established. The Plan also recognizes that the rails, in particular Yuma clapper rails, may rely heavily on exotic species as prey. Management of the existing exotics may require evaluation of the prey base such that new components could be identified more quickly. While this is not guaranteed (it is tied to the identified need to control exotic crayfish), it will

increase the chances of identifying a problematic exotic species if it does occur. Monitoring the rail species through call counts will offer another means, albeit indirect, to determine if a problem exotic species may be impacting the prey base for the rails. The specifics of the monitoring program have yet to be determined, but the program will need adequate rigor to identify trends and potential problems in a timely fashion.

Cumulative Effects

Adverse effects anticipated to impact Yuma clapper rails in the Plan area have already been discussed. Impacts associated with the IID water transfers are similar because water conservation in that system may result in increases of salt and selenium. The effects have been addressed in a previous consultation with the Bureau of Reclamation (USFWS 2002) that includes activities to offset these impacts. Other anticipated activities should benefit the clapper rail including IID's creation of an additional 500+ acres of freshwater marsh to offset effects of their drain maintenance activities. If a Salton Sea restoration project moves forward, it may include the creation of additional freshwater marsh.

CONCLUSION

A relatively small proportion of the species' range-wide population occurs in the areas subject to Plan covered activities. The majority of the population in the Salton Sea area occurs on lands managed by the Service and the CDFG. The limited potential loss of Yuma clapper rail reproduction associated with increases in selenium, harm resulting from loss of habitat associated with operation and maintenance activities, harassment associated with surveys, and potential harm associated with marsh management, are not likely to jeopardize the survival and recovery of the species.

AMOUNT OR EXTENT OF TAKE

It is difficult to quantify the number of birds that will be impacted as a result of the proposed action over the 75-year permit term due to the large Plan Area. Therefore, the Service is quantifying the take as the number of acres of modeled habitat that will be impacted in the MSHCP Plan Area as a result of the proposed action. We anticipate that up to 62 acres of modeled habitat within the Plan Area will become unsuitable for the Yuma clapper rail as a result of the proposed action. Additionally, a small, but undeterminable, number of Yuma clapper rails are anticipated to be taken as a result of management actions. All rails in the plan area will be subject to recorded call surveys and may be harassed as a result.

Take will be predominantly in the form of harassment, although harm may be associated with small loss and degradation of habitat associated with the covered activities. The increase in selenium that may occur in the drains carries some slight risk that eggs laid by adult females foraging in this habitat would fail to hatch. Because this increase is associated with the Quantification Settlement Agreement that provides CVWD with more Colorado River water, this take would be covered by the special exemption to the Fully Protected Species Act provided in Fish and Game Code 2081.7.

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California black rail (*Laterallus jamaicensis*)

STATUS OF THE SPECIES

Legal/Listing Status

The California black rail is not federally listed under the Act, however, it is afforded protection under the MBTA. The California black rail was listed as threatened by the State of California in 1971 and is a State Fully Protected Species.

Species Description

The black rail is the smallest of the North American rails. The adults are pale to blackish gray with white streaking on the undertail covers and flanks and a short, black bill. The nape and upper back are chestnut in color. The California subspecies is smaller and brighter than the Eastern black rail (*L. j. jamaicensis*; Eddleman *et al.* 1994). The California black rail is a secretive rail. Unlike other rails, the black rail is most vocal in the middle of the night.

The California black rail's diet consists mostly of insects, but also includes some crustaceans, and seeds of aquatic vegetation. Flores and Eddleman (1991) studied black rail diets and food availability at Mittry Lake and found that black rails consume a wide variety of invertebrates throughout the year, including beetles, earwigs, ants, grasshoppers, and snails. When invertebrate availability drops during the winter months, a larger portion of cattail and bulrush seeds is consumed. Lower resource availability in winter causes black rails to experience a significant weight loss, indicating they are more vulnerable to stress during this time. The California black rail forages by ground gleaning (Scott 1987; Ehrlich *et al.* 1988).

Distribution

The California black rail occurs in the lower Colorado River area from the Imperial Dam, south to the Mexican border, with generally smaller, isolated populations scattered along the California coast from Tomales Bay (Marin County) to San Diego County. An exception to this is the largest known black rail population occurring within the San Francisco Bay system (including San Pablo Bay, Suisun Bay, and the Carquinez Strait). This species also occurs in the San Bernardino/Riverside area and at the Salton Sea (CDFG 1991). Along the lower Colorado River, the California black rail is a permanent resident in the vicinity of Imperial Dam and Bill Williams Delta (Snider 1969, Repking and Ohmart 1977). Black rails are also thought to breed in Cienega de Santa Clara, one of the only three breeding localities for this species in Mexico and one of the few for the subspecies anywhere (Piest and Campoy 1998).

In the proposed project area, appropriate habitats are found primarily in the managed wetlands on the state and federal wildlife refuges, in wetland areas adjacent to the Salton Sea, Finney Lake, Salt Creek, and in marsh habitats supported by seepage areas adjacent to the All American Canal, the Coachella Canal, and the East Highline Canal (Garrett and Dunn 1981). Black rails may use agricultural drains in the valley, although they have not been found to make extensive use of agricultural drains in previous surveys. Vegetation along agricultural drains mainly consists of common reed and tamarisk, species that are not generally used by black rails. Areas

of cattails and bulrushes do exist along the drains. However, these areas are small and narrow and often interspersed with other vegetation. The habitat value of marsh vegetation supported by agricultural drains is probably limited and may only support foraging by black rails. The value of the drains to California black rails is also likely to be limited by their frequent water fluctuations, varying depths, and steep-sided slopes.

Habitat Affinities

The California black rail inhabits fresh, brackish, and salt water marshes, occasionally wet savannah, and rarely dry grassland. Preferred habitat of the California black rail is characterized by minimal water fluctuations that provide moist surfaces or very shallow water, gently sloping shorelines, and dense stands of marsh vegetation (Repking and Ohmart 1977). Studies conducted along the lower Colorado River suggest that habitat structure and water depths are more important factors than plant composition in determining black rail use of wetland habitats. Unsuitable water and structural conditions appear to restrict the California black rail to only a fraction of the emergent vegetation available within an entire wetland (Flores and Eddleman 1995). In general, Flores and Eddleman (1995) found that black rails used marsh habitats with high stem densities and overhead coverage that were drier and closer to upland vegetation than randomly selected sites. Marsh edges with water less than 1 inch deep dominated by California bulrush and three-square bulrush are used most frequently. Areas dominated by cattail are also used regularly, but only in a small proportion to their availability and generally within 165 feet of upland vegetation where water depth is 1.2 inches. Telemetry studies at Mittry Lake found black rails to be sedentary, with home ranges averaging 1.2 acres or less (Flores and Eddleman 1991). The erratic movements recorded for some juvenile and unmated birds during this research were consistent with the "wandering" behavior attributed to this subspecies and supports the idea that black rails may be capable of quickly occupying newly created habitats (Flores and Eddleman 1991).

Life History

Nesting biology of the California black rail is poorly understood. Double clutching and re-nesting may be fairly common in this subspecies. Both sexes assist in incubation and brood rearing, suggesting the species is monogamous, but the duration of its pair bond and variations in its mating system are still unstudied (Eddleman *et al.* 1994). These behaviors, combined with a relatively large clutch size, long breeding season (early march through mid-September), apparently low predation rates, and aggressive nest defense, suggest that the black rail has a high reproductive potential that is likely limited by the availability of shallow water environments (Eddleman *et al.* 1994; Flores and Eddleman 1991).

Population Trends

The North American population of black rails has small and discontinuous ranges restricted largely to the United States. It is found in the greater San Francisco Bay system, smaller bays along the California coast, and the lower Colorado River system. The most recent estimate for the San Francisco Bay system (including San Pablo Bay, Suisun Bay, and the Carquinez Strait) was a total of over 25,000 California black rails (Point Rayes Bird Observatory 2002). This estimate was based on surveys that were completed in 2000 and 2001. Previous counts in these areas were on the order of 600 birds (Evens *et al.* 1991), but that effort did not produce an area

wide population estimate as was done by PRBO. Much smaller numbers were found in surveys along the central California Coast in the late 1980s with two individuals in Bolinas Bay, six in Tomales Bay, and six in Morro Bay (Evens *et al.* 1991). Evens *et al*. (1991) stated that the black rail had been extirpated from southern California coastal areas in the 1950s.

Black rails in the lower Colorado River system occur in much lower numbers. Their numbers have remained fairly steady over the last 15 years (Conway *et al.* 2005). The most recent comprehensive survey of this area was conducted in 2000, and a total of 136 birds were detected (Conway *et al.* 2005).

Threats
California black rail populations declined substantially between the 1920's and 1970's due to the loss and degradation of coastal salt marsh and inland freshwater marsh habitats (Eddleman *et al.* 1994, California Department of Fish and Game; CDFG 1991). Along the lower Colorado River, black rail populations declined an estimated 30 percent between 1973 and 1989, with the majority of birds shifting from north of Imperial Dam to Mittry Lake during the same period (Eddleman *et al.* 1994). The effect of selenium in the lower Colorado River on black rails remains unknown, but elevated levels of this contaminant also may threaten black rail populations in the Salton Sea system (Arizona Game and Fish Department; AGFD 1996, Eddleman *et al.* 1994, Flores and Eddleman 1991). The lower Colorado River population and the small population in the Salton Sea area represent the only stable populations of this subspecies (Eddleman *et al.* 1994, Rosenberg *et al.* 1991) in the southern part of California.

Synopsis of Status
While the San Francisco Bay population may be robust, the population in the lower Colorado River system is very small. Other than Mittry Lake, most of the individual groups within the broader lower Colorado River/Salton Sea population have less than ten individuals. This fragmented distribution may make the black rail more vulnerable to the threats described above associated with changes in water management and selenium concentrations in the system.

ENVIRONMENTAL BASELINE

Status of the Species in the Action Area
Black rails occur along the lower Colorado River, with approximately 100 to 200 individuals estimated to occur from Imperial National Wildlife Refuge south to Mittry Lake (Rosenberg *et al.* 1991). In more recent surveys a total of 100 individuals were counted at 20 sites along the lower Colorado River (Courtney Conway, USGS, unpublished data). Of this total 62 black rails were found in Arizona, and 38 were in California.

This species was presumed to be rare and infrequent in the Salton Sea area until the late 1970s, when it was discovered that small numbers were present in the Imperial Valley and elsewhere around the Sea. Other regional records from the late 1970s through the 1980s are from the vicinity of the New River mouth and Fig Lagoon. The species persisted at Finney Lake through the 1980s, but disappeared when the CDFG drained the lakes for renovation, with the last bird recorded in April 1989 (Evens *et al.* 1991). A study by Jurek (1975) and other investigators in 1974 and 1975 identified eight marsh areas with black rails between the Coachella and East

Highline Canals south of Niland. Six individual records near Niland from January and February (Patten *et al.* 2003) suggest that black rails are resident at the Salton Basin, but it may be only a sporadic winter visitor to the Salton Basin area (Garrett and Dunn 1981; Evens *et al.* 1991). The Coachella Canal south of Niland was concrete-lined in 1981, and all black rail habitat supported by canal seepage was desiccated (Evans *et al.* 1991). More recently, black rails were censused along the All American Canal during April and May of 1988 in conjunction with Yuma clapper rail surveys. A minimum of three black rails was recorded for the area. In the a systematic survey for the species at the Salton Sea and surrounding areas in 1989, 15 birds were recorded in the Salton Sea area (Laymon *et al.* 1990).

In 1999, the Point Reyes Bird Observatory failed to find the species during focused surveys for it around the south end of the Sea (B. Mulrooney in Patten *et al.* 2003). In 2000 Courtney Conway (USGS, unpublished data) found no California black rails in surveys around the Salton Sea. These surveys also covered the seepage areas along the All American and Coachella Canals, and black rails were located in these surveys. A total of 21 were reported along the All American Canal and six along the Coachella Canal. Another five black rails were found along the New River. The reproductive status of these birds is uncertain, although some locations have had numerous calling birds over a period of several weeks in the spring, suggesting a breeding population (Salton Sea Authority and Bureau of Reclamation 2000). There is one record for this species along the CVSC, and it has been found in Dos Palmas and Frink Springs (CVWD 2002).

Factors Affecting the Species' Environment within the Action Area
Habitats used by black rails will be affected by the lining of the All American and Coachella Canals, but these impacts will be mitigated by creating additional habitats in wetland areas that will remain after the lining projects are complete. The Salton Sea elevation is expected to go down with the ongoing water transfers between Imperial Irrigation District (IID) and Metropolitan Water District of Southern California and with the San Diego County Water Authority. Ongoing operations and maintenance activities in the drains within the IID system also may affect habitat quality for black rails.

Management and Monitoring
The majority of the rails in the Salton Basin are found on the Sonny Bono Salton Sea NWR and at the Wister Unit of the Imperial Wildlife Management Area. These two facilities managed specific wetland cells for the Yuma clapper rail. Management includes the provision of adequate water to keep the cells in flowing, shallow water year-round with a dense cover of emergent vegetation throughout most of the cells. These conditions have created appropriate areas for California black rails in some of the managed wetland cells. These facilities conduct annual surveys using a taped-call protocol to estimate the number of rails using the ponds during the breeding season. Individual black rails have been observed at the Sonny Bono Salton Sea NWR, and 12 rails were detected in surveys of the Wister Unit in 2006 (Service, unpublished files). Vegetation is managed (usually burned) on an as-needed basis to ensure that the ponds do not become choked with senescent vegetation. This occurs at an interval of three to seven years, and the pioneer species are frequently the bulrushes preferred by black rails. Outside of these managed areas, surveys occur in some areas related to specific project activities (e.g., surveys for rails at mitigation sites along the All American and Coachella Canals), but no active

management has been pursued in these areas.

EFFECTS OF THE ACTION

Mitigation and Minimization Measures

The Plan calls for the creation of 66 acres of freshwater emergent marsh habitat to offset the impacts to habitat in the CVWD drains. The Plan also calls for no net loss of wetlands in other areas; areas that are disturbed will be replaced at 2:1. Such losses are to be limited to less than or equal to 10 percent of the existing habitat. Pre-activity surveys would be conducted in appropriate habitat, and activities that might result in disturbance of the rails in occupied habitat would be scheduled outside the breeding season. CVWD has agreed to monitor selenium concentrations in the drains with the implementation of their Water Management Plan (WMP). This would provide for an evaluation of the risk to black rails associated with this constituent, and adaptive management as needed.

Direct Effects

The increased flow in the CVSC may result in an expansion of the marsh habitat at its mouth. However, increased concentrations of TDS and selenium may degrade the overall quality of the habitat. Because of the uncertainties associated with the magnitude of these changes, it is not possible to quantify impacts to the California black rail. The net effect is anticipated to be small.

Agricultural drains may support limited use by black rails. High-quality habitat for black rails consists of dense emergent vegetation (particularly bulrush) with very shallow water and gentle side slopes. Black rails breed, forage, and find cover in this type of habitat. The CVWD drainage system is estimated to contain about 25 acres of potential black rail habitat, and the Coachella Valley Storm Channel contains approximately 41 acres. The vegetation characteristics of the drains suggest the drains provide poor quality habitat for black rails. Home range sizes vary greatly; values of 1.2 acres/rail have been reported (Flores and Eddleman 1991). However, in most cases the drains are unlikely to support a block of vegetation this size, which further suggests that habitat in the drains is of limited quality to black rails. Breeding has not been verified in the drains, nor have black rails been documented in surveys of drains during the breeding season.

Sediment and mechanical vegetation removal from the drains and the pilot channel of the Coachella Valley Storm Channel generally occurs on an annual basis. These activities could result in the take of California black rails if the appropriate vegetation characteristics and water level conditions have developed to support their use of these areas. The habitat occurring in these areas would be linear segments that are not ideal for this secretive species; nesting in the drains has not been confirmed. The extent of appropriate vegetation in the CVWD system is on the order of 66 acres spread across the Coachella Valley Storm Channel and the 22 primary drains. Given that individual patches of this vegetation tend to be small and water level fluctuations in the drains may preclude their use by this species, the number of California black rails that possibly may be using the drains and thus impacted by these activities cannot be estimated given the existing information but is likely to be very low. The existing mosaic of vegetation within the system will continue to exist as no changes in maintenance practices are required by the WMP, but the actual location of vegetated patches will move over time. As

mentioned previously, CVWD has committed to creating 66 acres of marsh habitat using low-selenium water to replace the habitat impacted by covered activities. A plan detailing the implementation of this measure is to be provided to the Wildlife Agencies within two years of permit issuance. CVWD also has committed to "pre-action" surveys to identify and avoid areas currently occupied by this species. They will develop a Maintenance Plan within one year of permit issuance that considers the needs of the covered species including the California black rail that may include modifications to their maintenance schedule and/or practices to reduce the potential for incidental take.

Road widening and road maintenance activities covered by the Plan have the potential to disturb rails if these activities occur in close proximity to occupied habitat. Because the Plan calls for pre-activity surveys in areas that might be occupied, these activities can be scheduled to occur outside the breeding season thus minimizing the potential for impacts. Operation and maintenance of the Coachella Canal, the operation of ALERT stations, and trail use at the State Recreation Area are not considered likely to result in adverse impacts.

Indirect Effects
The California black rail is not know to, but may, use drain habitat with the appropriate vegetative cover and water depth characteristics in the Coachella Valley, and it may be affected by WMP-related changes within the drains. These changes fall into two basic types: loss/degradation of vegetation as a result of changes in flows and/or increases in salinity of the drain flows and impacts to California black rail reproduction resulting from increases in drain water selenium concentrations.

Flow/Salinity Effects
Much of the vegetation in the drainage system is tamarisk and common reed. These species are tolerant of a wide range of conditions. As such, they would adjust to flow changes in the drains, and their occurrence and distribution would not change substantially. Bulrushes and other wetland plants used as habitat by black rails are limited. Bulrushes and cattails are concentrated in the bottoms of drains. Because of the steep drain sides, little difference in the distribution of emergents would occur with higher flow volumes. If drains were wetter for longer periods of time, minor, temporary changes in the extent of emergents would potentially occur. Although such changes could not be quantified, they are believed to be small and within the range of historic variability of flows within the system. Also, given the flat-bottomed and steep-sided configuration of most of the drains, increases in flows are not expected to change in a measurable way the existing very limited availability of shallow water depths and slopes that this species prefers.

By increasing the amount of Colorado River water used relative to groundwater, the CVWD WMP would increase salinity in the drains. Cattails are sensitive to salinity levels. Growth is best when water salinity is less than 3 g/L (3,000 ppm). Salinity levels of 3 to 5 g/L stunt the growth of cattails. Above 5 g/L (5,000 ppm), growth and survival of cattails are limited. The total amount of cattail vegetation with good growing conditions could potentially be reduced, but this impact is expected to be small given the change in average TDS concentration will increase from 2,000 mg/L to only 2,800 mg/L.

Selenium Effects

Predictions of selenium concentrations in bird eggs can be predicted based on water concentrations using the black-necked stilt model developed by Skorupa (1998). Further, based on information provided in Seiler *et al.* (2003), it is possible to estimate the probability of egg failure associated with modeled egg selenium concentrations. Based on the modeling completed for CVWD's WMP, black rails also could be impacted through exposure to slightly higher concentrations of selenium (on the order of 10 µg/L) in the drains that may result from implementation of CVWD's WMP. The probability of eggs failing to hatch in association with the modeled drain selenium concentrations is approximately 4 percent. CVWD has proposed to implement regular monitoring of selenium concentrations in the Coachella Valley Storm Channel and the drains to determine the magnitude of actual magnitude of those changes over time. Provided they fall within the predicted increase, and given the lack of confirmed use of the available vegetation in the Coachella Valley Storm channel and the primary drains, this probability of failure would not be anticipated to result in a measurable impact to black rail reproduction. CVWD has committed to creating 66 acres of marsh habitat using low-selenium water to replace the habitat impacted by covered activities. Within two years of permit issuance, CVWD will submit to the Service and CDFG a plan for their approval detailing the location, water source, monitoring and management responsibilities, and funding for this measure. Because this is anticipated to be higher quality habitat than the habitat present in the Coachella Valley Storm Channel and the drains (larger blocks with less potential for edge effects, managed water depths as appropriate for this species, and lower selenium concentrations), this should offset impacts associated with the covered activities in those areas. Monitoring of selenium in the drains would indicate whether concentrations increase beyond our expectations and thus warrant additional study and/or adaptive management to minimize the potential for adverse effects.

Management and Monitoring

We anticipate some impacts associated with the rail management and monitoring. Black rails that come to occupy the created marsh and existing habitats will be harassed during the protocol surveys required for monitoring. Some black rails could also be harmed as a result of the need to carry out management actions (e.g., burning) to maintain the long-term health of the created marsh and the existing marsh habitats. Such disturbances will be temporary, infrequent (approximately every third or fourth year), and will result in an overall increase in habitat quality as based on rail management experience at the Sonny Bono Salton Sea NWR and at the Wister Unit of the Imperial Wildlife Management Area.

Changed Circumstances

The Changed Circumstances that are likely to affect the California black rail are drought, fire, and invasion by new exotic species. Drought may reduce the flows through areas of existing habitat and/or reduce the volume of water available for created habitat. The need to maintain flows through the created habitat is a firm commitment in the Plan and as such should dictate that guaranteeing adequate flows for sustainability would be of the highest priority for CVWD. Drought may affect the rails using the irrigation drains, but this is likely to be ameliorated by the fact that water is imported into the CoachellaValley for use in agriculture. Based on the

agreements associated with the Quantification Settlement Agreement and the operation of the lower Colorado River in drought conditions, CVWD is unlikely to be subject to major reductions in access to Colorado River water such that water for their 66 acre obligation cannot be met and drainwater flows cease in the Coachella Valley drains. The maintenance of flows adequate to sustain the existing marsh at Dos Palmas is an environmental commitment required by the Coachella Canal lining project. Project documents indicate that water could be taken from the Coachella Canal to meet these obligations if the remaining groundwater is not adequate for this purpose. As stated above, CVWD will continue to receive Colorado River water even in drought conditions such that Plan and lining project water obligations should continue to be met.

Unintended fire in the desert environment could spread to rail habitat in wetlands, particularly in the Dos Palmas area given the existing access to off-road vehicle users. The preventive measures identified in the Plan will assist in reducing the risk of spread of fires from the desert to the marsh. In addition, controlled burning is likely to be a tool in the long-term management of the marsh vegetation communities. The management strategies that will be developed for the existing habitats and the design and management plan for created habitat should incorporate this potential need such that burns can be appropriately controlled to optimize vegetation health and maintain refuge areas for the occupants. Proper controls and configurations will reduce the risk of wildfire spreading into these areas and establish appropriate site-specific response actions. Wildlife Agency oversight should ensure that these tasks are completely appropriately and in a timely fashion.

Various disturbances, including fire, can result in the establishment of new exotic species within rail habitats. The most likely impact associated with exotic species is the invasion of an exotic plant that changes the structural characteristics of the marsh communities. The Plan area already has exotic plant species that warrant monitoring and management, and this management should afford the opportunity to identify and address new exotic plants relatively quickly before major invasions become established. The Plan also recognizes that the rails, in particular Yuma clapper rails, may rely heavily on exotic species as prey. Management of the existing invasives may require evaluation of the prey base such that new components could be identified more quickly. While this is not guaranteed (it is tied to the identified need to control exotic crayfish), it will increase the chances of identifying a problematic exotic species if it does occur. Monitoring the rail species through call counts will offer another means, albeit indirect, to determine if a problem invasive species may be impacting the prey base for the rails. The specifics of the monitoring program have yet to be determined, but the program will need adequate rigor to identify trends and potential problems in a timely fashion.

Cumulative Effects

Adverse effects anticipated to impact California black rails in the Plan area have already been discussed. Impacts associated with the IID water transfers are similar because water conservation in that system may result in increases of salt and selenium. The effects have been addressed in a previous consultation with the Bureau of Reclamation (USFWS 2002) that includes activities to offset these impacts. Other anticipated activities should benefit the black rail including IID's creation of an additional 500+ acres of freshwater marsh to offset effects of their drain maintenance activities. If a Salton Sea restoration project moves forward, it may

include the creation of additional freshwater marsh.

CONCLUSION

A relatively small proportion of the species' range-wide population occurs in the areas subject to Plan covered activities. The limited potential loss of California black rail reproduction associated with increases in selenium, harm resulting from loss of habitat associated with operation and maintenance activities, harassment associated with surveys, and potential harm associated with marsh management, are not likely to affect the long-term status of the species.

AMOUNT OR EXTENT OF TAKE

It is difficult to quantify the number of birds that will be impacted as a result of the proposed action over the 75-year permit term due to the large Plan Area. Therefore, the Service is quantifying the take as the number of acres of modeled habitat that will be impacted in the MSHCP Plan Area as a result of the proposed action. We anticipate that up to 62 acres of modeled habitat within the Plan Area will become unsuitable for the California black rail as a result of the proposed action. Additionally, a small, but undeterminable, number of California black rails are anticipated to be taken as a result of management actions. All rails in the plan area will be subject to recorded call surveys and may be harassed as a result.

Take will be predominantly in the form of harassment, although harm may be associated with small loss and degradation of habitat associated with the covered activities. The increase in selenium that may occur in the drains carries some risk that eggs laid by adult females foraging in this habitat would fail to hatch.

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Burrowing owl (*Athene cunicularia*)

STATUS OF THE SPECIES

The burrowing owl is a distinctive ground-dwelling member of western North and Central American grasslands and deserts and of Florida and adjacent Caribbean islands. Due to anthropogenic activities within the range of the owl, the burrowing owl has lost considerable habitat and is declining in numbers throughout North America, United States, and California (James and Espie 1997, DeSante *et al.* 2007, Lincer and Bloom 2007).

Legal/Listing Status

The western burrowing owl *Athene cunicularia hypugaea* (America Ornithologist's Union; AOU 1983) is currently listed as a California Species of Special Concern, (California Department of Fish and Game; CDFG 2003). Burrowing owls have been considered to be a species of concern by the U.S. Fish and Wildlife Service (Service) (Klute *et al*. 2003). They are a covered species in Habitat Conservation Plans throughout California and are considered a sensitive species by the Bureau of Land Management. In addition, this species is afforded protection under the Migratory Bird Treaty Act. The species was reviewed in detail by the Service (Klute *et al*. 2003), but has not been petitioned for listing under the Endangered Species Act, as amended (1973). However, the species was petitioned for listing in California due to scientific concern of declining populations, localized extirpations, and increase of fragmentation of existing habitat caused by rapidly increasing human populations (Center for Biological Diversity *et al.* 2003). CDFG rejected the petition for listing under the California Endangered Species Act (CESA; CDFG 2003).

Species Description

Burrowing owls have the following taxonomic designation per the AOU (1997): Class: Aves (birds); Order: Strigiformes (owls); Family: Strigidae (typical owls); Genus: *Athene*; Species: *cunicularia;* and Subspecies: *hypugaea* (Western) and *floridana* (Florida).

Athene cunicularia has been placed in the monotypic genus *Speotyto*, or alternatively as a long-legged member of the genus *Athene*, where it has three congeners (Haug *et al.* 1993). References can still be found using either name, though it is frequently still referred to as *Athene* (Haug *et al.* 1993). Others have argued that the greatly lengthened tarsometarsus is directly correlated to the burrowing owl's fossorial habits, and other osteological differences do not exist that would separate *cunicularia* from the other members of *Athene* (Olson and Hilgartner 1982). Cytogenetic evidence suggests that placement of this species in the monotypic genus *Speotyto* may be most appropriate (Schmutz and Moker 1991). This separation from the other members of *Athene* is further corroborated by DNA or DNA hybridization (Sibley and Monroe 1990). However, this technique has been criticized as inaccurate for comparison of closely related species due to the natural variation of the birds. Comparisons of vocalizations also suggest inclusion of all species into a single genus (Scherzinger 1988). The American Ornithologists' Union Committee on Classification and Nomenclature follows this latter approach and this protocol is followed herein (AOU 1997). At least 21 geographic races of burrowing owl have

been described though work is still needed to delimit ranges and characteristics of these races, especially in South America (Clark 1997). Within North America, two subspecies with non-overlapping territories are most often recognized (Johnsgard 1988, Dechant *et al.* 1999, Bates 2006). Western burrowing owls, *Athene cunicularia hypugaea*, extend south from southern Canada into the western half of the United States, Mexico and Central America, while Florida burrowing owls, *Athene cunicularia floridana*, occur in Florida and adjacent Caribbean islands.

The burrowing owl is a small, ground-dwelling owl (total length: males 19.5-25.0 centimeters, females 19.0-25.0 centimeters; mass about 150 grams). It has a round head, lacks eartufts, and has long legs which are sparsely feathered below the tibiotarsal joint. The burrowing owl has a distinct oval facial ruff, framed by a broad, buffy-white eyebrow-to-malar stripe on the interior part. The iris is usually bright lemon yellow. The wings are relatively long and rounded, with 10 brown and buffy-white barred primaries (3 outermost with inner webs sinuated). The tail is short with 12 brown and buffy-white barred rectrices. The dorsum is brown, with the back, scapulars, and crown profusely spotted with buffy-white. The throat and undertail coverts are white; the remainder of the ventrum of adults is buffy-white with broad brown barring on both sides. Females are generally darker than males overall, particularly in worn plumage (Haug *et al.* 1993).

Distribution

The burrowing owl is found throughout western North America, the Florida peninsula and adjacent Caribbean Islands. The burrowing owl breeds from southern interior British Columbia (extirpated and reintroduced in that area), southern Alberta, southern Saskatchewan (extirpated from a portion of province), and southern Manitoba (extirpated from a 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 the majority of burrowing owls vacate the northern areas of its range including the Columbia Basin, Great Basin, and Plains (Haug *et al.* 1993). The burrowing owl regularly winters as far south as El Salvador (AOU 1983).

Burrowing owl populations in California consist of both year-round residents and wintering owls from apparently outside of the breeding area (James and Ethier 1989, DeSante *et al.* 2004). The range and population of wintering birds in California is not well described, but is believed by some to be a small, temporary contribution to the resident population. Overlap of wintering and resident burrowing owls could be expected throughout California from October to March due to observed times when wintering owls are present, and when they are believed to depart.

In California, the burrowing owl is a resident in the open areas of the lowlands over much of the southern California region (Garrett and Dunn 1981). 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). The burrowing owl is present on the larger offshore islands and is found as high as 1,600 meters in Lassen County.

DeSante *et al.* (2007) reported in their 1991-1993 statewide survey, that the distribution of burrowing owls was exceedingly non-uniform; 92 percent were estimated to occur in lowland areas. The vast majority was estimated to reside in the Imperial Valley (71 percent) and the Great Central Valley (24 percent). More than 90 percent of the owls found were located on private lands, although more recent work on large grasslands suggests that the proportion of owls on public lands may be somewhat larger than indicated by their results.

Local Distribution
Kidd, *et al*. (2007) identified suitable burrowing owl habitat throughout the Coachella Valley particularly in the lowland valley floors. Burrowing owls are scattered in low numbers on natural desert terrain throughout the lowlands (DeSante *et al.* 1995). Burrowing owls in Coachella Valley currently have a discontinuous, patchy distribution over the valley floor, and south to the Salton Sea. Much historic habitat for burrowing owl colonies is believed to have been usurped or degraded by community development, agriculture, invasive species (e.g., mustard), and wind-farms. The species has been reduced to limited numbers and colony sizes.

Coachella Valley is located directly north of the Imperial Valley where approximately 50 percent of the burrowing owls of North America reside (DeSante *et al.* 2007). The Imperial Valley burrowing owl population is estimated at 5,600 individuals within the agricultural matrix of the Imperial Valley (De Sante *et al*. 2007). The relationship between the population in the Imperial Valley and the population in the Coachella Valley is likely important, but it has not been studied or described.

The number of burrowing owl pairs that occur in the Plan Area is not known. The relative population size and distribution of burrowing owls is highly variable, depending on local conditions of burrow and food availability. DeSante *et al.* (1996) reported that burrowing owls often move their breeding locations over short distances (less than two to three km) from year to year, but do not appear to move over large distances. Further research would be necessary to determine if this standard applies to burrowing owls in the Coachella Valley.

Habitat Affinities
The burrowing owl occurs in sparsely-vegetated open areas such as 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 use golf courses, cemeteries, road allowances within cities, airports, vacant lots in residential areas and university campuses, fairgrounds, abandoned buildings, and water conveyance systems (Haug *et al.* 1993). They also may occur in forbs and open shrub stages of pinyon-juniper and ponderosa pine habitats (Zeiner *et al.* 1990). Common to these habitats is that they contain plentiful populations of burrowing animals such as prairie dogs, ground squirrels, badgers and desert tortoise. These animals both serve as potential prey and their burrows are utilized for roosting and nesting cover.

Burrowing owls use a variety of habitat in California including all native and non-native grassland, converted grassland, habitat with interstitial grassland, habitat associated with rock

and wood piles, airfields, dairies, fallow fields, junk yards, agricultural areas and drainage features, artificial burrows, disturbed marginal sites including interstitial graded lands, and areas with populations of ground squirrels *(Spermophilus beecheyi)* present at any number (Schmutz 1997). Most plant communities in California are suitable areas for burrowing owls except forested habitats, dense sage scrub/coastal sage scrub, chaparral, and areas of steep topography.

Habitat associations with specific attributes and other wildlife species were identified by DeSante *et al*. 2007). The single greatest predictor associated with the probability of re-occupancy during a 1993 survey, was the presence of ground squirrels (DeSante *et al.* 2007). Higher re-occupancy rates were observed for sites near irrigation canals, sites with more than two pairs of owls, and areas with high density of owls (DeSante *et al*. 2007).

Life History
Literature detailing known biology of burrowing owls can be located elsewhere (Karalus and Eckert 1987, Haug *et al.* 1993, Clark 1997). Refer to CDFG 2003 and Center for Biological Diversity *et al.* 2003 for additional information on California burrowing owl populations.

The burrowing owl has been described as primarily a diurnal species with crepuscular hunting habits (Thomsen 1971). However, more recent studies have shown that they stay close to the nest during daylight hours and forage further from the nest between dusk and dawn, perhaps to avoid diurnal predators (Haug and Oliphant 1990). It has been observed that males forage crepuscularly for vertebrate prey, while females forage diurnally for invertebrates (Poulin and Todd 2006). They move the location of their perch to thermoregulate, perching in open sunlight in early morning, and moving to shade, or to their burrow, when hot (Coulombe 1971). The species is semi-colonial and it is probably the most gregarious owl in North America. The home range may vary from 0.1 to 4 acres (mean is 2 acres) with an average distance between burrow of 133 meters (Thomsen 1971, Martin 1973). Territory size is directly proportional to the available habitat and burrow availability.

Burrowing owls are highly terrestrial, but often perch on mounds of dirt, fence posts or other raised areas. They nest underground in abandoned burrows dug by mammals or desert tortoise, but can dig their own burrows if friable soil conditions allow. They will also readily utilize pipes, culverts and artificial nest boxes placed underground (Robertson 1929). Burrows often have multiple entry points for escape from predators and perhaps, ventilation. In central and southern California and Arizona, burrows serve as year round focal points for nesting and protection from environmental conditions and predators.

Nest densities can vary from high density colonies, small scattered colonies, or located single pairs (Desmond *et al.* 1995). Burrowing owls show a moderate to high site fidelity to breeding areas, and will utilize both different burrows in the same colony and the same burrow previously utilized (Rich 1984, Green and Anthony 1989, Klute *et al.* 2003). Burrow and nest sites are reused at a higher rate if the bird has reproduced successfully the previous year. Nevertheless, they are known to move from their natal area in search of higher quality habitat. In non-migratory populations, they use and maintain the burrow year-round (Haug *et al.* 1993).

They are relatively opportunistic foragers (Haug *et al.* 1993), and their prey base includes invertebrates and small vertebrates (Thomsen 1971). They may hunt by using short flights, running along the ground, hovering or by using an elevated perch from which prey is spotted. Their diet is primarily composed of small mammals, such as mice, voles, prairie dogs and squirrels, and invertebrates, such as grasshoppers and beetles, though they may also take reptiles, birds, and carrion. Although invertebrates occur in their diet with more frequency, in terms of overall biomass small mammals may be more important (Marti 1974, Schmutz *et al.* 1991). During the breeding season, there can be significant declines in vertebrate prey in the diet and increases in invertebrate prey (Haug *et al.* 1993). During nesting, males capture the majority of vertebrate prey while females collect the majority of invertebrate prey (Poulin and Todd 2006).

Courtship commences soon after the beginning of the year in southern California. During this time, pair bonds are cemented by the male through courtship displays and vocalizations near the burrow. Courtship is accompanied with copulation as the nesting season progresses. In February and March, the owls may be seen standing together near the selected burrow. Eggs are laid anywhere from March through August, with the majority of egg-laying from March to June. Coulombe (1971) indicated that in the Imperial Valley, burrowing owls start incubating in early March. In Southern California, the peak of the nesting season is mid-April to mid-July (CDFG 1995).

Females produce a single clutch, but they may have two clutches if the first nesting attempt is disturbed or destroyed. The clutch size is generally six to 12 eggs, with an average of seven to nine eggs (Bent 1938, Ehrlich *et al*. 1988, Haug *et al*. 1993). In California, the range is one to 11, but usually four to nine eggs are laid (Landry 1979, Gorman *et al*. 2003), and up to ten young can be fledged per nest in a good reproductive year (Gervais and Rosenberg 1999). Martin (1973) reported 95 percent of the young fledged, and 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). Nest success was 50 to 57 percent at a site in Oregon with desertion being the major cause of nest failures. This was typically related to the proximity to other nesting pairs. Chicks hatch after approximately 28-30 days of incubation, and remain in the burrow for two to three weeks. Chicks emerge mid-May through September, with the peak emergence of young occurring in June. The burrowing owl nesting period in California is long; some pairs have been known to still have downy young as late as late August in San Diego County (Unitt 1984).

Burrowing owls fledge at about five to six weeks of age but stay in the general area of the natal burrow for at least two months after fledging. Dispersal and 'floating' behavior have not been documented; current data suggest most fledglings augment existing colonies. Post-fledging mortality of owls is high; successive year returns of young in favorable habitat and with limited anthropogenic fragmentation of habitat suggest mortality levels between 17 -70 percent in Canada (Thomsen 1971, Clayton and Schmutz 1997). One banded bird survived to 8 years 8 months (Kennard 1975).

Burrowing owls show high fidelity to colony areas; therefore fall and wintertime surveys are useful to detect owl presence. However, this provides no assurance that the owls are also using

that particular habitat for breeding. Burrowing owls are most active during crepuscular periods when thermal conditions are favorable for owls and their prey. Owls are also active during the night, but detection abilities of surveyors may be lessened. Burrowing owls may be visible during nocturnal surveys; however, because of large home ranges of up to 1.8 linear miles from the nest sites (Rosenberg and Haley 2004), detected owls may be far from distant burrows.

Burrowing owls respond to disturbance comparably to diurnal raptors. As a prey species for numerous carnivores and raptors, burrowing owls react to disturbance by having limited approach distance, a high degree of vigilance for colony nesters, alarm signals and need for close proximity to escape burrows. Predators include prairie falcons (*Falco mexicanus*), red-tailed hawks (*Buteo jamaicensis*), Swainson's hawks, ferruginous hawks, northern harriers, golden eagles, foxes, coyotes, and domestic dogs and cats (Martin 1973). Fleas, lice, and feather mites are common ectoparasites.

Population Trends
An analysis of Christmas Bird Counts suggests a decline in numbers since the mid-1970s (James and Either 1989). Breeding Bird Survey (BBS) data from 1980 to 1989 show significant declines in west-central Kansas and adjacent parts of Nebraska and Oklahoma, the west Panhandle of Texas, and southern New Mexico. The same data set shows significant increases in the Lower-Sonoran Deserts and Lower Colorado River Valley in west Arizona and adjacent California (Haug *et al*. 1993). In Canada, there has been a decrease in numbers and range in all western provinces.

The burrowing owl was formerly common in appropriate habitats throughout California. Population numbers have become markedly reduced in recent decades in all areas of coastal southern California, and throughout the subspecies range in North America (Zeiner *et al.* 1990, DeSante *et al.* 2007). The number of burrowing owl breeding pairs in central, western, and southern California has drastically declined in the last 50 years; during the 1980's the decline was probably greater than 70 percent (DeSante and Ruhlen 1995). In California, there was a 12 to 27 percent decline in the number of breeding burrowing owl pairs from 1986 to 1991 (CEC 2005). The species appears to be seriously threatened with extirpation from central western and coastal southern California because of the extent and intensity of the development (DeSante and Ruhlen 1995, Lincer and Bloom 2007). Burrowing owls are thought to be extirpated from other California Counties including Napa, Marin, San Francisco, Santa Cruz, San Luis Obisbo, and Ventura (DeSante *et al*. 2007).

The largest stronghold of burrowing owls in California is the Imperial Valley, which has over 70 percent of the estimated pairs in the state and 50 percent of the owl population in North America (DeSante *et al.* 2007). While historical data are lacking for the Imperial Valley, the extremely high densities of owls currently found there suggests a substantial population increase during the past several decades (DeSante *et al.* 2007). Ongoing and future studies should help elucidate the trajectory of the Imperial Valley populations, though their dependence on irrigation canals for breeding sites suggests a finite possibility for population growth and a tenuous dependence on current irrigation practices.

Survey reports received by the Service indicate burrowing owl pairs throughout all counties in southern California, except Imperial County, are currently rare, and are believed to be in decline, with a high proportion of those burrowing owls on parcels that likely will be developed. Many of these owls were evicted or actively moved from parcels with little or no follow-up to ascertain mortality or success of relocation efforts. Virtually no published information is available on the efficacy of relocation in maintaining a stable population, or the effects of eviction on individual burrowing owls.

Threats

Burrowing owls were numerous in all southern California counties up to the 1940's (Center for Biological Diversity *et al.* 2003, CDFG 2003). Throughout most of California, burrowing owl populations are in decline due to development and other human activities (DeSante *et al.* 1997, Center for Biological Diversity *et al.* 2003, CDFG 2003, Klute *et al.* 2003, DeSante *et al.* 2007, Lincer and Bloom 2007).

The primary threat to the burrowing owl in the region is loss of habitat, either from human development, agriculture or conversion of native grasslands and to non-native annual grasslands. This species is usually associated with flat or shallow slopes on loamy soils; these areas are also attractive to agriculture, as well as residential and industrial development. Owl survival can be adversely affected by disturbance and foraging habitat loss even when impacts to individual birds and nest/burrows are avoided (CDFG 1995).

Burrowing owl populations in different locales typically are small, and are considered to be declining in California and elsewhere (Center for Biological Diversity *et al.* 2003, CDFG 2003). Caughley (1994) encapsulated key differences between populations that have always been small, versus populations that were once much larger but had experienced significant decline. Small population and declining population paradigms require special conservation management efforts to protect the species from genetic and demographic stochastic events contributing to extinction thresholds and vortices (Clark and Seebeck 1990, Lande and Barrowclough 1987, Lande *et al.* 2003).

Species respond to habitat fragmentation in relationship to their life history (With and King 1999). Burrowing owls are semi-colonial breeders; fragmentation of habitat in southern California has already disrupted historic areas of high owl aggregation. The current result in southern California (except Imperial Valley) is disjunct breeding complexes in sub-optimal habitat, and numerous dispersed and increasingly isolated nest sites.

As populations continue to shrink and become more patchily distributed, it could lead to potential problems associated with a genetic bottleneck, such as loss of genetic diversity and inbreeding depression. While there is some evidence that this may have happened in some populations (Johnson 1997), there appears to be relatively high gene flow throughout most of the burrowing owl's range, particularly in western North America (Korfanta *et al.* 2005). These studies may have difficulty distinguishing between historic and current gene flow, but it may be that the owl's ability to disperse buffers the effects of habitat fragmentation. While the majority of birds in some areas rarely disperse beyond 400 meters (0.25 miles) (Rosenberg and Haley

2004), in other habitats burrowing owls are known to disperse up to 53 kilometers (33 miles), even in an area with non-fragmented grassland (Rosier *et al.* 2005).

Eradication of fossorial mammals has been a contributing factor to the decline of burrowing owls in California and in other areas of North America (CEC 2005). Burrowing owls use burrows created by ground squirrels, prairie dogs, badgers, foxes and coyotes; when these smaller mammals and meso-predators are removed from ecosystems due to fragmentation, habitat degradation, and predator control, burrowing owls no longer have the benefit of a primary excavator.

The burrowing owl's ground-nesting habit leaves burrowing owls susceptible to predation by domestic dogs and cats. Road mortality can also be a significant mortality factor for this species (Konrad and Gilmer 1984, Haug and Oliphant 1987). OHV activity is believed to be a threat to burrowing owls, as their burrows can be crushed and their nest sites disturbed as a result of this activity (CVAG 2007).

Another potential risk factor comes from agricultural pesticides, even from those such as DDT that have not been used for over 30 years (Gervais *et al.* 2000). DDT contamination in eggs alone has not been seen to lead to reproductive failure. However, when combined with other stressors such as low food availability, egg contaminants have been seen to reduce reproductive capabilities (Gervais and Anthony 2003). In agricultural areas, levees and irrigation dikes where rodent burrows are present can provide a suitable nest site. In these areas, burrowing owls can be threatened by disturbance as a result of maintenance activities along dikes and levees.

Synopsis of Status
Burrowing owl populations are declining across their continental range, and have been extirpated, or nearly so, from numerous locales. In southern California, the only population stronghold is in the Imperial Valley, which has over 70 percent of California's population, and almost 50 percent of North America's western burrowing owl population (CEC 2005). The results of the 1991-1993 survey suggest that the long-term persistence of burrowing owls over most of their range in California will require strong conservation efforts and proactive management actions (DeSante *et al.* 2007).

ENVIRONMENTAL BASELINE
Regulations implementing the Act (50 CFR § 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, which are contemporaneous with the consultation in progress.

The action area is described as the Plan Area, Tribal lands within the Plan Area boundaries (but not covered by the Plan), and the Imperial Valley agroecosystem. The Plan Area is situated within the action area and comprises 1.1 million acres (1,719 square miles) within Riverside County, California (4.7 million acres or 7,344 square miles). The Plan Area is only a small

portion of the entire range of this species (Haug *et al.* 1993). However, the significance of the Plan Area to the North American population should not be underemphasized based on the fact that 50 percent of North America's burrowing owl population lies to the south in the Imperial Valley (DeSante *et al*. 2007). However, the relationship between these two populations is unknown and therefore its significance is not well understood (CEC 2005).

Note that Indian reservation lands are within the Plan Area, but are not subject to the Plan. Burrowing owl surveys have not been conducted on tribal lands therefore no occurrence data were available and therefore they are excluded from this analysis.

Status of the Species in the Action Area
There is no habitat model for the burrowing owl and, therefore, no estimate of acreage was made (Section 9.7.3). Habitat modeling was based on occurrence data. In addition to the CVAG data for the Plan Area (74 records), the Service has 52 records in its database, and the California Natural Diversity Database (CNDDB) includes 10 records for the Plan Area (Figure 1). Because the dates and other information of many of the sightings are uncertain, it is not possible to completely analyze these sightings as breeding, wintering, or migratory owl occurrences. The records from the Service and CNDDB also do not indicate which sightings were of paired birds. The burrowing owl occurrences were in the following Conservation Areas: Long Canyon, Thousand Palms, Santa Rosa and San Jacinto Mountains, Edom Hill, Willow Hole, Whitewater Floodplain, Coachella Valley Stormwater Channel and Delta, Upper Mission Creek/Big Morongo Wash, Cabazon, and Snow Creek/Windy Point (Figure 1).

For the burrowing owl, Conservation Areas are divided into Core Habitat Conservation Areas and Other Conserved Habitat Conservation Areas. Core Habitat Conservation Areas are identified in the Plan for a given species that are composed of a habitat patch or aggregation of habitat patches that (1) are of sufficient size to support a self-sustaining population of that species, (2) are not fragmented in a way to cause separation into isolated populations, (3) have functional Essential Ecological Processes, and (4) have effective Biological Corridors and/or Linkages to other Habitats, where feasible, to allow gene flow among populations and to promote movement of large predators. Throughout the Plan Area the Core Habitat Conservation Areas with known occurrences include: the Snow Creek/Windy Point, Whitewater Floodplain, Stubbe and Cottonwood Canyons, Upper Mission Creek Big Morongo (including the Morongo Wash Special Provisions Area), Willow Hole, Edom Hill, Thousand Palms, Santa Rosa and San Jacinto Mountains, and Coachella Valley Stormwater Channel and Delta.

Other Conserved Habitat includes part of a Conservation Area that does not contain core habitat for a given species, but still has Conservation value. These values may include Essential Ecological Processes, Biological Corridors and Linkages, buffering from edge effects, enhanced species persistence probability in proximate Core Habitat, genetic diversity, re-colonization potential, and flexibility in the event of long-term habitat change. In addition to those Core Habitat Conservation Areas identified above, the Conservation Areas identified below are classified as Other Conserved Habitat. Burrowing owl occurrences are known from the following Conservation Areas including: Mecca Hills/Orocopia Mountains, Indio Hills/Joshua Tree National Park Linkage, Long Canyon, and Cabazon. Conservation Areas with no

burrowing owl occurrences, but classified as other conserved habitat, include: Highway 111/Interstate 10. Other potential habitat areas that could also be important are in the Dos Palmas and the Desert Tortoise and Linkage Conservation Areas.

D. Hutchinson (pers. comm.) conducted burrowing owl surveys from 2003 through 2007 in the Plan Area and provided the observations and analysis of his survey in this paragraph. The greatest density of burrowing owls was located in the Desert Hot Springs/North Palm Springs area. Individuals also inhabited the Morongo and Mission Creek washes and the Whitewater River Floodplain. Hutchinson indicated that generally these populations were sustained by greater productivity as a result of increased rainfall in the western portion of the Coachella Valley. Fewer pairs inhabit the central Coachella Valley in and around the Willow Hole and Thousand Palms Reserves. Reduced rainfall likely affects resource availability and translates into reduced resource availability in those areas. North of the Salton Sea, burrowing owl density may increase where greater resources are available in association with agriculture. Burrows are found in the medium soft substrate known as tufa that marks the edge of ancient Lake Cahuilla, and in disturbed patches of salt bush scrub.

Hutchinson (unpubl. data) observed 87 occupied burrow occurrences in the Plan Area, 13 of his observations were of paired birds and in some cases, three or more individuals were observed at a burrow (Figure 1). Based on Hutchinson's recent observations, burrowing owls were found in the following Conservation Areas: Indio Hills/Joshua Tree National Park Linkage, Long Canyon, Thousand Palms, Santa Rosa and San Jacinto Mountains, Edom Hill, Willow Hole, Whitewater Floodplain, Coachella Valley Stormwater Channel and Delta, Upper Mission Creek/Big Morongo Wash, and Snow Creek/Windy Point (Figure 1). These Conservation Areas were identified as Core Habitats for burrowing owls. In addition, about 10 percent of his observations were found in the agricultural area of the Plan.

Wilkerson and Siegel (unpubl. data) compared survey results from the 1993 California statewide survey (DeSante *et al*. 2007) and a similar 2007 statewide survey. In the Coachella Valley (Plan Area), the two survey methods were similar. In 1993, no burrowing owls were observed in the Coachella Valley, but in 2007, 49 burrowing owls were observed. Of 20 survey blocks visited in 2007, 10 contained burrowing owls, four of which were also visited in the 1993 survey but were absent of burrowing owls (Wilkerson pers. comm.).

Recent information (CVAG 2007, Center for Biological Diversity *et al*. 2003, CDFG 2003) suggests that only a small breeding population of burrowing owls is extant in the Plan Area. However, further surveys need to be completed to determine: (1) if all known sites remain occupied, (2) if habitat is still available, and (3) the current status of the species within the Coachella Valley. Locations where burrowing owls have been seen in the past have not been systematically surveyed to determine how many of these sightings are in areas where development has already occurred and burrowing owls or favorable habitat is/are no longer extant.

Factors Affecting the Species' Environment within the Action Area
In 2003, the Colorado River Quantification Settlement Agreement (QSA) was signed by Imperial

Irrigation District (IID), Coachella Valley Water District (CVWD), and Metropolitan Water District of Southern California (MWD) to settle long-standing disputes among the local water agencies regarding their use of California's interstate apportionment of Colorado River water. As a result of the QSA, CVWD will receive an increase in irrigation water of up to 100,000 acre-feet per year (at full implementation). QSA water transfers from IID to CVWD and the San Diego County Water Authority will reduce flows in the IID drainage system. Burrowing owls are common in the Imperial Valley along the water conveyance and drainage features. The impacts associated with this reduction are uncertain because the location of specific water conservation measures and subsequent drain flow reductions will be based on voluntary agreements that change over time. No reduction in the overall extent of the conveyance and drainage systems is anticipated. Changes in the extent of the CVWD drainage system are not anticipated with their receipt of additional Colorado River water as this is expected to substitute for groundwater pumping in the lower Coachella Valley that currently provides water to agriculture in that area.

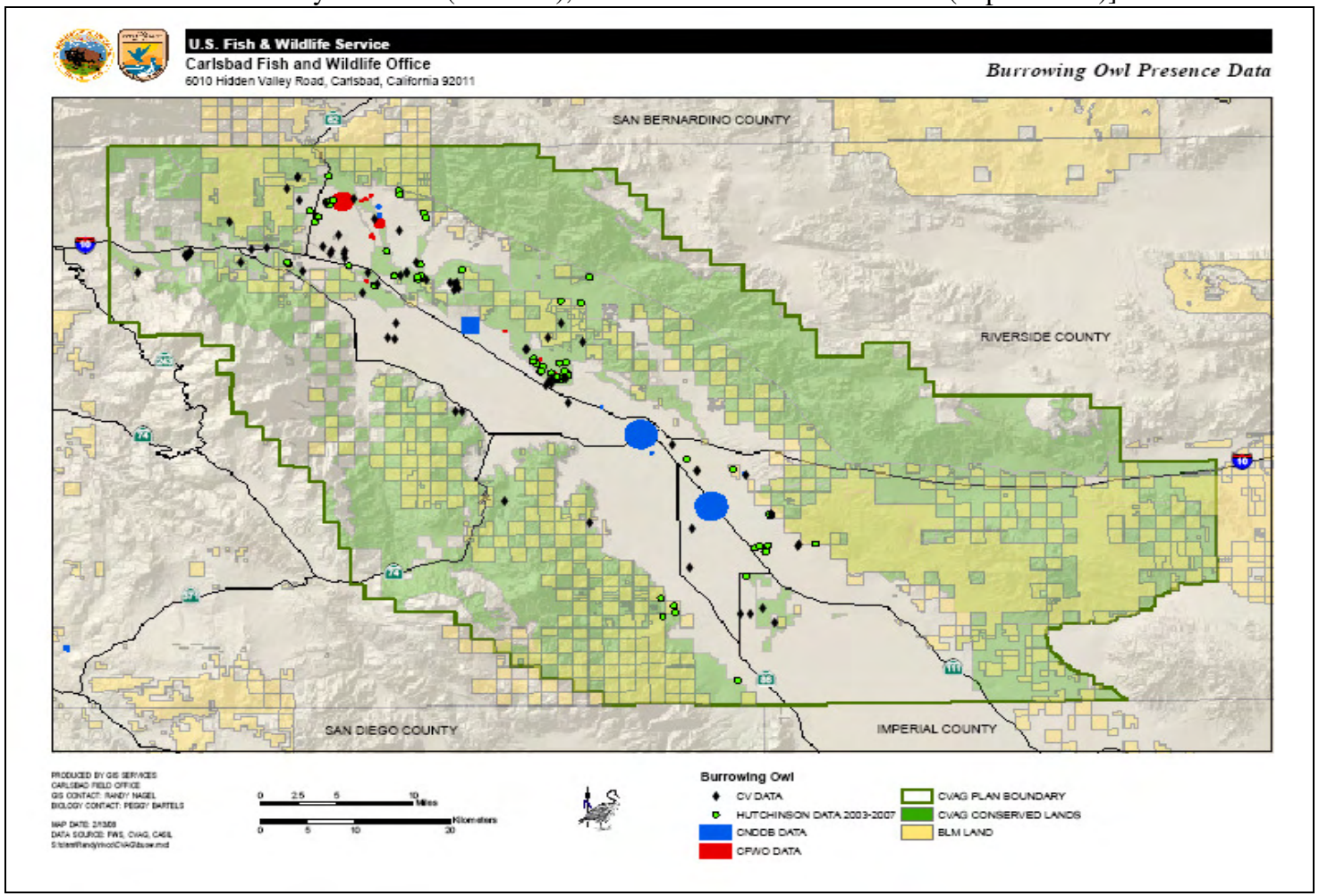
IID is currently working with the Service to develop a Habitat Conservation Plan that establishes drainage operations and maintenance procedures that would minimize and avoid take of burrowing owls that are along their facilities. This is anticipated to assist with stabilizing their population in the agricultural areas of Imperial County.

Management and Monitoring

Current management in the action area is limited. Cleaning activities are conducted by CVWD routinely along the Coachella Valley Storm Channel (CVSC) and the surface drains. There could be owl mortality or reduction in prey items along the drains as a result, but it is anticipated to be low. The surface drain system is of limited extent in the Coachella Valley, and there are only two known locations for burrowing owls along drainage structures. While there could be additional owls that have not been detected, the limited extent of these facilities combined with the avoidance and minimization measures in the Plan should result in few impacts associated with these activities. The cleaning conducted along the CVSC may enhance habitat value by reducing vegetative cover that would reduce the visibility around the burrow preferred by this species.

Monitoring of burrowing owls is not routine in the Coachella Valley or in Imperial County. Burrowing owl surveys are not conducted routinely by wildlife or land management agencies. A system-wide survey of the IID system is underway and should be completed this year. Occasionally, a large statewide survey is completed, such as the initial statewide survey in 1993-93 (DeSante *et al*. 2007, The Institute for Bird Populations 2007) and the recent survey conducted in 2006-07 by The Institute for Bird Populations (2007), but these are rare.

Figure 3. Known burrowing owl occurrences within the Coachella Valley Multiple Species Habitat Conservation Plan Area [Coachella Valley Association of Government occurrence data (CV), U.S. Fish and Wildlife Service occurrence data (CFWO), California Natural Diversity Database (CNDDB), and D. Hutchinson 2003 - 2007 (unpubl. data)].



EFECTS OF THE ACTION

Mitigation and Minimization Measures

The Plan did not provide modeled habitat for the burrowing owl, but the reserve design of the Plan focused on inclusion of areas of contiguous habitat around locations where burrowing owls were known to occur. This contiguous habitat also would provide adequate foraging areas. The primary purpose of the burrowing owl conservation measures identified in the Plan would be to ensure conservation of known burrow sites for burrowing owls. Because the burrowing owl conservation measures do not include the conservation of acres, but include the conservation of historical or known burrowing owl burrows, the avoidance and minimization measures are more detailed and specific to burrow occupancy and presence. The conservation measures for this species include: Conservation Objectives and Required Measures for the Conservation Areas (Section 4.3), avoidance and minimization measures (Section 4.4), the Conservation Objectives (Section 9.7.3), and the Burrowing Owl Interim Conservation Strategy (Section 8.5.2).

The following is a summary of the long term strategies and objectives for avoidance and minimization measures both inside and outside of the Conservation Areas (Sections 4.4). These conservation measures do not apply to single-family residences and any non-commercial accessory uses and structures including but not limited to second units on an existing legal lot, or to operations and maintenance of Covered Activities other than levees, berms, dikes, and similar features that are known to contain burrowing owl burrows. Operations and maintenance of roads are not subject to these measures. For other projects that are subject to California Environmental Quality Act (CEQA), the permittees will require burrowing owl surveys in the Conservation Areas using an accepted protocol (as determined by the CVCC in coordination with the Permittees and the wildlife agencies).

Prior to development, the construction area and adjacent areas within 500 feet of the development site, or to the edge of the property if less than 500 feet, will be surveyed by an Acceptable Biologist for burrows used by burrowing owls.

If a burrow is located, the biologist will determine if an owl is present in the burrow. If the burrow is determined to be occupied, the burrow will be flagged and a 160-foot buffer during the non-breeding season and a 250-foot buffer during the breeding season, or a buffer to the edge of the property boundary if less than 500 feet, will be established around the burrow. The buffer will be staked and flagged. No development or operations and maintenance activities will be permitted within the buffer until the young are no longer dependent on the burrow. If the burrow is unoccupied, the burrow will be made inaccessible to owls, and the Covered Activity may proceed. If either a nesting or escape burrow is occupied, owls shall be relocated pursuant to accepted wildlife agency protocols. A burrow is assumed occupied if records indicate that, based on surveys conducted following protocol, at least one burrowing owl has been observed occupying a burrow on site during the past three years.

If there are no records for the site, surveys must be conducted prior to construction to determine if burrowing owls are present. Determination of the appropriate method of relocation, such as eviction/passive relocation or active relocation, shall be based on the specific site conditions (e.g., distance to nearest suitable habitat and presence of burrows within that habitat) in coordination with the Wildlife Agencies. Active relocation and eviction/passive relocation require the preservation and maintenance of suitable burrowing owl habitat determined through coordination with the Wildlife Agencies.

Within one year of permit issuance, the CVCC will cooperate with Riverside County Flood Control, CVWD, and IID to conduct an inventory of levees, berms, dikes, and similar features in the Plan Area and maintained by those Permittees. Burrowing owl burrow locations will be mapped and each of the Permittees will incorporate the information into its operations and maintenance practices to avoid impacts to the burrowing owl to the maximum extent feasible. CVCC, in cooperation with Riverside County Flood Control, CVWD, and IID, will prepare a manual for maintenance staff, educating them about the burrowing owl and appropriate actions to take when owls are encountered to avoid impacts to the maximum extent feasible. The manual will be submitted to the Wildlife Agencies for review and comment within two years of permit issuance. In conjunction with the Monitoring Program, maps of the burrowing owl locations along the above-described levees, berms, dikes and similar features will be updated periodically.

To mitigate the take of burrowing owl, the permittees will protect and manage as described in the Plan and in perpetuity, 41 of the 74 (55 percent) known occurrences within the MSHCP Reserve System as identified in the Plan. It is important to note that the Plan only evaluated 74 occurrences and not 136 occurrences including the Service and the CNDDB data. The analysis also does not include the 87 occurrences that were found by Hutchinson (pers. comm., 2008) described above.

Direct Effects

The primary importance of the proposed MSHCP to the burrowing owl is that it provides conservation (including habitat protection, management and monitoring) of this species to the extent it occurs in the Coachella Valley. The Plan ensures the long-term conservation of previously unprotected habitat, the associated Essential Ecological Processes, and connectivity between these habitat areas. In addition, the Conservation Areas provide protection of currently unprotected burrow sites, foraging areas, and potential habitat areas. Unlike other covered species in the MSHCP where take is evaluated by the loss of modeled habitat (acres), burrowing owl take is evaluated through the loss of known or historical occurrences.

Within the Conservation Areas, the Plan would ensure conservation of known burrow sites for burrowing owls. Throughout the Plan Area, the protected known locations include those in the Whitewater Floodplain Preserve, Upper Mission Creek/Big Morongo Canyon area west of Highway 62, the Willow Hole-Edom Hill Preserve/ACEC area, and the Thousand Palms Preserve. With adaptive management, conserved populations should be protected from edge effects, from OHV impacts, and from any activities that may result in disturbance to owl burrows. Outside of the Conservation Areas, there are 33 known locations identified in the Plan to be authorized for Take. The habitat outside the Conservation Areas is marginal or already highly fragmented and is surrounded by existing development. The potential for these habitat areas to provide for the long-term persistence of burrowing owls is low. These fragmented blocks are more susceptible to edge effects, including mortality on roads and predation by feral animals.

Table 1. Identification of total known burrowing owl occurrences, number of occurrences authorized for disturbance outside of the Conservation Areas, total number of occurrences within already existing conserved lands, remaining occurrences to be conserved.

Data Source	Total Occurrences in Plan Area	Occurrences Outside of Conservation Areas	Total Occurrences Within Existing Conserved Lands	Remaining Occurrences to be Conserved	Total Occurrences Known to be in the MSHCP Reserve System
CVAG	74	33	23	18	41
CNDDB	10	10*	0	NA	0
FWS	52	12*	22	NA	43
Total	136				84

* Data from FWS and CNDDB were not analyzed by CVAG. Hutchinson data (pers. comm., 2008) are not included.

Based on the data provided by CVAG, the effects of take can be evaluated in part by analysis of the known occurrences within the Plan Area. There are 74 known locations described for this species within the Plan Area. There are 23 known locations (31 percent) within existing conservation lands which would be managed as part of the Reserve System. Acquisition of additional reserve lands would protect the remaining 18 known locations (24 percent) within the Conservation Areas. Overall, the Plan would ensure conservation of 41 of these known locations (55 percent) within the Reserve System.

Our analysis of the sighting data provided by three sources (CVAG, FWS, and CNDDB) suggests that 84 of the 136 (62 percent) locations where burrowing owls have been reported at least once are in proposed Conservation Areas. While this location within Conservation Areas increases the likelihood of conservation for these occurrences, the stated commitment in the Plan is the conservation of 41 occurrences. There are a few cases where proximity of the other occurrences to those identified by CVAG will increase the likelihood that they will be conserved even more depending on the specifics of property ownership. To date, the ultimate configuration of the Reserve System is unknown because the location of future development associated with Covered Activities is not currently known. The end result of the configuration may, or may not, include specific burrowing owl occurrences. Long-term sustainability for this species in the Plan Area may be more limited by the loss of birds both inside and outside Conservation Areas than by the actual conservation occurring within the Conservation Areas.

The absence of restrictions on Covered Activities outside of Conservation Areas and some Covered Activities inside the Conservation Areas as discussed above is expected to lead to direct harm or mortality of burrowing owls even with the proposed Avoidance and Minimization Measures in place (Section 4.4). If the owls are not disturbed directly, it is likely that abandonment of burrows in areas with suburban or dense rural development may occur over time as a result of these Covered Activities. This impact due to Covered Activities would not extend to all occurrences in the Conservation Areas, even with the authorized loss (up to 10 percent of the area, and the occurrences in excess of the 41 identified) because the Burrowing Owl Interim

Conservation Strategy (Section 8.5.2) calls for systematic surveys of the Conservation Areas (where access is provided) during the first three years under the Plan following permit issuance. Management actions would be taken to eliminate potential threats and stressors to the burrowing owls such that a minimum of 16 pairs can be sustained within the Conservation Areas during the Interim Conservation Strategy period. Projects subject to CEQA within Conservation Areas will be required to survey for and relocate owls as appropriate prior to construction (and this information would feed into the development of a long-term strategy). The same requirements are not extended to owls outside of the Conservation Areas. The take authorization requested for these areas is in the form of known occurrences identified in the Plan (33 have been identified). However, other known localities and localities currently not recognized in any database also would be subject to Covered Activities outside the Conservation Areas. Avoidance of the direct loss of owls associated with all of these occurrences outside the Conservation Areas is feasible as per the applicable measures in Section 4.4, but these are not specifically called for in the Plan as a result of their location. However, the Permit requires that the Covered Activities be in compliance with the prohibitions of the Migratory Bird Treaty Act. Given this statute covers burrowing owls, Permittees are prohibited from activities that would include to: "pursue, hunt, take, capture, kill, attempt to take, capture or kill, possess…any migratory bird…part, nest or egg of any such bird," including burrowing owls. Any activities that would have any of these results are expected to be avoided by the Permittees. As a condition of the Permit, prior to ground disturbing activities, Permittees shall provide information to affected landowners regarding their responsibilities under the Migratory Bird Treaty Act.
The conservation measures do not apply to operations and maintenance of Covered Activities other than levees, berms, dikes, and similar features that are known to contain burrowing owl burrows (which are to be addressed as described in number 4 above). While the disturbance associated with these activities may result in impacts to burrowing owls, they are smaller in scale and of lesser intensity such that the impact of any take is likely to be small. Requiring the implementation of the Avoidance and minimization Measures in association with these activities would result in limited benefits and is not likely practicable.

Indirect Effects
Take of burrowing owls may occur through reduction of foraging potential on adjacent lands, and increased predation events on burrowing owls via mesopredators, stray/feral dogs and cats, and raptors (e.g. Cooper's hawks which increase due to greater availability of perch, nest, and prey opportunities caused by construction associated with development). While the Land Use Adjacency Guidelines are expected to reduce the impacts of these stressors, it is unlikely that the potential for enhanced predation can be eliminated by the use of various types of barriers and signage as described in the Plan. However, the adaptive management approach outlined in the Interim Conservation Strategy affords the opportunity to evaluate specific management actions to address these types of problems.

Urbanization likely would increase pedestrian traffic through or adjacent to extant colonies or burrows, which may result in harassment of the owls present. The Plan does not specify a minimum distance of future trails or other acceptable uses from owl burrows, or survey requirements prior to planning and implementation of trails in potential burrowing owl habitat. Incompatibilities of this sort will not be addressed until management plans for the Conservation Areas are in place. Some impacts could result from unmanaged activities in the interim, but they

are likely to be limited during the Interim Conservation Strategy period. We anticipate that the studies undertaken as part of the second phase of that strategy should shed light on the extent of and need for management actions to address this problem.

Increase and spread of invasive plants can negatively affect burrowing owl presence. Saharan mustard and other invasive plants create dense vegetation taller than 15 cm, which impact burrowing owl foraging efficiency and vigilance at the burrow to avoid predation by limiting vision (Green and Anthony 1989, 1997). In the long term, extant stands and future disturbances will likely induce changes to the natural landscape inside and outside of Conservation Areas, and invasive plants may overwhelm native vegetation near extant burrowing owl colonies and nest sites. While the plan proposes to control invasive plants, the success may be limited by the scope, scale and ecology of native versus non-native plants, and the minimum response for prevention and control that is highlighted in the Plan. The Plan does not specifically target weed control as a needed management tool for burrowing owls, though individual management plans should address such issues as needed. Given control of invasive vegetation across the entire landscape will not be feasible, the proposed management measures will need to be targeted for maximum effect if the Plan is to address this indirect effect to the burrowing owl.

OHV impacts are anticipated to be addressed through adaptive management. Historically, management of OHV use on public lands has been difficult, and the lack of control has resulted in impacted wildlife on preserves. It will likely be an ongoing management concern as the population in the Coachella Valley, and likely the interest in the activity, increase.

Although some fossorial species, such as the Coachella Valley round-tailed ground squirrel, are covered in the MSHCP (Plan), most fossorial mammals that may provide burrows have not been addressed and their long-term presence is not ensured. The loss of fossorial animals in some portions of the Plan Area may limit the ability of the burrowing owl to occupy those soil types because it is not able to dig its own burrows in heavy soils. The Interim Conservation Strategy does include the provision of artificial burrows as a potential management action. We anticipate that the long-term conservation strategy will do the same if the studies conducted in the second phase of the Interim Conservation Strategy support the need.

Adaptive Management and Monitoring

The framework for the Management Program will include ongoing management responsibilities and Adaptive Management. This framework is adaptive and subject to modification as system stressors change and as new information on how better to manage the MSHCP Reserve System to achieve the species and habitat goals becomes available (Sections 8.5.2 and 9.7.3.2). The Monitoring Program will be implemented in phases starting with the collection of baseline data that will be used to evaluate conceptual monitoring strategies followed by implementation of long-term species monitoring. The Monitoring Program will thereafter be adaptive to incorporate new protocols and techniques as appropriate.

As discussed above, the Burrowing Owl Interim Conservation Strategy calls for a two-phased approach: 1) to identify locations in the Conservation Areas where the owls occur and implement management actions (e.g., installation of artificial burrows) to reduce stressors on the owls (within the first three years); and 2) to collect detailed information about owl use of the

Conservation Areas to support the development of the long-term conservation strategy for the species (within the first six years). The long-term conservation strategy would include additional monitoring and adaptive management such that the long-term conservation strategy can be modified as appropriate through the life of the permit.

The extent to which surveys would be successful in detecting burrowing owl presence in a desert environment has not been measured, adding to the difficulty in evaluating the survey protocol for detection. However, existing methods and understanding of the species suggest that detectability should be reasonable if the surveys are done correctly. Although some unquantifiable amount of take may result from failure to detect owls in the course of surveys, the Interim Conservation Strategy calls for improvement of the protocol as appropriate based on systematic survey efforts in the first three years such that this loss is expected to be small.

The avoidance and minimization measures identified in Section 4.4 would be addressed as part of this adaptive management process. The success of eviction, passive relocation and active relocation has not been measured in the desert environment of the Plan Area. While there currently is no way to estimate any losses associated with failures of these methods, we anticipate that the use of an adaptive management approach would be implemented such that the appropriate data are collected to support the improvement of their success over time. This should result in a net benefit for the species in the long-term.

The MSHCP outlines some initial management and monitoring actions:
1. Control and manage activities that degrade burrowing owl habitat. In particular, those activities that result in frightening birds away from their nests or that may crush burrows, including OHV travel in their habitat and other human disturbance, will be controlled through fencing and patrolling.
2. Consider whether a restriction on human access to occupied habitat during the breeding season is appropriate based on monitoring information. Burrowing owls, especially those in "colonies" during the breeding season, are vulnerable to disturbance (Haug, Millsap, and Martell 1993).
3. Identify actions to reduce impacts from, and control where feasible, invasive species if it is determined from monitoring results that there are impacts to burrowing owls.
4. Encourage the presence of burrowing owls in agricultural areas by allowing them to remain at burrows established in levees and dikes. Maintenance schedules for these levees should avoid the breeding season from March to July. Caution in use of pesticides in the vicinity of burrowing owl burrows is also important. Other measures that may enhance potential habitat in agricultural areas should be evaluated. Proactive habitat enhancement in agricultural areas could benefit burrowing owls if they are using berms along agricultural drains.

Changed Circumstances
We do not anticipate that fire, lowering of the water table, or new listings of species not covered by the MSHCP will result in impacts to the burrowing owl beyond those described above. Fire is generally not an issue in desert environments, but its frequency may increase to the extent that invasive plants become an issue in burrowing owl habitat. Should increased fire become an issue, the most direct effect would be a likely reduction in prey base for the burrowing owl. We have addressed the impacts of ongoing invasions by non-native plants above. Burrowing owls are not known to be dependent on vegetation communities that are dependent on groundwater, so

no impacts are anticipated with such changes. New listing warrant an evaluation of Covered Activities, and any associated changes in species coverage or management will be considered in the context of existing Covered Species when the identity of newly-listed species is/are known.

Under the set of agreements that control the apportionment of the Colorado River and State Water Project waters, the water delivered to the agricultural areas of the Coachella Valley may be reduced under drought conditions. This may result in reductions in agriculture with corresponding reductions in opportunities for the burrowing owl. However, given the senior water rights for Colorado River water held by CVWD, the QSA that affords them additional Colorado River water, and the limited number of burrowing owls known from the agricultural region of the Coachella Valley (approximately 15 based on all available data sources), we do not anticipate that this would result in major impacts to burrowing owls given the agriculture that is likely to remain. Burrowing owls may be affected by reduced prey availability in desert areas as a result of drought, as would be the case with or without the Plan. Although the Plan does not offer measures under Changed Circumstances to address this effect, we do not anticipate that this factor would drive the sustainability of the population in the Plan Area. The management provided for in the Plan should be adequate to offset this effect.

Exotic species within the Conservation Area are anticipated to increase. The most likely impact associated with exotic species is the invasion of an exotic plant that changes the structural characteristics of the desert communities. The Plan area already has exotic plant species that warrant monitoring and management, and this management should afford the opportunity to identify and address new exotic plants relatively quickly before major invasions become established.

Cumulative Impacts
Cumulative effects include the effects of future State, Tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to Section 7 of the Act.

We are unaware of any non-Federal actions currently affecting the burrowing owl that are reasonably certain to occur in the Plan Area, outside of actions described in the MSHCP Plan. Fragmentation of habitat and loss of suitable nesting habitat to development has affected burrowing owls by reducing potential nesting, roosting, foraging habitat, and dispersal corridors in areas inside and outside of the Plan Area.

The Agua Caliente Band of Cahuilla Indians is undertaking a Habitat Conservation Plan for all of their Tribal lands. The draft Plan and associated documents have been reviewed publicly. It is anticipated that the final Plan and associated environmental analysis will be complete in mid-2008 with permit issuance scheduled for late 2008. Although there will be habitat loss associated with that Plan, the overall net benefit to the species is positive. Because issuance of that permit is a Federal action, an analysis of the impacts of that Plan will be completed in the required section 7 process.

CONCLUSION

After reviewing the current status, environmental baseline, effects of the proposed action, and cumulative effects, it is our opinion that the issuance of an Incidental Take Permit to the Permittees under the Coachella Valley MSHCP is not likely to jeopardize the continued existence of the burrowing owl because of the anticipated continued presence of burrowing owls in other locations, including the Imperial Valley, in North America. The proposed permit condition, while not reducing the areal extent of Covered Activities under the Plan, ameliorates the direct effects of the take of the species. This condition in combination with the implementation of the MSHCP, including all conservation measures, land use adjacency guidelines, monitoring and adaptive management identified therein, is expected to provide for the conservation of the species in the Plan Area over the permit term.

AMOUNT OR EXTENT OF TAKE

Based on the CVAG analysis, the take of burrowing owl is estimated to be up to 33 (45 percent) known locations within the Plan Area. In the Reserve System, there are 23 (32 percent) known locations within Existing Conservation Lands and an additional 18 (23 percent) known locations that are proposed to be conserved. Although the fate of the occurrences within the Conservation Areas beyond the 41 identified in the Plan cannot be determined at this time we anticipate that the majority will be avoided or relocated prior to disturbance as a result of the Interim Conservation Strategy and the avoidance and minimization measures (Section 4.4) required under the Plan. The habitat outside the Conservation Areas is already highly fragmented and is surrounded by existing development. The potential for these habitat areas to provide for the long-term persistence of burrowing owls is low. These areas are primarily in areas of marginal or fragmented habitat, such as in the area south of Desert Hot Springs and east of Highway 62. These fragmented blocks are more susceptible to edge effects, including mortality from road traffic and predation by domesticated or feral animals. Some of the 33 occurrences identified in the Plan and other occurrences identified by the Service, CNDDB and Hutchinson outside the Conservation Areas are likely to be impacted by Covered Activities. A currently unknown portion is anticipated to be protected by the avoidance and minimization measures associated with levees and berms. The remainder would be subject to the impacts associated with Covered Activities. However, the Permit Term and Condition will minimize the destruction of occupied burrows by ensuring that birds that come to occupy the majority of these sites will be avoided during authorized disturbance. Although a substantial number of known burrowing owl locations could be lost to development within the next 75 years, the establishment of Conservation Areas, where a number of known occurrences exist, in combination with the Interim Conservation Strategy and its anticipated long-term successor constitute a considerable contribution to the long-term survival of this species in the Plan Area.

PERMIT CONDITIONS

The following Permit Condition has been identified through our analysis as being necessary and appropriate for coverage of this species in the Permit:

This section 10(a)(1)(B) Permit shall constitute a Special Purpose Permit under 50 Code of Federal Regulations section 21.27, for the take of Covered Species listed under the Act and which are also listed under the Migratory Bird Treaty Act (MBTA; 16 U.S.C. §§ 703-712), in the amount and/or number specified in the Plan, subject to the terms and conditions specified in the Section 10(a) Permit. Any such Take will not be in violation of the MBTA. The MBTA Special

Purpose Permit will extend to Covered Species listed under the Act and also under the MBTA after the Effective Date of the Section 10(a) Permit. This Special Purpose Permit shall be valid for a period of three (3) years from its effective date, provided the section 10(a) Permit remains in effect for such period. The Special Purpose Permit shall be renewed upon written request to the U.S. Fish and Wildlife Service (Service) or as otherwise applicable pursuant to the requirements of the MBTA, provided the Permittees remain in compliance with the terms of the Plan, the Implementing Agreement and the Section 10(a) Permit. Each such renewal shall be valid for a period of three (3) years, provided that the Section 10(a) Permit remains in effect for such period. Take, as defined by 50 C.F.R. 10.12, associated with habitat loss for bird species on the list of Covered Species is avoided or minimized within Conservation Areas by the restrictions provided in Section 4.4 of the Plan. For other birds protected by the Migratory Bird Treaty Act (MBTA) and not listed under the Act no take is authorized under the MBTA (including killing and wounding of any such birds, or take of eggs and active nests). Prior to ground disturbing activities, Permittees shall provide information to affected landowners regarding their responsibilities under the Migratory Bird Treaty Act.

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Southwestern willow flycatcher (*Empidonax traillii extimus*)

STATUS OF THE SPECIES

Legal/Listing Status

The southwestern willow flycatcher (*Empidonax traillii extimus* [Phillips]) was listed as endangered on February 27, 1995 (60 FR 10694). This species is additionally afforded protection under the MBTA and the California Endangered Species Act.

Critical habitat was designated on July 22, 1997 (62 FR 39129). 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 then set aside critical habitat designated for the southwestern willow flycatcher in all other states (California and Arizona) until the economic analysis could be reassessed. Critical habitat for the southwestern willow flycatcher was re-proposed on October 12, 2004 (69 FR 60706) and redesignated on October 19, 2005 (70 FR 60886). The Plan Area is entirely outside of the boundaries of designated critical habitat for the southwestern willow flycatcher.

A final recovery plan for the southwestern willow flycatcher was signed by the Service's Region 2 Director on August 30, 2002 (Service 2002). The Recovery Plan describes the reasons for endangerment, current status of the flycatcher, important recovery actions, detailed issue papers on management problems, and recovery goals.

Species Description

The southwestern willow flycatcher is a relatively small, insectivorous (passerine) songbird, approximately 15 centimeters (5.75 inches) in length. Both sexes of the southwestern willow flycatcher have 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 (*Empidonax traillii*).

Although previously considered conspecific with the alder flycatcher (*Empidonax alnorum*), the willow flycatcher is, and was historically (Coues 1903), considered to be distinguishable from that species by morphology (Aldrich 1951), song type, habitat use, structure and placement of nests (Aldrich 1953), eggs (Walkinshaw 1966), ecological separation (Barlow and MacGillivray 1983), and genetic distinctness (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. Although the subspecific differences in color have been termed "minor" (Unitt 1987), some expert observers (e.g., P.E. Lehman) have concluded that the southwestern willow flycatcher in California is distinguishable in the field from other forms of willow flycatchers that might be present (in migration) within the breeding range of the former. 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 southwest willow flycatcher is distinguishable from

other willow flycatchers.

Distribution

The breeding range of the southwestern willow flycatcher includes the southern third of California, southern Nevada, Arizona, New Mexico, and western Texas (Hubbard 1987, Unitt 1987, Browning 1993). The subspecies may also breed in southwestern Colorado, but nesting records are lacking. Records of breeding in Mexico are few and confined to extreme northern Baja California and Sonora (Unitt 1987, Howell and Webb 1995). California, Arizona, and New Mexico account for 89% of known flycatcher territories. Nevada, Colorado, and Utah collectively account for 11% of the known territories. The current status of the southwestern willow flycatcher in Texas is unknown (Durst *et al*. 2006). Willow flycatchers winter in Mexico, Central America, and northern South America (Phillips 1948, Ridgely 1981, AOU 1983, Stiles and Skutch 1989, Ridgely and Tudor 1994, Howell and Webb 1995).

Habitat Affinities

Southwestern willow flycatchers are obligate riparian breeders and occur within riparian zones along watercourses where dense growth of willows (*Salix* sp.), *Baccharis*, arrowweed (*Pluchea* sp.), buttonbush (*Cephalanthus* sp.) and other wetland plants provide dense thickets. Nests are built in thickets that are 4-7 meters (13-23 feet) or more in height and occupied habitat is usually canopied in willows or cottonwoods (Phillips 1948; Grinnell and Miller 1944; Whitmore 1977; Hubbard 1987; Unitt 1987; Whitfield 1990; Brown 1991; and Service, 1993, 1995). Typically, sites selected as song perches by male willow flycatchers show higher variability in shrub size than do nest sites and often include large central shrubs.

The subspecies of willow flycatcher generally prefer nesting sites with surface water nearby (Bent 1960, Harris *et al.* 1986) and in the Prado Basin, along the Santa Ana River in southern California, nest sites are almost always located near surface water or saturated soil (e.g., The Nature Conservancy 1994). Fragmented riparian zones with large distances between willow patches and individual willow plants are not selected for either nesting or singing (Sedgwick and Knopf 1992). Migrating willow flycatchers use habitats similar to breeding flycatchers, but will also use desert washes, oases, and open canyon woodlands near watercourses (Small 1994).

Life History

As relatively small, insectivorous songbirds, southwestern willow flycatchers typically glean insects from the foliage, sally to catch flying insects, and occasionally capture 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).

Males typically arrive in southern California from May through mid-June and establish a territory by singing and interacting aggressively with other flycatchers (Service 2002). 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).

Southwestern willow flycatchers typically raise one brood per year. The clutch size is usually three to four eggs, and incubation lasts 12 to 13 days (Service 2002). 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 (Service 2002). Birds are able to breed at one year of age and banding studies have documented survivorship up to 11 years of age, although a life span of one to three years is most likely (e.g., Sedgwick 2000, Service 2002).

Population Trends

Although the breeding range extends through six states, Kus *et al*. (2003) noted that southwestern willow flycatchers have declined to the point of near extinction as urbanization and burgeoning human populations have resulted in widespread loss and degradation of riparian habitat. In California, there has been a 95 percent reduction of riparian habitat over the last century, and willow flycatchers are now absent as a breeding species from the Central Valley of California, where they were once common (Harris *et al.* 1987). Southwestern willow flycatchers have been dramatically reduced in number along the lower Colorado River, which historically probably supported one of the largest flycatcher populations in the Southwest (Unitt 1987). Sogge *et al.* (2003) reported only 986 territories located among 221 sites, rangewide within the United States using data from 1993 to 2001, many of which consisted of unpaired males. Over the range of the species, most (82 percent) breeding sites are small, both in terms of population size (five or fewer territories) and habitat patch size (Sogge *et al.* 2003). Only 18 percent of the sites rangewide are over 5 territories. Seven of these sites (populations) consist of 20 or more territories and only two sites have 50 or more territories, one of which is the upper San Luis Rey River (near Lake Henshaw) in San Diego County, which is outside of the project area and action area (U.S. Fish and Wildlife Service, unpub. data). Small breeding sites are vulnerable to extirpation; 61 of the 65 sites from which southwestern willow flycatchers were extirpated since 1993 were composed of five or fewer territories. Even the "larger" sites of 50 or more territories are vulnerable to catastrophic events (e.g., fire, disease, or floods) and flood control/water supply projects.

Although some other riparian birds have increased in numbers, the rangewide population of the southwestern willow flycatcher has not experienced a significant increase in numbers. This may be a byproduct of this flycatcher's need for mature vegetation (greater than 8 years old), their need for nearby open water, and the reduced benefit that cowbird trapping provides the flycatcher.

Southwestern willow flycatcher populations in California are small; widely isolated, with very high percentages of unpaired males; and have between only 1 and 5 territories for 90 percent of the sites (Sogge *et al.* 2003). Within California, 45 to 46 percent of southwestern willow flycatchers detected in 1999-2001, respectively, were concentrated in three relatively "large" populations: the lower Santa Margarita River (17-18 territories annually), the Kern River (21-25 territories), and the upper San Luis Rey River (46-50 territories).

In California, intensive management to reduce the threat of nest parasitism and restore degraded riparian corridors has been underway for a number of years. The management efforts have

proven to be effective for the least Bell's vireo, a species that shares similar vulnerabilities to habitat loss and parasitism (Kus 2003). However, this management has failed to increase the number of territories within known populations of southwestern willow flycatchers.

Threats
Major threats to the southwestern willow flycatcher include the destruction, modification, or reduction of its habitat and nest parasitism by the brown-headed cowbird (Service 1995). Changes in riparian plant communities have resulted in the degradation and elimination of nesting habitat for the willow flycatcher, which in turn have reduced the range, distribution, and population size of this species (Service 1995).

Cowbird parasitism of willow flycatchers is frequent, particularly in lowland populations, and seems to heavily impact nesting success (Gaines 1977; Unitt 1987; Ehrlich *et al.* 1992; Service 1993, 1995). In California, parasitism rates have been documented ranging as high as 50 to 80 percent at some locales (Whitfield 1990, M. Whitfield and S. Laymon, unpublished data) to up to 100 percent in the Grand Canyon in 1993 (Service 1993). Mayfield (1977) thought that a species or population might be able to survive a 24 percent parasitism rate.

Loss and modification of southwestern riparian areas has occurred as a result of agricultural development, water diversion and impoundment, channelization, non-native plant invasions livestock grazing, off-road vehicle and other recreational uses, and hydrological changes resulting from these and other land uses (e.g., Klebenow and Oakleaf 1984, Taylor and Littlefield 1986). Estimated losses of wetlands between 1780 and the 1980's in the southwestern United States are: California (91 percent); Nevada (52 percent); Utah (30 percent); Arizona (36 percent); New Mexico (33 percent); and Texas (52 percent) (Dahl 1990).

Synopsis of Status
The most recent report compiling rangewide survey data for the southwestern willow flycatcher states that of the 275 known breeding sites, 142 were surveyed in 2005. Of the sites surveyed, 999 territories (territories are roughly equivalent to a pair) were detected. Most of these breeding sites are small; both in terms of the number of territories (five or fewer) and habitat patch size (Durst *et al*. 2006). This is consistent with the previous findings of Unitt (1987) and the Service (1995). Willow flycatcher territories have disappeared from 133 of the 275 sites tracked since 1993 – all but two of these sites had five or fewer territories (Durst *et al*. 2006).

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). Consistent with this premise, in 2001, Sogge *et al*. identified 224 southwestern willow flycatcher territories at a total of 65 breeding sites within California. In 2005, using similar methods and datasets, Durst *et al*. identified 191 territories at a total of 94 breeding sites.

ENVIRONMENTAL BASELINE

Status of the Species in the Action Area
The breeding status of the southwestern willow flycatcher within the Plan Area is not well known. Of the known locations at which this species has been observed, only one, Mission Creek, was confirmed as supporting breeding birds (R. McKernan *in* CVAG 2007). In 2003, a

possible pair and a singing male willow flycatcher were observed at each of two locations, Thousand Palms Oasis and Mission Creek, but breeding could not be confirmed (Center for Conservation Biology, University of California, Riverside 2004). Suitable breeding habitat is present in a number of locations where riparian habitat occurs, in Chino, Andreas, Murray, Palm, Millard, and Whitewater Canyons, and possibly in Stubbe and Cottonwood Canyons. Suitable breeding habitat may also occur at Oasis de los Osos, along the Coachella Valley Storm Channel near the Salton Sea, at the Thousand Palms Preserve, and at Dos Palmas Preserve/ACEC.

Survival and Recovery Needs of the Species in the Action Area
The Service's final Recovery Plan for the southwestern willow flycatcher identifies the protection, restoration, and creation of habitat and the control of cowbird parasitism as necessary to conserve this species. The Recovery Plan identifies 6 Recovery Units and 32 Management Units that should be managed to meet these objectives in a manner sufficient to promote stable or increasing flycatcher populations; the Plan area is within the Salton Management Unit of the Basin and Mojave Recovery Unit. The Salton Management Unit and the Basin and Mojave Recovery Unit have not met the minimum number of territories for reclassification (Durst *et al*. 2006). To meet stated recovery criteria, the Basin and Mojave Recovery Unit would need to support 200 territories, 25 of these would need to occur in the Salton Management Unit. The Basin and Mojave Recovery Unit had 56 known territories and the Salton Management Unit had four of these known territories between 1993 and 2005 (Durst *et al*. 2006). Therefore, an addition 21 territories would need to be established in the Plan area to meet recovery criteria. In addition, all of the territories within the Salton Management Unit still face ongoing threats and most areas are not managed for cowbird control.

Factors Affecting the Species' Environment within the Action Area
The primary factors affecting the southwestern willow flycatcher within the action area include loss, fragmentation, and degradation of riparian habitat; changes in stream hydrology; and the adverse effects of invasive plant and animal proliferations associated with the fragmentation and alteration of the overall landscape. Groundwater pumping, water storage, and water diversions may have a significant effect on this species' environment within the action area due to the reduction or cessation of stream flows, which are important habitat components that likely provide for the production of prey species and the optimum recruitment and development of riparian vegetation (Shafroth 1998, Stromberg *et al*. 2005, Stromberg *et al*. 1996, Stromberg *et al*. 1991).

EFFECTS OF THE ACTION
The effects analysis below is based on the following assumptions:

Species Conservation Goals and Objectives (Section 9) will be met through the Joint Project Review Process (Section 6.6.1.1) and Monitoring and Adaptive Management Programs (Sections 8 and 9).

Despite mutable General Plans of Local Permittees, future land uses and development patterns will reflect current land use trends (largely residential and tourist resort-commercial uses), thereby explicitly ruling out unlikely future land uses such as heavy industry, expansion of agriculture into native habitat (unregulated by the County and therefore not a Covered Activity),

etc.

Per Section 10.7, Desert Fan Palm Oasis is a natural community subject to the no net loss policy.

Mitigation and Minimization Measures

The mitigation measures proposed in the MSHCP are intended to conserve large areas of suitable breeding habitat for the southwestern willow flycatcher. Within the Plan Area, there are approximately 2,730 acres of modeled breeding habitat and 57,471 acres of modeled migratory habitat available for the southwestern willow flycatcher (NOTE: the acreage numbers specified here and the sections below reflect a discrepancy that was noted, after the final Plan was approved, in the amount of suitable habitat available for this species in the Mecca Hills/Orocopia Mountains conservation area). The Plan ensures conservation of 2,563 acres (94 percent) of modeled breeding habitat and 40,728 acres (71 percent) of modeled migratory habitat in perpetuity within the Reserve System. The BLM manages approximately 1,358 acres (2 percent) of modeled migratory habitat in the Plan area that is not included in conservation areas; the majority of these lands are classified as multiple-use class M – moderate use. These lands are managed to provide for a wider variety of uses such as mining, livestock grazing, recreation, utilities and energy development, while conserving desert resources and mitigating damages permitted uses may cause (BLM 2002).

Approximately 1,526 acres (60 percent) of modeled breeding habitat and 21,209 acres (52 percent) of modeled migratory habitat are currently preserved, leaving 1,037 acres and 19,519 acres of modeled habitat, breeding and migratory respectively, to be conserved as part of the MSHCP. The conservation areas include the known breeding habitat for southwestern willow flycatcher in Mission Creek and potential breeding habitat is present in a number of the conservation areas. Although a maximum of 10 percent of private land that has been modeled as southwestern willow flycatcher breeding and migration habitat could be impacted within each conservation area, the Plan's riparian no net loss policy ensures that any and southwestern willow flycatcher habitat impacted within the conservation areas would be replaced in kind.

Ninety percent of private lands within each conservation area would be conserved. Reserve System configuration would be subject to the Conservation Objectives and Required Measures established in Section 4 and Species Conservation Goals and Objectives established in Section 9 of the MSHCP for each conservation area.

Minimization measures have also been developed to reduce impacts to this species. The measures include required avoidance, minimization, and mitigation measures such as avoiding project activity during the breeding and nesting season (Section 4.4), maintaining upland buffers for occupied habitat (Section 9), and implementing Land Use Adjacency Guidelines (Section 4.5) for land adjacent to or within conservation areas. These guidelines include noise thresholds, shielding or directing of lighting, use of barriers to minimize unauthorized access, and avoidance of invasive plants in landscaping.

The Plan includes Management and Monitoring programs (Section 8) that would ensure the conservation of southwestern willow flycatcher, including control and management of activities that degrade southwestern willow flycatcher habitat, control of invasive species such as brown-

headed cowbirds, and coordinated management efforts to maintain, enhance, or restore southwestern willow flycatcher habitat. Additionally, the monitoring program would include data collection to determine factors affecting the distribution and abundance of southwestern willow flycatcher throughout the Plan area.

Direct Effects
Given the current unknown status of the species within the Plan Area, we cannot currently gauge the extent of direct impacts to breeding southwestern willow flycatchers. However, should the species nest in the Plan area now or in the future, the measures incorporated into the Plan should minimize or entirely avoid impacts to breeding birds.

Habitat loss is the most extensive direct effect. We anticipate that up to 59 (2.2 percent) of the 2,730 acres of the southwestern willow flycatcher modeled breeding habitat and 13,020 (23 percent) of the 57,471 acres of modeled migratory habitat for the species within the Plan area but outside of the Conservation Areas could potentially be permanently lost as a result of implementation of the Plan. In addition, 2,331 (4 percent) of the 57,471 acres of modeled migratory habitat present on private lands within conservation areas could also be permanently lost. Finally, 109 (4 percent) of the 2,730 acres of the modeled breeding habitat present on private lands within conservation areas could be temporarily lost. This loss is temporary as the Plan's wetland no net loss policy ensures that any and all southwestern willow flycatcher breeding habitat impacted within Conservation Areas would be replaced in kind. The no net loss policy will provide assurances that temporary losses to riparian areas will not significantly limit the reproduction potential of southwestern willow flycatcher as compared to the baseline condition.

The conservation areas include the potential breeding habitat for southwestern willow flycatchers in Whitewater Canyon, Chino Canyon, the Thousand Palms Preserve, the Coachella Valley Stormwater Channel mouth near the Salton Sea, Cottonwood Springs in Joshua Tree National Park and Dos Palmas. The one known breeding location in Mission Creek is conserved. Therefore, impacts to currently occupied breeding habitat will be avoided. Other suitable habitat for breeding sites in the Plan Area occurs in Palm Canyon, Murray Canyon, and Andreas Canyon on the Agua Caliente Band of Cahuilla Indian tribal land; portions of these canyons are currently protected as part of the Indian Canyons Heritage Park.

The Plan calls for Management and Monitoring Programs to ensure the conservation of this species, including control of activities that degrade southwestern willow flycatcher habitat, control of invasive species such as tamarisk and brown-headed cowbirds where necessary, and restoration and enhancement of degraded habitat as necessary according to monitoring results.

Beneficial effects of the plan include establishment of 44 acres of permanent Sonoran cottonwood-willow riparian forest in the Coachella Valley Stormwater Channel and Delta Conservation Area, the aforementioned minimization and mitigations measures, and management and monitoring programs that will be established as part of the Plan.

Because of the aforementioned management actions, conservation measures, and habitat conservation goals; and confirmed or suspected breeding territories and migration corridors will

remain substantially intact and available for use, the effects of the Plan are not expected to appreciably reduce the reproduction, numbers, or distribution of southwestern willow flycatchers in the Plan Area or rangewide.

Indirect Effects
Any Covered Activity-related creation and maintenance of conditions that favor the establishment and proliferation of invasive plants could impact the status of the southwestern willow flycatcher. Undisturbed areas vegetated with native species are much more resistant to invasion by non-native species. By contrast, areas directly affected or disturbed by construction and other landscape alteration activities are likely to accommodate, sustain, and facilitate the spread of non-native plants within the Plan area. Stands of invasive, non-native plants provide little or no habitat for the southwestern willow flycatcher, and progressively destroy native habitat elements by outcompeting them or producing microenvironments susceptible to fire or erosion.

The increase and spread of invasive plants such as tamarisk are continuing relatively unabated in the Southwest. In the long term, the Covered Activity-related alteration of the landscape within the Plan Area and associated potential establishment and dispersal of select non-native plants likely would overwhelm native riparian habitats occupied by the summer tanager and other riparian-obligate species in the action area. However, the Plan proposes to control non-native invasives, which would prevent this otherwise adverse impact of human activity.

Numerous studies have revealed that overall nest success of songbirds in the United States and southern California in particular is depressed in habitat fragments or edges due to the individual or combined effects of nest parasitism by the cowbird, nest depredation, and possibly, documented reductions in insect prey (e.g., see Askins 2000, Zembal *et al.* 2003). Cowbirds prefer feeding in open areas (Garrett and Dunn 1981) that are largely created by human alterations of the landscape. Such areas include manicured parks and lawns and the landscaping often associated with developed properties. Further, because even small numbers of cowbirds can strongly impact the reproductive success of southwestern riparian species (Powell and Steidl 2000), any Covered Activity-related feature that creates conditions favorable to cowbirds in, or immediately adjacent to, habitat areas could decrease the reproductive success of southwestern willow flycatcher in the absence of effective management measures. However, the Plan proposes to control and manage for nest parasitism by brown-headed cowbirds, which would limit, or prevent, this otherwise adverse impact.

Proposed mitigation measures (e.g., work restrictions during the breeding season) would substantially reduce or eliminate many indirect, project-related effects (e.g., noise and vibration) that might otherwise have occurred. Similarly, management measures such as invasive plant and animal control and the conservation of large blocks of southwestern willow flycatcher habitat would mitigate—or perhaps entirely compensate for—the effects associated with the project-induced fragmentation of southwestern willow flycatcher breeding habitats.

The potential spillage and/or dispersal of contaminants (e.g., crude oil, fuel, petroleum products, and solvents) within the action area as result of the construction or implementation of Covered Activities could have adverse consequences to breeding southwestern willow flycatchers. Given

that the bioaccumulation of toxic substances may cause reproductive failures in birds, the discharge, dispersal, and accumulation of potentially toxic environmental contaminants associated with construction and implementation of, for instance, residential housing and commercial projects, could adversely affect the southwestern willow flycatcher by decreasing recruitment and, in turn, abundance. Best management practices and conservation measures incorporated into the Land Use Adjacency Guidelines should contribute to a decreased likelihood of the accidental spillage and dispersal of environmental contaminants during the construction.

CHANGED CHIRCUMSTANCES

The Changed Circumstances that are likely to affect the southwestern willow flycatcher are drought, fire, invasion by new exotic species, and lowering of the water table. Drought and lowering of the water table may reduce water flows through areas of existing habitat and/or restored habitat. The need to maintain water flows through riparian areas is critical to maintain suitable areas of breeding and migratory habitat for this species. Section 6 of the Plan states that a drought event significantly affecting Covered Species is not anticipated to occur during the life of the Permit. Nevertheless, measures will be taken to monitor the effects of drought on Covered Species. Extended periods of drought in the action area could lead to changes in both the aboveground and belowground water dynamics affecting both plant survival and species composition (Shafroth *et al.* 2002). Therefore, monitoring in the event of an identified drought should include quantitative information on survival and species composition in existing riparian areas.

The Plan (Section 6) defines lowering of the water table as an increase in the depth to groundwater. Preventative measures to reduce the chances of this changed circumstance occurring include monitoring programs to determine whether substantial lowering of the water table occurs. The planned response in the event monitoring detects a substantial lowering or a decline in mesquite health in these areas includes, among other things, development of feasible measures to ameliorate the effects of substantial lowering of the water table on mesquite hummocks and associated Covered Species. To determine the health of mesquite in these areas, the monitoring should provide quantitative information on the timing and extent of morphological responses and mortality of mesquite to the rate, depth, and duration of water table declines to assist in the design of management of feasible measures to minimize impacts of groundwater depletion on mesquite in these areas.

Unintended fire in the desert environment could spread to riparian areas, particularly in the Dos Palmas area given the existing access to off-road vehicle users. The preventive measures identified in the Plan will assist in reducing the risk and spread of fires from the desert to the riparian areas. Proper controls and configurations will reduce the risk of wildfire spreading into these areas and establish appropriate site-specific response actions. Wildlife Agency oversight should ensure that these tasks are completed appropriately and in a timely fashion.

Various disturbances, including fire, can result in the establishment of new exotic species within riparian areas. The most likely impact associated with exotic species is the invasion of an exotic plant that changes the structural characteristics of these areas. The Plan area already has exotic plant species that warrant monitoring and management, and this management should afford the opportunity to identify and address new exotic plants relatively quickly before major invasions

become established.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

We are unaware of any non-Federal actions affecting the southwestern willow flycatcher that are reasonably certain to occur in the action area considered by this opinion. Even if activities are proposed within the Plan Area outside of the purview of the Plan, the breeding habitat of the southwestern willow flycatcher within the Plan Area and the United States range of the species as a whole is almost invariably located partly (and often entirely) within the jurisdiction of the Corps of Engineers pursuant to Section 404 of the Clean Water Act. In addition, approximately 50 percent of willow flycatcher habitat within conservation areas is located on Federal property.

The Agua Caliente Band of Cahuilla Indians is undertaking a Habitat Management Plan for all of their Tribal lands. The draft Plan and associated documents have been reviewed publicly. It is anticipated that the final Plan and associated environmental analysis will be complete in mid-2008 with permit issuance scheduled for late 2008. Although there will be habitat loss associated with that Plan, the overall net benefit to the species is positive. Because issuance of that permit is a Federal action, an analysis of the impacts of that Plan will be completed in the required section 7 process.

CONCLUSION

After reviewing the current status of the southwestern willow flycatcher, the environmental baseline for the action area, effects of the proposed action, the cumulative effects, and proposed permit conditions, it is our biological opinion that the proposed action is not likely to jeopardize the continued existence of the southwestern willow flycatcher. Our conclusion is based on the following findings:

Conservation measures have been proposed to minimize Covered Activity-related direct effects that likely would only marginally change the baseline of breeding habitat, abundance, and distribution for the southwestern willow flycatcher within the Plan Area and range of the species. The proposed conservation of large habitat blocks and/or creation efforts should ensure that the function of potential breeding and migration habitats for southwestern willow flycatchers is maintained within the action area; and the proposed action likely would not induce major indirect effects to the southwestern willow flycatcher resulting from implementation of the proposed Covered Activities. Although the proposed Covered Activities would contribute to the fragmentation and disturbance of potential southwestern willow flycatcher breeding and migration habitat in the Plan Area and possibly subject the species to increased depredation, parasitism, and the impacts associated with the proliferation of invasive plants, the proposed monitoring and management of the Reserve System would likely provide secure habitats and environments for individuals displaced or otherwise indirectly impacted by Covered Activities.

AMOUNT OR EXTENT OF TAKE

It is impossible to quantify the number of birds that will be impacted as a result of the proposed action over the 75-year permit term due to the large Plan Area. Therefore, the Service is quantifying the take as the number of acres of modeled habitat that would be impacted in the proposed Plan Area as a result of the proposed action. We anticipate that up to 59 acres of modeled breeding habitat and 15,351 (13,020 + 2,331) acres of modeled migratory habitat within the Plan Area would become permanently unsuitable for the southwestern willow flycatcher as a result of the proposed action. An additional 109 acres of breeding habitat would be disturbed in conservation areas under the Plan, but these acreages would be restored or replaced to ensure no net loss of riparian habitats in the conservation areas. Finally, a small, but as yet indeterminable number of southwestern willow flycatchers are anticipated to be taken as a result of monitoring and management actions.

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Crissal Thrasher (*Toxostoma crissale*)

STATUS OF THE SPECIES

Legal/Listing Status

The crissal thrasher (*Toxostoma crissale*) has been identified by California Department of Fish and Game (CDFG) as a California Species of Special Concern (CDFG 2005). CDFG gives such designations because of declining population levels, limited ranges, and/or continuing threats have made them vulnerable to extinction. CDFG's goal of designating a "Species of Special Concern" is to halt or reverse the species' decline by calling attention to their plight and addressing the issues of concern early enough to secure their long term viability (CDFG 2005).

The California Natural Diversity Database (CNDDB) has assigned the crissal thrasher a Global Rank (G1-G5) of worldwide status of G5, identified as presently secure and found throughout its historic range. Locally, the CNDDB State Rank (S1-S5) identified the statewide status for the crissal thrasher is S3. It is classified as a range restricted species and rare, or with about 21-100 viable occurrences, or 3,000 – 10,000 individuals, or has only 10,000 – 50,000 acres of occupied habitat (CDFG 2005).

Although the crissal thrasher is not federally or state listed under either the Endangered Species Act of 1973, as amended (Act) or the California Endangered Species Act, the Service has designated the species as a Bird of Conservation Concern, i.e., one of a number of species (beyond those already designated as Federally threatened or endangered) that represent the highest Service conservation priorities and in need of conservation action. This species is a resident species within the Plan Area and is afforded protection under the Migratory Bird Treaty Act.

There are other designations for this species. In a 2005 assessment, Partners in Flight (PIF) identified the crissal thrasher as a Regional Stewardship Species, i.e., a species that is concentrated within a region and merits stewardship, and which regional planners should consider as the species may be declining steeply within certain regions, or face higher threats than elsewhere (Panjabi *et al*. 2005). PIF also identified the crissal thrasher as a Continental Stewardship Species; i.e., a species that has a high proportion of their global population or range within an ecological planning area, for which PIF has traditionally stressed the importance of management responsibility. The type of conservation action most needed for improving or maintaining current population status of the crissal thrasher, as recommended by PIF, is long-term planning action to ensure that sustainable populations are maintained in regions with high responsibility for these species. Such management actions often target many species at once, like long-term multi-species monitoring programs, or broad plans targeting suites of species sharing a habitat (Panjabi *et al*. 2005). In addition, the World Conservation Union (IUCN) designated this species as a Species of Least Concern (Rich *et al.* 2004).

Species Description

The crissal thrasher is a medium-sized passerine (songbird) weighing up to 70 g (average about 62.7 g; Dunning 1993). Male and females show "no sexual variation in plumage and very little difference in size" (Mearns 1886). Overall, their adult plumage is grayish brown (Mearns 1886),

ashy brown (Ridgeway 1907), or "brownish-ash with a faint olive shade" (Coues 1894), and lacks notable markings except for a chestnut rufous color under the crissum (tail) (Mearns 1886). The crissal thrasher is distinguished by its relatively large sized long tail (just over 30 centimeters in total length) which is almost 50 percent of its total body length. The tip of the tail is lighter in color. It has short, rounded wings and longer legs for a terrestrial sized bird, and most notably a long, decurved bill (length to nearly 40mm). Further, it is relatively more ashy-colored above, its chest is uniformly pale and unstreaked, and it lacks a characteristic whitish supercilium (eye stripe).

In addition to its plumage, size, and ranges, the crissal thrasher can be distinguished from other thrashers primarily by its habitat preference, its inland desert range, the blue coloration of its eggs, and its distinctive, melodious song. It is secretive in nature, but is typically found in stark and sparsely populated desert canyons and washes. Although it sings infrequently, even during the breeding season, it stands out as a singularly fine vocalist; typically thrasher-like, with its song more deliberate and less hurried and blurry than the song of Le Conte's thrasher.

The crissal thrasher is in the family Mimidae which includes mockingbrids and other thrashers, such as Le Contes (*Toxostoma lecontei*) and the more common California thrasher (*Toxostoma redivivum*). The crissal thrasher is most similar in appearance to the California thrasher, but differs from other thrashers by its relatively larger size, long, graduated tail, and its light brown or yellow iris.

Distribution

Of the thrasher species, the crissal thrasher is the most geographically widespread on the North American continent (Cody 1999). However, the crissal thrasher's occurrence is closely tied with its preferred habitat - dense thickets of brush (e.g., mesquite) which is patchily distributed in the desert landscape (Cody 1999). This species has a widespread range of occurrence, but its distribution within this range is considered sparse and discontinuous (Cody 1999). The crissal thrasher is considered a year-round resident of California's southeastern deserts (Dobkin and Granholm 2003).

On a global scale, PIF describes the crissal thrasher breeding population as narrowly distributed relative to other avian species in the U.S., and gave the species a "Breeding Score" of 4 on a scale of 1-5. Based on species' range maps, PIF estimated that the crissal thrasher has among the smallest breeding and non-breeding ranges among U.S. avian species – i.e., a global range area in total between 500,000 and 1 million km^2 (Panjabi *et al*. 2005). The score's underlying assumption is that species with narrowly distributed breeding populations are more vulnerable than species with widely distributed populations (Panjabi *et al*. 2005).

By state, the crissal thrasher is found from southeastern California, southern most Nevada and the southwestern portion of Utah, east through southern Arizona, southern and central New Mexico, to southwestern Texas (Cody 1999) (Figure 1).

Within southwestern U.S., the crissal thrasher is sparsely and discontinuously distributed throughout the desert washes and riparian thickets of most of the Mojave, Colorado, Sonoran, and Chihuahuan deserts, and along the Colorado River and Rio Grande Valleys and their

tributaries (Figure 1). Although it is absent from the northwestern Mojave Desert (Cody 1999), the crissal thrasher occurs in dense sagebrush and other shrubs in washes up to 1,800 meters (5,900 feet) in the eastern Mojave Desert of San Bernardino and southeastern Inyo counties (Dobkin and Granholm 2003).

Southward from the U.S., its range extends from northwestern to north-central Mexico, to as far as central Sonora, Mexico, while it is absent from most of Baja California, southern Sonora and Sinaloa (Figure 1). Its range in Mexico consists of scattered recorded localities and is thus poorly known (Cody 1999).

Fitton (2005) provided a synopsis of crissal thrasher in California that noted, per Grinnell and Miller (1944), the crissal thrasher's range in California once extended all along the Colorado River, west through the Imperial and Coachella Valleys to Palm Springs, and to the east slope of the Providence Mountains. The thrasher could be found from 190 feet below sea level (bsl) near the Salton Sea up to 4,500 and possibly 5,400 feet above sea level (asl) in the Providence Mountains, with breeding occurring mainly below 500 feet asl (Grinnell and Miller 1944) (Figure 2).

Typical breeding locations in California included: Providence Mountains; Colorado River, and Needles (San Bernardino County) to Point Knob, Fort Yuma (Imperial County); Palm Springs (Riverside County); and Alamoria (Imperial County; Grinnell and Miller 1944) (Figure 2).

Within southeastern California, the crissal thrasher breeds in the lower Colorado Desert from Morongo Pass through Coachella Valley, south to Imperial and northeast San Diego Counties, and especially along the lower Colorado River valley (Cody 1999; Dobkin and Granholm 2003). Specifically, according to Greystone Environmental Consultations (2003), there are also small populations scattered elsewhere in the Colorado and Mojave Deserts west to Anza-Borrego State Park and Morongo Valley and north to Inyo County though these populations tend to be small and very local.

Crissal thrasher museum specimens were collected in Riverside County from 1911 through 1985. A total of 52 specimens and eggs were collected at the following locations: in Thermal, Coachella Valley, Mecca, Indio, Indian Wells, and Fig Tree/John's Spring (Chicago Field Museum; Carnegie Museum, San Bernardino Museum; National Museum of History, Los Angeles; San Diego Museum of Vertebrate Zoology; and University of California in Los Angeles Natural History Museum). The crissal thrasher has also been a permanent resident of the Imperial, Coachella, and Borrego Valleys (Dobkin and Granholm 2003) (Figure 3).

Historical Changes to Species Distribution

Changes in the overall distribution and abundance of the crissal thrasher in historical times appear to be minor (Cody 1999). Fitton (2005) also noted that in California the general outline of the crissal thrasher's range has changed little since 1944. Some recorded range changes were apparently associated with altered riparian-zone vegetation, contributing to either better or worse conditions for this species (Cody 1999). Historically, introduced Tamarisk trees (*Tamarix* spp.) have spread along the lower Colorado River. Following the removal of Tamarisks and subsequent re-vegetation of the area with native riparian shrubs, crissal thrasher densities were

found to increase (Cody 1999). Recent documentation of a new, isolated occurrence appears to reflect increased observer coverage rather than a true range expansion by the species [i.e., west to Borrego Valley (San Diego County)]. The center of crissal thrasher abundance in California continues to be areas with riparian habitat along the Colorado River (Rosenberg *et al*. 1991 and Patten *et al*. 2004).

Habitat Affinities

The crissal thrasher's habitat preferences are quite characteristic, and help to distinguish it from other thrasher species. The crissal thrasher is found in desert riparian and desert wash habitats where their cover is provided by dense thickets of shrub vegetation or low trees that shade the ground, often along streams and in washes (Laudenslayer *et al*. 1992, Dobkin and Granholm 2003). Of all arid-land thrashers, the crissal thrasher occurs in coolest, most shaded and moist habitats (Dobkin and Granholm 2003). Although considered a desert species, the crissal thrasher often occurs at somewhat higher elevations in foothill scrub, above the characteristic desert vegetation of the lower elevations (Cody 1999). Its dense thicket habitat is often found in loose sandy soil or alluvium and frequently consists of mesquite (*Prosopis* sp.), desert ironwood (*Olneya tesota*), catclaw acacia (*Acacia greggii*), willows (*Salix* sp.), and thickets including both exotic tamarisk (*Tamarix* sp.) and mesquite (Laudenslayer *et al*. 1992, Dobkin and Granholm 2003).

The crissal thrasher's occurrence is sympatric with that of the Le Conte's thrasher, but these two species differ in their habitat use. The Le Conte's thrasher generally occupies more open, less dense scrub vegetation of desert plains at lower elevations while the crissal thrasher, throughout much of its inland range, prefers dense, brushy habitats which are often narrowly restricted to larger desert canyon, arroyos (dry washes), mesquite (*Prosopis* spp.) thickets or foothill scrub.

Figure 1. Crissal thrasher range in Continental North America. (Cody, M. L. 1999).

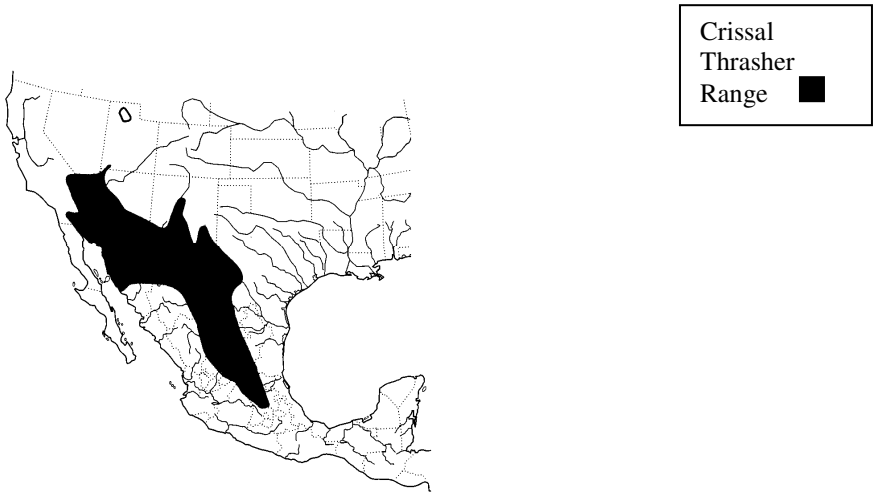
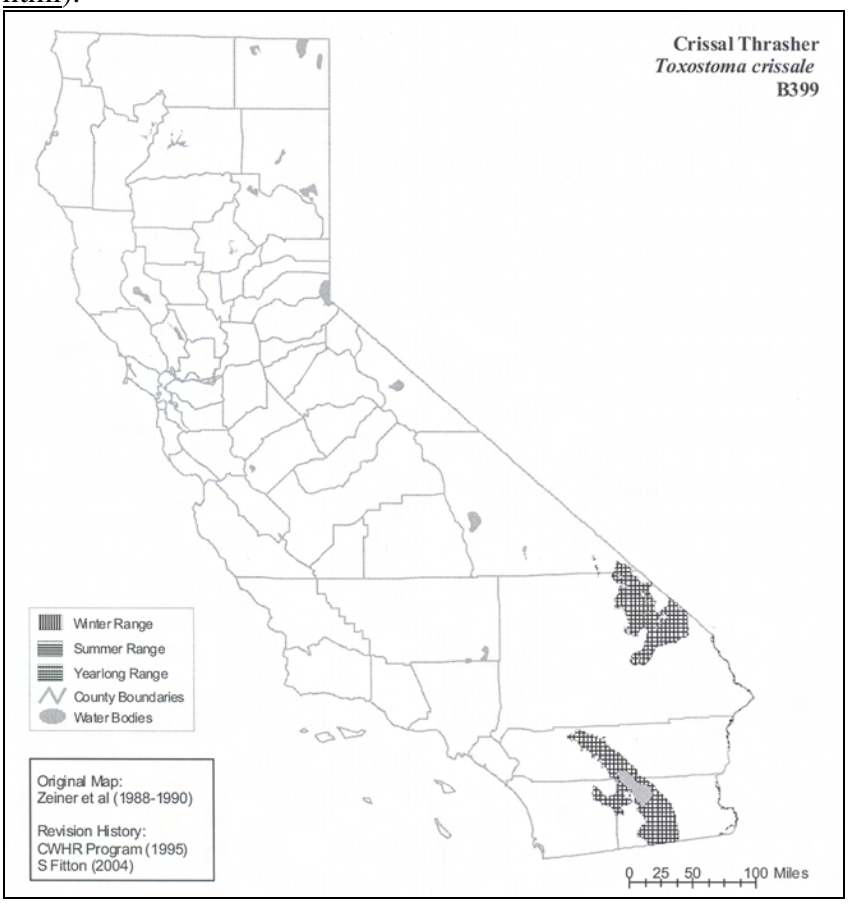


Figure 2. Current crissal thrasher range in California. (Zeiner, D.C., W. F. Laudenslayer, Jr., K.E. Mayer, and M. White, eds. 1990. California's Wildlife. Vol. 1-111. California Department of Fish and Game, Sacramento, California. http://www.def.ca.gov/whdab/html/cwhr_wetadate.html).



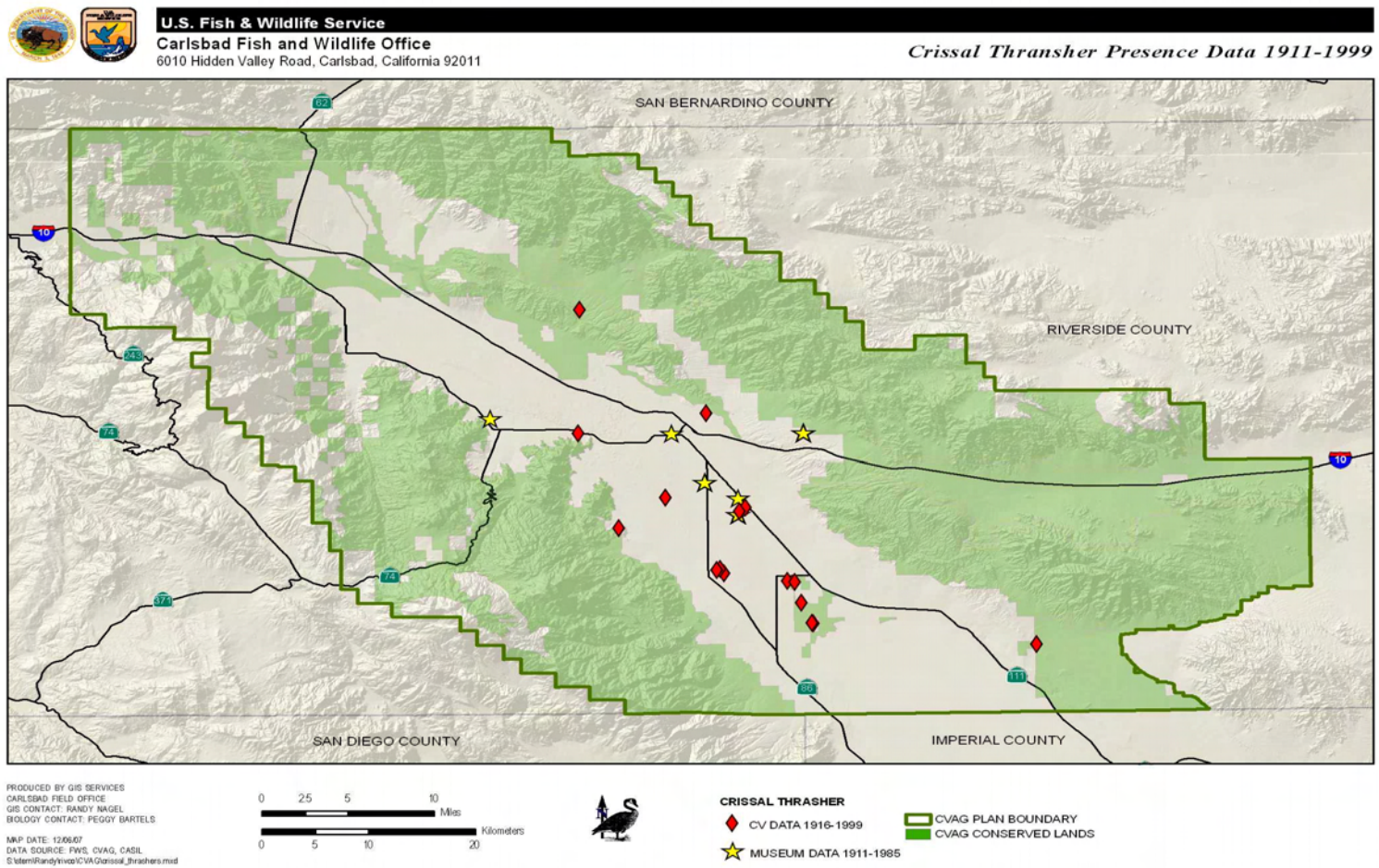


Figure 3. Known occurrences of crissal thrasher within Riverside County (Chicago Field Museum; Carnegie Museum, San Bernardino Museum; National Museum of History, Los Angeles; San Diego Museum of Vertebrate Zoology; and University of California in Los Angeles Natural History Museum).

At lower elevations in the lower California desert, such as in Coachella Valley [60 meters bsl to 200 metes asl], the crissal thrasher occurs mainly in mesquite thickets with taller catclaw acacia, desert ironwood, and arrowweed, but also in saltbush (*Atriplex* spp.), alien salt cedar (*Tamarix*) stands, and quailbush (*Atriplex lentiformes*) thickets in the lower Colorado River valley (Cody 1999). In New Mexico, this species nests in little-leaf sumac (*Rhus microphylla*), javelina bush (*Condalia lyciodes*), and Torry yucca (*Yucca torreyi*).

In the eastern Mojave Desert of San Bernardino and southeastern Inyo counties, the crissal thrasher also occurs in dense sagebrush and other shrubs and in washes within juniper and piñon-juniper habitats, up to 5,900 ft (1,800 m; Dobkin and Granholm 2003). In addition, crissal thrashers may nest and forage in native habitat patches, but also forage in adjacent agricultural edges, such as row crops and orchards (Rosenberg *et al*. 1991).

In the northwestern part of its range, the crissal thrasher can be found in riparian brush at lower elevations (e.g., Colorado River valley) and in low, dense scrub associated with arroyos at higher elevations, usually near or below the transition from desert scrub to the piñon-juniper foothill woodlands (e.g., Mojave Desert; Cody 1999).

In the eastern part of its range (southern Arizona and New Mexico), the crissal thrasher can be found along riparian scrub belts and mesquite thickets, ranging up foothill slopes into scrubby vegetation within piñon-oak woodlands (Cody 1999). Kozma (1997) measured crissal thrasher abundance along arroyos and in uplands using 400 meters wide and 1,400 meters long transects and found that crissal thrashes were primarily associated with arroyos, but also nested in the uplands. However, when nesting in the uplands, they were located within 100-200 meters of an arroyo.

Specific Habitat Requirements

All aspects of the crissal thrasher's ecology are closely tied to its preferred habitat consisting of low, dense vegetation. The crissal thrasher forages mostly on ground, especially between and under shrubs. It invariably seeks refuge from predators and desert climate within the cover provided by thickets of dense, shrubby vegetation along streams and in washes. The crissal thrasher builds its nest within thicket of desert shrubs or on a forked branch of a small tree (Cody 1999). In New Mexico, of 27 desert species Kozma (1997) studied, crissal thrashers were one of the most frequent nesting species found in arroyos.

The crissal thrasher nest tree species and height of nests in Riverside County were recorded (San Bernardino County Museum). Of 36 historical nesting records collected from 1890 through 1947, 20 nests (70 percent) were found in mesquite trees, 10 nests (27 percent) were found in saltbush (*Atriplex* sp.), and 1 nest (3 percent) was found in a cottonwood tree (*Populus* sp.). The crissal thrasher nests in the upper portion of the desert canopy and thus may be less susceptible to ground predators. Of the 34 recorded collected nest heights, the average nest height for this species was 4.4 feet (San Bernardino County Museum). Nest heights ranged between 2.5 and 8 feet with a standard deviation of 1.24 feet. This data suggests crissal thrashers prefer mature nest tree species.

Life History

Breeding Biology

Following pair formation in the fall, the breeding season extends from February to late July (Cody 1999). Nests are usually placed 0.6 to 3 m (2-10 ft) above ground, beneath a major limb in the nesting tree (Cody 1999). This may aid in the thermoregulation of the offspring or of incubating adults, and in protection of the nest from predators (Cody 1999). Hanna (1933) found that clutch size was 2-3 eggs/clutch in 246 clutches with no detectable geographical variation in clutch size. Eggs collected in Riverside County from 1927 through 1949 were collected between February 12 and May 22 (San Bernardino County Museum Collections). Incubation lasts 14 days (Wheelock 1903; Gilman 1909, and Finch 1982a). Both parents incubate (Mearns 1886). Hatching is reported to be asynchronous (Finch 1982) and possibly associated with potential brood reductions likely in the event of low food availability (Ricklefs 1965). Young spend 11-14 days in the nest (Wheelock 1903; Gilman 1909, Finch 1982a, and Murphy and Fleisher 1986). There is early nest leaving, possibly due to heavy predation on the nest associated with its height from the ground (Murphy and Fleisher 1986). The young continue to be fed by the parents for some time. There are reports of 2-egg second broods (Mearns 1886). Kozma (Yakima Nation; November 21, 2007; pers. comm.) reported that crissal thrashers in New Mexico were heard singing in mid-March, but weren't found during nest searches until early May. Based on the timing of their initial singing, he thought that they may have missed the first nesting attempts. The nest of crissal thrasher an open cup with rather large twigs, built low to the ground, and well hidden in dense mesquite or other thick desert vegetation. Crissal thrasher clutch size is typically 2 to 3 eggs with an incubation time of 14 days and fledging after 11 to 13 days (Cody 1999).

Predation

Crissal thrashers as well as other avian species suffer from the introduction of non-native predators such as cats and dogs. Other predators of crissal thrasher nests and young are snakes, corvids (Corvidea), coyotes (*Canis latrans*), kit fox (*Vulpes macrotis*), and possibly roadrunners (*Geococcyx californianus*). Predation is likely to be a major source of mortality to the eggs and the young (Cody 1999).

Although the distribution of the crissal thrasher overlaps the range of the brown-headed cowbird (*Molothrus ater*), its eggs have never been reported as a cowbird victim. Crissal thrasher is thought to be a true rejecter species (100 percent rejection) likely because it has been traditionally sympatric with the crissal thrasher for at least 100 years (historical ranges are similar; Bendire 1876, Grinnell 1914, Bent 1948), particularly in the lower Colorado River valley (Finch 1982a). Kozma (1997) found that crissal thrasher nest success and predation rates did not differ between arroyo and uplands and nest predation was the primary cause of mortality to eggs and nestlings in both habitats (Kozma 1997).

Movements

The crissal thrasher is considered a resident species as it is primarily sedentary and shows only local movement between habitats (Laudenslayer *et al*. 1992). Although some populations exhibit seasonal elevation movements (Laudenslayer *et al*. 1992), the species has no migration per se; it is widely reported as a permanent resident throughout its range, even at the northern extremities of its range (Cody 1999). Based on banding records in southeast Nevada, birds used "a few hundred feet" of the mesquite thickets habitat during the year (Gullion *et al*. 1959 in Cody 1999). Thus, the home range is equivalent to the territory size in year-round resident birds (Cody 1999).

Laudenslayer *et al*. (1992) indicated the crissal thrasher's lack of migratory behavior has conservation implications. Species that are highly vagile (wanderers) are easily capable of moving long distances across areas of unsuitable habitat. However, species with low vagility may not cross even a short gap with unsuitable habitat to reach another visible patch of suitable habitat. The tendency not to move across unsuitable habitat is a life history trait that makes it difficult for re-colonization to occur after a disturbance has eliminated an isolated population or patchy subpopulation. An examination of the Service's records of four *Toxostoma* thrasher species revealed that few individuals have been banded. All of the recoveries of the crissal thrashers were made in the same 10-minute block from where the individuals were originally banded, suggesting that they may have low dispersal distances (Cody 1999).

Since all aspects of the crissal thrasher's life history are closely tied with its habitat of dense cover and example of unsuitable habitat may be where there is little cover (i.e., open habitat lacking dense vegetation). Given this species relatively low population densities and their lack of movement over open ground between patches of suitable habitat, the loss of the crissal thrasher's natural habitat resulting in habitat fragmentation, could potentially lead to small, nonviable crissal thrasher populations.

Territoriality and Territory Size

Cody (1999) indicated that the crissal thrasher is a strongly territorial, monogamous species. Its territories, which are held year-round by pairs in some habitats, are often widely dispersed, with apparently little contact among neighbors. Some evidence suggests that territory sites are similar between years and possibly also the individual owners. Crissal thrashers maintain territories in dense thicket habitat, within which the birds' movements are mainly on the ground, in and around the vegetation. If danger approaches, it makes a rapid dash to seek or change cover, often dropping down by a shrub before running; it climbs through the dense vegetation cover to gain an elevated perch (from which they may sing) or gain access to the nest.

In the Granite Mountains, the territorial activity of crissal thrashers was strongly concentrated in their preferred habitat of dense brushy washes at the base of the mountains. All territories within a study site appeared discontinuous with other thrasher territories, with unsuitable intervening habitat where thrashers were not seen. In a study where the territory was defined as a "focal area" in which the activity of a breeding pair was concentrated (Cody 1999), the mean territory area was 13 ac (4.92 ha $\pm$ 1.0 SD; range 3.8 – 6.9, n = 8), although the defended area may be larger. In less optimal habitat (less dense, and likely less productive) are nearly twice as large, approximately 20 ac (8-10 ha). In the Mojave and Colorado Deserts, Breeding Bird Surveys have recorded crissal thrasher densities at 5.5 pairs/40 ha (100 acres) $\pm$ 1.2 SE (n = 9; Laudenslayer *et al*. 1992). Recent work along the Amargosa River indicates a higher than expected density of crissal thrasher in that northern desert wash habitat (McCreedy pers. comm. in Fitton (CDFG) 2005).

Foraging

Crissal thrashers spend their foraging time mostly on the ground, especially beneath the dense cover of vegetation, between and under shrubs (Cody 1999; Dobkin and Granholm 2003). Occasionally, the thrasher will forage in the open or under sparse cover (such as catclaw

acacias), but never far from dense vegetation (Cody 1999).

Pidgeon *et al*. (2006) found that crissal thrashers use a variety of landscape habitat patterns in the Chihuahua Desert and are thought to belong to a generalist food guild. Pidgeon *et al*. (2006) found that the crissal thrasher was limited to a core nesting habitat type, with expansion into suboptimal habitat following a year of high nest success. The crissal thrasher is known to be primarily insectivorous (Cody 1999). However, they will consume generally larger insects (7-20 mm; Rosenburg *et al*. 1991 in Cody 1999), the majority of which are beetles, year-round (*Coleoptera*). Both adult and larvae beetles are consumed year-round, especially darkling beetles (*Tenebrionidae*), scarab beetles (*Scarabaeidae*), ground beetles (*Carabidae*), and metallic wood-boring beetles (*Buprestidae*; Cody 1999). Besides beetles, the crissal thrasher also consumes butterfly larvae (caterpillars; *Lepidoptera*), flies (*Diptera*), ants (*Formicidae*), crickets and grasshoppers (*Acrididae*), and termites (*Isoptera*; Cody 1999). Their diet can also include other invertebrates, a small amount of berries, other small fruits, seeds, and occasionally small lizards (Bent 1948; in Dobkin and Granholm 2003). Laudenslayer (1981; in Cody 1999) found the crissal thrasher's diet generally consists of 69 percent Coleoptera, 10 percent Hymenoptera, 20 percent miscellaneous insects, and 1 percent plant material.

Beneath dense cover, the crissal thrasher locates its insect prey by using their bills, with both sideways sweeping motions, and fore-and-aft motions, for the purpose of digging in friable soil and to pick and probe in litter (Cody 1999; Dobkin and Granholm 2003). With its long, curved bill, the crissal thrasher excavates extensively in the ground around the base of grass clumps and digs persistently in litter beneath desert willows and at the bases of wormwood shrubs (*Artemisia dracunculus*; Cody 1999).

Population Trends

In California, the western periphery of its range, Grinnell and Miller (1944) considered the overall numbers of the crissal thrasher to be stable. The authors did not mention any appreciable range change or habitat loss that had occurred up to that time. In the Coachella Valley and the Salton Sink areas, Gilman (1902; in Cody 1999) historically observed "great numbers" of crissal thrashers, but their numbers in this area have probably decreased in recent times following removal of mesquite thickets for date cultivation, irrigated agricultural development (Remsen 1978 in Cody 1999), and through introduction of tamarisk to the region (Remsen 1978 in Dobkin and Granholm 2003). According to the CDFG, the numbers of crissal thrashers in the Imperial, Coachella, and also Borrego Valleys have declined markedly in recent decades (Grinnell and Miller 1944, Remsen 1978, Garrett and Dunn 1981, in Dobkin and Granholm 2003).

Crissal thrasher has a large range, with an estimated extent of occurrence of 247,040,000 acres (1,000,000 km² or 386,000 square miles). However, the species does not inhabit this entire area due to the patchiness of this species common habitat (mesquite, dry washes, and desert saltbush). This species has a large global population estimated to be 260,000 individuals (Rich *et al*. 2004). Based on the extent of this species range 247,040,000 acres and their population estimate of 260,000 individuals, the estimated number of individuals per acre is 0.001. Global population trends have not been quantified, but this species is not believed to approach the thresholds for the population decline criterion of the IUCN Red List (i.e., declining more than 30 percent in ten years or three generations). For these reasons, IUCN Red List evaluates the species globally as a

species of “Least Concern”.

Threats

Habitat loss is the most obvious impact of human activities on the crissal thrasher and has been primarily due to agricultural and urban development (Laudenslayer *et al*. 1992). Much of the riparian habitat along the Colorado River, where this species was found in high densities, has been converted to agriculture and to a lesser degree urban development [Fitton (CDFG) 2005]. Crissal thrashers in the Coachella Valley area are displaced by agriculture and development (Rosenberg *et al*. 1991; Fitton (CDFG) 2005).

Riparian areas have been further degraded by habitat fragmentation due to roads, agricultural and urban developments leading to a greater loss of species common habitat (Patten *et al*. 2004). Riparian habitats in the crissal thrasher’s range in California have been disproportionately replaced by agriculture and urban development, relative to upland habitats.

Development in some areas has mobilized salts by irrigation, killing or degrading mesquite, a common habitat of crissal thrashers (Simons and Lee 1996). When mesquite plants die back (or failed to leaf-out in some areas where a large portion of the mesquite plants still survive), crissal thrasher breeding habitat is lost. In addition, the loss of mesquite habitat has been accelerated during recent droughts. Fitton (2005) indicated that habitat degradation was a crucial threat, “Also, riparian habitat has been degraded by the introduction of tamarisk, a non-native and invasive woody species.

The grass/fire cycle is a serious ecological threat in southwestern deserts because native shrubs such as saltbush (*Atriplex spp*.), mesquite, quailbush and other riparian thicket shrubs used by the crissal thrasher are poorly adapted to frequent fires (Baisan and Swetnam1990). Desert habitats have been degraded by the addition of non-native annual plants, such as invasives, which may reach abundances that increase the risk and intensity of fire (Fitton (CDFG) 2005). Mediterranean grass (*Schismus barbatus*) and mustards contribute to the conversion of desert shrubland into annual grassland and in some cases carry fire across open areas, which it can ignite and kill native shrubs. Mediterranean grass can compete with, and reduce the productivity of native annual plants, especially when alien plant growth is enhanced by increased nitrogen availability (Brooks 2000 and Brooks *et al*. 2003). Tamarisk was introduced in Riverside County and has in many areas overtaken native riparian willow stands. It is an easily established plant and multiplies quickly. In addition, it changes the nature of riparian habitat it invades by reducing structure and function of the site. Dense cover of herbaceous vegetation especially introduced annual grasses and tamarisk shrubs result in thick mats of dead vegetation between the patchy shrub thickets, reduce foraging habitat for this species and increase the frequency of wildfires as well as change wildfire regimes.

Road creation increases the spread of invasive species and the spread of wildfires by introducing human activities and vehicle emissions to areas that are more susceptible to wildfires because they have generally been less impacted by development and changes in invasive species landscape. In addition, disturbance by development can increase the spread of invasives by disturbing habitats and transporting seeds on vehicles to other natural areas.

Crissal thrashers have been found to occur at low densities relative to other common birds breeding on the same plots in the Mojave and Colorado deserts of southern California (Laudenslayer *et al*. 1992). The crissal thrasher relies on narrow belts of habitat along riparian areas and desert washes, and it occurs in isolated patches of mesquite and other dense shrubs. The resulting restriction of some breeding populations to isolated and patchy habitats may cause it to be vulnerable to habitat fragmentation and loss, and poses an intrinsic threat of recurrent, local extirpations (Laudenslayer *et al*. 1992).

The populations of some native and non-native nest predators have increased as a result of the agricultural and urban development. Population increases in species such as the Common Raven (*Corvus corax*) and American Crow (*Corvus brachyrynchus*) could exacerbate the predation rates on crissal thrashers (Fitton (CDFG) 2005).

Human disturbances such as off-road vehicle activity can also degrade the riparian and wash areas. A primary threat to crissal thrasher populations elsewhere in the deserts is off-road vehicle activities in large washes with densely vegetated borders (Greystone Environmental Consultants 2003). Desert washes and riparian areas are often the locations of off-highway vehicle trails (Remsen 1978). Thus, high intensity recreation use along these narrow corridors could negatively affect this species [Fitton (CDFG) 2005]. In addition to the actual resulting physical degradation of wash habitats by off-road vehicles, the impact of loud noise on this shy species is probably considerable (Greystone Environmental Consultants 2003).

Agricultural and urban development in the Salton Sea area has reduced the quantity and quality of the crissal thrasher's habitat, thereby resulting in the species becoming increasingly local and uncommon. Elsewhere, away from the Colorado River, the crissal thrasher's habitat has been variously altered by livestock grazing and fire, but less from land development or excessive water use. Crissal thrasher numbers have not been documented in such places. Along the Colorado River, the crissal thrasher's habitat has been altered intensively and extensively (Rosenberg *et al*. 1991), mostly by being converted to unsuitable agricultural lands, row crops and orchards, such that by 1986, only 25 percent of historic floodplain riparian habitat remained (Rosenberg *et al*. 1991).

Other suitable habitat has been altered by changes in flood and fire regimes followed by changes in plant species composition (Rosenberg *et al*. 1991). Riparian areas throughout the southwestern U.S. in general have been altered by changes in hydrological regime and by invasion of non-native, woody plants such as salt cedar. The spread of salt cedar, while changing the bird's habitat (vegetation, soil and prey), may not be detrimental to this thrasher as it has been documented utilizing such habitat in the Lower Colorado River as well as to the east in Arizona, New Mexico, and Texas (Hunter *et al*. 1988). However, in the Salton Sea area, invasion of salt cedar together with a loss of mesquite habitat is accompanied by the loss of crissal thrasher indicating that this species may respond variably within California to invasive woody plants and loss of honey mesquite (Patten *et al*. 2004).

Synopsis of Status

Historic evidence suggests crissal thrasher was widespread in the early to mid 1900's. Habitat conversion to agriculture and later to development reduced mesquite habitat to small, remnant,

disjunct areas. Crissal thrasher's populations have declined throughout its historic range, leaving remaining populations spatially separated and subject to the effects and demographic quandaries found in patchily distributed and declining populations.

Within the Plan Area, crissal thrasher population is comprised of a few individuals in disjunct habitat. However, the number and extent of the current population or individuals has not been studied. Knowledge about productivity and population demography of the crissal thrasher within the Plan Area is limited. The existence of suitable habitat for remnant crissal thrasher is also largely unknown and not well quantified.

The threats to the crissal thrasher and its habitat including those within the Plan Area consist of the loss of habitat from agriculture and urbanization, loss or reduction in ground water, habitat degradation/modification, and fragmentation of available habitat. These threats are thought to have lead to the decline in habitat and as a result, a decline in the number of individuals within the Plan Area.

ENVIRONMENTAL BASELINE

Regulations implementing the Act (50 CFR § 402.02) define the environmental baseline as the past and present impacts of all Federal, State, 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 already undergone or will undergo section 7 consultation and the impacts of State and private actions, which are contemporaneous with the consultation in progress.

The action area is described as the Plan Area where the crissal thrasher will be conserved for the 75 year period of the MSHCP. The Plan Area comprises 1.1 million acres (1,719 square miles) within Riverside County, California (4.7 million acres or 7,344 square miles). Rich *et al*. (2004) indicates that this species range is approximately 247.1 million acres (1 million km^2 or 368,000 square miles). The Plan Area encompasses less than 0.05 percent of this entire species' range. Rich *et al.* (2004) estimates that there are 260,000 individuals within the extent of its 235,520,000 acres (368,000 square miles) of range.

Status of the Species in the Action Area

The crissal thrasher specimen collection (1911 through 1999) indicates that this species was specifically collected in the Plan Area in Thermal, Coachella Valley, Mecca, Indio, Indian Wells, Palm Springs, and the no longer existing, Fig Tree/John's Spring (Figure 3). Historically, this species was thought to inhabit larger portions of the Plan Area, but because of habitat loss and degradation from development, drought, invasive species, wildfires, and recreational pursuits, much of its habitat has been lost or degraded and the species population has likely declined. Data provided to the Service from CVAG and other sources was limited and did not provide the Service with recent information regarding this species status. The 6 Conservation Areas identified for conserving crissal thrasher habitat include 5 of the 15 (33 percent) known occurrences for this bird, including known locations on the Thousand Palms (recent occurrences), the Whitewater River Delta near the Salton Sea, and Dos Palmas. Other suitable habitat for this species in the Plan Area will be conserved in the Willow Hole, Thousand Palms, Indio Hills Palms, and East Indio Hill Conservation Areas.

Inside the Conservation Areas
CVAG did not attempt to assess the population status as a means of identifying core habitat for this species. Instead, the Conservation Areas include the largest acreages of contiguous mesquite hummocks, desert saltbush scrub, and desert sink scrub habitat available in the Plan Area, primarily in the Dos Palmas and Coachella Valley Stormwater Channel and Delta Conservation Areas. The Plan assumes that the crissal thrasher occurs throughout the Coachella Valley in primarily mesquite hummocks, dry washes, and saltbush thickets where nesting and foraging can occur. It is important to note that this is an unverified assumption. The Planning Team attempted to include all of the available habitat for this species that was not highly fragmented.

The total amount of modeled crissal thrasher habitat available within in the Plan Area is 6,852 acres (10.71 square miles) (Table 9-22). The modeled crissal thrasher habitat within the Conservation Areas currently comprises approximately 0.06 percent of the Plan Area, but less than 0.00003 percent of this species range. Based on the knowledge of suitable habitat for this species, 6 Conservation Areas were identified in the Plan Area as containing suitable crissal thrasher habitat. Two of these Conservation Areas comprise core habitat (containing a significant portion of the identified habitat) including Coachella Valley Stormwater Channel and Delta and Dos Palmas. The purpose of core habitat is to allow evolutionary processes and natural population fluctuations to occur. Another objective of the Conservation Areas is to minimize fragmentation, human caused disturbance, and edge effects to core habitat by conserving contiguous habitat patches and effective linkages between patches of core habitat. More information is needed on the distribution of the crissal thrasher, especially in the core habitats.

Coachella Valley Stormwater Channel and Delta Conservation Area
The Coachella Valley Stormwater Channel and Delta Conservation Area contains 896 acres of modeled crissal thrasher habitat. The objective for this Conservation Area is to conserve at least 809 acres (90 percent) of core modeled habitat for crissal thrasher. Of the 809 acres, only 28 acres are currently conserved and 781 acres need to be conserved (Section 9; Table 9-22). The habitat in this Conservation area is narrow with a high edge to area ratio. In particular, the Coachella Valley Stormwater Channel and Delta Conservation Area was configured to include the maximum amount of habitat for crissal thrashers; this included intact stands of desert saltbush scrub and desert sink scrub in the area around Johnson Street south of Highway 111. Management includes habitat modification for flood control and tamarisk infestations which degrade and dry up desert saltbush scrub, mesquite bosque, and mesquite hummock habitats are also anticipated in this Conservation Area. Another objective for this Conservation Area is to minimize fragmentation, human caused disturbance, and edge effects to core habitat by conserving contiguous habitat patches and effective linkages between patches of core habitat.

Dos Palmas Conservation Area
The Dos Palmas Conservation Area consists of 536 acres of modeled habitat (55 acres of mesquite and 482 acres; 93 percent) of mesquite bosque) of which 498 acres would be conserved (Section 9; Table 9-22). A total of 155 acres are already protected and 343 acres are not yet conserved. The Dos Palmas Conservation Area consists of the existing Dos Palmas Area of Critical Environmental Concern (ACEC), the existing Oasis Springs Ecological Reserve, and a

portion of the existing Salton Sea State Recreation Area. The presence of both mesquite hummocks and desert saltbush scrub make this area particularly suitable for this species. Primary management actions for this Conservation Area range from control of exotic species and limiting public access to compatible scientific, educational, and recreational uses. A tamarisk eradication program is ongoing.

Willow Hole Conservation Area

Crissal thrasher has been found in the Willow Hole Conservation Area. The Willow Hole Conservation Area consists of 294 acres of modeled habitat. Of the total acres, 266 acres (90 percent) would be protected through Plan implementation. Currently, there are 16 acres of existing conservation lands and there are 250 acres remaining to be conserved. The Conservation Area also includes the existing Willow Hole Preserve. No observations of crissal thrashers have been reported within this area. The modeled Habitat in this Conservation Area is based on the potential for crissal thrasher to occur here, given the presence of mesquite hummocks.

Thousand Palms Conservation Area

The Thousand Palms Conservation Area consists of approximately 58 acres of modeled crissal thrasher habitat which includes 58 acres of mesquite habitat, an important habitat for crissal thrasher (Section 9; Table 9-22). The entire Conservation Area's modeled habitat is currently protected and would continue to be protected with Plan implementation (100 percent). Crissal thrasher has been noted in this Conservation Area.

Indio Hills Palms Conservation Area

The Indio Hills Palms consists of 3 acres of modeled crissal thrasher habitat and of these acres, 1 acre is already protected and an additional acre is anticipated to be protected (Section 9; Table 9-22). Approximately 75 percent of the modeled habitat within this Conservation Area would be protected.

East Indio Hills Conservation Area

The East Indio Hills Conservation Area consists of approximately 47 acres of modeled crissal thrasher habitat (Section 9; Table 9-22). Of that habitat, 43 acres are mesquite habitat. Approximately 42 acres will be conserved (91 percent) of the entire 47 modeled acres. There are no existing protected habitats. In addition, Saharan mustard has invaded the Thousand Palms Preserve, and was estimated to cover 40 percent of the sampled sand fields in 2005 (C. Barrows, pers. comm.). The effect of this exotic species on desert woodlands is unknown but most likely it increases vulnerability of the habitat to fire.

In summary, after full implementation of the Plan, a total of 1,676 acres (10.71 square miles) or 25 percent of the modeled habitat will be conserved in all Conservation Areas. Based on Laudenslayer *et al*. (1992), there would be approximately 92 pairs remaining in the Conservation Areas with the implementation of the Plan. However, Indio Hills Palms Conservation Area will have only 3 acres of modeled habitat and based on the habitat requirements for this species as identified above, it is unlikely that Indio Hills Palms will support crissal thrasher. The majority of conservation for this species is found in the two larger Conservation Areas, Coachella Valley Stormwater Channel and Delta Conservation Area and Dos Palmas.

Outside of the Conservation Areas
Approximately 5,013 acres (75 percent) of the 6,852 acres of modeled habitat lie outside of the 6 Conservation Areas, much of it on Tribal lands. Of the 259 acres currently conserved for crissal thrasher, only 1 acre is currently conserved on public lands outside of the Conservation Areas. Based on Laudenslayer *et al*. (1992), depending upon the suitability of the habitat, there could be approximately up to 276 pairs outside of the Conservation Areas. This estimate is based on suitable habitat in the Mojave Desert which is higher quality than the Sonoran desert and therefore, the estimate is most likely higher than would be exhibited within the Conservation Area.

Factors Affecting the Species' Environment within the Action Area
As stated above, the primary factors affecting the crissal thrasher and its habitat within the action area generally include loss of riparian and upland habitats, habitat degradation and modification, fragmentation, and the other factors including adverse effects of exotic plant and animal proliferations and recreational pursuits. Groundwater pumping, water storage, and water diversions may also have a significant effect on this species within the action area by preventing or complicating the development of water-dependent, essential habitat components such as mesquite hummocks.

Bureau of Land Management
Bureau of Land Management (BLM) lands within the Plan Area (and environs) are subject to the California Desert Conservation Area Coachella Valley Amendment (CDCA) (BLM 2002). Existing protection within the Plan boundaries currently protects 14 percent (258 acres) of crissal thrasher modeled habitat (primarily in existing mesquite hummocks). These are primarily managed by the Coachella Valley Preserve.

Management and Monitoring
The Plan proposes management and monitoring to minimize impacts to this species, including control of activities that degrade crissal thrasher habitat including OHV use, control of invasive species if monitoring results indicate it is necessary, and restoration and enhancement of degraded habitat as necessary. The Plan also proposes the monitoring of groundwater management on mesquite habitat, as well as data gathering as part of the Monitoring Program. Specific fire management measures are not currently proposed.

The Plan recommends conducting crissal thrasher surveys in the Dos Palmas, Coachella Valley Stormwater Channel and Delta, Willow Hole and Thousand Palms Conservation Areas. Although not specific to the crissal thrasher, the Plan calls for management and monitoring programs to ensure the conservation of the species, including control of activities that degrade habitat, control of invasive species if monitoring results indicate it is necessary, and restoration and enhancement of degraded habitat as necessary according to monitoring results. The Plan calls for evaluation of groundwater management on crissal thrasher habitat in mesquite areas (Section 9.7.5.2). The Plan also provides for a research element as part of the Monitoring Program that addresses the distribution of the species, its home range size, dispersal distances and barriers to dispersal, and its population density throughout the Plan Area.

EFFECTS OF THE ACTION

Mitigation and Minimization Measures

It is anticipated that the Species Conservation Goals and Objectives established in Section 9 would be met through the Joint Project Review Process (Section 6.6.1.1) and the Monitoring and Adaptive Management Program (Section 8 and 9).

There are specific mitigation measures for the crissal thrasher, but some measures do not apply to single-family residences and any non-commercial accessory uses and structures including but not limited to second units on an existing legal lot, or to O&M of Covered Activities (Chapter 4.4, Page 4-170). In modeled crissal thrasher habitat in the Willow Hole, Thousand Palms, Indio Hills Palms, East Indio Hills, Dos Palmas, and Coachella Valley Stormwater Channel and Delta Conservation Areas, prior to development, surveys will be conducted by an Acceptable Biologist prior to the start of construction activities during the nesting season, January 15 – June 15, to determine if active nest sites for this species occur on the construction site and/or within 500 feet of the construction site, or to the edge of the property boundary if less than 500 feet. If nesting crissal thrashers are found prior to construction then a 500-foot buffer, or a buffer to the edge of the property boundary if less than 500 feet, will be established around the nest site. The buffer will be staked and flagged. No construction activities will be permitted within the buffer during the breeding season of January 15 – June 15 or until the young have fledged. We anticipate that these mitigation measures will prevent at least some take of crissal thrashers.

Kozma (1997) found this species to be especially secretive and reported that it was difficult to follow a crissal thrasher to its nest. Crissal thrashers would leave their nests well before an observer got within visual range of the nest and he had to develop special techniques to find their nests (Kozma; Yakima Nation; November 21, 2007; pers. comm.). Based on this information, an unknown number of crissal thrasher may be disturbed and potentially abandon their nests or have a lower productivity due to construction related activities during or after adjacent habitat has been cleared because the 500 foot circle around nest sites suggested by CVAG is an estimate, and does not appear to be based on any substantive biological information or inference.

Construction activities in the Willow Hole, Thousand Palms, Indio Hills Palms, East Indio Hills, Dos Palmas, and Coachella Valley Stormwater Channel and Delta Conservation Areas will avoid mesquite hummocks and mesquite bosque to the maximum extent feasible. To address specific impacts to mesquite hummocks, which could provide habitat for crissal thrasher, the Plan requires restoration of mesquite habitat in the East Indio Hills Conservation Area. This restoration would result in a minimum of 40 acres, and as many as 80 acres, of additional mesquite hummock habitat.

Minimization measures also have been developed to reduce impacts to this species. The measures include Required Avoidance, Minimization Measures, and Mitigation Measures such as maintaining fluvial sand transport (Section 4.4 of the MSHCP) and Land Use Agency Guidelines (Section 4.5 of the MSHCP) such as limiting noise, avoiding invasive plant species in landscaping, and directing lighting away from conservation areas. Currently, some of the language in Section 4.5 of the MSHCP appears to be discretionary or optional, and, if interpreted as such, it would not fully minimize or mitigate the impacts of the taking. In our analysis we have assumed that the Land Use Adjacency Guidelines are implemented as appropriate to

minimize and mitigate the effects to covered species. A Permit Term and Condition has been included in the Permit to clarify that the Land Use Adjacency Guidelines are not optional where they are applicable. For the crissal thrasher, the Reserve System has been designed to include mesquite hummocks and mesquite bosques, salt desert scrub and dry washes which are essential components of their habitat. The Plan also allows for restoration activities to remove tamarisk in areas where this invasive currently occurs and restore other degraded habitats.

In order to meet the Conservation Objective of conserving mesquite hummocks, action is required to maintain/restore the conditions that support the existing stands of mesquite. The Plan was not clear on the requirements in this regard. This necessitates the inclusion of a Permit Term and Condition to ensure no net loss of mesquite as indicated elsewhere in the Plan and that these actions are taken in a timely fashion.

Direct Effects

Inside the Conservation Areas

Specific habitat loss within the 6 Conservation Areas would include: Willow Hole (28 acres), Indio Hills Palms (1 acres), East Indio Hills (5 acres), Dos Palmas (38 acres), and the Coachella Valley Stormwater Channel and Delta (87 acres). Thousand Palms does not have specific habitat loss related to permitting because all 58 acres within its modeled habitat are already conserved. The exact location and configuration of these acres within the Conservation Areas is not known. However, the acres proposed to be lost would be subject to the Conservation Objectives and Required Measures for each conservation area as described in Section 4 of the MSHCP. CVAG estimates at least 10 of the 15 (66 percent) known locations of crissal thrasher would be lost.

The entire Plan Area includes approximately 6,852 acres of modeled habitat for the crissal thrasher. Seventy-five percent of the modeled crissal thrasher habitat would be lost. A total of 1,834 acres (28 percent) lie within the 6 Conservation Areas and of this amount, 1,676 acres (91 percent) will be conserved (259 acres are already conserved) and 159 acres (9 percent) are subject loss under the Permit (i.e., nonfederal lands) (Table 4-114 of the MSHCP). Based on Laudenslayer *et al*. (1992), there would be a loss of approximately 2 pairs in the Conservation Areas with the implementation of the Plan.

Given this species relatively low population densities and their lack of movement over open ground between patches of suitable habitat, the loss of the crissal thrasher's habitat resulting in, or leading to greater habitat fragmentation, could potentially lead to small, nonviable crissal thrasher populations. In addition, in these fragmented patches, recruitment would be low and would be expected to decline over time.

The decline or loss of the crissal thrasher may have cascading effects on other species in the Plan. The crissal thrasher was selected by CVAG and the Service as an umbrella species for species that use the mesquite bosques. Decline and loss of the crissal thrasher should suggest the potential demise of other species using the same habitat.

The proposed Conservation Areas in the Plan include approximately 1,676 acres (25 percent) of all modeled habitat for the crissal thrasher. Conserving habitat blocks of adequate size for this species is difficult, as the natural communities it depends on including mesquite hummocks,

desert saltbush scrub, and desert sink scrub, are highly fragmented in the Plan Area and its home range size and habitat use are not well known.

The crissal thrasher will benefit from the establishment of the MSHCP Reserve System because it includes conservation of habitat in the Dos Palmas and Coachella Valley Stormwater Channel and Delta Conservation Areas where this species is known to occur. Implementation of the Plan is expected to provide for conservation of the crissal thrasher within the Plan Area, because currently unprotected portions of its habitat and potential habitat areas will be conserved. Because much of its habitat was already fragmented and reduced to small patches, the potential for habitat conservation for this species was already compromised prior to this Plan. Although the crissal thrasher is apparently more vagile than other sickle-billed thrashers (Laudenslayer *et al*. 1992), increasing distances between occupied habitat patches [habitat fragmentation] could leave these occupied areas functioning as population islands that make birds more prone to extirpation [Fitton (CDFG) 2005].

The combination of the overall conservation measures; species-specific measures such as management to minimize impacts to thrashers and their habitat, monitoring to better understand the distribution and population status of this species in the Plan Area, and long-term protection, management, and enhancement of crissal thrasher habitat is expected to assist in continuing the longevity of the species in this area. However, due to a lack of recent survey information the Service does not know precisely how many crissal thrashers remain in the Conservation Areas with the most modeled habitat heretofore, we have only provided estimates based on published literature. This estimate and prediction indicates the significant need to conduct surveys on this species with the implementation of this Plan. This would provide for opportunities to increase the quality of the habitat within the Conservation Areas and increase the crissal thrasher population within the Conservation Areas.

Outside the Conservation Areas
Approximately 5,013 acres (75 percent) of the 6,852 acres of modeled habitat lie outside 6 Conservation Areas and all have potential for disturbance. The majority of this acreage is under tribal jurisdiction. Based on Laudenslayer *et al*. (1992), there would be a loss of approximately 276 crissal thrasher pairs outside of the Conservation Areas if all habitat outside of conservation areas is lost.

Indirect Effects
Aerial predation by raptors may increase from loss of mesquite and opening of their habitats which may affect thrasher populations during and after available nesting, roosting and foraging habitat is removed. Projects that favor the establishment and continued presence of exotic plants could have additional impacts on crissal thrasher. In the long term, the alteration of the landscape surrounding and including crissal thrasher habitat would likely overwhelm native habitat and affect prey species population, density, and distribution.

Proposed mitigation measures would reduce but not eliminate the potential indirect effects if they are directed at exotic plant species, and corvid and starling presence. Wildfires could start due to human carelessness or OHV travel. We anticipate that activities that have degraded crissal thrasher habitat in the past would continue until/unless more effective management of

mesquite hummocks and bosques in the Conservation Areas is undertaken under the Plan. As such, fires set by vandals, illegal dumping, and invasive weeds would continue to challenge land managers with or without approval of the Plan. There is no plan for fire management within the Conservation Areas. Activities such as these would degrade existing habitat and affect crissal thrasher population.

Primary factors affecting the crissal thrasher population and habitat within the four noncore Conservation Areas include the potential for loss of habitat due to fires, OHV use and management, recreation, control of invasive species, habitat restoration, and vandalism. To adequately manage these Conservation Areas, OHV activity and associated adverse effects need to be effectively controlled. OHV activity could increase the frequency of fires either through accidental ignition resulting from sparks or riders unintentionally setting fire to dead vegetation. It is anticipated that there would be minimal habitat loss in conjunction with trails and trailheads; but some existing uses that impact natural qualities will occur. Other management actions range from control of exotic species and limiting public access to compatible scientific, educational, and recreational uses.

Changed Circumstances
Drought or increased population may reduce or increase the flows or ground water to areas of existing mesquite habitat. The loss or degradation by opening the canopy of mesquite habitat would thereby degrade or destroy potential breeding habitat for the crissal thrasher.

Cumulative Effects
Cumulative effects include the effects of future State, tribal, local or private actions that are reasonably certain to occur in the action area. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to Section 7 of the Act.

The Agua Caliente Band of Cahuilla Indians is undertaking a Habitat Management Plan for all of their Tribal lands. The draft Plan and associated documents have been reviewed publicly. It is anticipated that the final Plan and associated environmental analysis will be complete in mid-2008 with permit issuance scheduled for late 2008. Although there will be habitat loss associated with that Plan, the overall net benefit to the species is positive.

We are unaware of any non-Federal actions affecting the crissal thrasher that are reasonably certain to occur in the action area. However, any development on tribal lands in the lower Coachella Valley will affect crissal thrasher.

CONCLUSION
Data suggest that crissal thrasher populations have declined. Because of already low numbers within the Plan Area and lack of current conservation measures specifically aimed at this species, it could be extirpated from the Plan Area without the proposed action. Whereas with the Plan in place, it is possible that with restoration efforts, careful mitigation and minimization measures, and expert management of the Conservation Areas, this species will still be present at the end of the Permit term.

After reviewing the current status of the crissal thrasher, the environmental baseline for the action area, effects of the proposed action, the cumulative effects, the proposed permit conditions, and the issuance of the Take Permits that would occur with the implementation of the MSHCP, it is our biological opinion that with the management, restoration efforts, and mitigation and minimization measures proposed in the action, the plan is not likely to jeopardize the continued existence of the crissal thrasher. Our conclusion is based on the following findings:
Conservation measures have been proposed to minimize project-related direct effects to mesquite, saltbush thickets and dry wash habitat and thus reverse or slow the decline of the crissal thrasher within the Conservation Areas.
Mesquite restoration measures would increase the quality of this species habitat and over time could indirectly increase the population.

AMOUNT OR EXTENT OF TAKE
It is difficult to quantify the number of crissal thrashers that would be impacted as a result of the proposed action over the 75-year permit term due to the size of the large Plan Area and the lack of site specific data. Therefore, the Service is approximating the take as the number of acres of modeled habitat that would be impacted in the proposed Plan Area and the modeled habitat that would be impacted in the proposed Conservation Areas as a result of the proposed action. We anticipate that up to 5,013 acres of 6,689 acres of crissal thrasher modeled habitat outside of the Conservation Areas and 159 acres of the 1,676 acres (total 1,835 acres; 75 percent of habitat) within the Conservation Areas would become degraded or destroyed as a result of development under the MSHCP.

PERMIT CONDITIONS
The following Permit Conditions have been identified through our analysis as being necessary and appropriate for coverage of this species in the Permit:
CVCC and the Land Manager, through the land management program, shall identify and document implementation compliance with the Land Use Adjacency Guidelines and work with the landowners and appropriate jurisdictions to address these concerns. This information shall be included in the Annual Report to the Wildlife Agencies and the Permittees.
The CVCC shall ensure that the mesquite hummocks Natural Community will be subject to a "no net loss" requirement as described in Section 8.2.4.1 of the Plan. The CVCC shall ensure that these requirements are implemented within 10 years of impacts, including providing suitable or potential habitat for Covered Species if such habitat is affected or lost due to Covered Activities.
The CVCC, after coordination with its Implementation Manual Subcommittee, shall provide the Implementation Manual for review and concurrence by the Wildlife Agencies prior to its finalization and distribution to the Permittees.

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Le Conte's Thrasher (*Toxostoma lecontei*)

STATUS OF THE SPECIES

Legal/Listing Status

Le Conte's thrasher (*Toxostoma lecontei*) was identified in 1851 in Yuma County, Arizona (Lawrence 1851). Le Conte's thrasher is not a Federal listed species under the Endangered Species Act of 1973, as amended, but it is afforded protection under the Migratory Bird Treaty Act. The Le Conte's thrasher has been designated as a Species of Special Concern by the California Department of Fish and Game (CDFG). The Bureau of Land Management (BLM) lists it as a sensitive species. It is also listed as a species of lower risk/least concern by the IUCN (Red List of Threatened Species).

Species Description

The Le Conte's thrasher is an uncommon bird of the deserts of the American Southwest. This sandy-colored, 10-inch long bird blends well with dry desert vegetation. The Le Conte's thrasher is distinguishable from other thrashers in the area by a combination of a totally unspotted breast in all ages, and deep buff crissum (area around the vent; undertail coverts). The crissum is paler in juveniles. They have a dark eye, no distinct superciliary stripe, and a dark tail contrasting sharply with a pale body (Sheppard 1996). It does not occupy the same habitats as the other two *Toxostoma* species with overlapping ranges: [crissal thrasher (*T. crissale*) and California thrasher (*T. redivivum*)].

The *Toxostoma* species are often separated according to morphological characteristics including skull characteristics. Phylogenetic analyses confirmed the monophyly of the traditionally recognized assemblages: the rufum group [brown thrasher (*T. rufum*); long-billed thrasher (*T. longirostre*); and Cozumel thrasher (*T. guttatum*)]; lecontei group (Le Conte's thrasher; crissal thrasher; and California thrasher) and cinereum group [Bendire's thrasher (*T. benderei*); and Grey thrasher (*T. cinereum*)]. The cinereum and lecontei assemblages were found to be sister lineages (Zink *et al*. 1999). Generally, three putative subspecies are recognized including Le Conte's thrasher (*T. leucontei leucontei*), San Joaquin thrasher (*T. l. macmillanorum*), and Vizcaino thrasher (*T. l. arenicola)* (Zink *et al.* 1997). However, Zink *et al.* (1997) found that haplotypes were shared only between the Le Conte's thrasher and San Joaquin thrasher. *Toxostoma* haplotypes of Vizcaino thrasher differed in sequence divergence from those of Le Conte's and San Joaquin. Zink *et al*. (1999) found that Vizcaino thrasher differed consistently from Le Conte's thrasher and San Joaquin and suggested that *T. l. arenicola* be recognized as a species.

Distribution

The fossil records are currently interpreted that the Le Conte's thrasher may have increased its range into the San Joaquin Valley since the Pleistocene (Sheppard 1973). This species is a permanent resident throughout its range. This species is patchily distributed within its range. It is found in the San Joaquin Valley and Mojave and Colorado deserts of California and Nevada, southward into northeast Baja California, Mexico, farther south into central and both coasts of Baja, California; and in the Sonoran Desert from extreme southwest Utah and west Arizona south into west Sonora, Mexico (Figure 1).

A small number of records lie outside of its known breeding range confirmed by specimens (Fisher 1893; Hayward *et al*. 1963; McCaskie 1968; and Sheppard 1973).
In more recent times annual precipitation and temperatures limit distribution (Bent 1948; Sheppard 1973). Elevational distribution of this species is between -81 meters below sea level to about 1,600 meters above sea level (Sheppard 1996) (Figure 2).

Three hundred sixteen museum specimens and egg collection locations were identified within the Coachella Valley Multiple Species Habitat Conservation Plan (Plan) Area from eight museums, including references from the San Bernardino County Museum; Chicago Field Museum; Carnegie Museum; San Diego Museum of Vertebrate Zoology; Smithsonian Natural History Museum; University of California Los Angeles – Dickey Museum; Louisiana State University Museum of Natural History; and San Diego College Museum. Because these specimens are in some cases quite old, it is not possible to obtain the exact or near location that readily and accurately identifies the location where the bird, nest, or eggs were collected. Therefore, these museum specimens should be primarily used to indicate the distribution of the species across the Plan Area rather than indicate presence either inside or outside of a Conservation Area.

More recently, Darrell Hutchinson, (University of Riverside California, pers. comm. 11/19/2007) conducted callback Le Conte's thrasher surveys from 2004-2006 and found presence in the Plan Area (Figure 3). The Plan also identified an additional 19 Le Conte's thrasher locations (California Natural Diversity Database (CNNDB) (Figure 3).

In addition to the *Toxostoma* species being often separated according to morphological characteristics, they are also separated by geographical distribution and habitat preferences. The fact that ecological segregation of the *Toxostoma* lineage has occurred leads one to infer that there may be distinctive adaptations in each species to the special requirements of preferred habitats, although this has not been specifically studied. Le Conte's thrasher overlaps somewhat with the California thrasher and more so with the crissal thrasher, but their respective habitats differ (Bent 1948).

Habitat Affinities
Typical Le Conte's thrasher habitat throughout this species range consists of sparsely vegetated desert flats, dunes, alluvial fans, or gently rolling hills having a high proportion of species of saltbush or shadscale (*Atriplex* spp.) and/or cylindrical cholla (*Opuntia*) cacti from 0.9 to 1.9 meters in height. They also inhabit other desert areas with similar structural profiles, but typically lacking saltbush, shadscale, or cholla cacti. In addition, their habitats are described as scattered shrub thickets, usually with continuous or closed
canopy cover of less than 15 meters in any direction, even along sides of arroyos. Undercover is typically bare ground or sparse patches of grasses and annuals (average height - 30 centimeters).

This species is rarely found in habitats entirely consisting of creosote (Small 1994). Thorny plants are also used by Le Conte's thrasher as perches or nest sites including mesquite, palo verde and shadescale. Small (1994) found that this species prefers denser stands of saltbushes, palo verde, and mesquite.

Bent (1948) reported that this species seems to select the densest most thickly branched chollas and nests an average of about 3 feet above the ground. In the Plan Area, nests are typically found in ocotillo (*Fouquieria splendens),* cholla cacti, smoke bush (*Dalea* spp.), and ironwood (*Olneya tesota*). Sheppard (1970) reported their territories contain between 6 and10 old nests. San Bernardino County Museum records identified 76 nests collected between 1900 and 1941 in the Palm Springs area. All nests were found in cholla cacti. Typical territories have topographical relief from 10-20 meters in height with many broad canyon floors and large flood plains with poorly vegetated sides (Sheppard 1970). Narrow boulder-strewn canyons with little or no sand deposition are infrequently used by this species. Small arroyos, depressions, and streambeds traversing more level terrain with associated larger saltbush/shadscale and other desert shrubs are commonly used by Le Conte's thrasher (Grinnell 1933 and Bent 1948). Anthony (1897) and Franzreb (1978) reported that this species also uses vegetated margins of large, rolling sand dunes as habitat.

In Sheppard's (1970) study, this species preferred to nest in thick, dense saltbush or cholla cacti (85 percent) and small trees, other desert shrubs, and yucca (15 percent). About 15 percent of the nests were found in shrubs overhanging arroyos, built against the sides of arroyos, and all in relatively deep shade (Sheppard 1970). Le Conte's thrasher nests are most commonly found in desert washes in large shrubs in shade. This species prefers breeding in saltbush/shadscale vegetation or cholla cacti in sandy substrate.

Figure 1. Le Conte's thrasher range in Continental North America (Sheppard 1996).

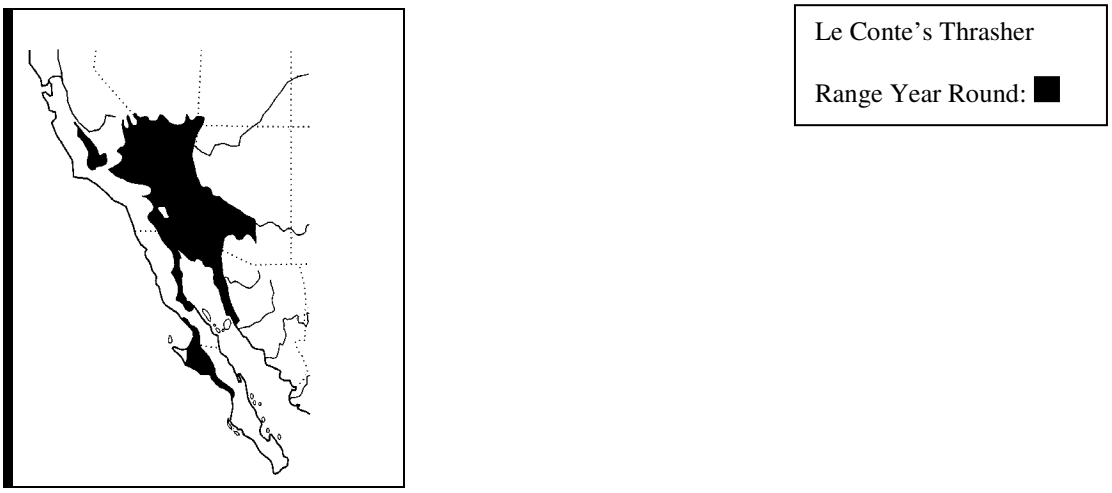
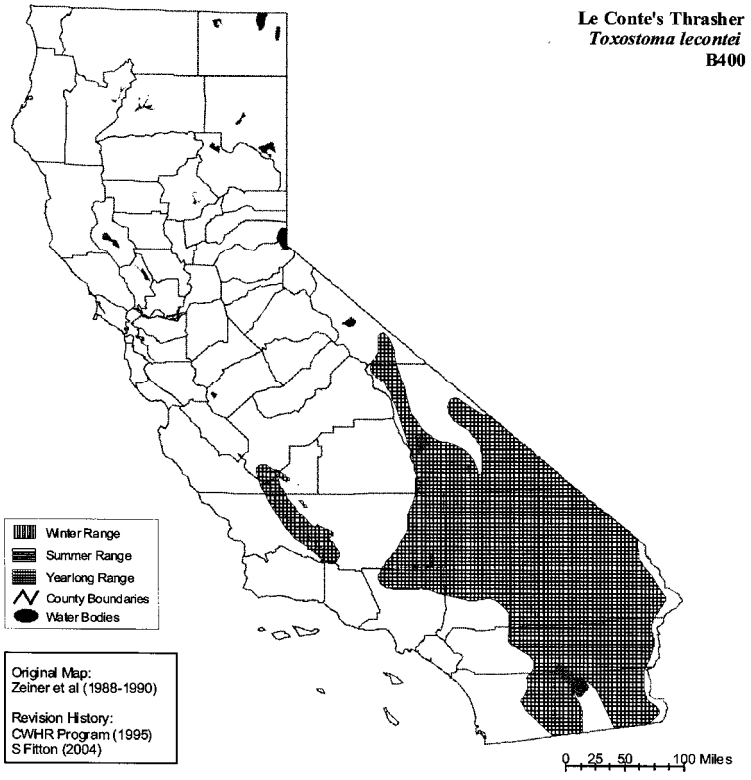


Figure 2. Current Le Conte's thrasher range in California. (Maps are based on available occurrence data and professional knowledge. The maps represent current, but not historic or potential range. Maps were originally published in Zeiner *et al*. 1990).



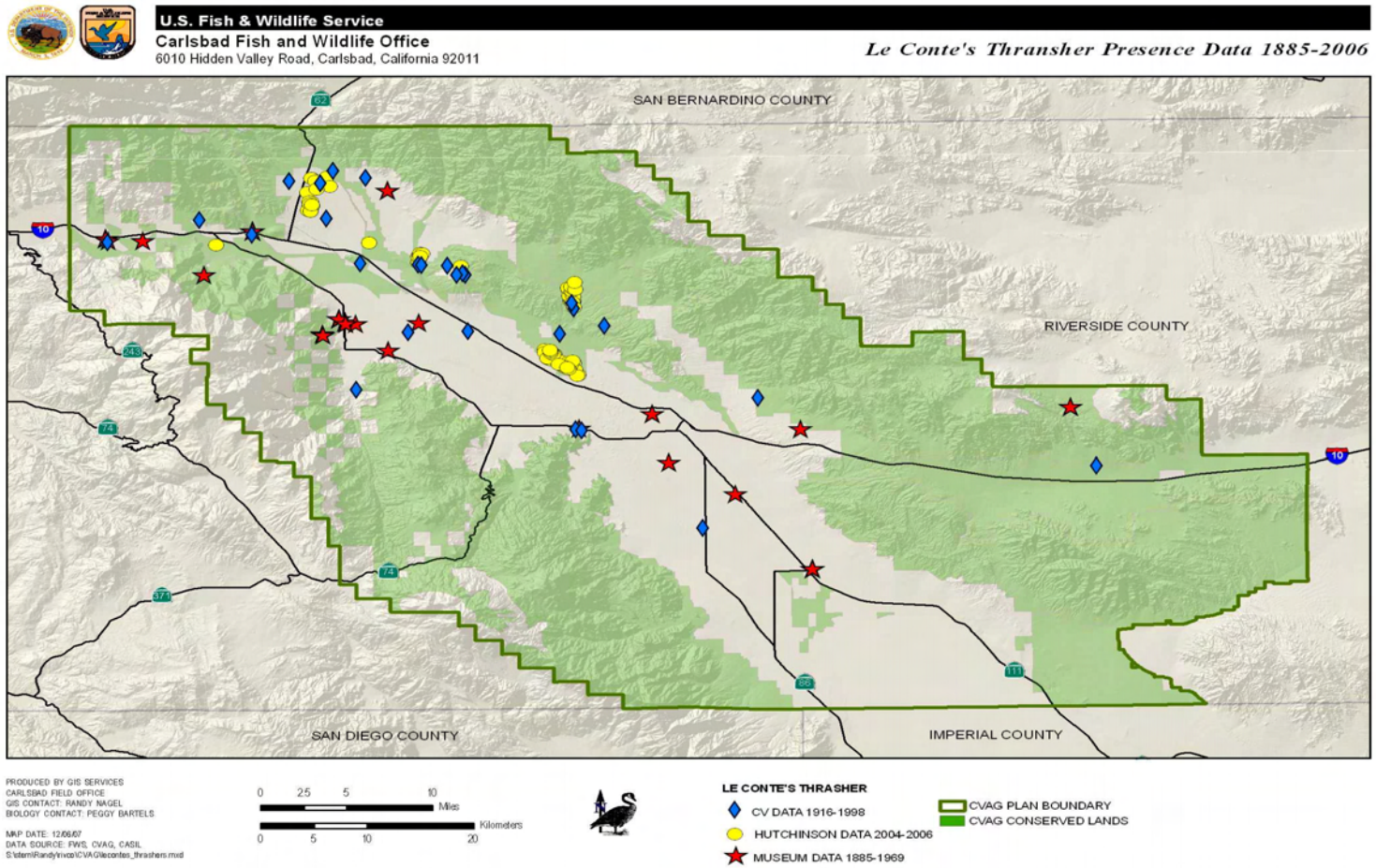


Figure 3. Le Conte's thrasher Presence information (1885-2006). (References: San Bernardino County Museum; Chicago Field Museum; Carnegie Museum; San Diego Museum of Natural History; Smithsonian Natural History Museum; University of California Los Angeles – Dickey Museum; Louisiana State University Museum of Natural History; San Diego College Museum of Vertebrate Zoology; and Darrell Hutchinson, University of Riverside California, pers. com. 11/19/2007). CV Data are specimen locations provided by CVAG.

Life History

Food

Almost all of this species food is found under litter of the desert vegetation or on the substrate. The main foods taken include arthropods (e.g., ants, butterfly larvae, beetles, scorpions, and spiders) and some plant seeds (e.g., small seeds of *Erodium* and mesquite). It chases grasshoppers and other insects in the vegetation when available. Some interesting behavior regarding foraging is reported by Sheppard (1996). This species is capable of flipping objects greater than 1.5 times its body weight to search for food items under them. Foraging occurs at all times of the day, although it is generally less active in the extreme heat of the day in the deserts. Bands of juveniles will chase grasshoppers together from the same shrub when large numbers of them are present. Most foraging is completed while standing on the ground. This species regularly takes eggs of conspecifics, small snakes, and lizards. This species rarely drinks and is thought to obtain the majority of its water through its diet (metabolic water producer). There is only one known observation of drinking reported in the literature (J. Tarble pers. comm. in Sheppard 1996).

Territory

The average January density at Maricopa, CA was 4.63 pairs/247 acres (km^2) over 4 year study. In the main study area of 1,814 acres (7.34 km^2) there were an average of 10.3 birds/247 acres (km^2) during the four year study (Sheppard 1996). Grinnell (1933) estimated 2.3 pairs/247 acres (km^2) near McKittrick, Kern County, during late February and March when adults can be less obvious. Bury *et al.* (1977) estimated a density of 1.7 pairs/247 acres (km^2) in the Mojave Desert, San Bernardino County (dominated by creosote bush and 2 species of cholla cactus). Demaree (pers. comm. in Sheppard 1996) estimated an overall density within the main United States range (excluding San Joaquin Valley, CA) at less than 0.2 pairs/247 acres (km^2), with many areas of 24,710 acres (100 km^2) having few, if any breeding Le Conte's thrashers.

Occupied nesting territories averaged 18.14 acres (7.34 ha) (SD 1.49, with a range of 3.9-11.7; n = 31). At any given time, a pair may occupy a home range of between 8.65 acres (3.5 ha) and 44.48 acres (18 ha) (Sheppard 1996). The smallest, isolated fragment of habitat found to still be occupied by Le Conte's thrasher was 321 acres (130 ha) for all habitat patches, located approximately 2 km from the nearest other habitat segment (S. Fitton unpubl. data in Sheppard 1996).

Breeding/Nesting

Le Conte's thrasher is believed to be primarily monogamous and is thought to mate for life (Sheppard 1970). Mating can occur during any month, although the pair bond is subdued, infrequent, and brief, likely because this is a non-migratory bird. The earliest nesting records for this non-migratory species in the Colorado Desert of California are mid-January or late January (Sheppard 1970). This species nests until about the end of May, peaking in mid-March through April (Sheppard 1970). The latest egg date for Le Conte's thrasher occurred on June 24 in the Santa Rosa Mountains (Sheppard 1973). The cup-like nest is built low to the ground in a dense shrub. Typically, there are 2 and rarely up to 5 eggs in the nest generally laid on 3-4 consecutive days. Eggs are light bluish green (Bent 1948). Incubation occurs for 14-20 days (Sheppard 1970). Two or more nesting attempts occurred in the majority of pairs in Sheppard's (1973) study in Maricopa, California.

A nest is not typically reused again by the same pair in the next nesting cycle. However, other pairs may use that nest after renovation. The young are thought to fledge in about 14-20 days (Sheppard 1970). The young remain within the parent's territory for about 15-18 days and then disperse up to 2,500 meters. The average dispersal for fledged young was about 0.245 miles (395 meters) from the nest. There are at least 2 broods raised during a breeding season, in part thought to be related to the light and winter weather patterns (Bent 1948). The major reason for nest/egg loss is related to cold rain early in the nesting season.

Except for immature birds (below about 9 months of age), most birds are observed as mated pairs (Gilman 1904, Sheppard 1973). Intraspecific encounters between unmated adults of the same sex resulted in at least some chasing and fleeing during any season. Fighting with physical contact was mostly seen from December through February (Sheppard 1970; based on 2,000 hours of observation in Maricopa, California). Resident pairs defend the territory against conspecific intruders of the same sex. This species has a threat display called shuffle-fluff display. The resident male slowly shuffles around bushes about 9.8 feet – 32.8 feet (3-10 meters) from the intruder with its plumage fluffed up to varying degrees with wings held high and slightly opened. The body is held low to the ground. There is also a bush-dive display. The resident male starts on the top of a bush in full body fluff then proceeds to drop bill first into the interior of the bush.

Population Status/Trends

Insufficient data exist to determine an accurate acreage of habitat available rangewide or to determine an accurate population estimate to develop population trends, primarily because population distribution is patchily distributed across this species range, especially on the western periphery of its range in southeastern California. Engels (1940) found that concentrations of this species were observed along the draws where saltbush and shadscale were densest. This characteristic patchy habitat distribution of Le Conte's thrasher makes it difficult to evaluate population status and trends across its range.

Bent (1948) considered this species to be the rarest and most elusive of the desert birds. Demaree (pers. comm. in Sheppard 1996) estimated an overall density within the main United States range (excluding San Joaquin Valley, CA) at less than 0.2 pairs/247 acres (km^2), with many areas of 24,710 acres (100 km^2) having few, if any breeding Le Conte's thrashers. Rich *et al*. (2004) considered this species to have a moderate range, with an estimated global extent of occurrence of 61,780,000 acres (250,000 km^2 or 96,530 square miles). Rich *et al*. (2004) estimated the global population of this species at 190,000 individuals.

Availability of suitable habitat appears to be the major factor limiting population density and distribution. Because of habitat loss from development, invasive species, wildfires, and recreational pursuits, much of this species habitat, its population has likely declined in recent years. Sheppard (1996) reports great reductions in numbers in the Coachella and Imperial Valleys, primarily due to loss of habitat because of development.

Threats

The primary threat to the species is loss of habitat due to conversion to urban, agricultural, or

other uses, or the degradation of habitat from OHV use, fire, and pesticide use near agricultural areas.

In the Coachella Valley, habitat for Le Conte's thrasher has been severely reduced and fragmented by agricultural and urban development and related activities. In some parts of the Plan Area, the Le Conte's thrasher has lost extensive habitat to development. Irrigated lawns, groves, and fields are not compatible with its need for desert vegetation (Cornell Lab of Ornithology website). Aerial photographs taken of the Coachella Valley in 1939, 1945, and 1955 (National Aerial Photography Program) revealed that much of the land was altered from these activities. Le Conte's thrasher may occupy suitable habitat adjacent to housing (Darrell Hutchinson pers. comm.), but it will not tolerate habitat conversion or degradation (Sheppard 1996).

Isolated populations produced by habitat loss and fragmentation, experience higher probabilities of extirpation due to increased vulnerability to demographic and environmental stochastic (natural randomly occurring) events (Hanski 1994) and/or reduced fitness from genetic drift and inbreeding depression (Caughley 1994). Furthermore, isolation compounds the risk produced from small population size because it reduces the chance that populations will naturally recover through immigration of dispersing individuals from nearby populations. Urbanization is an isolating factor for this species because the predominant features, such as vast expanses of pavement, structures, and other landscaping remove suitable habitat and greatly prohibit movements between areas of suitable habitat.

In addition, the Le Conte's thrasher is affected by DDT contamination, which was banned in the United States in the 1970s (Sheppard 1970). DDT was just recently been banned in Mexico in 2004 (Yanez *et al.* 2004). High DDE levels may still be affecting this species within its range and it may have declined in Mexico as it did in the United States. Other threats may include shooting, collisions with cars, and the predation of young by house cats. Le Conte's thrasher is also impacted by parasitism of the cowbird (*Molothrus ater*).

In Maricopa, CA, a study by Sheppard (1970) indicated that10 percent of the bird eggs were preyed upon by house cats (*Felis catus*), snakes and kit fox (*Vulpes macrotis*). Eggs were also taken by Yuma antelope ground squirrel (*Ammospermophilus harrisi*) (Parker 1886). Le Conte's thrasher remains were found in a prairie falcon nest (Boyce 1985). In addition, Le Conte's thrasher also took conspecific's eggs and took a nestling in one case (Sheppard 1970).

Rainfall abundance and the presence of a sandy/gravel substrate are likely limiting factors to their distribution in the Plan area (Darrell Hutchinson pers. comm.). Threats to the existing population include persistent low rainfall and urban development around Desert Hot Springs (Darrell Hutchinson pers. comm.). Habitat availability and suitability declines with drought, therefore local population viability may be strained during periods of low reproduction related to prolonged drought.

Synopsis of Status

Few studies have been conducted to date, and the few that have been conducted are inconclusive with respect to the population status or this species' response to threats. The continued loss of habitat, conversion of habitat, disturbance and fragmentation of existing habitat, and the degradation (Coachella Valley of Associated Governments; CVAG 2007) of habitat combined with the natural population cycles suggests that this species population is likely to continue its decline overtime.

ENVIRONMENTAL BASELINE

Regulations implementing the Act (50 CFR § 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, which are contemporaneous with the consultation in progress.

The action area is described as the Plan Area where the Le Conte's thrasher will be conserved for the 75 year period of the Coachella Valley Multiple Specie Habitat Conservation Plan (MSHCP) permit. The Plan Area comprises 1.1 million acres (1,719 square miles) within Riverside County, California (4.7 million acres or 7,344 square miles).

Le Conte's thrasher's range wide extent is approximately 61,780,000 acres (250,000 km^2or 96,530 square miles) with an estimated population of 190,000 individuals (Rich *et al*. 2004). Based on the above information, the Plan Area (1,719 square miles) encompasses about 1.78 percent of this species' entire range (Rich *et al*. 2004).

There are 243,242 acres (380 square miles; 985 square km^2) of Le Conte's thrasher modeled habitat within the Plan Area (CVAG 2007). This comprises approximately 0.04 percent of the entire range of this species. Based on Bury *et al*. (1977), the Le Conte's thrasher population in modeled habitat in the Plan Area would be approximately 1,675 pairs. Demaree (pers. comm. in Sheppard 1996) estimated an overall density within the main United States range (excluding San Joaquin Valley, CA) at less than 0.2 pairs/247 acres (km^2). Demaree's (pers. comm. in Sheppard 1996) calculations would equate to 891 pairs within the Plan Area. Realistically, the actual pair population estimate within the Plan Area most likely falls somewhere between these two estimates.

Status of the Species in the Action Area

Darrell Hutchinson (pers. comm.) conducted Le Conte's thrasher surveys within the Plan Area from 2004 through 2006. The following paragraph summarizes his study. Hutchinson selected transect locations based on the following criteria, historical occurrence, recent sightings, suitable habitat, niche model projections, and public access. He used playback calls and found that in suitable habitat, Le Conte's thrashers were observed on 8 of 22 survey transects in Riverside County. He found 5 breeding pairs and 1 unmated male. His results indicated that the Le Conte's thrasher was more commonly found in the western rather than the eastern portions of the Coachella Valley (Figure 3). West of Desert Hot Springs, 50 percent of transects (n = 6 transects) detected thrashers compared to 37.5 percent of transects (n = 8) in the central Coachella Valley, and 0 percent of transects (n = 8) east of Indio (Figure 3). Please note that Le Conte's thrasher absence is not indicated in Figure 3. During the post-nesting period, when thrashers were most numerous and easily detected, 28 separate individuals (n = 10 surveys) were detected on transects near Desert Hot Springs compared to 11 individuals (n = 11 surveys) detected on transects at Willow Hole and Thousand Palms Preserves. High numbers of adults and juveniles suggested multiple pairs are breeding successfully near Desert Hot Springs (Hutchinson pers. comm.). Additional playback surveys in the Desert Hot Springs area revealed

the presence of neighboring pairs occupying adjacent territories, whereas at the Willow Hole and Thousand Palms Conservation Areas, most territories were disjunct. In the Coachella Valley, the Le Conte's thrasher population densities appear to be highest around Desert Hot Springs and diminish going eastwards. One possible explanation is rainfall abundance. Rainfall is associated with productivity and thrashers are likely using the availability of resources. The second factor limiting the distribution of Le Conte's thrasher in the Coachella Valley may be size of substrate. Large areas of seemingly suitable habitat, (e.g., on the alluvial fans bordering the Joshua Hills or the Martinez slide bordering the Santa Rosa Mountains), contain a relatively heavy or rocky substrate. Hutchinson (pers. comm.) found that in general, thrashers avoid areas that contain a rocky substrate.

Outside of the Conservation Areas
There are 243,242 acres of Le Conte's thrasher modeled habitat within the Plan Area (CVAG 2007). A total of 95,963 acres of the 243,242 modeled habitat acres are found outside of the Conservation Areas. Within the 95,963 acres of Le Conte's thrasher modeled habitat, a total of 8,557 acres are located on federal lands and are currently conserved, and 87,406 acres (36 percent) are authorized for disturbance (Section 4; Table 4-114).

Data provided to the Service from CVAG and other sources was limited, and did not provide the Service with limited data regarding this species status. However, under the Plan, 14 of the 33 (42 percent) known occurrences that were reported in the Plan Area (CNDDB occurrences) were found outside of the Conservation Areas. These 14 occurrences will be lost (Chapter 9, Page 9-172 and Figure 3).

Inside the Conservation Areas
Data provided to the Service from CVAG and other sources was limited, and did not provide the Service with recent information on this species status. Nineteen of the same 33 known occurrences (58 percent) reported in the CVMSHCP (CNDDB occurrences) that were found inside of the Conservation Areas will be conserved (Chapter 9, Page 9-172 and Figure 3).

In addition, more than 300 museum specimens and nest and egg locations were mapped in the Plan Area (Figure 3). While many of these museum specimens should not be used to identify specific locations, some of the newer specimen locations could be appropriately used to identify specific sites within the Conservation Areas (Figure 3). Some of the recent and museum occurrences were found in the Snow Creek, Santa Rosa and San Jacinto Mountain, and Joshua Tree National Park Conservation Areas. The Le Conte's thrasher habitats in these Conservation Areas are characterized by lower elevations; less rock; alluvial fans. During the Hutchinson (pers. comm.) surveys, Le Conte's thrasher was found in Thousand Palms; Willow Hole, Edom Hill, and on the border between the Indio Hills/Joshua Tree National Park Linkage and Thousand Palms Conservation Areas.

The potential habitat for the Le Conte's thrasher is widely dispersed in the Plan Area. The Plan assumes that the Le Conte's thrasher occurs throughout the Coachella Valley in suitable habitats. However, this is an unverified assumption. There are 21 different Conservation Areas that are composed of at least some Le Conte's thrasher modeled habitat, primarily identified as desert dry wash/woodland, succulent scrub community, and creosote bush/scrub saltbush vegetation

communities (Chapter 9; Table 9-23). The specific and current status of this species in the Conservation Areas is not known; however, the high number of acres of modeled habitat in each Conservation Area provides a general perspective of the potential for this species presence in the Plan Area. The historical museum specimen distribution occurrences indicate a potential for this species to be found in lower elevations and on alluvial fans throughout the Plan Area (Figure 3). Hutchinson's data also indicates that this species is found more commonly on the west side of the Plan Area (east of the Interstate 10 Freeway).

With so little data on specific occurrences of Le Conte's thrashers in the Conservation Areas, the Planning Team opted to take a conservative approach and recommend conservation of all areas where suitable habitat was present (CVAG 2007). It is necessary to understand the definitions of the ecological values of the Conservation Areas for purposes of analyzing their value. The ecological values are described in the following paragraphs.

Core Habitat

Core habitat areas identified in the Plan for a given species are composed of a habitat patch or aggregation of habitat patches that: (1) are of sufficient size to support a self-sustaining population of that species, (2) are not fragmented in a way to cause separation into isolated populations, (3) have functional essential ecological processes, and (4) have effective biological corridors and/or linkages to other habitats, where feasible, to allow gene flow among populations and to promote movement of large predators.

Essential Ecological Processes

Essential ecological processes maintain specific habitat types and are necessary to sustain the habitat (in a state usable by covered species). Essential ecological processes may include abiotic hydrological processes (both subsurface and surface), washes, erosion, deposition, blowsand movement, substrate development and soil formation, and disturbance regimes such as flooding and fire; and biotic processes such as reproduction, pollination, dispersal, and migration.

Existing Conservation Lands

Existing conservation lands are a subset of MSHCP Reserve System lands consisting of lands in public or private ownership and are managed for conservation and/or open space values that contribute to the conservation of covered species (Figure 4-2 of the MSHCP).

Linkage

Linkage habitat provides for the occupancy of covered species and their movement between larger blocks of habitat over time, potentially over a period of generations. In general, linkages are large enough to include adequate habitat to support small populations of the species and thus, do not require that an individual of a species move through the entire Linkage area to maintain gene flow between populations. What functions as a linkage for one species may provide only a biological corridor or no value for other species.

Other Conserved Habitat

Other conserved habitat is described as part of a Conservation Area that does not contain core habitat for a given species, but which still has conservation value. These values may include essential ecological processes, biological corridors, linkages, buffering from edge effects,

enhanced species persistence probability in proximate core habitat, genetic diversity, re-colonization potential, and flexibility in the event of long-term habitat change. The majority of the Conservation Area for Le Conte's thrasher will be conserved as Other Conserved Habitat.

It is important to note that no core habitat for the Le Conte's thrasher exists within the Plan Area, largely due to a lack of information and the broad ecological niche that this species uses as described above. Thus, the lands that are conserved will also be conserved for Le Conte's thrasher, other covered species, essential ecological processes, and corridors.

Table 9-23 in the plan summarizes the acres that will be conserved, monitored and managed on 21 Conservation Areas with the implementation of the Plan. All 21 Conservation Areas contain Other Conserved Habitat areas for Le Conte's thrasher. With the implementation of the proposed MSHCP Reserve System, the Conservation Areas will consist of the following acres of conserved habitat 42 acres (Cabazon); 1,142 acres (Stubbe and Cottonwood Canyons); 2,540 acres (Snow Creek/Windy Point); 5 acres (Whitewater Canyon); 350 (Highway 111/I-10 Conservation Area); 6,867 acres (Whitewater Floodplain); 3,290 acres (Upper Mission Creek/Big Morongo Canyon); 4,928 acres (Willow Hole); 2,354 acres (Edom Hill); 10,506 acres (Thousand Palms); 5,790 acres (Indio Hills/Joshua Tree National Park Linkage); 105 acres (Indio Hills Palms); 1,985 (East Indio Hills); 4,305 (Joshua Tree National Park); 46,571 acres (Desert Tortoise and Linkage); 16,815 acres (Mecca Hills/Orocopia Mountains); 14,139 acres (Dos Palmas); 706 acres (Coachella Valley Stormwater Channel and Delta); 10,006 acres (Santa Rosa and San Jacinto Mountains); 12 acres (Long Canyon); and 0 acres (West Deception). Approximately 90 percent of the modeled habitat will be conserved.

There are 243,242 acres (207 square miles; 536 square km^2) of modeled habitat for Le Conte's thrasher within the Plan Area with a total of 147,317 acres of other conserved habitat occurring within the 21 Conservation Areas. A total of 8,727 acres are authorized for disturbance in the Conservation Areas.

Core habitat was not designated for this species given the limited knowledge about its habitat and distribution in the Plan Area. The Plan would ensure conservation of approximately 132,456 acres (54 percent of total) of this modeled habitat. Approximately 59,252 acres (24 percent) of the modeled habitat are within existing conservation lands and would be managed as part of the Reserve System. The Plan would conserve an additional 73,204 acres (30 percent) of the modeled habitat for Le Conte's thrasher in the Conservation Areas. An additional 6,134 acres of habitat in fluvial sand transport system (for which the objective is to maintain fluvial sand transport (Table 9-23; Page 9-167) would be conserved and may retain habitat characteristics although there is no such obligation associated with this acreage under the Plan. A total of 1,529 acres would be included in the Morongo Wash Special Provisions Area Corridor for purposes of storm water drainage system. In total, the Permittees will protect and manage 132,456 acres of Le Conte's thrasher modeled habitat (54 percent of the entire modeled habitat within the Plan Area) within the 21 Conservation Areas.

With Plan implementation, the Conservation Areas and Special Provisions Area would conserve approximately 0.02 percent of the entire range of Le Conte's thrasher (Rich *et al.* 2004). To estimate the population within the Conservation Areas and Special Provisions Area, we applied

data from Bury *et al*. (1977) to the Le Conte's thrasher modeled habitat within all of the 21 Conservation Areas (132,456 acres; 536 square km^2). Based on Bury *et al*. (1977), we would estimate the pair population within the conserved Conservation Area as approximately 912 pairs. Next we applied Demaree (pers. comm. in Sheppard 1996) calculations and these would equate to 107 pairs within the Conservation Area after take has occurred. Realistically, the actual pair population estimate within the Plan Area most likely falls somewhere between these two estimates.

Factors Affecting the Species' Environment within the Action Area
Note that Indian reservation lands within the Plan Area are not subject to the Plan. The bulk of the lands currently conserved within the Plan Area for Le Conte's thrasher are under the jurisdiction of BLM.

The primary factors affecting the Le Conte's thrasher within the Plan Area include the loss of habitat due to conversion to urban and/or agriculture, proliferation of invasive plants, fire, and the degradation of habitat from OHV use. Other factors that have altered this species environment in recent times include collisions with cars and predation by domestic cats and dogs.

Proliferation of invasive plants has resulted in larger and more frequent fires in the deserts of the southwest (Brooks *et al*. 2002). In the Plan Area, the interface between the Colorado and Mojave deserts in the northwest part of the Plan Area around San Gorgonio Pass and Morongo Valley is a hotspot for fires in California deserts (Brooks *et al*. 2002). Alien plants *Schismus* spp. (Mediterranean grass), filaree (*Erodium cicutarium*), Sahara mustard (*Brassica tournfortia*), and *Bromus rubens* (red brome) appear to be the primary facilitators of increased fire frequency because the dead plants may remain for many years and create a fuel bed for fire to cross between shrubs.

Based on the information provided by CVAG, the majority of Le Conte's thrasher historic habitat was degraded because of the direct and indirect effects of OHV use, and/or changes to suitable habitat from invasive species. Off-highway vehicles (OHVs) destroy or degrade vegetation communities and lead to compaction of soils. Illegal OHV activity occurs in many places in the Plan Area. The nature and extent of impacts of OHV use depends upon the kind of activity. Important factors determining the intensity of compaction are soil moisture, vehicle type, and amount of vehicle activity. Important factors in erosion of desert soils are slope, soil particle size, and size of disturbed area. Erosion occurs in the alluvial fan and wash areas leading to loss of shrubs.

Management and Monitoring
Actions may be needed to ensure species persistence and long-term viability if biological monitoring indicates that such actions are warranted. Some of the action items may be to control and manage OHV activities that degrade Le Conte's thrasher habitat; control invasive species; and establish research elements that address distribution of the species.

Initial monitoring in the form of baseline surveys was conducted from April to June 2003 to 2007 to refine distribution models, determine habitat correlates, revisit known occurrences, and

test different strategies for detection of the Le Conte's thrasher in the following Conservation Areas: Willow Hole, Thousand Palms, Desert Tortoise Linkage, Dos Palmas, and Coachella Valley Stormwater Channel and Delta. In the alluvial fan and dry wash communities, there are also key monitoring objectives that will be completed over time. Le Conte's thrasher was recently observed in Willow Hole and Thousand Palms Conservation Areas and monitoring objectives could support a long term analysis for determining trend in these Conservation Areas.

General objectives for the monitoring program include: (1) identifying trends in species and community level resources protected under the Plan; (2) conducting species-specific actions to secure and enhance habitat quality and provide for long-term population viability; (3) identifying activities, and any restrictions on those activities, allowed within Conservation Areas and Special Provisions Area that are compatible with the conservation of species, habitats, natural communities, and their associated ecological functions; and (4) controlling threats, which may include habitat fragmentation, invasive plant and animal species, OHV use, and edge effects.

EFFECTS OF THE ACTION

Mitigation and Minimization Measures

The Plan proposes management and monitoring to minimize impacts to this species, including control of activities that degrade Le Conte's thrasher habitat including OHV use, control of invasive species if monitoring results indicate it is necessary, and restoration and enhancement of degraded habitat as necessary. Land Use Adjacency Guidelines as described in Section 4.5 would minimize the impacts of development in the Conservation Areas and Special Provisions Area and adjacent to the Reserve System. Specific fire management measures are not currently proposed.

The mitigation and minimization measures proposed in the MSHCP are intended to conserve a minimum of 54 percent of the modeled habitat within the Plan Area for the Le Conte's thrasher occurring on private lands within each of the Conservation Areas and Special Provisions Area with suitable roosting/breeding habitat. It is anticipated that the Species Conservation Goals and Objectives established in Section 9 would be met through the Joint Project Review Process (Section 6.6.1.1) and the Monitoring and Adaptive Management Program (Section 8 and 9).

In the Plan, there are general and specific mitigation and minimization measures that are required for any permitted activity covered under the Plan for Le Conte's thrasher. There are specific mitigation measures for the Le Conte's thrasher, but some measures do not apply to single-family residences and any non-commercial accessory uses and structures including but not limited to second units on an existing legal lot, or to operations and maintenance of Covered Activities (Chapter 4.4, Page 4-170). In modeled Le Conte's thrasher habitat in all the Conservation Areas and Special Provisions Area, surveys shall be conducted by an Acceptable Biologist on the construction site and within 500 feet of the construction site, or to the property boundary if less than 500 feet. These surveys shall be conducted during the nesting season, January 15 - June 15, prior to the start of construction activities. If nesting Le Conte's thrashers are found, a 500 foot buffer, or to the property boundary if less than 500 feet, will be established around the nest site. The buffer will be staked and flagged. No construction will be permitted within the buffer during the breeding season of January 15 - June 15 or until the young have fledged.

Required measures for the Conservation Areas and Special Provisions Area include the Land Use Adjacency guidelines as follows: controlling noise, lighting, drainage, human disturbance, and prevent introduction of exotic plants, chemicals and wastes, and domestic predators such as dogs and cats. Edge effects will also be addressed through reserve management activities such as fencing (Chapter 4.5 page 178). Where appropriate when implementing the Plan, native landscaping, rocks/boulders, fencing, walls, signage and/or setbacks will be addressed.

Direct Effects

Outside the Conservation Areas and Special Provisions Area

There are 243,242 acres of modeled Le Conte's thrasher habitat within the Plan Area. There are 87,406 acres (354 square km^2; 36 percent) that lie outside of the Conservation Areas and Special Provisions Area that are authorized for disturbance through the implementation of the Plan (Section 4; Table 4-114). Based on Bury *et al*. (1977) and Demaree (pers. comm. in Sheppard 1996), the Le Conte's thrasher pair population in the Plan Area modeled habitat that would be lost would range between 602 and 71 pairs. The proposed loss of the above acres of Le Conte's thrasher modeled habitat outside of the Conservation Areas would predominately result from Covered Activities, particularly development and associated infrastructure.

Those areas where disturbance would be permitted for this species are primarily locations in the area west of Desert Hot Springs and scattered locations in the urbanized areas of Indio and Palms Springs. Roads and urban development already fragment a significant portion of the authorized disturbance area. Thus, implementation of the Plan will maintain and enhance population viability of the species by protecting large Conservation Areas that otherwise would be subject to conversion to other uses.

Inside the Conservation Areas

A total of 147,317 acres of modeled habitat for Le Conte's thrasher are found within the Conservation Areas and Special Provisions Area. Of this amount 8,727 acres (6 percent) of Le Conte's thrasher modeled habitat are authorized for disturbance. Based on calculations of Bury *et al*. (1977) and Demaree (pers. comm. in Sheppard 1996), estimated range of between 7 and 60 pairs would be lost or killed through authorization of disturbance within the Conservation Area. With the implementation of the Plan, there would be a range wide loss of approximately 0.02 percent of this species range.

In summary, for the entire Plan Area, authorized disturbance would impact a total of 102,267 acres of the 243,242 acres of Le Conte's thrasher modeled habitat within the Plan Area. A total of 87,406 acres (37 percent) outside of the Conservation Areas are authorized for disturbance and 8,727 acres inside of the Conservation Areas are authorized for disturbance. In addition, there is another 6,134 acres that may or may not be maintained as other conserved habitat inside of the Conservation Areas (i.e., it could be authorized for take). This additional 6,143 acres is dedicated to the maintenance of fluvial sand transport. The remainder of the total amount of modeled habitat is under federal ownership and outside of the Conservation Areas.

Based on the loss of at least 96,133 acres of Le Conte's thrasher modeled habitat within the Plan Area, we applied Bury *et al*. (1977) and Demaree (pers. comm. in Sheppard 1996) data to the

modeled habitat and estimated that between 661and 79 pairs would be lost or killed due to disturbance authorized by the MSHCP.

The Plan would ensure conservation of approximately 132,456 acres (54 percent of the total) of the modeled habitat. Approximately 59,252 acres (24 percent) of the modeled habitat are within existing conservation lands and would be managed as part of the Reserve System. The Plan would conserve an additional 73,204 acres (30 percent) of the modeled habitat for Le Conte's thrasher in the Plan Area. Within the Conservation Areas under the worst case scenario, 8,727 acres of take of modeled Le Conte's thrasher habitat (4 percent) could occur (See Table 9-23 and Table 4-114). Take of Le Conte's thrasher habitat within the Conservation Areas must be consistent with the conservation objectives for this species to: (1) ensure Conservation of habitat for Le Conte's thrasher across a range of environmental conditions and (2) ensure conservation of Le Conte's thrasher nest sites through avoidance, minimization, and mitigation measures as described in Section 4.4.3 implement biological monitoring and Adaptive Management to ensure long-term persistence of this species. So, although some take could occur within the Conservation Areas, the Conservation Objectives required by the Plan will provide for protection of habitat to ensure the long-term persistence of this thrasher. Outside of the Conservation Areas, there are 87,406 acres (36 percent) of modeled habitat for Le Conte's thrasher that are authorized for take. Those areas where take could be permitted for this species are primarily locations in the area west of Desert Hot Springs and scattered locations in the urbanized areas of Indio and Palms Springs. Roads and urban development already fragment a significant portion of the take area. The modeled habitat for Le Conte's thrasher outside the Conservation Areas is east of Highway 62 and surrounding Desert Hot Springs.

Mitigation and Minimization Measures
Implementation of the avoidance, minimization, and mitigation measures identified in the MSHCP and the recommended changes would further reduce impacts to this species. With the additional measures described in the analysis above, this species is anticipated to persist within the Action Area through the conservation and management of Conservation Areas. We anticipate that the Le Conte's thrasher populations and habitat would be monitored and managed in perpetuity. We anticipate that these mitigation measures will prevent at least some take of Le Conte's thrasher.

As noted above mitigation for edge effects could be completed by fencing an area. Effects of protective fencing were found to result in higher abundance and species richness of birds (Brooks 1999). This included Le Conte's thrasher for which nesting was also found to be more frequent inside the fenced area. This increase in abundance may be related to an increase in abundance of seed and invertebrate food sources (Brooks 1999).

Indirect Effects
Indirect effects would primarily result from activities that may reduce prey species for the Le Conte's thrasher, such as loss of vegetation from OHV access, wildfires, and increase in invasive weeds. These indirect effects are anticipated to largely be contained through monitoring and management actions in the Conservation Areas and Special Provisions Area.

Feral animals and pets that may be in the Plan Area would likely prey upon the Le Conte's

thrasher. Stipulations to decrease pet predators from entering the Conservation Areas are in place.

Monitoring and Adaptive Management Program
Adaptive Management, discussed in Section 8.4.3, would focus on identification of threats and development of a Monitoring Program to address management questions related to these threats. Monitoring of covered species is proposed in order to identify potential threats posed by exotic species. We anticipate that these mitigation measures will prevent at least some take of Le Conte's thrasher. In addition, we anticipate that the monitoring and adaptive management program will identify problems earlier and thus allow more effective management strategies.

Changed Circumstances
The Changed Circumstances that are likely to affect the Le Conte's thrasher are loss of habitat due to conversion to urban, proliferation of invasive plants, fire, and the degradation of habitat from OHV use. Other factors that have altered this species environment in recent times include collisions with cars and predation by domestic cats and dogs.

Unintended fire in the desert environment could spread to Le Conte's thrasher habitat, particularly in the Dos Palmas area given the existing access to off-road vehicle users. The preventive measures identified in the Plan will assist in reducing the risk of spread of fires in the desert. Proper controls and configurations will reduce the risk of wildfire spreading into these areas and establish appropriate site-specific response actions. Wildlife Agency oversight should ensure that these tasks are completely appropriately and in a timely fashion.

Various disturbances, including fire, can result in the establishment of new exotic species within rail habitats. The most likely impact associated with exotic species is the invasion of an exotic plant that changes the structural characteristics of the vegetation communities. The Plan area already has exotic plant species that warrant monitoring and management, and this management should afford the opportunity to identify and address new exotic plants relatively quickly before major invasions become established. The specifics of the monitoring program have yet to be determined, but the program will need adequate rigor to identify trends and potential problems in a timely fashion.

OHV use has been increasing in the Plan Area. Enforcement and potentially the need for fencing to curb and control OHV use will be evaluated in the Plan Area. Monitoring will be developed to determine the extent of concern in the Conservation Areas and then adaptive management will assist with continuous feedback about the level of the problem.

Cumulative Effects
We anticipate that activities that have degraded Le Conte's thrasher in the past would continue until/unless more effective management impacted by unauthorized or uncontrolled factors is undertaken under the Plan. As such, OHV damage, fires set by vandals, and invasive weeds would continue to challenge the land manager with or without approval of the Plan. Activities such as these would degrade existing habitat and affect Le Conte's thrasher populations.

The Agua Caliente Band of Cahuilla Indians is undertaking a Habitat Management Plan for all of

their Tribal lands. The draft Plan and associated documents have been reviewed publicly. It is anticipated that the final Plan and associated environmental analysis will be complete in mid-2008 with permit issuance scheduled for late 2008. Although there will be habitat loss associated with that Plan, the overall net benefit to the species is positive.

CONCLUSION

In summary, of the 243,242 acres (estimated between 1,675 and 891 pairs, depending on the method of estimation; 0.04 percent of species range; 380 square miles) of Le Conte's thrasher modeled habitat in the Plan Area, authorized take would occur on 96,133 acres (between 661and 79 pairs; less than 0.02 percent of species range; 173 square miles) (Bury *et al*. 1977 and Demaree pers. comm. in Sheppard 1996). A total of 132,456 acres (between 911 and 107 pairs; 207 square miles) would be conserved in the 21 Conservation Areas with the implementation of the MSHCP. Very little habitat of the modeled habitat for the range of the Le Conte's thrasher is within the action area, and a corresponding small amount would be preserved. The viability and long-term conservation for this species lies primarily outside of the action area. The area conserved and managed within the action area is adequate to provide coverage for this species.

The raw acreage numbers and percentage of the modeled habitat indicate a substantial acreage of Le Conte's thrasher modeled habitat could be lost to development within the next 75 years. Evaluation of the impacts of take requires an assessment of the quality of the habitat. The actual reduction in habitat value is expected to be considerably less because:

Conserved Habitat areas are large enough to contain self-sustaining metapopulations of Le Conte's thrashers and incorporate key habitat elements, including washes, higher cholla cactus density, and alluvial fans.

Take within the Conservation Areas and Special Provisions Area would not eliminate or significantly impact any core populations. Conservation objectives require that a large enough area for the species be protected within Conservation Areas and Special Provisions Area.

As a result of implementing the suite of conservation objectives established in the Plan, for Le Conte's thrasher, habitat will be conserved. The Plan will minimize fragmentation, human-caused disturbance, and edge effects to this habitat by conserving contiguous habitat patches and effective linkages between patches.

Lands in the MSHCP Reserve System would be managed and monitored to address significant edge effect problems, invasive species, and other stressors to this species.

Le Conte's thrasher is sensitive to development. If Conservation Areas were not established in the lower elevations, where this species appears to be more common, then the population decline may trend down more quickly. Development will be lower with fewer edge effects in the Conservation Areas and this species will likely be less impacted in the anticipated higher quality habitat in the Conservation Areas as compared with the lesser quality habitat outside of the Conservation Areas.

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 Le Conte's thrasher. Critical habitat has not been designated for this species; therefore, the proposed action would not destroy or adversely modify critical habitat. We reached this conclusion because 54 percent of the Le Conte's thrasher modeled habitat within the Plan Area would be conserved and managed in perpetuity and 40 percent would be lost due to authorized disturbance. Thus, impacts to this species and its modeled habitat, when viewed in conjunction with the protection and management of the Conservation Areas and Special Provisions Area, are not anticipated to result in an appreciable reduction in the numbers, potential for reproduction, or distribution of this species throughout its range.

The Le Conte's thrasher will benefit from the establishment of the MSHCP Reserve System which will include conservation of habitat from the western to the eastern limits of the Plan Area. Implementation of the Plan is expected to provide for conservation of the Le Conte's thrasher within the Plan Area, as currently unprotected portions of its habitat and potential habitat areas will be conserved. The combination of the overall conservation measures; species-specific measures such as management to minimize impacts to thrashers and their habitat, monitoring to better understand the distribution and population status of this species in the Plan Area, and long term protection, management, and enhancement of Le Conte's thrasher habitat is expected to effectively compensate for potential adverse effects to this bird species.

AMOUNT OR EXTENT OF TAKE

It is difficult to quantify the number of Le Conte's thrasher that would be impacted as a result of the proposed action over the 75-year permit term due to the large Plan Area. Of the 243,242 acres (estimated between 1,675 and 891 pairs, depending on the method of estimation; 0.04 percent of species range; 380 square miles) of Le Conte's thrasher modeled habitat in the Plan Area, authorized take would occur on 96,133 acres (between 661and 79 pairs; less than 0.02 percent of species range; 173 square miles) (Bury *et al*. 1977 and Demaree pers. comm. in Sheppard 1996). We estimated the approximate population of Le Conte's thrasher in the Conservation Areas and Special Provisions Area (132,456 acres) on modeled habitat to be 911 and 107 pairs.

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Least Bell's vireo (*Vireo bellii pusillus*)

STATUS OF THE SPECIES

Legal/Listing Status

The least Bell's vireo was federally listed as endangered on May 2, 1986 (51 *FR* 16474), and State listed as endangered in California on October 2, 1980, the species is also afforded protection under the MBTA. A draft recovery plan was published for this species in March 1998 (USFWS 1998). The draft recovery plan constituted a thorough summary of the status of the species at the time it was distributed and provided broadly measurable recovery goals aimed at reducing threats and increasing the number of breeding pairs within the species' present and historic range. On October 2, 2006, the Service announced completion of a 5-year review for the vireo and recommended that the species be downlisted from endangered to threatened status (USFWS 2006).

Critical habitat was designated for the least Bell's vireo on February 2, 1994 (59 *FR* 34982), in 10 areas encompassing about 38,000 acres (15,200 hectares) in Santa Barbara, Ventura, Los Angeles, San Bernardino, Riverside, and San Diego counties. Primary constituent elements that support feeding, nesting, roosting, and sheltering are considered 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.

Species Description

The least Bell's vireo, *Vireo bellii pusillus* (Coues 1903) is a small migratory songbird in the family Vireonidae, and is one of four subspecies of *Vireo bellii* (Bell's vireo) that have been recognized. Although all four subspecies are similar in behavior and life history, they are likely isolated from one another on both the breeding and wintering grounds (e.g., American Ornithologists' Union; AOU 1957).

The least Bell's vireo is olive-gray above and mostly white on its underparts with two dull white wing stripes and dull white to olive narrow margins on the outer border of its wings and tail. Males and females are identical in 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), but females rarely sing and therefore cannot generally be identified by song. Phrases of the song are alternatively slurred upward and downward. Eggs are on average 0.7 inches (17.5 millimeters) long, and dull white, often with fine brown, black, or reddish-brown dots concentrated on the larger end (Brown 1993).

Distribution

The least Bell's vireo formerly was found in valley bottom riparian corridors from Tehama County, California, southward (but locally) to northwestern Baja California, Mexico. It ranged from near the Pacific coast, in some areas, to as far east (inland) as the Owens Valley, Death Valley, and along the Mojave River in California (Grinnell and Miller 1944). Except for a few outlying pairs, the subspecies is currently restricted to southern California south of the Tehachapi Mountains and northwestern Baja California (Garrett and Dunn 1981, U.S. Geological Survey

[USGS] 2002). Least Bell's vireo breeding pairs currently occur in Santa Clara, Inyo, San Bernardino, Ventura, Los Angeles, Orange, Riverside, and San Diego counties. As of 2004, the largest concentrations of least Bell's vireo (approximately 800 territories) occurred in the Santa Ana River near the Prado Basin and the Santa Margarita River on Marine Corps Base Camp Pendleton (Griffith Wildlife Biology 2001a, b, USGS 2002, Pike *et al.* 2004). According to Grinnell and Miller (1944) 4,000 feet (1,200 meters) is the upper elevational limit where least Bell's vireo occur in coastal southern California.

Habitat Affinities
The least Bell's vireo primarily occupies riparian habitats that typically feature dense cover within 3 to 7 feet (1 to 2 meters) of the ground and a dense, stratified canopy. It inhabits low, dense riparian growth along water or along dry parts of intermittent streams. The understory is typically dominated by sandbar willow (*Salix hindsiana*); mule fat (*Baccharis salicifolia*); young individuals of other willow species, such as arroyo willow (*Salix lasiolepis*) or black willow (*Salix gooddingii*); and one or more herbaceous species (Salata 1983a, 1983b, Zembal 1984, Zembal *et al.* 1985). Important overstory species include mature arroyo willows and black willows. Other overstory species that may contribute to vireo habitat include cottonwoods (*Populus* spp.), western sycamore (*Platanus racemosa*), and coast live oak (*Quercus agrifolia).* The species primarily nests in riparian vegetation typically dominated by willows and mule fat but may also use a variety of shrubs, trees, and vines. Nests are typically built within 3 feet (1 meter) of the ground in the fork of willows, mule fat, or other understory vegetation (Pike *et al.* 2004). Cover surrounding nests is usually a moderately open midstory with an overstory of willow, cottonwood, sycamore, or oak. Crown cover is usually more than 50 percent and contains occasional small openings. The most critical structural component to least Bell's vireo breeding habitat is a dense shrub layer at 2 to 10 feet (0.6 to 3 meters) above the ground (e.g., Zembal *et al.* 1985). The birds forage in riparian areas and adjoining chaparral habitat (Salata 1983b).

Life History
The Bell's vireo exhibits year-round diurnal activity and is known to be a nocturnal migrant (Brown 1993). The species feeds primarily on insects and spiders, and rarely on fruit (Brown 1993). Insects consumed include true bugs, beetles, bees, wasps, ants, snails, grasshoppers, moths, and butterflies (Terres 1980). The vireo forages primarily within willow (*Salix* spp.) stands or associated riparian vegetation with forays into non-riparian vegetation including chaparral and oak woodlands later in the breeding season (Gray and Greaves 1984, Salata 1983b, Kus and Miner 1987). Individuals travel between 10 and 200 feet (3 and 61 meters) while foraging, with the majority of these destinations occurring within 98 feet (30 meters) of the edge of riparian vegetation (Kus and Miner 1987). Least Bell's vireo forage in all vertical vegetation layers from 0 to 66 feet (0 to 20 meters) but most feeding is concentrated above the ground surface in the lower vegetation layers between 0 to 20 feet (0 to 6 meters) (Kus and Miner 1987, Salata 1983b). Feeding behavior largely consists of collecting prey from leaves or in bark crevices while perched or hovering, and less frequently by capturing prey by aerial pursuit (Salata 1983a, 1983b).

Least Bell's vireo are mainly monogamous, however, some individuals of both sexes are sequentially polygamous within the breeding season (Greaves 1987). The male vireo contests

and establishes breeding territories (Barlow 1962) which range in size from 0.5 to 7.4 acres (0.2 to 3.0 hectares) (Gray and Greaves 1984, Zembal *et al.* 2003) with most averaging between 1 and 3 acres (0.4 and 1.2 hectares) (USFWS 1998). The least Bell's vireo maintains their territories by threat and physical confrontation early in the breeding season, tapering to vocal warnings later in the season (Barlow 1962).

The breeding season for least Bell's vireo extends from mid-March to mid- or late-September (USFWS 1986). A majority of the birds arrive from the Mexican wintering areas by the end of March, and depart by end of August (Zeiner *et al.* 1990).

Nests are typically suspended in forked branches of many different riparian species with no clear preference for any particular species (Barlow 1962, Gray and Greaves 1984). Although least Bell's vireo nests are usually placed approximately 1.0 meter above the ground, nests have been recorded as high as 4.3 meters (Zembal *et al.* 2003). Females probably select the nesting sites but both genders participate in nest construction (Barlow 1962). Between two to five (typically three or four) eggs are laid shortly after nest construction (USFWS 1998). A typical clutch is incubated by both parents for about 14 days with the young remaining in the nest for another ten to 12 days (Pitelka and Koestner 1942, Barlow 1962). Each nest appears to be used only once with new nests constructed for failed or successive broods (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 (USFWS 1998).

Banding records have documented least Bell's vireo that lived approximately seven years, however, the maximum life-span is probably longer (Brown 1993). Survival rates measured as average nesting success has been recorded for several large drainages in southern California (USFWS 1998). The average percentage of nests to successfully produce fledglings over several study areas ranged from 46 percent (on the Santa Ana River) to a high of 74 percent (on the western portion of the San Luis Rey River) (USFWS 1998).

Least Bell's vireos can be heavily parasitized by brown-headed cowbirds (*Molothrus ater*) in unmanaged locales (e.g., Zembal *et al*. 2003). Nest predation among least Bell's vireo has been reported as high as 45 percent in the San Luis Rey River to as low as 8 percent on the San Diego River (Salata 1983b).

Additional long-term research is needed over long periods of time to determine dispersal characteristics of least Bell's vireo (USFWS 1998). Dispersal distance has been shown to increase to a maximum of approximately 1 mile (1.6 kilometer) during a given breeding season (Gray and Greaves 1984). Studies by Kus have provided estimates of extra-watershed dispersal rates and distances for least Bell's vireo with approximately 20 percent dispersing outside their natal drainages between breeding seasons (USFWS 1998). Data collected by Kus also suggests that males are more likely to disperse from their natal sites than females (USFWS 1998).

Population Trends

No other passerine (perching songbird) species in California is known to have declined as dramatically as the least Bell's vireo (Brown 1993). The narrow and limited nature of the habitat of the least Bell's vireo makes the subspecies more susceptible to major population reductions

than the other subspecies of Bell's vireo. Intensive surveys between 1977 and 1985 of virtually all potential breeding habitat were conducted (Gaines 1977, Goldwasser 1978, Goldwasser *et al.* 1980), resulting in occurrences at only 46 of over 150 former localities. Once common, the vireo populations had decreased substantially by the late 1980's due to loss and degradation of habitat as well as from brown-headed cowbird parasitism (Goldwasser *et al.* 1980).

The estimated population of vireos has increased from approximately 300 pairs in 1986 to over 1,500 pairs in 2001 (USGS 2002); this population increase is primarily attributable to the management of local cowbird populations and habitat conservation (Kus 1998, USFWS 1998). 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 (Griffith Wildlife Biology; GWB 2001b, USGS 2002). Despite some declines, other areas continue to have increasing populations and the overall population appears to be stable or moderately increasing (Hoffman and Zembal 2002, USGS 2002, Pike *et al*. 2004).

Threats

Causes for the past decline of the least Bell's vireo include destruction of habitat, river channelization, water diversions, lowered water tables, gravel mining, agricultural development, invasion of exotic species (including *Arundo donax* and *Tamarix* spp.), and cowbird parasitism (USFWS 1986, 1998). 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. It appears that 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). Additionally, widespread habitat losses have fragmented most remaining populations into small, disjunct, widely dispersed subpopulations (USFWS 1998). 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). Over 15 years ago, Oberbauer (1990) reported a 61 percent loss of riparian habitat for San Diego County compared to historic conditions; overall riparian area losses have likely continued since 1990. Habitat fragmentation negatively affects abundance and distribution of neotropical migratory songbirds, in part by increasing incidence of nest predation and parasitism (e.g., Askins 2000). Management programs aimed at reducing numbers of cowbirds have been successful at restoring and recovering some local populations (e.g., Zembal *et al.* 2003). However, cowbird nest parasitism continues to be a significant threat to the vireo. While cowbird trapping has proven a successful tool to halt vireo population declines over the short term, it may not be the best method for long-term recovery of the vireo. It remains unclear as to how best to manage this threat and additional research is needed to resolve this issue (USFWS 2006).

Synopsis of Status

The status of the least Bell's vireo has been improving since the start of monitoring and management programs, associated with focused recovery efforts, conducted pursuant to

California Endangered Species Act and the Act. From a recorded low of approximately 300 territories in 1986, the entire United States segment of the population had grown to approximately 2,900 territories in 2005 (USFWS 2006). However, threats to the survival and recovery of the least Bell's vireo continue as further research is needed to address the primary threat of cowbird parasitism on the long-term recovery of the vireo. Without intensive cowbird control at the main population sites, which is linked to the aforementioned regulatory mechanisms, or new evidence to suggest that least Bell's vireo can persist without management intervention, populations are likely to return to the low levels that necessitated the listing of the species (USFWS 2006).

ENVIRONMENTAL BASELINE

Status of the Species in the Action Area

Focused surveys for the least Bell's vireo within the Plan Area (MSHCP Monitoring Program, Chapter 4, p. 86) resulted in the detection of the species for three successive years at Andreas Canyon, Chino Canyon and Mission Creek. During the course of the surveys, successful breeding was confirmed at Chino Canyon, a breeding attempt was confirmed at Andreas Canyon, and breeding was suspected at Mission Creek. Suitable breeding habitat may also occur in Millard Canyon, Whitewater Canyon, Palm Canyon, Murray Canyon, Oasis de los Osos, Willow Hole-Edom Hill Preserve/ACEC, along the Coachella Valley Storm Channel near the Salton Sea, and Dos Palmas Preserve/ACEC. Breeding and other suitable habitat in Andreas, Palm, and Murray Canyons is on the Agua Caliente Band of Cahuilla Indians tribal lands; the canyons are part of the Indian Canyons Heritage Park and are not included in this Plan. Critical habitat for the least Bell's vireo does not occur within the Plan area.

Factors Affecting the Species' Environment within the Action Area

The primary factors affecting the least Bell's vireo within the action area include loss of riparian habitat, hydrological alteration, and the adverse effects of exotic plant and animal proliferations associated with the fragmentation and alteration of the landscape. Groundwater pumping, water storage, and water diversions may have a significant effect on this species' environment within the action area due to the reduction or cessation of stream flows, which are important habitat components that likely provide for the production of prey species and the optimum recruitment and development of riparian vegetation (Shafroth *et al.* 1998, Stromberg *et al*. 2005, Stromberg *et al*. 1996, Stromberg *et al*. 1991).

EFFECTS OF THE ACTION

The effects analysis below is based on the following assumptions:

Species Conservation Goals and Objectives (Section 9) will be met through the Joint Project Review Process (Section 6.6.1.1) and Monitoring and Adaptive Management Programs (Sections 8 and 9).

General Plans of Local Permittees, future land uses and development patterns will reflect current land use trends (largely residential and tourist resort-commercial uses), thereby explicitly ruling out unlikely future land uses such as heavy industry, expansion of agriculture into native habitat (unregulated by the County and therefore not a Covered Activity), etc.

Mesquite Hummocks will be avoided and/or subject to the Plan's no net loss policy (per Section 8.2.4).

Per Section 10.7, Desert Fan Palm Oasis is a natural community subject to the no net loss policy.

Mitigation and Minimization Measures

The mitigation measures proposed in the MSHCP are intended to conserve large areas of suitable breeding habitat for the least Bell's vireo. Within the Plan Area, there are approximately 3,675 acres of modeled breeding habitat and 56,525 acres of modeled migratory habitat available for the least Bell's vireo (NOTE: the acreage numbers specified here and the sections below reflect a discrepancy that was noted, after the final Plan was approved, in the amount of suitable habitat available for this species in the Mecca Hills/Orocopia Mountains conservation area). The Plan ensures conservation of 2,911 acres (79 percent) of modeled breeding habitat and 40,392 acres (72 percent) of modeled migratory habitat in perpetuity within the Reserve System. The BLM owns and manages 1,358 acres (2 percent) of modeled migratory habitat in the Plan area that is not included in conservation areas; the majority of these lands are classified as multiple-use class M – moderate use. These lands are managed to provide for a wider variety of uses such as mining, livestock grazing, recreation, utilities and energy development, while conserving desert resources and mitigating damages permitted uses may cause (Bureau of Land Management; BLM 2002).

Approximately 1,629 acres (56 percent) of modeled breeding habitat and 21,106 acres (52 percent) of modeled migratory habitat are currently preserved, leaving 1,282 acres and 19,286 acres of modeled habitat, breeding and migratory respectively, to be conserved as part of the MSHCP. The conservation areas include the known breeding habitat for least Bell's vireo in Chino Canyon, and potential breeding habitat at Whitewater Canyon, Mission Creek, the Thousand Palms Preserve, the Coachella Valley Storm Channel mouth near the Salton Sea, Cottonwood Springs in Joshua Tree National Park, and Dos Palmas Preserve/ACEC.

Approximately 626 acres (17 percent) of the total acreage of breeding habitat available to this species is located outside of the conservation areas and/or Federal lands and thus subject to loss as a result of the implementation of the Plan. The amount of habitat reportedly available to migrating least Bell's vireos is 56,643 acres. Of this total, 12,470 acres (22 percent) would be authorized for impact outside the conservation areas (Table 4-114). Although a maximum of 10 percent of private land that has been modeled as least Bell's vireo breeding and migration habitat could be impacted within each conservation area, the Plan's riparian no net loss policy ensures that any and all least Bell's vireo habitat impacted within the conservation areas would be replaced in kind.

Although 90 percent of private lands within each conservation area would be conserved, the ultimate configuration of the Reserve System is unknown at this time. Reserve System configuration would be subject to the Conservation Objectives and Required Measures established in Section 4 and Species Conservation Goals and Objectives established in Section 9 of the MSHCP for each conservation area.

Minimization measures have also been developed to reduce impacts to this species. The

measures include required avoidance, minimization, and mitigation measures such as avoiding project activity during the breeding and nesting season (Section 4.4), maintaining upland buffers for occupied habitat (Section 9), and implementing Land Use Adjacency Guidelines (Section 4.5) for land adjacent to or within conservation areas. These guidelines include noise thresholds, shielding or directing of lighting, use of barriers to minimize unauthorized access, and avoidance of invasive plants in landscaping.

The Plan includes Management and Monitoring programs (Section 8) that would ensure the conservation of least Bell's vireos, including control and management of activities that degrade least Bell's vireo habitat, control of invasive species such as brown-headed cowbirds, and coordinated management efforts to maintain, enhance, or restore least Bell's vireo habitat. Additionally, the monitoring program would include data collection to determine factors affecting the distribution and abundance of least Bell's vireos throughout the Plan area.

Direct Effects

It is impossible to accurately quantify the number of birds that will be impacted as a result of the proposed action over the 75-year permit term due to the large Plan area. Therefore, the Service is quantifying the take as the number of acres of modeled habitat that will be impacted in the MSHCP Plan Area as a result of the proposed action. We anticipate that up to 626 (17 percent) of the 3,675 acres of the least Bell's vireo modeled breeding habitat and 12,470 (22 percent) of the 56,525 acres of modeled migratory habitat for the species within the Plan area but outside of the Conservation Areas could potentially be permanently lost as a result of implementation of the Plan. In addition, 2,305 (4 percent) of the 56,525 acres of modeled migratory habitat on private lands within Conservation Areas could also be permanently lost. Finally, 135 (4 percent) of the 3,675 acres of the modeled breeding habitat on private lands within Conservation Areas could be temporarily lost. This loss is temporary as the Plan's wetland no net loss policy ensures that any and all least Bell's vireo breeding habitat impacted within Conservation Areas would be replaced in kind. The no net loss policy will provide assurances that temporary losses to riparian areas will not limit the reproduction potential of least Bell's vireo as compared to the baseline condition.

Activities that completely remove habitat reduce availability of breeding, nesting, and foraging sites for least Bell's vireo. Even if habitat modification activities occur outside of the breeding season, the reduction of nesting and sheltering habitat could harm individual vireos by reducing the available resources for individuals' subsequent reproduction. Vireos typically return to established breeding territories year after year (Greaves and Labinger 1997, Salata 1983b), and most vireo territories average between 1 to 3 acres in size (USFWS 1998). In a study on the San Diego River (Beck 1996), a banded population of vireos generally returned year after year with only minor adjustments in territory location. Further, loss of habitat may cause the returning vireos to adjust or shift their territory. When shifting territories, vireos could experience decreased fitness due to increased energy and time spent on competing for new area to shift their territory into. This could result in a delay in the initiation of nest building, fewer nesting attempts per season, a reduced clutch size per attempt, and an overall reduction in reproductive output.

Since vireos typically return to established breeding territories, the permanent loss of 626 acres

of modeled breeding habitat could potentially decrease reproductive output of the least Bell's vireo in the Plan Area. However, the Plan would ensure conservation of 2,911 acres of modeled breeding habitat in conservation areas (Table 4-114); this number represents 79 percent of the total modeled breeding habitat in the Plan area. Further, conserved habitat areas are large enough to contain self-sustaining metapopulations of least Bell's vireo, and authorized take in conservation areas will not permanently eliminate or considerably impact least Bell's vireo confirmed or suspected breeding habitat. Therefore, the permanent and temporary loss of modeled habitat allowed under the Plan is not expected to appreciably reduce the reproduction, numbers, or distribution of vireos in the Plan Area or rangewide as the majority of confirmed or suspected breeding territories and migration corridors will remain intact and available for use.

Beneficial direct effects of the plan include establishment of 44 acres of permanent Sonoran cottonwood-willow riparian forest in the Coachella Valley Stormwater Channel and Delta Conservation Area, the aforementioned minimization and mitigations measures, and management and monitoring programs (Section 8) that will be established as part of the Plan.

Indirect Effects
Any Covered Activity-related creation and maintenance of conditions that favor the establishment and proliferation of exotic plants could impact the status of the least Bell's vireo. Undisturbed areas vegetated with native species are much more resistant to invasion by tamarisk and other non-native plants. By contrast, areas directly affected or disturbed by construction and other landscape alteration activities are likely to accommodate, sustain, and facilitate the spread of non-native plants within the Plan area.

The increase and spread of invasive plants such as tamarisk are continuing relatively unabated in the Southwest. In the long term, the project-induced alteration of the landscape within the Plan Area and associated potential establishment and dispersal of select non-native plants likely would overwhelm native riparian habitats occupied by the least Bell's vireo and other riparian-obligate species in the project action area. However, the Plan proposes to control non-native invasives, which would prevent this otherwise considerable adverse impact.

The disturbance or removal of native riparian communities and upland vegetation may result in the creation of cowbird foraging habitat or increase cowbird parasitism rates resulting in adverse impacts to least Bell's vireo. Numerous studies have revealed that overall nest success of songbirds in the United States and southern California in particular is depressed in habitat fragments or edges due to the individual or combined effects of nest parasitism by the cowbird, nest depredation, and possibly documented reductions in insect prey (e.g., see Askins 2000, Zembal *et al.* 2003). Cowbirds prefer feeding in open areas (Garrett and Dunn 1981) that are largely created by human alterations of the landscape. Such areas include manicured parks and lawns and the landscaping often associated with developed properties. Further, because even small numbers of cowbirds can strongly impact the reproductive success of southwestern riparian species (Powell and Steidl 2000), any Covered Activity-related feature that creates conditions favorable to cowbirds in, or immediately adjacent to, habitat areas could decrease the reproductive success of least Bell's vireos in the absence of effective management measures. However, the Plan proposes to control and manage for nest parasitism by brown-headed cowbirds, which would limit, or prevent, this otherwise considerable adverse impact.

Proposed mitigation measures (e.g., work restrictions during the breeding season) would substantially reduce or eliminate many indirect, project-related effects (e.g., noise and vibration) that might otherwise occur. Similarly, management measures such as invasive exotic plant and animal control and the conservation of large blocks of least Bell's vireo habitat would mitigate – or perhaps entirely compensate for – the effects associated with the project-induced fragmentation of existing breeding habitats within the Plan Area.

The potential spillage and/or dispersal of contaminants (e.g., crude oil, fuel, petroleum products, and solvents) within the action area as result of the construction or implementation of the Covered Activities could have adverse consequences to breeding least Bell's vireo. Given that the bioaccumulation of toxic substances may cause reproductive failures in birds, the discharge, dispersal, and accumulation of potentially toxic environmental contaminants associated with construction and implementation of, for instance, residential housing and commercial projects, could adversely affect the vireo by decreasing recruitment and, in turn, abundance. Best management practices and conservation measures incorporated into the Land Use Adjacency Guidelines should contribute to a decreased likelihood of the accidental spillage and dispersal of environmental contaminants during construction.

CHANGED CHIRCUMSTANCES

The Changed Circumstances that are likely to affect the least Bell's vireo are drought, fire, invasion by new exotic species, and lowering of the water table. Drought and lowering of the water table may reduce water flows through areas of existing habitat and/or restored habitat. The need to maintain water flows through riparian areas is critical to maintain suitable areas of breeding and migratory habitat for this species. Section 6 of the Plan states that a drought event significantly affecting Covered Species is not anticipated to occur during the life of the Permit. Nevertheless, measures will be taken to monitor the effects of drought on Covered Species. Extended periods of drought in the action area could lead to changes in both the aboveground and belowground water dynamics affecting both plant survival and species composition (Shafroth *et al.* 2002). Therefore, monitoring in the event of an identified drought should include quantitative information on survival and species composition in existing riparian areas.

The Plan (Section 6) defines lowering of the water table as an increase in the depth to groundwater. Preventative measures to reduce the chances of this changed circumstance occurring include monitoring programs to determine whether substantial lowering of the water table occurs. The planned response in the event monitoring detects a substantial lowering or a decline in mesquite health in these areas includes, among other things, development of feasible measures to ameliorate the effects of substantial lowering of the water table on mesquite hummocks and associated Covered Species. To determine the health of mesquite in these areas, the monitoring should provide quantitative information on the timing and extent of morphological responses and mortality of mesquite to the rate, depth, and duration of water table declines to assist in the design of management of feasible measures to minimize impacts of groundwater depletion on mesquite in these areas.

Unintended fire in the desert environment could spread to riparian areas, particularly in the Dos Palmas area given the existing access to off-road vehicle users. The preventive measures

identified in the Plan will assist in reducing the risk and spread of fires from the desert to the riparian areas. Proper controls and configurations will reduce the risk of wildfire spreading into these areas and establish appropriate site-specific response actions. Wildlife Agency oversight should ensure that these tasks are completed appropriately and in a timely fashion.

Various disturbances, including fire, can result in the establishment of new exotic species within riparian areas. The most likely impact associated with exotic species is the invasion of an exotic plant that changes the structural characteristics of these areas. The Plan area already has exotic plant species that warrant monitoring and management, and this management should afford the opportunity to identify and address new exotic plants relatively quickly before major invasions become established.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

We are unaware of any non-Federal actions affecting the least Bell's vireo that are reasonably certain to occur in the action area considered by this opinion. Even if activities are proposed within the Plan Area outside of the purview of the Plan, the breeding habitat of the least Bell' vireo within the Plan Area and the United States range of the species as a whole is almost invariably located partly (and often entirely) within the jurisdiction of the Corps of Engineers pursuant to Section 404 of the Clean Water Act. In addition, approximately 50 percent of least Bell's vireo habitat within conservation areas is located on Federal property.

The Agua Caliente Band of Cahuilla Indians is undertaking a Habitat Conservation Plan for all of their Tribal lands. The draft Plan and associated documents have been reviewed publicly. It is anticipated that the final Plan and associated environmental analysis will be complete in mid-2008 with permit issuance scheduled for late 2008. Although there will be habitat loss associated with that Plan, the overall net benefit to the species is positive. Because issuance of that permit is a Federal action, an analysis of the impacts of that Plan will be completed in the required section 7 process.

CONCLUSION

After reviewing the current status of the least Bell's vireo, the environmental baseline for the action area, effects of the proposed action, the cumulative effects, and the proposed permit conditions, it is our biological opinion that the proposed action is not likely to jeopardize the continued existence of the least Bell's vireo. Our conclusion is based on the following findings:

Conservation measures have been proposed to minimize Covered Activity-related direct effects that would have a limited effect on the baseline of breeding habitat, abundance, and distribution for the least Bell's vireo within the range of the species. The proposed habitat conservation and/or creation efforts should ensure that the function of documented breeding and migration habitats for least Bell's vireos is maintained within the action area; and the proposed action likely would not induce considerable indirect effects to the least Bell's vireo resulting from

implementation of the proposed Covered Activity-related activities. Although the proposed Covered Activities would contribute to the fragmentation and disturbance of least Bell's vireo breeding and migration habitat in the Plan Area and potentially subject the species to increased depredation, parasitism, and the impacts associated with the proliferation of invasive exotic plants, the proposed monitoring and management of the Reserve System would likely provide secure habitats and environments for individuals displaced or otherwise indirectly impacted by project-related activities.

AMOUNT OR EXTENT OF TAKE

It is currently impossible to quantify the number of least Bell's vireos that would be impacted as a result of the proposed action over the 75-year permit term due to the large size of the Plan Area and the ongoing recovery of the species. Therefore, the Service is quantifying the take as the number of acres of modeled habitat that would be impacted in the proposed Plan Area as a result of the proposed action. We anticipate that up to 626 acres of modeled breeding habitat and 14,775 (12,470 + 2,305) acres of modeled migratory habitat within the Plan Area would become permanently unsuitable for the least Bell's vireo as a result of the proposed action. An additional 135 acres of breeding habitat would be disturbed in conservation areas under the Plan, but these acreages would be restored or replaced to ensure no net loss of riparian habitats in the conservation areas. Finally, a small, but as yet undeterminable, number of least Bell's vireos are anticipated to be taken as a result of monitoring and management actions.

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Gray vireo (*Vireo vicinior*)

STATUS OF THE SPECIES

Legal/Listing Status

The gray vireo is not federally listed under the Act, but it is afforded protection under the MBTA and is on the Partners in Flight National Watch List (Rich *et al.* 2004). This species has been designated as a Species of Special Concern by CDFG.

Species Description

The gray vireo is 6 inches in length and weighs approximately 0.4 ounce (Barlow *et al.* 1999). Males and females are sexually monomorphic in plumage color and pattern, although males harbor slightly larger bills, wings, and tails. This species is distinguished by its narrow white eye-ring on a dull, gray body frame. The chin, throat, and upper chest are slightly paler gray, contrasting with a whitish abdomen and undertail coverts. The wings are dark gray to blackish with greater coverts tipped white forming one whitish wing-bar (Barlow *et al.* 1999). Additionally, the blackish-colored bill is small and thick. Juveniles can be distinguished from adults between May and August by plumage that is washed brown with a relatively distinct wing-bar (Pyle 1997). Sympatric gray-colored species in both summer and winter ranges include gnatcatchers (*Polioptila* spp.), Bushtit (*Psaltriparus minimus*), Oak Titmouse (*Baeolophus inornatus*), Juniper Titmouse (*B. ridgwayi*), and occasionally Cassin's vireo (*V. cassinii*) in southern California (Barlow *et al.* 1999). The male gray vireo sings throughout the breeding, migration, and over-wintering seasons with a song that is made up of short, burry, frequency-modulated syllables (Barlow *et al.* 1999). Females occasionally sing a brief, buzzy version of the male's song (Barlow *et al.* 1999).

Distribution

The heart of gray vireo's breeding range extends across a broad swath of the "Four Corners" states of Arizona, New Mexico, Utah, and Colorado, in addition to limited areas of southern California, northern Baja California, and western Texas (Audubon 2006). Its winter range extent is not as well documented, currently known to include southwestern Arizona, southwestern Texas, southeastern California, the lowlands of Sonora, Mexico, and southern Baja California (American Ornithologist's Union; AOU 1998, Howell and Webb 1995, Unitt 1994, 2000). This species was formerly more widespread, based on known occurrence records, in portions of California where the species has not been documented recently (e.g., Joshua Tree National Park, Kingston Mountains (Grinnell 1922), San Gabriel Mountains, Mint Canyon near Saugus (Miller 1921), some areas in the Grapevine Mountains north of Death Valley, the Phelan/Cajon Pass/Hesperia area, and a selection of other localities in Riverside and San Diego counties (Audubon 2006).

Current data for California document the species as a summer resident in the mountains of the eastern Mojave Desert, the northeastern slope of the San Bernardino Mountains, locally on the slopes of the San Jacinto and Santa Rosa Mountains, and in the mountains of San Diego County (Garrett and Dunn 1981, Small 1994). Although recent observations (i.e., as late as the early 1990s into 2002) document the gray vireo in Inyo, Santa Barbara, Ventura, Los Angeles, San Bernardino, and Riverside counties, the species is apparently most numerous in San Diego

County (Winter and Hargrove 2004, Unitt 2004). These surveys recorded individuals, pairs, and/or nests in the Pine Valley, Kitchen Creek, Bear Valley, Noble Canyon and areas west of Hot Springs Mountain on the Cleveland National Forest (USDA Forest Service 1997), and areas north of Warner Springs, the southern Laguna Mountains, north of Alpine, east of Campo, east of Jacumba, the In-Ko-Pah Mountains, near San Felipe, Granite Mountain, and north Palomar Mountain (Unitt 2004). Within Riverside County where the Coachella Valley resides, gray vireos formerly occurred at Covington Flat in Joshua Tree National Park (Miller and Stebbins 1964), and rare sightings are known in the San Jacinto Mountains from Pinyon Flat and Santa Rosa Peak Road (CVAG 2007). Thorough surveys have not been conducted in all suitable or potential habitat within Coachella Valley.

Habitat Affinities

Breeding range of the gray vireo includes some of the hottest, driest areas of the American Southwest. The species favors dry thorn scrub, chaparral, and pinyon-juniper or oak-juniper scrub with continuous cover up to 6.6 feet high that is located in arid mountains and high plains scrubland (Grinnell and Miller 1944). In southern California, gray vireos inhabit coastal montane chaparral where redshanks (*Adenostoma sparsifolium*), chamise (*A. fasciculatum*), and ceanothus (*Ceanothus* spp.) dominate (Grinnell and Swarth 1913, Grinnell and Miller 1944). In the mountains of the Mojave Desert, gray vireos occur in a more open canopied area from 5,400 to 6,600 feet in elevation (Miller 1946, Johnson 1972). Additionally, the gray vireo may be more likely to build nests near water sources (Miller and Stebbins 1964, Barlow *et al.* 1999) or occur in riparian habitat at lower elevations during its spring migration (Brown *et al.* 1986, Parrish *et al.* 2002).

This species forages in thickets, taking most of its prey from leaves, twigs, and branches of small trees and bushes. Its diet on the breeding grounds consists of a variety of arthropods, including predominantly large grasshoppers, cicadas, and caterpillars (Barlow and Wauer 1971). The gray vireos winter diet is known to differ based on locality (i.e., birds in western Texas are primarily insectivorous, while those wintering in southern Arizona and adjacent northern Mexico feed mainly on fruit). In the Sonoran Desert including southeastern California, the diet may be composed primarily of fruit from elephant trees (*Bursera* spp.; Bates 1992).

Life History

The gray vireo is a fairly active bird, regularly hopping along branches of shrubs and trees, dropping to the ground to capture insects or hopping about to collect nesting material. The bird is known to fly rapidly and directly between shrubs, often making lengthy flights up to one quarter mile across territory (Barlow *et al.* 1999).

The breeding biology of gray vireos in California is not well known. Males arrive on breeding grounds a few days before females, between approximately late March and early May. The gray vireo is a short-distance migrant, leaving the northern parts of its breeding range by early autumn, with departure from southern California by the end of August or early September (Barlow *et al.* 1999). Additionally, gray vireos in California have been found to overwinter in the Sonoran desert of Anza-Borrego Desert State Park (Unitt 2000, 2004), and in areas in southern Arizona and northern Mexico (Bates 1992).

Territory size has been roughly estimated in the southern Laguna Mountains at 8 to 20 acres per

pair based on spot-mapping of unmarked singing males, with density estimated at 14 pairs per square mile of suitable habitat (USDA Forest Service 2002). Densities of birds in the San Jacinto Mountains have been recorded at 16 pairs per square mile of suitable habitat (Grinnell and Swarth 1913) and at Deep Canyon in the Providence Mountains at 4 pairs per square mile (Johnson *et al.* 1948).

The gray vireo's nest is cuplike and hangs freely from the fork of horizontal branches on west- or north-facing tree forks. It consists of woven grass, mesquite, or juniper bark, and is lined with fine grass, hair, and thistle-down. Nest building begins 1 to 2 days following pair formation, with on average 3 to 4 eggs laid predominantly before the end of June followed by 13 to14 days of incubation (Barlow *et al.* 1999). Eggs in nests exposed to direct sunlight may be harmed by extreme heat if left uncovered (Barlow *et al.* 1999). Additionally, nests are not reused, although some nest material may be taken from earlier nests to construct a new nest during the same season (Barlow *et al.* 1999). A breeding pair can raise two broods per year.

Nestlings are known to fledge 13 to14 days after hatching. In California, young are known to fledge roughly between late May and early July (Bent 1950). Young are cared for by both parents for 5 to 10 days post-fledging (Barlow *et al.* 1999). Offspring may remain as a family group until migration, although they may depart earlier in some instances (Phillips *et al.* 1964). Juveniles are thought to be capable of breeding by the first spring after hatching (Barlow *et al.* 1999).

Gray vireo nests are parasitized by brown-headed cowbirds (*Molothrus ater obscurus*), although the incidence of brood parasitism seems to be high only in California (Winter and Hargrove 2004). The gray vireo often responds to cowbird eggs by abandoning the nest (even if it contains a full clutch of vireo eggs) followed by constructing a new nest (Audubon 2006). Additional studies are needed in California to examine gray vireo range reduction that is potentially attributed to brood parasitism.

Population Trends

Recent breeding bird atlas efforts in Arizona, Colorado, Nevada, and southern California have found gray vireo to be slightly more common and widespread than previously reported (Winter and Hargrove 2004, Dexter 1998, Unitt 2004). However, many of the new records were collected from areas that had never been surveyed, indicating no specific trend (Winter and Hargrove 2004). Regardless of increases recently reported in California, positive sightings and number of localities fall short of historical records on file (Unitt 2004).

Population numbers of gray vireo are difficult to estimate because of the species ability to hide in scrub cover and inaccessibility of its habitat and terrain (e.g., private lands, dense shrub cover, steep elevations, etc.). Population densities appear greatest in northern Arizona and southern Utah (Sauer *et al.* 1997, Barlow *et al.* 1999), with the California population likely not exceeding more than a few dozen pairs (USDA Forest Service 1994). Also in California, the species has undergone range contraction and population declines due in part to habitat loss and fragmentation – with extensive areas of apparently suitable habitat unoccupied (Winter and Hargrove 2004, Unit 2004). Because the species is very poorly studied, especially in California, the reasons as to why suitable habitat is not occupied are unknown.

Threats

As mentioned above, positive sightings and number of current localities of gray vireos has declined (Unitt 2004). A number of factors may have contributed to the species decline, including the following:

Although the gray vireos habitat is relatively remote throughout its range, loss of habitat since the 1940s is the primary threat to the gray vireo in southern California, resulting in a contraction of the species' range and numbers of individuals in that area (Garrett and Dunn 1981, Unitt 1984). In the heart of the bird's range (i.e., "Four Corners" area of Arizona, Utah, New Mexico, and Colorado) there has been substantial clearing of pinyon-juniper woodlands to create foraging area for domestic livestock (Barlow *et al.* 1999). More than one million acres of such woodland were cleared in Arizona between 1950 and 1961 (Audubon 2006). Pinyon-juniper woodland is also degraded by the widespread practice of cutting trees for firewood (C. Beardmore *in* Barlow *et al.* 1999). Additionally, suitable chaparral habitat has been lost, although the amount and extent is unknown (Winter and Hargrove 2004).

Habitat fragmentation has and is expected to continue to occur, resulting in development of private inholdings that destroy or degrade suitable breeding habitat and introduce non-native predators (i.e., domestic dogs and cats). The extent of wintering habitat loss of elephant trees is unknown (Winter and Hargrove 2004).

An increase in brown-headed cowbirds has resulted from the clearing of woodlands for development or use by livestock. These birds have been documented to parasitize gray vireo nests (Barlow *et al.* 1999). While the impact of cowbird parasitism on gray vireo reproductive success across the gray vireo's range is not fully understood, a potential increase in cowbird numbers is at least cause for concern. Cowbirds occur throughout the breeding range of the gray vireo, and this vireo's behavior and easily discovered nest make it an easy target for nest parasitism (Barlow *et al.* 1999). It is well documented that other lowland vireo species and many other bird species have responded negatively to brood parasitism by brown-headed cowbirds, some undergoing population declines as a result of parasitism (Mayfield 1960, Payne 1977, Clarke and Robertson 1981, Marvil and Cruz 1989, Kus 1999, Averill-Murray *et al.* 1999, Parker 1999).

Gray vireos may abandon their nests when the clutch is partially complete or prior to nest construction completion if disrupted by human, predator, or cowbird interference (Barlow *et al.* 1999). However, minor disturbances (other than predation) after the second egg is laid would likely have minimal effects (Barlow *et al.* 1999).

Another possible cause for the decline of the gray vireo could be habitat changes and senescence of the vegetation due to fire suppression activities since the turn of the century (CVAG 2007). It has been suggested that changes in natural fire regimes in pinyon-juniper woodland and chaparral habitats has potentially affected natural successional stage development (Minnich and Chou 1997), creating larger homogenous age class stands within these habitats, which has the potential to limit preferred breeding habitat for the gray vireo.

Synopsis of Status

The status of the gray vireo is largely unknown due to a lack of surveys, difficulty in accessing suitable breeding habitat, and the relatively quiet/secretive nature of this species in thick scrub habitat. Relatively low numbers of the species are known today, in addition to a lower number of known localities based on historic data. Within southern California specifically, habitat loss and fragmentation continue. The USDA Forest Service estimated in 1994 that the California population likely did not exceed more than a few dozen pairs (USDA Forest Service 1994).

ENVIRONMENTAL BASELINE

Status of the Species in the Action Area

Regular or focused surveys have not been conducted within the Plan Area for the gray vireo. In Riverside County, the species formerly occurred at Covington Flat in Joshua Tree National Park (Miller and Stebbins 1964). In the San Jacinto Mountains, they were formerly described as common by Grinnell and Swarth (1913). It is not known how many birds persist, but sightings are rare. The few records are from Pinyon Flat, 1 pair within the vicinity of Piñyon Flats in 1977 (Goldwasser 1978), and one individual was seen in the same area in July 1997 (Freeman *in* CVAG 2007). Along Santa Rosa Peak Road, 1 to 4 pairs were seen in 1979 south of Highway 74, followed by 1 nesting pair at this same location in 1981 (McKernan *in* CVAG 2007). Multiple pairs have been observed near Potrero Spring, north of Asbestos Mountain, and near the head of Palm Canyon (Grinnell and Swarth 1913).

The gray vireo breeding season in the Coachella Valley occurs between late March and the end of June. Migration to over-wintering grounds is expected to occur by early September. However, over-wintering birds could potentially occur in Riverside County based on documented over-wintering occurrences in adjacent San Diego County at Anza-Borrego Desert State Park (Unitt 2000, 2004).

Currently, it is unknown to what degree population sizes and occupancy patterns fluctuate in the Coachella Valley, although major long-term trends could be estimated if surveys for gray vireo in suitable habitat are repeated over future years.

Factors Affecting the Species' Environment within the Action Area

The primary factors affecting the gray vireo within the action area include loss of breeding habitat to development or agricultural purposes, nest abandonment resulting from brown-headed cowbird nest parasitism, and the adverse effects of invasive plant and animal proliferations associated with the fragmentation and alteration of the landscape. It is unknown to what degree these adverse effects or other factors may be affecting reproductive success of gray vireos in the Coachella Valley. Regardless, gray vireos have been documented to occur in the Coachella Valley since the early 1900s, although individual sightings and locality numbers are rare. The gray vireos occurrence in the Coachella Valley is likely important for the continued existence of this species in California due to its limited range, absence of individuals from historic localities, continued loss of suitable breeding habitat, and increased accounts of brown-headed cowbirds in southern California that could influence reproductive output for this species.

EFFECTS OF THE ACTION

The effects analysis below is based on the following assumptions:

Species Conservation Goals and Objectives (Section 9) will be met through the Joint Project Review Process (Section 6.6.1.1) and Monitoring and Adaptive Management Programs (Sections 8 and 9).

Despite mutable General Plans of Local Permittees, future land uses and development patterns will reflect current land use trends (largely residential and tourist resort-commercial uses), thereby explicitly ruling out unlikely future land uses such as heavy industry, expansion of agriculture into native habitat (unregulated by the County and therefore not a Covered Activity), etc.

Mitigation and Minimization Measures
The mitigation measures proposed in the MSHCP are intended to conserve large areas of suitable and potential breeding habitat for the gray vireo. The total acreage of modeled habitat available to this species within the Plan Area is 105,562 acres. The Plan ensures conservation of 101,544 acres (96.2 percent) of suitable gray vireo habitat in perpetuity within the Reserve System. Approximately 88,350 acres of suitable habitat are currently preserved, leaving 13,194 acres to be conserved as part of the MSHCP. A total of approximately 1,466 acres (1.4 percent) of suitable habitat within the Coachella Valley Plan Area would be authorized for disturbance impacts inside conservation areas (see Table 4-114 in final MSHCP). The two known occurrences for the gray vireo in the Plan Area are both within the Santa Rosa and San Jacinto Mountains Conservation Area. The BLM owns and manages 75 acres of modeled migratory habitat in the Plan Area that is not included in conservation areas; the majority of these lands are classified as multiple-use class M – moderate use. These lands are managed to provide for a wider variety of uses such as mining, livestock grazing, recreation, utilities and energy development, while conserving desert resources and mitigating damages permitted uses may cause (BLM 2002).

Although 90 percent of private lands would be conserved within each conservation area, the ultimate configuration of the Reserve System is unknown at this time. Reserve System configuration would be subject to the Conservation Objectives and Required Measures established in Section 4 and Species Conservation Goals and Objectives established in Section 9 of the MSHCP for each conservation area.

Minimization measures have also been developed to reduce impacts to the gray vireo. General measures subject to all covered species addressed in section 4.4 of the MSHCP include surveys by qualified biologists when surveys are required, and management and monitoring programs to ensure conservation of the covered species.

The Plan includes Management and Monitoring programs (Section 8) that would ensure the conservation of gray vireos, including control activities that degrade gray vireo habitat and control of invasive species such as brown-headed cowbirds if monitoring determines them to be a threat. Additionally, the monitoring program would include data collection to determine distribution and abundance of gray vireos in suitable habitat throughout the Plan Area, and coordinated management efforts to maintain, enhance, or restore gray vireo habitat.

Direct Effects

We anticipate that up to 2,447 (2.3 percent) of the 105,562 acres of gray vireo modeled habitat within the Plan Area that is outside of the Conservation Areas could potentially be permanently lost as a result of implementation of the Plan. In addition, 1,466 (1.4 percent) of private lands within Conservation Areas of the 105,562 acres of the modeled habitat present in the Plan Area also could be permanently lost. Most of this lost habitat could be used for nesting and foraging habitat by gray vireos. Moreover, any habitat restored or enhanced to natural conditions is not anticipated to occur for many years after the original impacts have occurred. However, the plan ensures conservation of 101,544 acres, or 96.2 percent, of the modeled habitat within conservation areas for this species.

Additionally, an unknown number of gray vireos may be disturbed (e.g., nest abandonment prior to second egg laying) due to disturbance-associated with construction activities after adjacent habitat has been cleared. The limited areas where Incidental take could occur both through direct injury or disturbance are primarily locations in the already developed area around Pinyon Flat in the Santa Rosa Mountains.

However, gray vireos should not be directly harmed or killed by project-related activities in conservation areas when suitable habitat overlaps with other listed species that are afforded additional protections during breeding seasons. These include 1) pinyon-juniper dominated woodlands up to 4,000 feet (overlapping with Peninsular bighorn sheep) in the Snow Creek/Windy Point Conservation Area and Santa Rosa and San Jacinto Mountains Conservation Area; and, 2) some desert tortoise habitat up to 3,800 feet in elevation in the Cabazon, Stubbe and Cottonwood Canyons, Snow Creek/Windy Point, Whitewater Canyon, and Upper Mission Creek/Big Morongo Canyon Conservation Areas.

While the aforementioned conservation measures provide avoidance and minimization measures within conservation areas to avoid direct harm to the species, it is unclear if population numbers within the Plan Area are adequate to maintain and enhance population viability and ensure persistence of the species within the Plan Area. For example, this species no longer occurs in Joshua Tree National Park, a conservation area listed as having 30,653 acres of suitable habitat for the gray vireo, and occurrence records in the San Jacinto and Santa Rosa Mountains, listed as having 67,401 acres of suitable habitat, are rare and outdated. Therefore, conserving large blocks of suitable, yet unoccupied, habitat does not ensure the survival and persistence of the gray vireo in the Plan Area; which poses some uncertainty as to whether this conservation measure is adequate. However, if focused surveys determine the species occurs in the Plan Area, conservation and management of these large blocks of habitat will likely ensure the persistence of the species. Further, the Plan proposes management measures that provide a benefit to the species where none currently exist, e.g., controlling brown-headed cowbirds and improving diversity of habitat structure through improved fire management (Section 8.4.6).

Finally, in the southern Colorado Plateau, the heart of the species range, gray vireo are abundant and consideration for special conservation status is not warranted – mainly due to expected expansions of its preferred habitat, pinyon-juniper woodlands (Schlossberg 2006). Therefore, should the species be extirpated from the Plan Area (at present or at some point in the future), it is not expected to appreciably reduce the likelihood of the survival and recovery of the species throughout its current range.

Indirect Effects
Gray vireos will be indirectly impacted by loss of foraging habitat, loss of corridors to adjacent suitable habitat, and presence of brown-headed cowbirds which may affect nesting success of gray vireos. Projects that favor the establishment and continued presence of nonnative plants or animals could have additional impact on gray vireos by causing nest abandonment or loss of individuals by predation. In the long term, the alteration of the landscape surrounding and including gray vireo potential habitat associated with invasive plants or other system perturbations could adversely affect presence and abundance of prey species (e.g., grasshoppers, cicadas) and their distribution. Proposed mitigation measures (i.e., invasive plant control, habitat restoration, or cowbird control if warranted), if implemented, would reduce but not eliminate the potential indirect effects to the species.

CUMULATIVE EFFECTS
Cumulative effects include the effects of future State, tribal, local or private actions that are reasonably certain to occur in the action area. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to Section 7 of the Act. We are unaware of any non-Federal actions affecting the gray vireo that are reasonably certain to occur in the action area.

The Agua Caliente Band of Cahuilla Indians is undertaking a Habitat Conservation Plan for all of their Tribal lands. The draft Plan and associated documents have been reviewed publicly. It is anticipated that the final Plan and associated environmental analysis will be complete in mid-2008 with permit issuance scheduled for late 2008. Although there will be habitat loss associated with that Plan, the overall net benefit to the species is positive. Because issuance of that permit is a Federal action, an analysis of the impacts of that Plan will be completed in the required section 7 process.

CONCLUSION
After reviewing the current status of the gray vireo, the environmental baseline for the action area, effects of the proposed action, and the cumulative effects, it is our biological opinion that the proposed action is not likely to jeopardize the continued existence of the gray vireo. This conclusion is based on the following:

The species exists in other areas throughout its range in sufficient localities and probable numbers to suggest that the extirpation of gray vireo from the CVAG Plan Area will not cause the loss of the species;

Proposed conservation measures will minimize project-related direct effects that are anticipated to marginally change the baseline of breeding habitat, abundance, and distribution for the gray vireo within the range of the species;

Proposed habitat conservation of potential habitat and enhancement or restoration efforts should ensure that the function of historically documented breeding habitats for gray vireo is maintained within the action area; and, the proposed action likely will not cause significant indirect effects (e.g., reduction in prey base) to the gray vireo resulting from the proposed implementation of

project-related activities. The proposed monitoring and management of the MSHCP area is anticipated to provide secure habitats and environments for individuals displaced or otherwise indirectly impacted (e.g., increased depredation, nest parasitism) by project-related activities even though minimal habitat fragmentation and disturbance will occur.

AMOUNT OR EXTENT OF TAKE

It is impossible to quantify the number of gray vireos that will be impacted as a result of the proposed action over the 75-year permit term due to the large Plan Area and lack of survey information available for the species. Therefore, the Service is quantifying the take as the number of acres of modeled habitat that will be impacted in the MSHCP Plan Area as a result of the proposed action. We anticipate that a maximum of 3,913 acres, 1,466 of which is inside the conservation areas, of modeled habitat within the Plan Area will become unsuitable for the gray vireo as a result of the proposed action. Additionally, a small, but indeterminable, number of gray vireos are anticipated to be taken as a result of monitoring and management actions.

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Yellow warbler (*Dendroica petechia brewsteri*)

STATUS OF THE SPECIES

Legal/Listing Status

This species is not federally listed under the Act, but it is afforded protection under the MBTA. The yellow warbler has been designated as a Species of Special Concern by the CDFG.

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 (Dunn and Garrett 1997).

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 (American Ornithologist Union; AOU 1998). The breeding range of *D. p. brewsteri* occurs along coastal Washington, Oregon, and California. In California, Zeiner *et al.* (1990) 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 common migrant throughout much of California (Grinnell and Miller 1944; Garrett and Dunn 1981). The species is even a common migrant on the Channel and Farallon islands in spring and fall (DeSante and Ainley 1980, Garrett and Dunn 1981). Although the *aestiva* group of yellow warblers winters primarily from northern Mexico south to Bolivia and Brazil, the species occasionally winters in southern California (AOU 1957, Garrett and Dunn 1981).

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 (e.g., Garrett and Dunn 1981). The yellow warbler is now rare to uncommon in many lowland areas in California where it was formerly common (McCaskie *et al.* 1979, Garrett and Dunn 1981).

Habitat Affinities

The yellow warbler breeds in a variety of wet habitats, often those dominated by successional species. 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.* 1990). Breeding in montane shrubs and conifers is perhaps a recent phenomenon (Gaines 1977).

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). 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 1977).

During spring and fall migrations in southern California, the yellow warbler occurs in scrub/shrub and semi-open habitats and second growth forests and is often associated with wetlands (e.g., Garrett and Dunn 1981). 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). Small numbers of yellow warblers regularly overwinter in a variety of habitats (often water-associated) in the southern California lowlands (Garrett and Dunn 1981).

Life History

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 three to six eggs (usually four or five); eggs are incubated by the female for 11 days. The altricial young are tended by both parents until fledging at nine to 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 (Beer *et al.* 1956, Ficken and Ficken 1966). Peak densities measured in southeast Arizona reached 19 birds per acre (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 (*Molothrus ater*) 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). Within select study areas, it has been observed that the yellow warbler has responded 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).

Population Trends

Given the continuing threats to the species (see below), it is not surprising that the species apparently has declined considerably in southern California and the west coast as a whole (Garrett and Dunn 1981, Dunn and Garrett 1997). For instance, a subspecies of the yellow warbler (*D. p. sonorana*) that formerly bred along the length of the Colorado River may have been completely extirpated from California (Garrett and Dunn 1981, Dunn and Garrett 1997).

The experimental management of appropriate habitats, however, is beginning to reverse the decline of yellow warblers in select areas. For instance, by the 2003 breeding season, an estimated 650+ pairs of yellow warblers were detected within the Prado Basin and environs (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.

Threats

The primary continuing threats to the yellow warbler and other sensitive or listed avian species in southern California include habitat destruction, degradation, fragmentation, and brood parasitism by cowbirds (Garrett and Dunn 1981, Zembal *et al*. 2003). Although threats to the species within the Plan Area have not been specifically identified or quantified, it is apparent that range-wide threats apply also to the Plan Area. Habitat destruction and degradation by the proliferation of invasive plants (e.g., tamarisk) has been extensive in most of the southern California desert landscape.

In the absence of invasive plant abatement measures, the invasive spread of tamarisk 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, tamarisk, in particular, has overtaken and displaced native riparian habitat elements throughout the Southwest including the lower Colorado River watershed.

Brood parasitism by brown-headed cowbirds is a documented, major cause of the decline in yellow warbler numbers in lowland localities in southern California and the west coast of the United States (Garrett and Dunn 1981; Dunn and Garrett 1997). Despite 19 years of intensive cowbird abatement efforts in the Prado Basin and the relative success of the yellow warbler population breeding there, cowbird parasitism of susceptible riparian species has not been

entirely eliminated in that area (e.g., Pike *et al.* 2004). Cowbird parasitism is not an uncommon phenomenon even in montane locales in California (Rothstein *et al.* 1980; Verner and Ritter 1983; Airola 1986).

Synopsis of Status
The yellow warbler has significantly and steadily declined in the western United States (Dunn and Garrett 1997). It was once a common to locally abundant summer resident in riparian areas throughout California. Currently, populations are reduced and locally extirpated (e.g., Sacramento Valley and San Joaquin Valley). Although the yellow warbler was once a common resident in San Francisco, there are no recent breeding records for this area. Breeding populations in Marin County have declined, but the species is still common in Santa Cruz County. Numbers have also declined in Siskiyou County, but are steady in some areas of the Sierra Nevada. Yellow warblers are common along streams below about 8,000 feet in the eastern Sierra. The yellow warbler has declined significantly as a breeding bird in the coastal lowlands of southern California and is believed to be extirpated from the Colorado River. By contrast, populations in select managed locales (e.g., the Santa Ana River watershed) appeared to have benefited greatly from cowbird control and habitat restoration efforts (e.g., Pike *et al.* 2004). Destruction of riparian habitats and cowbird parasitism are the major causes of the decline.

ENVIRONMENTAL BASELINE
Status of the Species in the Action Area
Yellow warblers were detected for at least two years of a three year survey window at Chino Canyon, Dos Palmas Preserve, Mission Creek, Thousand Palms Oasis, and Whitewater Canyon. Detections were found during single years at Andreas Canyon and Coachella Valley Storm Channel Delta. Breeding within the Plan Area was not confirmed (MSHCP Monitoring Program, Chapter 4, Species Accounts, p. 87). Because non-breeding migrants are present in breeding habitats during most of the breeding season (e.g., Garrett and Dunn 1981), an understanding of the species' breeding status and distribution within the Plan Area require relatively intensive monitoring, which was not the objective of recent survey efforts. Accordingly, the breeding distribution and status of the yellow warbler in the Plan Area is unclear. However, given the presence of the yellow warbler at a large number of sites within the Plan Area and the detection of nine birds at a single site during one day only, the survey data suggest that the Plan Area is important to the species for migration.

Factors Affecting the Species' Environment within the Action Area
The primary factors affecting the yellow warbler within the action area include loss of riparian habitat, hydrological alteration, and the adverse effects of invasive plant and animal proliferations associated with the fragmentation and alteration of the landscape. Groundwater pumping, water storage, and water diversions may also have an effect on this species within the action area by preventing or complicating the development of water-dependent, essential habitat components (Shafroth 1998, Stromberg *et al*. 2005, Stromberg *et al*. 1996, Stromberg *et al*. 1991).

EFFECTS OF THE ACTION
The effects analysis below is based on the following assumptions:

Species Conservation Goals and Objectives (Section 9) will be met through the Joint Project Review Process (Section 6.6.1.1) and Monitoring and Adaptive Management Programs (Sections 8 and 9).

Despite mutable General Plans of Local Permittees, future land uses and development patterns will reflect current land use trends (largely residential and tourist resort-commercial uses), thereby explicitly ruling out unlikely future land uses such as heavy industry, expansion of agriculture into native habitat (unregulated by the County and therefore not a Covered Activity), etc.

Per Section 10.7, Desert Fan Palm Oasis is a natural community subject to the no net loss policy.

Mitigation and Minimization Measures
The mitigation measures proposed in the MSHCP are intended to conserve large areas of suitable breeding habitat for the yellow warbler. Within the Plan Area, there are approximately 2,730 acres of modeled breeding habitat and 57,471 acres of modeled migratory habitat available for the yellow warbler (NOTE: the acreage numbers specified here and the sections below reflect a discrepancy that was noted, after the final Plan was approved, in the amount of suitable habitat available for this species in the Mecca Hills/Orocopia Mountains conservation area). The Plan ensures conservation of 2,563 acres (94 percent) of modeled breeding habitat and 40,728 acres (71 percent) of modeled migratory habitat in perpetuity within the Reserve System. The Bureau of Land Management (BLM) manages 1,352 acres (2 percent) of modeled migratory habitat in the Plan area that is not included in conservation areas; the majority of these lands are classified as multiple-use class M – moderate use. These lands are managed to provide for a wider variety of uses such as mining, livestock grazing, recreation, utilities and energy development, while conserving desert resources and mitigating damages permitted uses may cause (BLM 2002).

Approximately 1,526 acres (60 percent) of modeled breeding habitat and 21,209 acres (52 percent) of modeled migratory habitat are currently preserved, leaving 1,037 acres and 19,519 acres of modeled habitat, breeding and migratory respectively, to be conserved as part of the MSHCP. Although a maximum of 10 percent of private land that has been modeled as least Bell's vireo breeding and migration habitat could be impacted within each conservation area, the Plan's riparian no net loss policy ensures that any and all least Bell's vireo habitat impacted within the conservation areas would be replaced in kind.

Although 90 percent of private lands within each conservation area would be conserved, the ultimate configuration of the Reserve System is unknown at this time. Reserve System configuration would be subject to the Conservation Objectives and Required Measures established in Section 4 and Species Conservation Goals and Objectives established in Section 9 of the MSHCP for each conservation area.

Minimization measures have been developed to reduce adverse impacts to this species. The measures include required avoidance, minimization, and mitigation measures such as avoiding project activity during the breeding and nesting season (Section 4.4), maintaining upland buffers for occupied habitat (Section 9), and implementing Land Use Adjacency Guidelines (Section

4.5) for land adjacent to or within conservation areas. These guidelines include noise thresholds, shielding or directing of lighting, use of barriers to minimize unauthorized access, and avoidance of invasive plants in landscaping.

The Plan also includes Management and Monitoring programs (Section 8) that would ensure the conservation of yellow warbler, including control and management of activities that degrade yellow warbler habitat; control of invasive species such as brown-headed cowbirds; and coordinated management efforts to maintain, enhance, or restore yellow warbler habitat. Additionally, the monitoring program would include data collection to determine factors affecting the distribution and abundance of yellow warbler throughout the Plan area.

Direct effects
Because it is impossible to accurately quantify the number of birds that will be impacted as a result of the proposed action over the 75-year permit term due to the large Plan area, the Service is quantifying the take as the number of acres of modeled habitat that will be impacted in the MSHCP Plan Area as a result of the proposed action. We anticipate that up to 59 (2.2 percent) of the 2,730 acres of the yellow warbler modeled breeding habitat and 13,040 (23 percent) of the 57,471 acres of modeled migratory habitat for the species within the Plan area but outside of the Conservation Areas could potentially be permanently lost as a result of implementation of the Plan. In addition, 2,331 (4 percent) of the 57,471 acres of modeled migratory habitat present on private lands within Conservation Areas could also be permanently lost. Finally, 109 (4 percent) of the 2,730 acres of the modeled breeding habitat present on private lands within Conservation Areas could be temporarily lost. This loss is temporary as the Plan's wetland no net loss policy ensures that any and all yellow warbler breeding habitat impacted within Conservation Areas would be replaced in kind. The no net loss policy will provide assurances that temporary losses to riparian areas will not significantly limit the reproduction potential of yellow warbler as compared to the baseline condition.

Because of the proposed avoidance of Covered Activities during the breeding season, yellow warblers should not be directly harmed or killed by Covered Activities. In addition, most of the potential yellow warbler breeding habitats are currently in areas that likely will not be impacted as a result of the permitting of the Plan. Although the potential removal of 23 percent of modeled yellow warbler migration habitat is considerable, the species utilizes a large variety of habitats away from breeding grounds, which should ameliorate the effects of habitat removal. The species elsewhere in Riverside County and southern California as a whole appears to maintain stable populations in managed, large blocks of undisturbed habitat such as those that will be maintained or restored by the Plan.

Indirect Effects
Any Covered Activity-related creation and maintenance of conditions that favor the establishment and proliferation of invasive plants could impact the status of the yellow warbler. Undisturbed areas vegetated with native species are much more resistant to invasion by tamarisk and other invasive plants. By contrast, areas directly affected or disturbed by construction and other landscape alteration activities are likely to accommodate, sustain, and facilitate the spread of invasive plants within the Plan area. Stands of tamarisk and other invasive, non-native plants provide little or no habitat for the yellow warbler and progressively destroy native habitat

elements by outcompeting them or producing microenvironments susceptible to fire or erosion.

The increase and spread of alien plants such as tamarisk are continuing relatively unabated in southern California. In the long term, the Covered Activity-related alteration of the landscape within the Plan Area and associated potential establishment and dispersal of select invasive plants likely would overwhelm native riparian habitats occupied by the yellow warbler and other riparian-obligate species in the project action area. However, the Plan proposes to control invasives, which would prevent this otherwise adverse impact of human activity.

Numerous studies have revealed that overall nest success of songbirds in the United States and southern California in particular is depressed in habitat fragments or edges due to the individual or combined effects of nest parasitism by the cowbird, nest depredation, and, possibly, documented reductions in insect prey (e.g., see Askins 2000, Zembal *et al.* 2003). Cowbirds prefer feeding in open areas (Garrett and Dunn 1981) that are largely created by human alterations of the landscape. Such areas include manicured parks and lawns and the landscaping often associated with developed properties. Because even small numbers of cowbirds can strongly impact the reproductive success of southwestern riparian species (Powell and Steidl 2000), any Covered Activity-related feature that creates conditions favorable to cowbirds in, or immediately adjacent to, project areas could decrease the reproductive success of yellow warblers in the absence of effective management measures.

Proposed mitigation measures (e.g., work restrictions during the breeding season) will substantially reduce or eliminate many indirect, project-related effects (e.g., noise and vibration) that might otherwise have occurred. Similarly, management measures such as invasive plant and animal control, riparian buffers, and the conservation of large blocks of yellow warbler habitat would mitigate – or perhaps entirely compensate for – the effects associated with the project-induced fragmentation of the yellow warbler breeding habitats.

The potential spillage and/or dispersal of contaminants (e.g., crude oil, fuel, petroleum products, solvents) within the action area as result of the construction or implementation of the project could have adverse consequences to breeding yellow warblers. Given that the bioaccumulation of toxic substances may cause reproductive failures in birds, the discharge, dispersal, and accumulation of potentially toxic environmental contaminants associated with construction and implementation of, for instance, residential housing and commercial projects, could adversely affect the yellow warbler by decreasing recruitment and, in turn, abundance. Best management practices and conservation measures incorporated into the Land Use Adjacency Guidelines should contribute to a decreased likelihood of the accidental spillage and dispersal of environmental contaminants during the construction.

CHANGED CHIRCUMSTANCES

The Changed Circumstances that are likely to affect the yellow warbler are drought, fire, invasion by new exotic species, and lowering of the water table. Drought and lowering of the water table may reduce water flows through areas of existing habitat and/or restored habitat. The need to maintain water flows through riparian areas is critical to maintain suitable areas of breeding and migratory habitat for this species. Section 6 of the Plan states that a drought event

significantly affecting Covered Species is not anticipated to occur during the life of the Permit. Nevertheless, measures will be taken to monitor the effects of drought on Covered Species. Extended periods of drought in the action area could lead to changes in both the aboveground and belowground water dynamics affecting both plant survival and species composition (Shafroth *et al.* 2002). Therefore, monitoring in the event of an identified drought should include quantitative information on survival and species composition in existing riparian areas.

Unintended fire in the desert environment could spread to riparian areas, particularly in the Dos Palmas area given the existing access to off-road vehicle users. The preventive measures identified in the Plan will assist in reducing the risk and spread of fires from the desert to the riparian areas. Proper controls and configurations will reduce the risk of wildfire spreading into these areas and establish appropriate site-specific response actions. Wildlife Agency oversight should ensure that these tasks are completed appropriately and in a timely fashion.

Various disturbances, including fire, can result in the establishment of new exotic species within riparian areas. The most likely impact associated with exotic species is the invasion of an exotic plant that changes the structural characteristics of these areas. The Plan area already has exotic plant species that warrant monitoring and management, and this management should afford the opportunity to identify and address new invasive plants relatively quickly before major invasions become established.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

We are unaware of any non-Federal actions affecting the yellow warbler that are reasonably certain to occur in the action area considered by this opinion. Even if activities are proposed within the Plan Area outside of the purview of the Plan, the breeding habitat of the least Bell' vireo within the Plan Area and the United States range of the species as a whole is almost invariably located partly (and often entirely) within the jurisdiction of the Corps of Engineers pursuant to Section 404 of the Clean Water Act. In addition, approximately 50 percent of yellow warbler habitat within conservation areas is located on Federal property.

The Agua Caliente Band of Cahuilla Indians is undertaking a Habitat Management Plan for all of their Tribal lands. The draft Plan and associated documents have been reviewed publicly. It is anticipated that the final Plan and associated environmental analysis will be complete in mid-2008 with permit issuance scheduled for late 2008. Although there will be habitat loss associated with that Plan, the overall net benefit to the species is positive. Because issuance of that permit is a Federal action, an analysis of the impacts of that Plan will be completed in the required section 7 process.

CONCLUSION

After reviewing the current status of the yellow warbler, the environmental baseline for the

action area, effects of the proposed action, the cumulative effects, and proposed permit conditions, it is our biological opinion that the proposed action is not likely to jeopardize the continued existence of the yellow warbler. Our conclusion is based on the following findings:

Proposed conservation measures have been proposed to minimize Covered Activity-related direct effects that likely will only marginally change the baseline of breeding habitat, abundance, and distribution for the yellow warbler within the range of the species. The proposed habitat conservation and/or creation efforts should ensure that the function of documented breeding and migration habitats for yellow warblers is maintained within the action area; and

The proposed action likely will not induce considerable indirect effects to the yellow warbler resulting from implementation of the proposed Covered Activities. Although the proposed Covered Activities will contribute to the fragmentation and disturbance of yellow warbler breeding and migration habitat in the Plan Area and potentially subject the species to increased depredation, parasitism, and the certain impacts associated with the proliferation of invasive plants, the proposed monitoring and management of the Plan Area likely will provide secure habitats and environments for individuals displaced or otherwise indirectly impacted by Covered Activities.

AMOUNT OR EXTENT OF TAKE

It is presently impossible to quantify the number of birds that will be impacted as a result of the proposed action over the 75-year permit term due to the large Plan Area. Therefore, the Service is quantifying the take as the number of acres of modeled habitat that will be impacted in the MSHCP Plan Area as a result of the proposed action. We anticipate that up to 59 acres of modeled breeding and 15,371 (13,040 + 2,331) acres of modeled migratory habitat within the Plan Area will become unsuitable for the yellow warbler as a result of the proposed action. An additional 109 acres of breeding habitat would be disturbed in conservation areas under the Plan, but these acreages would be restored or replaced to ensure no net loss of riparian habitats in the Conservation Areas. Finally, small, but undeterminable, numbers of yellow warblers are anticipated to be taken as a result of monitoring and management actions.

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Yellow-breasted chat (*Icteria virens*)

STATUS OF THE SPECIES

Legal/Listing Status

This species is not federally listed under the Act, but it is afforded protection under the MBTA. The yellow-breasted chat has been designated as a Species of Special Concern by CDFG.

Species Description

The yellow-breasted chat is a very large, aberrant warbler that apparently deserves further taxonomic review. The size, unusual morphology, 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).

Distribution

Yellow-breasted chats summer and nest from British Columbia eastward to New Hampshire and southward to Baja California and northern mainland Mexico. The relatively secretive species presumably migrates throughout much of North America and winters primarily from northern Mexico to Panama (AOU 1998).

Zeiner *et al.* (1990) 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 1977, 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). The species 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).

Habitat Affinities

In the arid west, the yellow-breasted chat 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 shrub 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.* 1990). 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.* 1990). 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 typically lays from three to four egg clutches, six egg clutches have been recorded. Incubation is 11 to 15 days, and chicks fledge in eight 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 2.7 to 4.0 acres (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 1.2 to 2.5 acres (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 also subject to predation by accipiters, small mammals, and snakes (Zeiner *et al.* 1990).

Population Trends
The yellow-breasted chat 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). Once considered common in California (Grinnell and Miller 1944), it is now considered uncommon in southern California (Garrett and Dunn 1981).

A clear exception to this trend in southern California, however, is the important cluster of populations in western Riverside County. For instance, the number of yellow-breasted chats in the Prado Basin greatly exceeds yellow-breasted chat numbers in all of Orange County (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 likely has remained stable or increased slightly over the past 19 years (L. R. Hays, Staff Ornithologist, Carlsbad Fish and Wildlife Office, pers. comm., December 8, 2005). An additional 200 pairs likely occur in the remainder of the Santa Ana River Watershed (L. R. Hays, Staff Ornithologist, Carlsbad Fish and Wildlife Office, pers. comm., December 8, 2005). Population data from the remainder of the range of the species is currently unavailable.

Threats

The primary threats range-wide, as well as in the Plan Area, to the yellow-breasted chat are habitat loss and fragmentation, parasitism by brown-headed cowbirds, and the proliferation of invasive plants (e.g., tamarisk). 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 1974; Remsen 1978). The invasive spread of tamarisk, 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.

Synopsis of Status

The precise status of the species in southern California is largely unknown outside of select areas that are managed primarily to benefit the least Bell's vireo or southwestern willow flycatcher. In those locales (e.g., the Prado Basin and Santa Ana River watershed), populations of yellow-breasted chats currently appear to be stable or increasing. Elsewhere in southern California (in largely unmanaged areas), the species apparently remains uncommon and local as a result of the threats identified immediately above (see Garrett and Dunn 1981). This same diminished status might well be applied also to the west coast range of the species as a whole (Dunn and Garrett 1997).

ENVIRONMENTAL BASELINE

Status of the Species in the Action Area

"Numerous yellow-breasted chats were detected. . ." at Dos Palmas Preserve in 2003 and 2004 and breeding was suspected at that locale (MSHCP Monitoring Program, Chapter 4, p. 86). The species also was observed in numbers in 2004 in Chino Canyon, which may serve as another breeding locale for the species. Birds observed at Mission Creek, Thousand Palms Oasis, Whitewater Canyon, and Willow Hole were thought to be migrants.

Factors Affecting the Species' Environment within the Action Area

The primary factors affecting the yellow-breasted chat within the action area include loss of riparian habitat, hydrology alteration, and the adverse effects of invasive plant and animal

proliferations associated with the fragmentation and alteration of the landscape. Groundwater pumping, water storage, and water diversions may have a significant effect on this species' environment within the action area due to the reduction or cessation of stream flows, which are important habitat components that likely provide for the production of prey species and the optimum recruitment and development of riparian vegetation (Shafroth 1998, Stromberg et al. 2005, Stromberg et al. 1996, Stromberg et. al 1991).

EFFECTS OF THE ACTION

The effects analysis below is based on the following assumptions:

Species Conservation Goals and Objectives (Section 9) will be met through the Joint Project Review Process (Section 6.6.1.1) and Monitoring and Adaptive Management Programs (Sections 8 and 9).

General Plans of Local Permittees, future land uses and development patterns will reflect current land use trends (largely residential and tourist resort-commercial uses), thereby explicitly ruling out unlikely future land uses such as heavy industry, expansion of agriculture into native habitat (unregulated by the County and therefore not a Covered Activity), etc.

Per Section 10.7, Desert Fan Palm Oasis is a natural community subject to the no net loss policy.

Mitigation and Minimization Measures

The mitigation measures proposed in the MSHCP are intended to conserve large areas of suitable breeding habitat for the yellow-breasted chat. Within the Plan Area, there are approximately 3,007 acres of modeled breeding habitat and 57,194 acres of modeled migratory habitat available for the yellow-breasted chat (NOTE: the acreage numbers specified here and the sections below reflect a discrepancy that was noted, after the final plan was approved, in the amount of suitable habitat available for this species in the Mecca Hills/Orocopia Mountains conservation area). The Plan ensures conservation of 2,829 acres (94 percent) of modeled breeding habitat and 40,465 acres (71 percent) of modeled migratory habitat in perpetuity within the Reserve System. The BLM owns and manages approximately 1,358 acres (2 percent) of modeled migratory habitat in the Plan area that is not included in conservation areas; the majority of these lands are classified as multiple-use class M – moderate use. These lands are managed to provide for a wider variety of uses such as mining, livestock grazing, recreation, utilities and energy development, while conserving desert resources and mitigating damages permitted uses may cause (BLM 2002).

Approximately 1,669 acres (59 percent) of modeled breeding habitat and 21,066 acres (52 percent) of modeled migratory habitat are currently preserved, leaving 1,160 acres and 19,399 acres of modeled habitat, breeding and migratory respectively, to be conserved as part of the MSHCP. Although a maximum of 10 percent of private land that has been modeled as least Bell's vireo breeding and migration habitat could be impacted within each conservation area, the Plan's riparian no net loss policy ensures that any and all least Bell's vireo habitat impacted within the conservation areas would be replaced in kind.

Ninety percent of private lands within each conservation area would be conserved. Reserve System configuration would be subject to the Conservation Objectives and Required Measures

established in Section 4 and Species Conservation Goals and Objectives established in Section 9 of the MSHCP for each conservation area.

Minimization measures have been developed to reduce adverse impacts to this species. The measures include required avoidance, minimization, and mitigation measures such as avoiding project activity during the breeding and nesting season (Section 4.4), maintaining upland buffers for occupied habitat (Section 9), and implementing Land Use Adjacency Guidelines (Section 4.5) for land adjacent to or within conservation areas. These guidelines include noise thresholds, shielding or directing of lighting, use of barriers to minimize unauthorized access, and avoidance of invasive plants in landscaping.

The Plan also includes Management and Monitoring programs (Section 8) that would ensure the conservation of yellow-breasted chat, including control and management of activities that degrade yellow-breasted chat habitat; control of invasive species such as brown-headed cowbirds; and coordinated management efforts to maintain, enhance, or restore yellow-breasted chat habitat. Additionally, the monitoring program would include data collection to determine factors affecting the distribution and abundance of yellow-breasted chat throughout the Plan area.

Direct Effects
We anticipate that up to 58 (2 percent) of the 3,007 acres of the yellow-breasted chat modeled breeding habitat and 13,040 (23 percent) of the 57,194 acres of modeled migratory habitat for the species within the Plan area but outside of the Conservation Areas could potentially be permanently lost as a result of implementation of the Plan. In addition, 2,318 (4 percent) of the 57,194 acres of modeled migratory habitat on private lands within Conservation Areas could also be permanently lost. Finally, 122 (4 percent) of the 3,007 acres of the modeled breeding habitat on private lands within Conservation Areas could be temporarily lost. This loss is temporary as the Plan's wetland no net loss policy ensures that any and all yellow-breasted chat breeding habitat impacted within Conservation Areas would be replaced in kind. The no net loss policy will provide assurances that temporary losses to riparian areas will not limit the reproduction potential of yellow-breasted chat as compared to the baseline condition.

The riparian forests typically used by yellow-breasted chats for breeding are often particularly time-consuming and logistically difficult to replace. Because of the proposed avoidance of Covered Activities during the breeding season, yellow-breasted chats should not be directly harmed or killed by Covered Activities. In addition, all known breeding habitats occupied breeding yellow-breasted chats are currently in areas that likely would not be impacted as a result of the permitting of the Plan. Although the potential removal of 23 percent of modeled yellow-breasted chat migration habitat is considerable, the species has broad habitat preferences away from breeding grounds, which should ameliorate the effects of habitat removal. The species elsewhere in Riverside County and southern California as a whole appears to maintain stable populations in managed, large blocks of undisturbed habitat such as those that will be maintained or restored by the Plan.

Indirect Effects
Any Covered Activity-related creation and maintenance of conditions that favor the

establishment and proliferation of invasive plants could impact the status of the yellow-breasted chat. Undisturbed areas vegetated with native species are much more resistant to invasion by tamarisk and other invasive plants. By contrast, areas directly affected or disturbed by construction and other landscape alteration activities are likely to accommodate, sustain, and facilitate the spread of non-native plants within the Plan area. Stands of tamarisk and other invasive, non-native plants provide little or no habitat for the yellow-breasted chat, and progressively destroy native habitat elements by outcompeting them or producing microenvironments susceptible to fire or erosion.

The increase and spread of invasive plants such as tamarisk are continuing relatively unabated in southern California. In the long term, the Covered Activity-related alteration of the landscape within the Plan Area and associated potential establishment and dispersal of select non-native plants likely could overwhelm native riparian habitats occupied by the yellow-breasted chat and other riparian-obligate species in the project action area. However, the Plan proposes to control non-native invasives, which would prevent this otherwise adverse impact of human activity.

The disturbance or removal of existing riparian and upland vegetation may result in the creation of cowbird foraging habitat or increase cowbird parasitism rates. Numerous studies have revealed that overall nest success of songbirds in the United States and southern California in particular is depressed in habitat fragments or edges due to the individual or combined effects of nest parasitism by the cowbird, nest depredation, and possibly, documented reductions in insect prey (e.g., see Askins 2000, Zembal *et al.* 2003). Cowbirds prefer feeding in open areas (Garrett and Dunn 1981) that are largely created by human alterations of the landscape. Such areas include manicured parks and lawns and the landscaping often associated with developed properties. Because even small numbers of cowbirds can strongly impact the reproductive success of southwestern riparian species (Powell and Steidl 2000), any Covered Activity-related feature that creates conditions favorable to cowbirds in, or immediately adjacent to, the project areas could decrease the reproductive success of yellow-breasted chats in the absence of effective management measures.

Proposed mitigation measures (e.g., work restrictions during the breeding season) will substantially reduce or eliminate many indirect, project-related effects (e.g., noise and vibration) that might otherwise have occurred. Similarly, management measures such as invasive plant and animal control, riparian buffers, and the conservation of large blocks of yellow-breasted chat habitat would mitigate – or perhaps entirely compensate for – the effects associated with the project-induced fragmentation of existing breeding areas.

The potential spillage and/or dispersal of contaminants (e.g., crude oil, fuel, petroleum products, solvents) within the action area as result of the construction or implementation of the project could have adverse consequences to breeding yellow-breasted chats. The bioaccumulation of toxic substances may cause reproductive failures in birds. Specifically, the discharge, dispersal, and accumulation of potentially toxic environmental contaminants associated with construction and implementation of, for instance, residential housing and commercial projects, could adversely affect the yellow-breasted chat by impacting the fecundity, recruitment and, in turn, the abundance of the species. Best management practices and conservation measures incorporated into the Land Use Adjacency Guidelines should contribute to a decreased likelihood

of the accidental spillage and dispersal of environmental contaminants during the construction.

CHANGED CHIRCUMSTANCES

The Changed Circumstances that are likely to affect the yellow-breasted chat are drought, fire, invasion by new exotic species, and lowering of the water table. Drought and lowering of the water table may reduce water flows through areas of existing habitat and/or restored habitat. The need to maintain water flows through riparian areas is critical to maintain suitable areas of breeding and migratory habitat for this species. Section 6 of the Plan states that a drought event significantly affecting Covered Species is not anticipated to occur during the life of the Permit. Nevertheless, measures will be taken to monitor the effects of drought on Covered Species. Extended periods of drought in the action area could lead to changes in both the aboveground and belowground water dynamics affecting both plant survival and species composition (Shafroth et al. 2002). Therefore, monitoring in the event of an identified drought should include quantitative information on survival and species composition in existing riparian areas.

The Plan (Section 6) defines lowering of the water table as an increase in the depth to groundwater. Preventative measures to reduce the chances of this changed circumstance occurring include monitoring programs to determine whether substantial lowering of the water table occurs. The planned response in the event monitoring detects a substantial lowering or a decline in mesquite health in these areas includes, among other things, development of feasible measures to ameliorate the effects of substantial lowering of the water table on mesquite hummocks and associated Covered Species. To determine the health of mesquite in these areas, the monitoring should provide quantitative information on the timing and extent of morphological responses and mortality of mesquite to the rate, depth, and duration of water table declines to assist in the design of management of feasible measures to minimize impacts of groundwater depletion on mesquite in these areas.

Unintended fire in the desert environment could spread to riparian areas, particularly in the Dos Palmas area given the existing access to off-road vehicle users. The preventive measures identified in the Plan will assist in reducing the risk and spread of fires from the desert to the riparian areas. Proper controls and configurations will reduce the risk of wildfire spreading into these areas and establish appropriate site-specific response actions. Wildlife Agency oversight should ensure that these tasks are completed appropriately and in a timely fashion.

Various disturbances, including fire, can result in the establishment of new exotic species within riparian areas. The most likely impact associated with exotic species is the invasion of an exotic plant that changes the structural characteristics of these areas. The Plan area already has exotic plant species that warrant monitoring and management, and this management should afford the opportunity to identify and address new exotic plants relatively quickly before major invasions become established.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section

because they require separate consultation pursuant to section 7 of the Act.

We are unaware of any non-Federal actions affecting the yellow-breasted chat that are reasonably certain to occur in the action area considered by this biological opinion. Even if activities are proposed within the Plan Area outside of the purview of the Plan, the breeding habitat of the least Bell' vireo within the Plan Area and the United States range of the species as a whole is almost invariably located partly (and often entirely) within the jurisdiction of the Corps of Engineers pursuant to Section 404 of the Clean Water Act. In addition, approximately 50 percent of yellow-breasted chat habitat within conservation areas is located on Federal property.

The Agua Caliente Band of Cahuilla Indians is undertaking a Habitat Management Plan for all of their Tribal lands. The draft Plan and associated documents have been reviewed publicly. It is anticipated that the final Plan and associated environmental analysis will be complete in mid-2008 with permit issuance scheduled for late 2008. Although there will be habitat loss associated with that Plan, the overall net benefit to the species is positive. Because issuance of that permit is a Federal action, an analysis of the impacts of that Plan will be completed in the required section 7 process.

CONCLUSION

After reviewing the current status of the yellow-breasted chat, the environmental baseline for the action area, effects of the proposed action, the cumulative effects, and proposed permit conditions, it is our biological opinion that the proposed action is not likely to jeopardize the continued existence of the yellow-breasted chat. Our conclusion is based on the following findings:

Conservation measures have been proposed to minimize Covered Activity-related direct effects that would only marginally change the baseline of breeding habitat, abundance, and distribution for the yellow-breasted chat within the range of the species. The proposed habitat conservation and/or creation efforts should ensure that the function of documented breeding and migration habitats for yellow-breasted chats is maintained within the action area; and

The proposed action likely would not induce significant indirect effects to the yellow-breasted chat resulting from implementation of the proposed Covered Activities. Although the proposed Covered Activities would contribute to the fragmentation and disturbance of yellow-breasted chat breeding and migration habitat in the Plan Area and potentially subject the species to increased human pressures, depredation, parasitism, and the certain impacts associated with the proliferation of invasive plants, the proposed monitoring and management of the Reserve System would likely provide secure habitats and environments for individuals displaced or otherwise indirectly impacted by Covered Activities.

AMOUNT OR EXTENT OF TAKE

It is presently impossible to quantify the number of birds that will be impacted as a result of the proposed action over the 75-year permit term due to the large Plan Area. Therefore, the Service is quantifying the take as the number of acres of modeled habitat that would be impacted in the proposed Plan Area as a result of the proposed action. We anticipate that up to 58 acres of

modeled breeding and 15,358 (13,040 + 2,318) acres of modeled migratory habitat within the Plan Area would become permanently unsuitable for the yellow-breasted chat as a result of the proposed action. An additional 122 acres of breeding habitat would be disturbed in Conservation Areas under the Plan, but these acreages would be restored or replaced to ensure no net loss of riparian habitats in the conservation areas. Finally, a small, but undeterminable, number of yellow-breasted chats are anticipated to be taken as a result of monitoring and management actions.

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Summer tanager (*Piranga rubra*)

STATUS OF THE SPECIES

Legal/Listing Status

The summer tanager is not federally listed under the Act, but is afforded protection under the MBTA. The summer tanager has been designated as a Species of Special Concern by CDFG.

Species Description

The summer tanager is a large passerine, about 7-8 inches in total length, with a large, omnivorous bill (Oberholser 1974, Robinson 1996). The male is distinguished from other tanagers by its uniformly bright red plumage. Second-year and some third-year males show yellow plumage with varying levels of red spotting. Female plumage varies from brownish yellow to orangeish yellow and may contain some red pigment, especially in older individuals (Robinson 1996). Two subspecies are recognized, the eastern summer tanager, *P. r. rubra*, and the Cooper's summer tanager, *P. r. cooperi* (American Ornithologists' Union; AOU 1957). These subspecies show unique morphological characters (Ridgway 1869, Rea 1970), display geographic variation in song (Shy 1983, Shy 1984, Shy 1985), have different habitat preferences (Robinson 1996, Isler and Isler 1999), and are genetically distinct (Shepherd 2004). In the late spring and summer, Cooper's summer tanager breeds in scattered riparian woodlands of southern California. The eastern summer tanager can also be found in California as a wintering vagrant and during spring and fall migration.

Distribution

The summer tanager breeds throughout the southern United States and portions of northern Mexico (Robinson 1996). The eastern summer tanager breeds among deciduous forests in the eastern U.S., south of 40^{o} N, from southern New Jersey west to southeast Nebraska and into central Texas and northeastern Mexico. This eastern subspecies winters in southeastern Mexico and south into western Brazil (Robinson 1996). Cooper's summer tanager breeds among scattered riparian areas throughout the southwestern U.S. into west Texas and north central Mexico and winters from southern Baja California and along southwestern Mexico (Robinson 1996). Populations of Cooper's summer tanager occur in southern California, southern Nevada, southwest Utah, Arizona, New Mexico and western Texas.

In California, the Cooper's summer tanager historically nested in large numbers along the lower Colorado River valley (Rosenberg *et al*. 1991, Small 1994). This population has declined dramatically due to the loss of native riparian woodland from hydrology alterations, invasive plant invasion, and conversion of habitat to agricultural land (Rosenberg *et al*. 1991). Over the past several decades, documented range expansions have occurred among many southwestern bird species, including the Cooper's summer tanager (Johnson 1994). Populations of Cooper's summer tanager have expanded into southern California where appropriate habitat is available, as far north and west as the South Fork Kern River (Small 1994).

Habitat Affinities

In the west, breeding birds occupy mature stands of riparian woodland dominated by cottonwood (*Populus* spp.) and willow (*Salix* spp.) (Robinson 1996). This species will also utilize honey

mesquite (*Prosopis glandulosa*) and invasive saltcedar (*Tamarix* spp.) at higher elevations in eastern Arizona (Rosenberg *et al*. 1991). The summer tanager resides at low elevations, up to 1900 m (Isler and Isler 1999). In California, the migrating and winter vagrant, *P. r. rubra*, will also utilize oak woodlands, parks, suburbs, tamarisk stands and desert oases (Small 1994).

Life History
The summer tanager's diet consists mainly of large insects, especially bees and wasps, but during winter and migration, it will regularly consume fruit (Robinson 1996, Isler and Isler 1999). It captures prey by surface gleaning from branches or leaves and by sallying to catch flying insects (Robinson 1996). It will also occasionally capture insects on the ground (Rosenberg *et al*. 1982).

The summer tanager arrives on its breeding grounds in mid-April and immediately begins pair-bonding for the season (Robinson 1996). It constructs a sturdy, open-cup nest, which is placed in a tall, mature tree. Nests are often placed along a horizontal branch among a cluster of leaves or within the fork of a branch (Bent 1958), but nests have been observed against the main trunk supported by emerging branches (Shepherd 2004). Nest height ranges from 1.3 to >22 m above ground (Robinson 1996). Egg-laying dates reported for the lower Colorado River valley are mid-May through mid-July (Rosenberg *et al*. 1991). This species typically lays three or four eggs, which are pale blue with brown speckles (Potter 1985). The first eggs hatch approximately 12 days after the clutch is complete, and young fledge eight to ten days following hatching, with parental care extending two to four weeks post-fledge (Potter 1973, Potter 1985, Rosenberg *et al*. 1991). Double-brooding is reported as common in the lower Colorado River valley (Rosenberg *et al*. 1991).

Population Trends
The summer tanager was once considered a common summer resident of the lower Colorado River valley (Grinnell 1914), but by 1981, it was reported as uncommon in this area (Garrett and Dunn 1981). Rosenberg *et al*. (1991) reported that by 1976, only 216 individuals were estimated to inhabit the valley. In 1986, a field survey by Laymon and Halterman found only three males on the California side of the lower Colorado River (Rosenberg *et al*. 1991). Because of the tremendous decline of the summer tanager within its historic range, Hunter (1984) highly recommended it be listed as a threatened or endangered species in California.

The significant decline of summer tanagers along the lower Colorado River has been partially offset by an expansion of breeding populations northward into southern California. Johnson (1994) hypothesized that climatic changes leading to wetter and warmer summers have facilitated this expansion. Currently, the largest extant California breeding population of summer tanagers is at the Kern River Preserve in Kern County (Small 1994). This population has increased from 6 pairs in 1981, to 30-35 pairs reported in 1994 (Small 1994), to a current population size of at least 70 pairs (Shepherd 2004). Other small colonies in California of 5-15 pairs include Mohave River, Victorville, San Bernardino County and San Felipe Creek, San Diego County. Sporadic breeding of 1-4 pairs has also been documented at scattered locations in Inyo, Riverside, Los Angeles, and Imperial Counties. Specific locations in Riverside County include Palm Canyon near Palm Springs, Thousand Palms oasis, and near Mecca (Small 1994).

Threats

The primary threats to the summer tanager in southern California include habitat loss, hydrological alteration, and invasive plant invasion (Rosenberg *et al*. 1991; Patten *et al*. 2003). Because of nest height, the effect of brood parasitism has not been well studied in this species, but data show that parasitism by the brown-headed cowbird (*Molothrus ater*) is a problem in the eastern U.S. and its occurrence has been documented in California (Robinson 1996). Threats to this species throughout its range also apply to the Plan Area. Specifically within the Plan Area, mortality of the summer tanager during migration may occur from collisions with wind turbines (Anderson *et al*. 2005). However, the greater threat within the Plan area, to breeding summer tanagers, is the elimination of riparian willow and cottonwood forest habitat (Patten *et al*. 2003).

Habitat destruction and degradation by the proliferation of invasive plants (e.g., giant reed and tamarisk) and impacts attributable to the brood-parasitic cowbird deserve further attention. In the absence of invasive plant abatement measures and guarantees of large-scale, long-term invasive species eradication efforts within the Plan Area, the spread of tamarisk and other nonnative plants would pose a serious threat to the function and survival of southwestern riparian habitats and the species, including the summer tanager, that are dependent upon them.

Synopsis of Status

Rangewide, this species has experienced noted declines. The eastern subspecies remains a fairly common resident of eastern deciduous forest, but has experienced population declines, especially along the northern edges of its former range (Robinson 1996). Causes of population decline in the eastern United States are likely due to habitat loss and brood parasitism. In the Southwest, the western species has experienced rapid declines due to the intense hydrological alteration of western riparian areas. These hydrological alterations have led to habitat loss and invasion of non-native plants, leading to a drastic decline in summer tanager populations. The recent northerly range expansion in the Southwest has allowed the summer tanager to colonize formerly unoccupied areas. With the continued loss of essential habitat, though, this expansion will not be sufficient to increase the overall population size of this species. The population in California appears to be expanding although there is no scientific study to suggest the population is increasing. It is in decline in the lower Colorado River valley because of loss of habitat and yet seems to be expanding to suitable areas in, and outside of, the Plan area. In summary, the summer tanager remains fairly common throughout its range, but its overall population size is steadily declining.

ENVIRONMENTAL BASELINE

Status of the Species in the Action Area

The precise number of summer tanagers in the Plan Area is not known. However, riparian bird surveys done pursuant to the MSHCP (CCB 2005) resulted in the detection of this species at six sites within the plan area from 2002-2004 (Table 4.8.2). These same surveys documented breeding at four sites: Andreas Canyon, Chino Canyon, Whitewater Canyon, and Stubbe Canyon. Given the presence of the species for three successive years (2002 to 2004) at Palm Canyon, the species may also breed there.

Former nesting areas include a single pair at Mecca in 1969 and an unreported number at Thousand Palms Oasis (Garrett and Dunn 1981), but recent breeding at these locations has not been documented. Small (1994) reported that, annually, two to four pairs nested at Whitewater

Canyon and Morongo Valley. Historically, this species was only reported to nest in California along the lower Colorado River valley. Grinnell and Miller (1944) report the summer tanager as common along the Colorado River, but do not mention its occurrence elsewhere in the state. Thus, the presence of the summer tanager within the action area is fairly recent, with the first breeding records dating to the 1960's. This region, though, may become an important area for this species in the future.

Factors Affecting the Species' Environment within the Action Area
The primary factors affecting the summer tanager within the action area include loss of riparian habitat, hydrological alteration, and the adverse effects of invasive plant and animal proliferations associated with the fragmentation and alteration of the landscape. Groundwater pumping, water storage, and water diversions may also have a significant effect on this species within the action area by preventing or complicating the development of water-dependent, essential habitat components (Shafroth 1998, Stromberg *et al*. 2005, Stromberg *et al*. 1996, Stromberg *et al*. 1991).

EFFECTS OF THE ACTION
The effects analysis below is based on the following assumptions:
Species Conservation Goals and Objectives (Section 9) will be met through the Joint Project Review Process (Section 6.6.1.1) and Monitoring and Adaptive Management Programs (Sections 8 and 9).
Despite mutable General Plans of Local Permittees, future land uses and development patterns will reflect current land use trends (largely residential and tourist resort-commercial uses), thereby explicitly ruling out unlikely future land uses such as heavy industry, expansion of agriculture into native habitat (unregulated by the County and therefore not a Covered Activity), etc.
Per Section 10.7, Desert Fan Palm Oasis is a natural community subject to the no net loss policy.

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The mitigation measures proposed in the MSHCP are intended to conserve large areas of suitable breeding habitat for the summer tanager. Within the Plan Area, there are approximately 2,730 acres of modeled breeding habitat and 57,471 acres of modeled migratory habitat available for the summer tanager (NOTE: the acreage numbers specified here and the sections below reflect a discrepancy that was noted, after the final Plan was approved, in the amount of suitable habitat available for this species in the Mecca Hills/Orocopia Mountains conservation area). The Plan ensures conservation of 2,563 acres (94 percent) of modeled breeding habitat and 40,728 acres (71 percent) of modeled migratory habitat in perpetuity within the Reserve System. The BLM owns and manages 1,358 acres (2 percent) of modeled migratory habitat in the Plan area that is not included in conservation areas; the majority of these lands are classified as multiple-use class M – moderate use. These lands are managed to provide for a wider variety of uses such as mining, livestock grazing, recreation, utilities and energy development, while conserving desert resources and mitigating damages permitted uses may cause (BLM 2002).

Approximately 1,526 acres (60 percent) of modeled breeding habitat and 21,209 acres (52 percent) of modeled migratory habitat are currently preserved, leaving 1,037 acres and 19,519 acres of modeled habitat, breeding and migratory respectively, to be conserved as part of the

MSHCP. The conservation areas include the known or suspected breeding habitat for the summer tanager in Stubbe and Whitewater Canyon. Additional potential breeding habitat is present in a number of the conservation areas. Although a maximum of 10 percent of private land that has been modeled as summer tanager breeding and migration habitat could be impacted within each conservation area, the Plan's riparian no net loss policy ensures that any and all summer tanager habitat impacted within the conservation areas would be replaced in kind.

Although 90 percent of private lands within each conservation area would be conserved, the ultimate configuration of the Reserve System is unknown at this time. Reserve System configuration would be subject to the Conservation Objectives and Required Measures established in Section 4 and Species Conservation Goals and Objectives established in Section 9 of the MSHCP for each conservation area.

Minimization measures have been developed to reduce adverse impacts to this species. The measures include required avoidance, minimization, and mitigation measures such as avoiding project activity during the breeding and nesting season (Section 4.4), maintaining upland buffers for occupied habitat (Section 9), and implementing Land Use Adjacency Guidelines (Section 4.5) for land adjacent to or within conservation areas. These guidelines include noise thresholds, shielding or directing of lighting, use of barriers to minimize unauthorized access, and avoidance of invasive plants in landscaping. However, the proposed noise standard is known to exceed the tolerance of passerine birds and, therefore, would not effectively avoid/minimize adverse effects on the summer tanager. The Service has established a mitigation requirement for indirect impacts when noise levels are greater than 60 dBA, Leq hourly (RECON 1989). As a condition of the permit, the Implementation Manual, which will specify the requirements relative to noise associated with Covered Activities, shall have Service review and concurrence thus ensuring the appropriate avoidance and minimization measures are implemented.

The Plan also includes Management and Monitoring programs (Section 8) that would ensure the conservation of summer tanager, including control and management of activities that degrade summer tanager habitat; control of invasive species such as brown-headed cowbirds; and coordinated management efforts to maintain, enhance, or restore summer tanager habitat. Additionally, the monitoring program would include data collection to determine factors affecting the distribution and abundance of summer tanager throughout the Plan area.

Direct Effects

It is impossible to accurately quantify the number of birds that will be impacted as a result of the proposed action over the 75-year permit term due to the large Plan area. Therefore, the Service is quantifying the take as the number of acres of modeled habitat that will be impacted in the MSHCP Plan Area as a result of the proposed action.

We anticipate that up to 59 (2.2 percent) of the 2,730 acres of the summer tanager modeled breeding habitat and 13,040 (23 percent) of the 57,471 acres of modeled migratory habitat for the species within the Plan area but outside of the Conservation Areas could potentially be permanently lost as a result of implementation of the Plan. In addition, 2,331 (4 percent) of the 57,471 acres of modeled migratory habitat present on private lands within Conservation Areas could also be permanently lost. Finally, 109 (4 percent) of the 2,730 acres of the modeled

breeding habitat present on private lands within Conservation Areas could be temporarily lost. This loss is temporary as the Plan's wetland no net loss policy ensures that any and all summer tanager breeding habitat impacted within Conservation Areas would be replaced in kind. The no net loss policy will provide assurances that temporary losses to riparian areas will not limit the reproduction potential of summer tanagers as compared to the baseline condition.

Most or all lost habitat could be used for nesting and foraging habitat by summer tanagers. Moreover, the reestablishment of mature riparian habitat suitable for nesting by the summer tanager as a result of restoration measures is not anticipated to occur for many years after the original impacts have occurred. The mature cottonwood-willow forests typically used by the summer tanagers for breeding are particularly time-consuming and logistically difficult to replace. The Plan states that consideration should be given to the management of riparian areas with regard to the successional stages that benefit each of the five riparian bird species included in this Plan (Section 9); however, it is unclear how this will be achieved. As a condition of the permit, a specific time frame has been imposed to limit the impacts associated with the lag between disturbance and restoration.

Because of the proposed avoidance of Covered Activities during the breeding season, summer tanagers should not be directly harmed or killed by Covered Activities. In addition, all known or potential breeding habitats occupied by breeding summer tanagers are currently in areas that likely would not be impacted as a result of the permitting of the Plan. There is a potential removal of 23 percent of modeled summer tanager migratory habitat. The local breeding race of the species is encountered exceedingly rarely in migration and the species as a whole is rare, at best, within the Plan Area during migration and winter periods (e.g., Garrett and Dunn 1981). As is suggested in the Plan model, the species has broad habitat preferences away from breeding grounds. Therefore, loss of this migratory habitat is not expected to limit migration of the bird through the Plan area.

Indirect Effects

Any Covered Activity-related creation and maintenance of conditions that favor the establishment and proliferation of invasive plants could impact the status of the summer tanager. Undisturbed areas vegetated with native species are much more resistant to invasion by tamarisk and other invasive plants. By contrast, areas directly affected or disturbed by construction and other landscape alteration activities are likely to accommodate, sustain, and facilitate the spread of non-native plants within the Plan area. Stands of tamarisk and other invasive non-native plants provide little or no habitat for the summer tanager, and progressively destroy native habitat elements by outcompeting them or producing microenvironments susceptible to fire or erosion.

Unfortunately, the increase and spread of invasive plants such as tamarisk are continuing relatively unabated in the Southwest. In the long term, the Covered Activity-related alteration of the landscape within the Plan Area and associated potential establishment and dispersal of select non-native plants likely would overwhelm native riparian habitats occupied by the summer tanager and other riparian-obligate species in the action area. However, the Plan proposes to control non-native invasives, which would prevent this otherwise adverse impact of human activity.

The disturbance or removal of existing riparian and upland vegetation may also result in the creation of cowbird foraging habitat or increase cowbird parasitism rates resulting in adverse impacts to the summer tanager. Numerous studies have revealed that overall nest success of songbirds in the United States and southern California in particular is depressed in habitat fragments or edges due to the individual or combined effects of nest parasitism by the cowbird, nest depredation, and possibly, documented reductions in insect prey (e.g., see Askins 2000, Zembal *et al.* 2003). Cowbirds prefer feeding in open areas (Garrett and Dunn 1981) that are largely created by human alterations of the landscape. Such areas include manicured parks and lawns and the landscaping often associated with developed properties. Because even small numbers of cowbirds can strongly impact the reproductive success of southwestern riparian species (Powell and Steidl 2000), any Covered Activity-related feature that creates conditions favorable to cowbirds in, or immediately adjacent to, project areas could decrease the reproductive success of summer tanagers in the absence of effective management measures.

Proposed mitigation measures (e.g., work restrictions during the breeding season) will substantially reduce or eliminate many indirect, project-related effects (e.g., noise and vibration) that might otherwise have occurred. Similarly, management measures such as invasive plant and animal control, riparian buffers, and the conservation of large blocks of summer tanager habitat would mitigate – or perhaps entirely compensate for – the effects associated with the project-induced fragmentation of the summer tanager breeding habitats.

The potential spillage and/or dispersal of contaminants (e.g., crude oil, fuel, petroleum products, solvents) within the action area as result of the construction or implementation of the project could have adverse consequences to breeding summer tanagers. Given that the bioaccumulation of toxic substances may cause reproductive failures in birds, the discharge, dispersal, and accumulation of potentially toxic environmental contaminants associated with construction and implementation of, for instance, residential housing and commercial projects, could adversely affect the summer tanager by decreasing recruitment and, in turn, abundance.

In addition, best management practices and conservation measures incorporated into the Land Use Adjacency Guidelines should contribute to a decreased likelihood of the accidental spillage and dispersal of environmental contaminants during the construction. .

CHANGED CIRCUMSTANCES

The Changed Circumstances that are likely to affect the summer tanager are drought, fire, invasion by new exotic species, and lowering of the water table. Drought and lowering of the water table may reduce water flows through areas of existing habitat and/or restored habitat. The need to maintain water flows through riparian areas is critical to maintain suitable areas of breeding and migratory habitat for this species. Section 6 of the Plan states that a drought event significantly affecting Covered Species is not anticipated to occur during the life of the Permit. Nevertheless, measures will be taken to monitor the effects of drought on Covered Species. Extended periods of drought in the action area could lead to changes in both the aboveground and belowground water dynamics affecting both plant survival and species composition (Shafroth *et al.* 2002). Therefore, monitoring in the event of an identified drought should include quantitative information on survival and species composition in existing riparian areas.

The Plan (section 6) defines lowering of the water table as an increase in the depth to groundwater that significantly affects water availability to mesquite plants in the Willow Hole, East Indio Hills, or Thousand Palms Conservation Areas. Preventative measures to reduce the chances of this changed circumstance occurring include monitoring programs to determine whether substantial lowering of the water table occurs. The planned response in the event monitoring detects a substantial lowering or a decline in mesquite health in these areas includes, among other things, development of feasible measures to ameliorate the effects of substantial lowering of the water table on mesquite hummocks and associated Covered Species. To determine the health of mesquite in these areas, the monitoring should provide quantitative information on the timing and extent of morphological responses and mortality of mesquite to the rate, depth, and duration of water table declines to assist in the design of management of feasible measures to minimize impacts of groundwater depletion on mesquite in these areas.

Unintended fire in the desert environment could spread to riparian areas, particularly in the Dos Palmas area given the existing access to off-road vehicle users. The preventive measures identified in the Plan will assist in reducing the risk and spread of fires from the desert to the riparian areas. Proper controls and configurations will reduce the risk of wildfire spreading into these areas and establish appropriate site-specific response actions. Wildlife Agency oversight should ensure that these tasks are completed appropriately and in a timely fashion.

Various disturbances, including fire, can result in the establishment of new exotic species within riparian areas. The most likely impact associated with exotic species is the invasion of an exotic plant that changes the structural characteristics of these areas. The Plan area already has exotic plant species that warrant monitoring and management, and this management should afford the opportunity to identify and address new exotic plants relatively quickly before major invasions become established.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

We are unaware of any non-Federal actions affecting the summer tanager that are reasonably certain to occur in the action area considered by this opinion. Even if activities are proposed within the Plan Area outside of the purview of the Plan, the breeding habitat of the summer tanager within the Plan Area and the United States range of the species as a whole is almost invariably located partly (and often entirely) within the jurisdiction of the Corps of Engineers pursuant to Section 404 of the Clean Water Act. In addition, approximately 50 percent of summer tanager habitat within conservation areas is located on Federal property.

The Agua Caliente Band of Cahuilla Indians is undertaking a Habitat Management Plan for all of their Tribal lands. The draft Plan and associated documents have been reviewed publicly. It is anticipated that the final Plan and associated environmental analysis will be complete in mid-2008 with permit issuance scheduled for late 2008. Although there will be habitat loss

associated with that Plan, the overall net benefit to the species is positive. Because issuance of that permit is a Federal action, an analysis of the impacts of that Plan will be completed in the required section 7 process.

CONCLUSION
After reviewing the current status of the summer tanager, the environmental baseline for the action area, effects of the proposed action, the cumulative effects, and proposed permit conditions, it is our biological opinion that the proposed action is not likely to jeopardize the continued existence of the summer tanager. Our conclusion is based on the following findings:

Conservation measures have been proposed to minimize Covered Activity-related direct effects and thus only marginally alter the baseline of breeding habitat, abundance, and distribution for the summer tanager within the project action area. In particular, the proposed habitat conservation and/or creation efforts would ensure that the function of an essential core breeding area for summer tanagers is maintained within the action area and California population center; and the broad habitat preferences of migrating and wintering summer tanagers will prevent jeopardy to the species despite the removal of 27 percent of migratory habitat currently available to the species within the Plan Area; and the proposed action likely would not induce considerable indirect effects to the summer tanager resulting from implementation of the proposed Covered Activities. Although the proposed Covered Activities would contribute to the fragmentation and disturbance of summer tanager habitat in the Plan Area and potentially subject summer tanagers to increased depredation, parasitism, and the impacts associated with the proliferation of invasive plants, the proposed monitoring and management of the Reserve System would likely maintain substantial amounts of habitat that will provide a secure environment for individuals displaced or otherwise indirectly impacted by Covered Activities.

AMOUNT OR EXTENT OF TAKE
It is presently impossible to quantify the number of birds that would be impacted as a result of the proposed action over the 75-year permit term due to the large Plan Area. Therefore, the Service is quantifying the take as the number of acres of modeled habitat that would be impacted in the proposed Plan Area as a result of the proposed action. We anticipate that up to 59 acres of modeled breeding habitat and 15,371 (13,040 + 2,331) acres of modeled migratory habitat within the Plan Area would become unsuitable for the summer tanager as a result of the proposed action. An additional 109 acres of breeding habitat would be disturbed in Conservation Areas under the Plan, but these acreages would be restored or replaced to ensure no net loss of riparian habitats in the Conservation Areas. Finally, small, but as yet undeterminable, numbers of summer tanagers may be taken as a result of monitoring and management actions.

PERMIT CONDITIONS
The CVCC, after coordination with its Implementation Manual Subcommittee, shall provide the Implementation Manual for review and concurrence by the Wildlife Agencies prior to its finalization and distribution to the Permittees.

The CVCC shall ensure that the mesquite hummocks Natural Community will be subject to a "no net loss" requirement as described in Section 8.2.4.1 of the Plan. The CVCC shall ensure that all no net loss requirements are implemented within 10 years of impacts, including providing

suitable or potential habitat for Covered Species if such habitat is affected or lost due to Covered Activities.

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MAMMALS

Western yellow bat (*Lasiurus xanthinus*)
Formerly Southern yellow bat (*Lasiurus ega*)

Status of the Species
Species and Critical Habitat Legal/Listing Status
Lasiurus xanthinus formerly was included in *L. ega*. *L. xanthinus* was retained within *L. ega* by Koopman (in Wilson and Reeder 1993), Kurta and Lehr (1995), and Kurta (in Wilson and Ruff 1999). However, Jones *et al.* (1992) and Baker *et al.* (2003) recognized *L. xanthinus* as distinct based on chromosomal and electrophoretic evidence collected by Baker *et al.* (1988). Only *L. xanthinus* occurs in California.

The western yellow bat currently is not federally or California State listed. The western yellow bat is on the draft revised California Mammal Species of Special Concern (MSSC) list due to its limited distribution and apparently restrictive habitat requirements (Betsy Bolster, CDFG, pers. com. 2005). The California Natural Diversity Database (CNDDB) ranks the western yellow bat as G5S3. The G5 ranking indicates that the species is considered to be "demonstrably secure; common through its historic range," while the S3 indicates that, in California, the western yellow bat has a "restricted range" of 21 to 100 element occurrences (EO's), 3,000 to 10,000 individuals, or 10,000 to 50,000 acres of occupied habitat. NatureServe Explorer (2005) gives *L. xanthinus* a Natural Heritage Global Rank G5 (Secure); S1 (Critically imperiled) in Arizona, New Mexico, Nevada, and Texas; and as SNR in California (Not Ranked/Under Review). The Biota Information System of New Mexico (BISON 2004) lists the western yellow bat as U.S. Forest Service Region 3 Sensitive (Arizona and New Mexico), a State Threatened Species in New Mexico and Texas, and as an Arizona Species of Special Concern.

Species Description
The western yellow bat, in the family Vespertilionidae, is a medium-large sized bat with fur that is yellowish-buff/light brownish tipped with gray or white. The forearm length is 1.6–1.9 inches (41.5–49.0 millimeters); wings are long, with a wingspan of 13.4-14.2 inches (335.0-355.0 millimeters); weight is 0.4-0.5 ounce (10-15 grams). Sexual dimorphism exists in this species, with the female averaging 0.08 inch (2.0 millimeters) longer forearm length than males (Williams 2005). Lasiurine bats have short, round ears and a long tail membrane (uropatagium) with the anterior portion well furred, while the posterior half is bare or with scattered hairs.

Recent studies suggest that the western yellow bat is genetically different from the southern yellow bat (*L. ega*) (Baker *et al.* 1988). Morphologically, the western yellow bat cannot be reliably distinguished from the southern yellow bat, but the western yellow is more common further west than the southern yellow (Texas Parks and Wildlife Department 2005; Connor 2004; Harvey *et al.* 1999). The western yellow may be confused with *L. blossevillii*, but is larger and has more yellow fur. The coloration is most similar to *Antrozous pallidus* (which has large ears) and *Pipistrellus hesperus* (which is much smaller and has a black mask).

Distribution

The range of the western yellow bat extends southward from southwestern New Mexico, southern Arizona, and southern California through Baja California, western Mexico, and the Mexican Plateau to Nuevo Leon and Morelos (Constantine 1998; Harvey *et al.* 1999). Barbour and Davis (1969) suggested that this species may be extending its range in the United States. Constantine recorded the first observation in California from Palm Springs in 1945. It has since been detected in fourteen additional localities in the counties of Riverside, San Bernardino, San Diego, Los Angeles, and Imperial (Constantine *et al*. 1979; Constantine 1998). The first record of a western yellow bat captured in Texas was reported from Big Bend National Park in 1997 (Higgenbotham *et al.* 1999). The first record in Nevada was from the Moapa Valley National Wildlife Refuge (MVNWR), Muddy River, Clark County, in January 1999 (O'Farrell *et al.* 2004). The range expansion may be due to the increased usage of ornamental palms in landscaping (Williams 2005).

Habitat Affinities

Fossil evidence indicates that the California fan palm (*Washingtonia filifera*) that makes up the fan palm oasis woodland, apparently the preferred habitat of the western yellow bat, once extended throughout the Mojave and Sonoran deserts, to the Pacific coast of California. However, due to geologic and climatic changes, there are only about 70 desert oases where they occur naturally, ranging from Death Valley National Park south into northern Baja California, Mexico. A few specimens occur in extreme southern Nevada and western Arizona (Dimmitt 2000; Pyle 2005).

The western yellow bat has been recorded below 2000 feet (600 meters) in valley foothill riparian, desert riparian, desert wash, and palm oasis habitats in southern California (California Department of Fish and Game; CDFG 1999) and up to 6500 feet (2000 meters) in the mountains of Arizona (Williams 2005). This species is associated with dry, thorny vegetation on the Mexican Plateau, but shows a particular association with palms and other desert riparian habitats in the southwestern United States (Williams 2005). Roosting, foraging, and breeding appears to occur in both native and non-native palm trees (Mirowsky 1997; O'Farrell *et al.* 2004). Of the four habitats (riparian marsh, mesquite bosque, California palm groves, and riparian shrubland) acoustically investigated by Williams (2001) in southern Nevada, the western yellow bat was detected in exotic California fan palm groves 80 percent of the time. Yellow bats were reported roosting in native riparian trees along the Bill Williams River in Arizona (Pat Brown, pers. comm. 2005). Barbour and Davis (1969) reported that, in New Mexico, this species was found to roost in hackberry and sycamore trees approximately 14-15 feet above the ground and were netted over water holes in an intermittent stream. In Texas, one male was reported roosting in a yucca (Higgenbotham *et al.* 2000), and pups were found on dead fronds trimmed from palm trees (Mirowsky 1997).

Life History

Little is known about the life history of the western yellow bat. This species probably does not hibernate, as activity has been observed year-round in both the southern and northern portions of their range (Williams 2005). A portion of the breeding population may be migratory, but Kurta and Lehr (in O'Farrell *et al.* 2004) indicate year-round presence in southern Arizona and

California. Although there is year-round activity in southern Nevada, the number of individuals captured and the number of minutes of activity decline during the winter months (O'Farrell *et al.* 2004). Western yellow bats wrap themselves into their tail membrane for added thermal regulation while roosting (Arizona Game and Fish Department; AGFD 2003). This species may roost individually or in small groups. It has been suggested that seasonal segregation between sexes during parturition may occur in northern portions of this species range, as males are scarce from April through June. However, in southern Nevada, seasonal segregation apparently does not occur, as both sexes have been captured throughout the year (O'Farrell *et al.* 2004).

The breeding status of the western yellow bat in California is unknown due to lack of data. No pregnant or lactating females had been reported from Arizona until June 2005 when a tree trimmer found a western yellow bat pup that had fallen out of a palm tree in Tucson (AGFD 2005). Litter size is from one to four per year, with pregnant females known from late April through June, and lactation occurring during June and July (Williams 2005). Like other species of *Lasiurus*, females of this species have two pair of mammae instead of a single pair. No data are available on this species home range or territory size (CDFG 1999).

Western yellow bats are nocturnal insectivores, emerging from their roosts in the evening to forage on Coleoptera, Diptera, Hemiptera, Homoptera, Lepidoptera, and Orthoptera (O'Farrell *et al.* 2004). Some western yellow bats forage over ponded water in streams (Findley *et al.* 1975). However, it is unknown where the yellow bats in the Coachella Valley forage as they emerge from the palm trees and leave the canyons (Matthew Rahn, pers. comm. 2005).

Population Trends

Barbour and Davis (1969) suggested that this species may be extending its range in the United States. Extension of its westernmost and northernmost range is supported by its appearance at sites in southern Los Angeles and San Bernardino counties in California (Constantine 1998) and at the MVNWR in southern Nevada (O'Farrell *et al.* 2004). While the species range may be expanding as a result of the increased use of palms in landscaping, there are no estimates of population size or density.

Threats

The primary threat to the western yellow bat is the loss or degradation of roosting habitat created by dead palm fronds on standing live palm trees. The trimming of native and non-native palm trees for aesthetic or fire management purposes usually completely removes viable roosting habitat. The loss of dead fronds in the spring and summer before the pups can fly could result in the loss of a year's reproduction. Fires occurring naturally from lightning or intentional vandalism also pose a threat to viable roosting habitat through the removal of dead palm leaf skirts of fan palms. The loss of riparian forest and woodland may also affect roosting and foraging habitats. In addition, the use of pesticides in date palm and other orchards could be a threat to both roosting bats and the insects upon which they forage. Domestic cats, either feral or pets, are also a source of predation.

Synopsis of Status

The species' range appears to be expanding as a result of the increased use of ornamental palm

trees; however, there are no population estimates for any of the known localities. The western yellow bat is reported to be common in south-central Arizona, but uncommon elsewhere throughout its range in the United States. However, the Natural Heritage ranks the bat as "critically imperiled" in Arizona (NatureServe 2005), and it is on the draft revised California MSSC list due to the species' limited distribution and restricted habitat requirements.

Environmental Baseline
Status of the Species in the Action Area
As discussed under *Habitat Affinities*, fossil evidence indicates the California fan palm (*Washingtonia filifera*) that makes up the fan palm oasis woodland, apparently the preferred habitat of the western yellow bat, once extended throughout the Mojave and Sonoran deserts to the Pacific coast of California. Although there are only approximately 70 desert oases where they occur naturally due to geologic and climatic changes, a significant number of the native palm oases in southeastern California occur in the Coachella Valley, thus eluding to the importance of the these areas, including those in the Plan Area.

Insufficient data exist to determine the acreage of habitat available range-wide. The potential habitat for the western yellow bat is widely dispersed in the Plan Area. Naturally occurring palm oases are found along the San Andreas Fault in the Indio Hills area and at Dos Palmas. Palm oases are also found in canyons and associated with seeps in the San Jacinto and Santa Rosa Mountains, in the Mecca Hills, and in Cottonwood Canyon in Joshua Tree National Park. However, no Core Habitat was described for the western yellow bat because there were not enough data available on the occurrence of this species within the Plan Area to evaluate and determine Core Habitat. Therefore, desert fan palm oasis woodland occurring within the MSHCP Reserve System was considered as Other Conserved Habitat. The Other Conserved Habitat areas of the proposed MSHCP Reserve System for the western yellow bat consist of approximately 1,316 acres of habitat (1,297 acres of desert fan palm oasis woodland) within eight conservation areas, described separately below: Whitewater Canyon, Willow Hole, Thousand Palms, Indio Hills Palms, Joshua Tree National Park, Mecca Hills/Orocopia Mountains, Dos Palmas, and the Santa Rosa and San Jacinto Mountains. Approximately 660 acres of modeled yellow bat habitat within the Plan Area occurs within Existing Conservation Lands managed by local, state, or federal agencies, or non-profit conservation organizations. Approximately 887 acres of habitat (867 acres of desert fan palm oasis woodland) in the Plan Area are subject to the Permit.

The Plan assumes that the yellow bat occurs throughout the Coachella Valley in palm oases and in residential areas with untrimmed palm trees. However, this is an unverified assumption. The western yellow bat is known from three locations within the Plan Area: Thousand Palms Preserve, Dos Palmas Preserve/Area of Critical Environmental Concern (ACEC), and on the Applegarth Ranch in the Thermal Area. Two of these occur within conservation areas, while the third is a privately held parcel that includes a planted oasis of fan palms. This property is not within a conservation area, but is currently held for conservation by a local land trust, the Friends of the Desert Mountains. The western yellow bat was also identified within Indian Canyons on the Agua Caliente Reservation using an ANABAT (The ANABAT system converts the ultrasonic echolocation signals of bats into audible electronic signals that can be recorded and processed, to assist in identification of the species.) system (Tierra Environmental Consultants

2003). There is no estimate of the population size, either range-wide or within the Plan Area due to lack of data.

Collisions with wind turbines may result in western yellow bat mortality. According to Michael O'Farrell, western yellow bats have been observed flying as high as 30-50 meters and may be highly susceptible to colliding with wind turbines (pers. comm. to J. Stuckrath, January 17, 2008). However, no data are available for bat mortality associated with wind turbines in the Coachella Valley (Matthew Rahn, San Diego State University, Field Station Program, pers. comm. to J. Stuckrath, January 16, 2008).

Whitewater Canyon Conservation Area
Whitewater Canyon Conservation Area consists of approximately one acre of modeled yellow bat habitat located within Existing Conservation Lands controlled by BLM. The primary factors affecting the western yellow bat is the loss of roosting habitat as a result of tree trimming for aesthetic and fire management reasons, as well as the loss of habitat due to natural fires and vandalism. This conservation area is within Conservation Level 2, and it is anticipated that there would be minimal habitat loss in conjunction with trails and trailheads. Management objectives include habitat enhancement and protection through controlling access to appropriate areas and monitoring the effectiveness of the Management Program.

Willow Hole Conservation Area
The Willow Hole Conservation Area consists of 20 acres of modeled habitat. Of this total, one acre is Existing Conservation Land controlled by BLM. The primary factors affecting the western yellow bat is the loss of roosting habitat as a result of tree trimming for aesthetic and fire management reasons, as well as the loss of habitat due to natural fires and vandalism. OHV activity could increase the frequency of fires either through accidental ignition resulting from sparks or riders intentionally setting fire to dead palm fronds. To adequately manage this conservation area, OHV activity and associated adverse effects need to be effectively controlled. Although it was the intention of the BLM's California Desert Conservation Area Plan (CDCA) Plan Amendment and its associated Terms and Conditions within the Biological Opinion to manage these areas, it appears that management and enforcement activities, such as patrolling and blocking access, have not been entirely successful. We anticipate that activities on BLM lands would be addressed through our section 7 consultation process on the CDCA and that management would be consistent with that of the MSHCP. This conservation area is within Conservation Level 2, and it is anticipated that there would be minimal habitat loss in conjunction with trails and trailheads; but some existing uses (0.5 acre) that impact natural qualities occur. Management objectives include habitat protection through land acquisition and control of deleterious activities such as OHV use.

Thousand Palms Conservation Area
The Thousand Palms Conservation Area consists of approximately 137 acres of modeled yellow bat habitat within Existing Conservation Lands controlled by BLM, State Parks, and TNC. OHV activity could increase the frequency of fires either through accidental ignition resulting from sparks or riders intentionally setting fire to dead palm fronds. In addition, Saharan mustard has invaded the Thousand Palms Preserve, and was estimated to cover 40 percent of the sampled sand fields in 2005 (C. Barrows, pers. comm.). The effect of this invasive species on desert fan

palm oasis woodlands is unknown but may increase vulnerability of the palm oasis to fire. This conservation area is within Conservation Level 2, and it is anticipated that there would be minimal habitat loss in conjunction with trails and trailheads. The Preserve System is managed to protect and enhance the habitat of the Coachella Valley fringe-toed lizard. Primary management actions range from control of invasive species and limiting public access to compatible scientific, educational, and recreational uses. A tamarisk eradication program has been successfully completed.

Indio Hills Palms Conservation Area

The Indio Hills Palms Conservation Area consists of 93 acres of modeled yellow bat habitat. Of this total, approximately 46 acres of modeled habitat occurs in Existing Conservation Lands controlled by State Parks and managed per an MOU as part of the Coachella Valley Fringe-toed Lizard Preserve by the Preserve Management Committee. The Indio Hills are part of the watershed for the desert fan palm oasis woodlands. These oases are also dependent on groundwater brought to or near the surface by the San Andreas Fault. The primary factors affecting the western yellow bat is the loss of roosting habitat as a result of tree trimming for aesthetic and fire management reasons, as well as the loss of habitat due to natural fires and vandalism. OHV activity could increase the frequency of fires either through accidental ignition resulting from sparks or riders intentionally setting fire to dead palm fronds. This conservation area is within Conservation Level 2, and it is anticipated that there would be minimal habitat loss in conjunction with trails and trailheads. The primary management objective for Level 2 lands is maintenance of natural values, but some existing uses that impact natural qualities occur. This preserve will be incorporated into the MSHCP Reserve System and management of State Parks' lands will be consistent with the Conservation Area and Covered Species Goals and Objectives of the Plan.

Joshua Tree National Park

The Joshua Tree National Park Conservation Area consists of 5 acres of modeled yellow bat habitat within Existing Conservation Lands controlled by NPS. Joshua Tree National Park Conservation Area is connected to the Thousand Palms Conservation Area through the Indio Hills/Joshua Tree National Park Linkage Conservation Area. The primary factors affecting the western yellow bat is the loss of roosting habitat as a result of tree trimming for aesthetic and fire management reasons, as well as the loss of habitat due to natural fires and vandalism. OHV activity could increase the frequency of fires either through accidental ignition resulting from sparks or riders intentionally setting fire to dead palm fronds. This conservation area is within Conservation Level 1 and 2. All development is precluded from the one oasis within Conservation Level 1; however, within Conservation Level 2, we anticipate that there would be minimal habitat loss in conjunction with trails and trailheads within the two oases. These lands are managed in accordance with the 1964 Wilderness Act to protect and maintain the area in its natural state.

Mecca Hills/Orocopia Mountains Conservation Area

The Mecca Hills/Orocopia Mountains Conservation Area consists of one acre of modeled habitat within Existing Conservation Lands controlled by BLM. This conservation area is predominantly within the Mecca Hills Wilderness and the Orocopia Mountains Wilderness. Hydrological processes in this area maintain desert dry wash woodland and desert fan palm oasis

woodland. The primary factors affecting the western yellow bat is the loss of roosting habitat as a result of tree trimming for aesthetic and fire management reasons, as well as the loss of habitat due to natural fires and vandalism. OHV activity could increase the frequency of fires either through accidental ignition resulting from sparks or riders intentionally setting fire to dead palm fronds. This conservation area is within Conservation Level 1; therefore, no habitat loss is anticipated. The Mecca Hills and Orocopia Mountains Wilderness areas are managed under the 1964 Wilderness Act, the 1994 California Desert Protection Act, and all applicable laws, regulation, and policy. These areas are also addressed in the Northern and Eastern Colorado Desert Coordinated Management Plan (NECO), as well as the CDCA.

Dos Palmas Conservation Area
The Dos Palmas Conservation Area consists of 125 acres of modeled habitat. Of this total, 69 acres occurs within Existing Conservation Lands controlled by BLM and the WCB. The Dos Palmas Conservation Area consists of the existing Dos Palmas ACEC, the existing Oasis Springs Ecological Reserve, and a portion of the existing Salton Sea State Recreation Area. Habitat restoration opportunities exist in this conservation area because of the prevalence of tamarisk. The primary factors affecting the western yellow bat is the loss of roosting habitat as a result of tree trimming for aesthetic and fire management reasons, as well as the loss of habitat due to natural fires and vandalism. OHV activity could increase the frequency of fires either through accidental ignition resulting from sparks or riders intentionally setting fire to dead palm fronds. This conservation area is within Conservation Level 2, and it is anticipated that there would be minimal habitat loss in conjunction with trails and trailheads; but some existing uses (25.5 acres) that impact natural qualities occur. The existing Management Plan focuses on protecting the entire Dos Palmas ecosystem to provide generally for the conservation of the species and natural communities that occur at Dos Palmas.

Santa Rosa and San Jacinto Mountains Conservation Area
The Santa Rosa and San Jacinto Mountains Conservation Area consists of 934 acres of modeled habitat. Of this total, 400 acres are within Existing Conservation Lands controlled by BLM, USFS, and WCB. This Conservation Area contains 70 percent of the desert fan palm oasis woodlands in the Plan Area. The desert fan palm oasis woodlands in this conservation area are maintained by hydrological processes such as flooding, groundwater from springs, and the availability of perennial water. To adequately manage this conservation area, these hydrological processes would need to be protected. This conservation area is within Conservation Level 2, and it is anticipated that there would be minimal habitat loss in conjunction with trails and trailheads.

Outside of Conservation Areas
Approximately 12 acres of modeled habitat occur within the Plan Area but outside the conservation areas. Agua Caliente Band of Cahuilla Indians Tribal lands occur as a checkerboard throughout much of the Plan Area. Modeled potential habitat for this species totals approximately 1,176 acres. Of this number, 869 acres of modeled habitat occur on Tribal lands within their action area, including: approximately 467 acres in the Mountains and Canyons Conservation Area (MCCA); 12 acres in the Valley Floor Conservation Area (VFCA); and 390 acres of Tribal lands outside the Reservation in the MCCA. Under the draft Tribal HCP, approximately 782 acres (90 percent) of the 869 acres of modeled habitat for the western yellow

bat is proposed for in-place conservation within the Tribal HCP Plan Area. Tribal lands are not subject to this Plan.

Factors Affecting the Species' Environment within the Action Area
The primary factors affecting the western yellow bat is the loss of roosting habitat as a result of tree trimming for aesthetic and fire management reasons, as well as the loss of habitat due to natural fires and vandalism. OHV activity could increase the frequency of fires either through accidental ignition resulting from sparks or riders intentionally setting fire to dead palm fronds. Loss of bat habitat could also result from degradation of desert fan palm oases through changes in the hydrological regimes that maintain these oases. Primary threats to these oases include invasive plants such as tamarisk that may dominate the community, and edge effects. The oases occur where springs or streams provide perennial water. Most of the springs are associated with earthquake faults in the canyons of the Indio Hills and in the Santa Rosa and San Jacinto Mountains.

Management and Monitoring
Currently, no management or monitoring specific to this species occurs within the Plan Area. Management of Existing Conservation Lands focuses on conservation of the entire ecosystem, thus providing for the conservation of the species. The San Diego State University Field Station Program is conducting ANABAT and thermal imaging studies with the Agua Caliente Band of Cahuilla Indians in three canyons on the reservation.

Effects of the Action
Urban Development
Direct Effects
The entire Plan Area includes approximately 1,329 acres of modeled habitat for the western yellow bat. Of this acreage, 887 acres are subject to the Permit (i.e., non-Federal lands) (Table 4-116 of the MSHCP). Approximately 12 acres (1 percent) of the modeled habitat is outside MSHCP conservation areas and anticipated to be lost due to MSHCP implementation. Within the conservation areas, it is anticipated that 10 percent of modeled habitat on private lands would be subject to loss. Specifically, the MSHCP anticipates that 66 acres of modeled Other Conserved Habitat would be lost within four conservation areas: Willow Hole (2 acres), Indio Hills Palms (5 acres), Dos Palmas (6 acres), and the Santa Rosa and San Jacinto Mountains (53 acres;). The exact location and configuration of these acres is not known. However, the acres proposed to be lost would be subject to the Conservation Objectives and Required Measures for each conservation area as described in Section 4 of the MSHCP. Thus, a total of 78 acres of western yellow bat habitat would be lost under the Plan.

Direct effects to the species also could be a result of trimming dead palm fronds for either fire management or aesthetic purposes on private lands. The removal of dead palm fronds could directly injure western yellow bat pups if done prior to the pups flying. Trimming or removal would alter or destroy the species habitat making it unable to sustain individuals or populations of this species. As a member of the Reserve Management Oversight Committee, the Service will work with the CVCC and the Land Manager to ensure that any palm trimming that is necessary on Reserve Lands is conducted to avoid or minimize impacts to this species.

Inside of the Conservation Areas
MSHCP anticipates the loss of up to 66 acres (10 percent) of the modeled habitat for the western yellow bat on private lands within the conservation areas. Land Use Adjacency Guidelines as described in Section 4.5 would minimize the impacts of development in the conservation areas and adjacent to the Reserve System.

Whitewater Canyon Conservation Area
One acre of modeled western yellow bat habitat occurs within Existing Conservation Lands controlled by BLM and is anticipated to be included in the MSHCP Reserve System. Up to 1 percent of BLM lands may be impacted per the Coachella Amendment to the CDCA Plan.

Willow Hole Conservation Area
The Willow Hole Conservation Area includes 20 acres of modeled western yellow bat habitat. Of this total, 17 acres (85 percent) are proposed for conservation and 2 acres (10 percent) are anticipated to be lost. An additional one acre is within Existing Conservation Lands controlled by BLM and is anticipated to be included in the MSHCP Reserve System.

Thousand Palms Conservation Area
Thousand Palms Conservation Area includes 137 acres of modeled western yellow bat habitat within Existing Conservation Lands. The Existing Conservation Lands are managed by BLM and State Parks and are anticipated to be included in the MSHCP Reserve System. Up to 1 percent of BLM lands may be impacted per the Coachella Amendment to the CDCA. The Existing Conservation Lands owned by TNC are anticipated to be fully conserved and included in the MSHCP Reserve System.

Indio Hills Palms
The Indio Hills Palms Conservation Area includes 93 acres of modeled habitat within the conservation area. Of this total, 42 acres (45 percent) are proposed for conservation and 5 acres (5 percent) are anticipated to be lost. An additional 46 acres (49 percent) are within Existing Conservation Lands controlled by CDPR that are anticipated to be included in the MSHCP Reserve System.

Joshua Tree National Park
Joshua Tree National Park Conservation Area includes 5 acres of modeled yellow bat habitat within Existing Conservation Lands controlled by NPS and are anticipated to be included in the MSHCP Reserve System. No additional impacts are anticipated within this conservation area.

Mecca Hills/Orocopia Mountains Conservation Area
One acre of modeled western yellow bat habitat occurs within Existing Conservation Lands controlled by BLM and is anticipated to be included in the MSHCP Reserve System. Up to 1 percent of BLM lands may be impacted per the Coachella Amendment to the CDCA Plan.

Dos Palmas Conservation Area
The Dos Palmas Conservation Area includes 125 acres of modeled western yellow bat habitat. Of this total, 50 acres are proposed to be preserved and 6 acres are anticipated to be lost. An additional 69 acres are classified as Existing Conservation Lands that are managed by BLM and

WCB and are anticipated to be included in the MSHCP Reserve System. Up to 1 percent of BLM lands may be impacted per the Coachella Amendment to the CDCA Plan.

Santa Rosa and San Jacinto Mountains Conservation Area
The Santa Rosa and San Jacinto Mountains Conservation Area includes 934 acres of modeled western yellow bat habitat. Of this total, 481 acres are proposed for conservation and 53 acres are anticipated to be lost. An additional 400 acres of modeled habitat for the western yellow bat are classified as Existing Conservation Lands, managed by BLM, USFS, and WCB, are anticipated to be included in the MSHCP Reserve System. Up to 1 percent of BLM lands may be impacted per the Coachella Amendment to the CDCA Plan.

Outside of the Conservation Areas
The proposed loss of 12 acres of western yellow bat habitat outside of the conservation areas would predominately result from Covered Activities, particularly development and associated infrastructure. The loss of approximately 1 percent of modeled yellow bat habitat is relatively small compared to the 94 percent of modeled habitat proposed for conservation within the Plan Area.

Agua Caliente Band of Cahuilla Indians Tribal lands occur as a checkerboard throughout much of the Plan Area. Under the draft Tribal MSHCP, approximately 782 acres (90 percent) of the 869 acres of modeled habitat for the western yellow bat is proposed for in-place conservation within the Tribal HCP Plan Area. Up to 10 percent (87 acres) of the naturally occurring palm oases and 15 percent of adjacent upland areas could be impacted within the Tribal HCP Plan Area. However, the no-net-loss standard would result in no fan palm oases habitat being lost after mitigation. Of the total 1,176 acres of modeled habitat for the western yellow bat that occurs within the Tribal HCP Action Area, approximately 479 acres occurs on reservation lands and an additional 390 acres of modeled habitat occur on Other Tribal Lands owned by the Tribe but outside the reservation. Approximately 148 acres of modeled western yellow bat habitat are designated as BLM Exchange Lands, and 159 acres are classified as Target Acquisition Lands. The latter two categories are currently included within conservation areas of the MSHCP.

Indirect Effects
Indirect effects would primarily result from activities that may reduce prey species for the western yellow bat, such as the use of pesticide in date palm or other fruit orchards. The indirect effects would not necessarily result in immediate harm to the species, but over time may reduce the ability of the bat to find appropriate food sources.

Avoidance and Minimization Measures Included in the Plan
The mitigation and minimization measures proposed in the MSHCP are intended to conserve a minimum of 90 percent of the modeled habitat for the western yellow bat occurring on private lands within each of the conservation areas with suitable roosting/breeding habitat. The Reserve System has been designed to include most of the palm oases along the San Andreas Fault and all of the oases occurring in the Mecca Hills/Orocopia Mountains, Joshua Tree National Park, and the San Jacinto and Santa Rosa Mountains (except for those on the Agua Caliente Indian Reservation). Approximately 1,250 acres (94 percent) of modeled western yellow bat habitat are proposed to be conserved throughout the Plan Area. Currently, 660 acres (50 percent) are

Existing Conservation Lands managed by BLM, USFS, WCB, USPS, CDPR, and TNC. It is anticipated that 99 percent of BLM lands and 100 percent of the other Federal, State, and non-profit Existing Conservation Lands would be managed in accordance with the Plan in perpetuity. The Plan would protect an additional 590 acres (44 percent) of Other Conserved Habitat proposed for conservation in four conservation areas: Willow Hole (17 acres), Indio Hills Palms (42 acres), Dos Palmas (50 acres), and the Santa Rosa and San Jacinto Mountains (481 acres). The conservation areas include two of the three known occurrences of the western yellow bat within the Plan Area (except for those on the Agua Caliente Indian Reservation lands).

The Plan proposes management and monitoring to minimize impacts to this species, including control of activities that degrade western yellow bat habitat (e.g., OHV use), control of invasive species if monitoring results indicate it is necessary, and restoration and enhancement of degraded habitat as necessary. The Plan also proposes the evaluation of groundwater management on western yellow bat habitat, as well as data gathering as part of the Monitoring Program. Land Use Adjacency Guidelines as described in Section 4.5 would minimize the impacts of Development in the Conservation Areas and adjacent to the Reserve System. Fire management measures are not currently proposed.

It is anticipated that the Species Conservation Goals and Objectives established in Section 9 would be met through the Joint Project Review Process (Section 6.6.1.1) and the Monitoring and Adaptive Management Program (Section 8 and 9). Although the 90 percent of private lands would be conserved within a given conservation area, the ultimate configuration of the Reserve System is unknown at this time.

Monitoring and Adaptive Management Program
Adaptive Management, discussed in Section 8.4.3, would focus on identification of threats and development of a Monitoring Program to address management questions related to these threats. One issue identified to be addressed through Adaptive Management includes the monitoring of groundwater to determine whether wells north and south of the fault line show substantial declines related to surface water levels at the desert fan palm oasis, determine appropriate water conservation measures, restrictions on additional water use, or surface flow alterations above the oasis that could remediate the water supply to the oasis baseline levels. Monitoring of Covered Species is proposed in order to identify potential threats posed by invasive species. Currently, the palm oases are relatively free of invasive species (except for the Dos Palmas Conservation Area, which is heavily infested with tamarisk). The Monitoring and Adaptive Management Program proposes that each palm oasis be visited every 3-5 years and weed control programs implemented as needed.

Initially baseline data would be collected on the western yellow bat. The precise protocols to be used for these surveys would be developed during the baseline phase. These surveys would also gather baseline data on invasive species and their effects on the Covered Species. Based on the information gathered during the baseline phase, the appropriate level of ongoing monitoring would be determined for each of the Covered Species.

Public Use and Recreation
It does not appear that the Trails Plan would affect any modeled western yellow bat habitat

unless it occurs within the 1 percent of BLM lands not protected under the CDCA.

Changed and Unforeseen Circumstances
To avoid and minimize potential direct and indirect effects from changed or unforeseen circumstances on the western yellow bat and its habitat, the Plan would implement preventive measures and planned responses as discussed in Section 6.8.3.1 through 6.8.3.5 in conjunction with Adaptive Management (Section 8).

Changed Circumstances addressed by the Plan would include: drought, fire, invasion by new invasive species, lowering of the water table, and new listings of species not covered by the Plan. It is anticipated that fire would result in direct effects to the yellow bat similar to those discussed above. Direct effects from drought or lowering of the water table could result in the potential loss of habitat if palm trees died and fell over. Dead trees that remained standing could potentially still provide roosting habitat until the fronds or tree would fall.

Indirect effects could result from drought, fire, invasion by new invasive species, or lowering of the water table to the extent of change or reduction of prey species available.

CUMULATIVE EFFECTS
We anticipate that activities that have degraded bat habitat in the past would continue until/unless more effective management of palm oases is undertaken under the Plan. As such, unmanaged trimming of palm trees, fires set by vandals in the palm skirts, illegal dumping, and invasive weeds would continue to challenge the land manager with or without approval of the Plan. Activities such as these would degrade existing habitat and affect western yellow bat populations.

The Agua Caliente Band of Cahuilla Indians is undertaking a Habitat Conservation Plan for all of their Tribal lands. The draft Plan and associated documents have been reviewed publicly. It is anticipated that the final Plan and associated environmental analysis will be complete in mid-2008 with permit issuance scheduled for late 2008. Although there will be habitat loss associated with that Plan, the overall net benefit to the species is positive.

Conclusion
In summary, a total of 590 acres (44 percent) of western yellow bat modeled habitat are proposed to be conserved in perpetuity to offset the loss of 78 acres (6 percent) of modeled habitat as a result of proposed Covered Activities throughout the Plan Area. The conservation areas also contain Existing Conservation Lands (660 acres; 50 percent) that augment the reserve design of the Plan, thereby enhancing the Reserve System. In addition to the modeled habitat within the Plan Area, the Tribe proposes to conserve at least 90 percent of modeled habitat on reservation lands in the Tribal MSHCP. Due to the lack of data on this species, it is not possible to determine how much of the bat's original range is affected in the Plan Area. However, the Coachella Valley probably represents an important part of the species available habitat since it supports the majority of natural desert fan palm oases within the United States portion of the species range.

We anticipate the proposed action would affect the western yellow bat as described in the

analysis above, including the loss of approximately 6 percent (78 acres) of modeled habitat within the Plan Area. At least 590 acres of additional conservation lands that are modeled habitat would be conserved through the MSHCP implementation. In combination with 660 acres of ECL, there would be a total of 1,250 acres in the Reserve System. The draft Agua Caliente Band of Cahuilla Indians Tribal HCP anticipates a loss of no more than 10 percent (87 acres) of modeled habitat on Tribal land; thus conserving an additional approximately 782 acres of modeled habitat on Tribal lands. It is expected that the Tribal MSHCP would coordinate with the MSHCP Permittees and would implement management and monitoring consistently with the MSHCP. Therefore, the Plan Area, in conjunction with the proposed Agua Caliente Tribal HCP, includes the majority of modeled habitat for the western yellow bat. The Reserve System includes Federal lands and other Existing Conservation Lands that are anticipated to be managed consistently with the MSHCP Conservation Goals and Objectives in the future, but not assured. Implementation of the avoidance, minimization, and mitigation measures identified in the MSHCP would further reduce impacts to this species. With all of these measures described in the analysis above, this species is anticipated to persist within the Action Area through the conservation and management of Other Conserved Habitat within the Plan Area and the conservation and management of modeled habitat within the Agua Caliente Tribal HCP. We anticipate that the western yellow bat populations and habitat would be monitored and managed in perpetuity.

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 bat. Critical habitat has not been designated for this species; therefore, the proposed action would not destroy or adversely modify critical habitat. We reached this conclusion because over 90 percent of the western yellow bat modeled habitat within the Plan Area would be conserved and managed in perpetuity. Another 90 percent of modeled habitat on Tribal lands is anticipated to be managed pending MOUs or other restrictions on lands within their Tribal HCP Area. This includes the majority of the desert fan palm oasis woodlands that have the potential to support the western yellow bat in the Coachella Valley. 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, potential for reproduction, or distribution of this species throughout its range.

Amount or Extent of Take
It is difficult to quantify the number of western yellow bats that would be impacted as a result of the proposed action over the 75-year permit term due to the large Plan Area. Therefore, the Service is quantifying the take as the number of acres of modeled habitat that would be impacted in the MSHCP Plan Area as a result of the proposed action. We anticipate that up to 78 acres of modeled habitat within the Plan Area would become unsuitable for the western yellow bat as a result of the proposed action. Additionally, a small, but unquantifiable, amount of western yellow bat habitat is anticipated to become unsuitable as a result of monitoring and management actions.

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Coachella Valley Round-tailed Ground Squirrel (*Spermophilus tereticaudus chlorus*)

STATUS OF THE SPECIES

Legal/Listing Status

The Coachella Valley round-tailed ground squirrel is designated as a Federal candidate species. The State of California has designated this squirrel as a Species of Special Concern.

Species Description

Spencer F. Baird (1857) first described the round-tailed ground squirrel (*Spermophilus tereticaudus*) in a report for the Pacific Railroad. In 1903, Elliot (1904) described the round-tailed ground squirrel in the Coachella Valley as a full species (*Citellus chlorus*). Grinnell (1913) subsequently reduced *C. chlorus* to a subspecies of *C. tereticaudus* (as *C. t. chlorus*). Spermophilus later replaced the genus, Citellus. Grinnell and Dixon (1918) used "Palm Springs round-tailed ground squirrel" as the common name to describe this subspecies. The Coachella Valley round-tailed ground squirrel is a subspecies of the more widely distributed round-tailed ground squirrel (CVAG 2007).

Hall (1981) described four subspecies of the round-tailed ground squirrel (*S. t. apricus, S. t. chlorus, S. t. neglectus, and S. t. tereticaudus*). However, questions exist regarding the validity of *S. t. chlorus* as its own subspecific taxon. The IUCN/SSC rodent specialist group recommended comparing populations of *S. t. chlorus* with *S. t. tereticaudus* to document the level of evolutionary differentiation and subspecific validity (Hafner 1998). Consequently, the Service funded the San Diego Natural History Museum in 2000 to conduct a taxonomic review of *S. t. chlorus*. This study compared 28 morphological characters from museum specimens from the Coachella Valley, the Colorado River region of eastern Imperial and Riverside counties, Death Valley, the Mojave Desert, Borrego Valley, and Mason Valley in San Diego County (Scott Tremor unpublished data). Of these characters, pelage color was the only character that was found to statistically distinguish *S. t. chlorus* from *S. t. tereticaudus*. Tremor (unpublished data) suggested that squirrels in the central region of the Mojave Desert, Death Valley, and Borrego Valley were more similar to *S. t. chlorus* than *S. t. tereticaudus*, and proposed that the geographic range for *S. t. chlorus* include these other areas. Because only one phenotypic characteristic distinguished *S. t. chlorus* from *S. t. tereticaudus* and phenetic (classification based on grouping by overall similarity, not recency of common descent) similarities can arise from both common ancestry and convergent evolution, the Service is interested in also pursuing a phylogenetic study based on molecular techniques to understand of the validity of the subspecies classification of *S. t. chlorus*.

Round-tailed ground squirrels are relatively small in comparison to other *Spermophilus* species. They have a small, rounded head with small ears and large dark eyes (Ernest and Mares 1987). Round-tailed ground squirrels have even coloration and no stripes. Color phases include plain drab gray, pinkish cinnamon, or pale cinnamon brown (Ingles 1965; Ernest and Mares 1987). Unlike other ground squirrels, round-tailed ground squirrels have a relatively long round tail that is not bushy. The range of this species includes the Mojave and Sonoran deserts of the southwestern United States and northwestern Mexico. Like other ground squirrels, round-tailed ground squirrels are active only during the day (diurnal). Round-tailed ground squirrels can

aestivate or enter torpor when their energetic requirements cannot be met (Hudson 1964). They also spend the winters largely inactive and inside their burrows, but occasionally have been observed above ground on warm winter days (Hudson 1964; Drabek 1970). Round-tailed ground squirrels appear somewhat colonial because different individuals have been observed exiting the same burrow (Dunford 1977a).

Distribution

As stated above, the *S. t. chlorus* is a subspecies of the more widely distributed round-tailed ground squirrel that inhabits desert areas in the southwestern United States and northwestern Mexico (CVAG 2007). Round-tailed ground squirrels generally inhabit sandy areas from 73 meters below sea level to 1,190 meters above sea level (Grinnell and Dixon 1918; Cockrum 1960; Ernest and Mares 1987) throughout southern California, northern Baja California, Mexico, southwestern Nevada, western Arizona, and northwestern mainland Mexico (Hall 1981). They are often found occupying low flat areas in various types of desert shrub communities (e.g., mesquite, creosote, *Atriplex* spp.) in sand dunes (Johnson *et al.* 1948; Bradley and Deacon 1971); fine sand accumulated along banks, roads, and among shrubs; and in areas with coarser, hard-packed sand and gravel (Ernest and Mares 1987). The Plan Area and interspersed tribal lands include all of the known range for *S. t. chlorus* (CVAG 2007; Hall 1981). The range for *S. t. chlorus* was described from records in Cabazon, Whitewater Station, Coachella, Mecca, and Agua Caliente Band of Cahuilla Indians tribal lands that correspond with the Coachella Valley floor (Hall 1981). The species is found throughout the plan area and along the shores of the Salton Sea into Imperial County. Round-tailed ground squirrels largely are replaced by antelope ground squirrels (*Ammospermophilus leucurus leucurus*) in rocky habitats, but both species are found in the sandy habitats of Snow Creek.

Habitat Affinities

In the Coachella Valley, *S. t. chlorus* burrows were found by Grinnell and Dixon (1918) in sandy hummocks underneath mesquite, creosote, and creosote with palo-verde (*Cercidium* sp.). The mesquite habitats of the Coachella Valley are composed of honey mesquite (*Prosopis glandulosa*) and screwbean mesquite (*Prosopis pubescens*) in areas with high water tables; and honey mesquite in some sand dune areas. The spatial habitat map created to describe the distribution of ground squirrels within the Coachella Valley indicated that various vegetation and substrate types were equally valuable to the squirrel (CVMC 2003). The Service evaluated the model and tested the underlying assumptions about the squirrel's habitat affinities, estimated the occupancy rates and detection probabilities of squirrels in modeled habitat, quantified the total area of the proposed preserves occupied by squirrels, and tested *a priori* hypotheses about how occupancy differed among vegetation and substrate types (Ball *et al.* 2005). The results demonstrated that squirrels were more often detected in mesquite (*Prosopis glandulosa* var. *torreyana)* on dunes/hummocks (estimated proportion of habitat occupied = 0.99 $\pm$ 0.01) than creosote (*Larrea tridentata*) on dunes/hummocks (0.33 $\pm$ 0.09) or other vegetation/substrate types ($\leq$ 0.08 and $\leq$0.02). Mesquite provides food (e.g., leaves, flowers seed pods, and bark), escape cover, and traps sand to form and maintain the dunes and hummocks into which squirrels burrow (Grinnell 1937; Drabek 1970). In 2003, Ball *et al.* (2005) hypothesized that the relationship between occupancy rates of squirrels and distance to mesquite differed for each vegetation/substrate type. Though Ball *et al.* (2005) reported that the distance to mesquite from other habitat types did not have strong support by the data; Anderson (2008) conducted further

analysis of the data and found that there was more support than previously believed.

Life History

Round-tailed ground squirrels are omnivorous with a diet that shifts throughout the year. They eat insects, spiders, lizards, birds and carrion including their dead (Ernest and Mares 1987). Bradley and Deacon (1971) reported that the volume of stomach contents of *S. t. tereticaudus* collected in the vicinity of Death Valley National Park was 100 percent green vegetation in the summer with seeds and insects incorporated in varying amounts the rest of the year. Drabek (1970, 1973) reported that ground squirrels in Arizona (*S. t. tereticaudus*) were observed eating blooming chinchweed (*Pectis papposa*), mesquite (e.g., leaves, seeds, flowers, and bark), and creosote fruit. Grinnell (1937) reported that the stomachs of *S. t. tereticaudus* in Death Valley shot in April were full of mesquite leaves. While trapping *S. t. chlorus* near their burrows in the Coachella Valley, Service personnel often found partially consumed leaves and seedpods of honey mesquite outside of *S. t. chlorus* burrow entrances in mesquite communities (Service unpublished data). Further, Grinnell and Dixon (1918) collected an individual with a mesquite flower in its mouth. The timing of the mesquite leaf-out coincides with the squirrel's active period in the Coachella Valley (Service unpublished data; Lianne Ball and Jeremy Groom personal observations 2004).

S. t. chlorus also occupies some areas vegetated primarily with creosote in the Coachella Valley, but the ecological value of those lands appear to be lower to the squirrel than those with mesquite. Creosote leaves and stems are coated with a phenolic resin that is toxic to many herbivores and causes problems such as kidney lesions and an increased production of urine (Grice *et al.* 1968; Rhoades and Cates 1976; Mangione *et al.* 2000; Dearing *et al.* 2002). Mammals limit their consumption of creosote to minimize their intake of toxins, but this puts them in an energy and water debt if they do not supplement their diet. For example, woodrats (*Neotoma lepida*) in the Mojave Desert lose body mass during the early winter while eating creosote almost exclusively before herbaceous species become available with late winter rains (Karasov 1989). Karasov (1989) and Meyer & Karasov (1989) suggested that woodrats did not eat a larger volume of creosote because they were limiting their intake of the phenolic resin to prevent toxicosis. Also, *S. t. neglectus* is often found in creosote-dominated vegetation in Arizona. It is believed that they increase their consumption of water and energy by supplementing their creosote diet with insects and herbaceous annuals (G. Walsberg, Arizona State University, Tempe, AZ, pers. comm. 2003) that are available because of the winter and summer monsoon rains. The Coachella Valley receives less rain and probably produces fewer amounts of annuals and insects than Arizona. *S. t. chlorus* within patches of creosote in the Coachella Valley may experience greater physiological stress than *S. t. neglectus* within creosote in Arizona because of the reduced availability of supplemental food.

Reproduction

Coachella Valley round-tailed ground squirrel colonies, similar to other ground squirrels, appear to be mostly composed of females and their female offspring (Dunford 1977b; Sherman and Runge 2002). In Arizona, adult male *S. t. neglectus* were observed arriving at colonies in March to mate, new juveniles emerging above ground in May, and males dispersing around June or July (Drabek 1970; Dunford 1977b). Survival is generally lowest for juveniles (Sherman and Runge 2002) and few survive to breeding age.

Colonies within creosote or dying patches of mesquite might suffer high rates of mortality because they may be unable to adequately prepare (e.g., gain mass) for aestivation, and starve during the winter. This phenomenon was documented for a population of northern Idaho ground squirrels (*Spermophilus brunneus brunneus*), which decreased from 270 to 10 squirrels in 13 years (Sherman and Runge 2002). Additionally, the *S. b. brunneus* population could not be rescued by neighbouring populations, because the distance between populations was further than the species usually disperses (100 meters), and the matrix between populations had become an inhospitable dispersal route. The loss of mesquite patches and the increased urbanization between squirrel colonies in the Coachella Valley decreases the probability that declining colonies can be rescued by dispersing individuals.

In the spring and summer of 2004, the Service conducted a capture-recapture project in the Coachella Valley. Adult females trapped in mesquite weighed approximately 145g (n = 37) compared to 127g (n = 3) trapped in creosote on dunes and hummocks (Service unpublished data). Juveniles in the mesquite weighed approximately 110 grams while those in the creosote weighed approximately 88 grams. Because the squirrels aestivate in the winter, they must gain enough mass to survive several months without food. Based on mass, it appears that squirrels in the mesquite would be better prepared to survive aestivation than those in the creosote (Service unpublished data).

Population Trends

There are no population estimates for this squirrel throughout its range. However, because of the relationship between the squirrel and mesquite, we can examine the amount and conditions of the mesquite communities within the range of the taxon to assess the population status of the squirrel.

Also outside of the Plan Area, a population of *S. tereticaudus* spp. (subspecies undetermined) occurs 40 km south of Coachella Valley near Ocotillo Wells, where squirrels have been seen in mesquite patches (Service personnel observations). Approximately 50 percent of the mesquite is on State and County lands (North of State Route 78) while half is on private land (south of State Route 78). The private land supports agriculture in places but is largely undeveloped. The mesquite hummocks, on State and private land, frequently exhibit sustained damage and partial vegetation removal by OHVs.

The status of *S. t. chlorus* in the Dos Palmas area (in the Plan Area along the northeastern shore of the Salton Sea) is unknown. Squirrels are commonly seen climbing in mesquite trees near the San Andreas oasis, and appear to be widely distributed throughout the Dos Palmas Conservation Area (M. Swartz, pers. comm.).

Outside the Plan Area, the status of squirrels is similarly unknown on the Agua Caliente Band of Cahuilla Indians tribal lands interspersed with Plan Area lands.

Within the Plan Area, all the Conservation Areas are likely to have squirrel populations, however, the core *S. t. chlorus* populations are identified to occur within the Whitewater Floodplain, Snow Creek/Windy Point, Thousand Palms, and Willow Hole areas.

Threats

Habitat fragmentation

Small and isolated populations produced by habitat loss and fragmentation, experience higher probabilities of extirpation due to increased vulnerability to demographic and environmental stochastic (natural randomly occurring) events (Hanski 1994) and/or reduced fitness from genetic drift and inbreeding depression (Caughley 1994; Lacy 1997). Furthermore, isolation compounds the risk produced from small population size because it reduces the chance that populations will naturally recover through immigration of dispersing individuals from nearby populations. Urbanization is a threat for *S. t. chlorus* (Section 9.8.2.2) because vast expanses of pavement and structures remove suitable habitat and likely prohibit movements of *S. t. chlorus* between areas of suitable habitat.

Groundwater and Mesquite

In the Coachella Valley, habitat for *S. t. chlorus* has been severely reduced and fragmented by agricultural and urban development and related activities. Aerial photographs taken of the Coachella Valley in 1939, 1945, and 1955 (National Aerial Photography Program) revealed that farmers formerly tilled around stands of mesquite instead of removing them. It is likely that squirrels typically persisted in these mesquite stands and that the surrounding matrix was not inhospitable to them, occasionally providing food. This is probably why some historical reports suggested that squirrels occurred in agricultural land and were well distributed throughout the Valley. However, modern farming equipment removed the mesquite patches from agricultural land, possibly resulting in the lack of squirrel detections in agricultural lands in recent Service surveys.

Mesquite stands in the Coachella Valley have been reduced to approximately 352 hectares (870 acres) as of 1998, a decline of almost 90 percent from the 1930's (National Aerial Photography Program). Of the mesquite habitat remaining in the Coachella Valley and environs, a minimum of 50 percent is directly at risk from urban development currently provided for under Riverside County's General Plan (Riverside County Planning Department 2003a; 2003b), and the general plans of incorporated cities in this area (e.g., Desert Hot Springs, Palm Springs, Rancho Mirage, Palm Desert, Indio, Coachella). Based on information from the California Department of Finance, and the Southern California Association of Governments, the population in the Coachella Valley is projected to increase to 456,971 in 2020 (the population was 289,819 in 1997). Significant projects in size and number continue to move forward in potential habitat for *S. t. chlorus*. Numerous smaller patches of mesquite hummocks scattered throughout La Quinta and Indio are threatened by rapidly expanding urban development. In addition, the Desert Dunes golf course in Desert Hot Springs is proposing several hundred houses that would eliminate most or all of the approximately 10 acres of mesquite hummocks remaining on the site.

As described above, increasing groundwater withdrawals associated with existing and growing urbanization is threatening the mesquite sand dune/hummock communities by potentially lowering the water table below the level at which mesquite roots can effectively reach the water. For example, in response to population growth in a portion of the upper Coachella Valley, the Mission Springs Water District (MSWD) withdrew 1,400 acre-feet from the Mission Springs Groundwater Subbasin (Subbasin) in 1978, 4,834 acre-feet in 1988, and 7,096 acre-feet in 1998

(MSWD 2000). The groundwater level in the Subbasin (near the Banning Fault) dropped from 232 meters (760 feet) above sea level in 1955 to 218 meters (715 feet) above sea level in 1998 and was projected to drop to 212 meters (695 feet) above sea level by 2005, a total drop of 20 meters (66 feet) over a 50-year period (MSWD 2000). The Mission Springs Water District (MSWD) Water Management Plan Programmatic Environmental Impact Report (MSWD 2008) states that modeling of the Mission Creek Groundwater Subbasin indicates that the groundwater level will drop below the level at which mesquite can be supported by the year 2016, resulting in individually and cumulatively significant impacts to the quantity of water stored in the subbasin, which subsequently has the potential to adversely affect the mesquite hummocks in Willow Hole and the species they support. The loss of mesquite plants within mesquite hummocks not only eliminates a highly valuable food source for the squirrel, but mesquite communities also trap aeolian sands forming dunes that *S. t. chlorus* uses extensively for burrows.

Invasive plant species and fire

Invasive plants may pose a host of potential threats (e.g., native plant species competition, fire) to the species, but it is unknown how invasive plants affect the species at this time. In the spring of 2005, Saharan mustard exhibited an irruptive germination event following a winter of above-average rainfall. Many areas contained substantial densities of Saharan mustard. Other invasive species such as Mediterranean grass were likely abundant as well. Areas dominated by Saharan mustard or invasive grasses may also be more prone to ignite and carry fires. Fire may affect soil porosity by removing organic matter (Gebow and Halvorson 2005) and removing native vegetation that the species may depend on for food or cover from predators (Thompson 1982).

Mesopredator release

Domestic cats are extremely effective recreational hunters that will continue to hunt when prey availability is low (Crooks and Soulé 1999) and have potential to reduce a rodent population very quickly (Pearson 1964). Domestic cats may be a threat to squirrels within portions of Conservation Areas adjacent to developed areas. The level of this threat to ground squirrels is unknown at this time but will likely increase as development increases in the Plan Area.

Synopsis of Status

While there have been no population estimates of *S. t. chlorus* in its range, the amount of mesquite which it is closely associated for food and burrow construction, has decreased dramatically in California the last 50 years Populations of *S. tereticaudus* spp., which may or may not be the *chlorus* subspecies, occur north of the Coachella Valley, in Barstow, Death Valley National Park, and Borrego Springs, and are also associated with mesquite. If these populations are the same subspecies, they are disconnected from *S. t. chlorus* populations in the Coachella Valley and would not provide demographic rescue of those populations. The status of populations of *S. t. chlorus* on the southern edge of the Coachella Valley (Dos Palmas) and on Agua Caliente Band of Cahuilla Indians tribal lands is unknown.

ENVIRONMENTAL BASELINE

Distribution

Based on the current taxonomy of the subspecies, *S. t. chlorus* is endemic to the Plan Area and interspersed tribal lands; its range essentially corresponds with the Coachella Valley floor (CVAG 2007). *S. t. chlorus* occurs from the Salton Sea in the southeast to San Gorgonio Pass in

the northwest (Grinnell and Dixon 1918). The range for *S. t. chlorus* was described from records in Cabazon, Whitewater Station, Coachella, Mecca, and Agua Caliente Band of Cahuilla Indians tribal lands (Hall 1981).

The status of the species outside of the Plan Area is unknown because of unsettled taxonomy. If southern populations of *S. t. chlorus* exist near Ocotillo Wells and to the north in Barstow and Death Valley, the proposed Plan would affect one of four known major populations that may be included within the taxon. If any of these regional populations outside the Plan Area are not *S. t. chlorus*, a larger proportion of the taxon would be affected by the proposed Plan.

Baseline

There are numeric discrepancies in vegetation acreage between CVAG modeled habitat and Service GIS data obtained from CVAG for modeled habitat within the Plan Area. Based on the Plan, there are 101,723 acres of modeled habitat for this species within the Plan Area (Section 4, Table 4-114), of which, approximately 20,918 are identified as Core (Habitat) Areas. Based on Service GIS data, there are 102,201 acres of modeled habitat for the squirrel within the Plan Area, of which, approximately 20,741 acres are identified as Core Habitat. There is an additional 8,277 acres of modeled habitat for this species on Tribal Reservation Lands. This land is inside of the Action Area but outside the Plan Area and comprises 7 percent of the total CVAG-modeled habitat for this species. For the purposes of the baseline for this species, unless otherwise specified, we relied upon Service GIS data.

As stated above, mesquite hummocks, the habitat type most strongly associated with high squirrel densities, has declined by 90 percent within the Plan Area since the 1930's. There are approximately 1,670 acres of mesquite habitat (hummocks and bosque) remaining in the Action Area, of which, approximately 815 acres of mesquite is modeled habitat for the squirrel. Of the 1,670 acres remaining, only 388 acres will be protected by the Plan (CVAG 2007). There are 460 acres of squirrel modeled habitat within Existing Use Lands of the Plan Area. On Tribal Reservation Lands within the Action Area, there are 99 acres of mesquite squirrel modeled habitat (Service GIS data).

Service ground-truthing of GIS vegetation coverage revealed that, in certain areas (e.g., Thousand Palms), mesquite is largely mapped in error. Large swathes of sandy areas are mapped as mesquite. Dead or senescing mesquite is often present locally, but little of the mapped area contains mesquite. These results indicate that: 1) less mesquite exists than is mapped, and 2) some mesquite populations are performing poorly or have died out entirely. In 2002, ground squirrels were detected on a smaller proportion of modeled lands than predicted by the habitat model for CVAG, though the overall occupancy of modeled lands increased between two years (Ball *et al.* 2005). The best supported model in 2002 described the distribution of ground squirrels as a function of vegetation and substrate type (Ball *et al.* 2005). Though parameter estimates of ground squirrels, occupancy rates in mesquite were higher than other vegetation and or substrate types both years, the best supported models in 2003 results suggest a spatial component to the occupancy of non-mesquite vegetation (Service files, unpublished data; Anderson 2008). The Service studies (unpublished data) found a significant relationship between squirrel detection rates and the distance from mesquite: the greater the distance from mesquite = the lower the squirrel detection rates (e.g., in creosote, at a distance of 2500 meters from

mesquite, the detection rate of squirrels has decreased by approximately 50 percent; the differential is even greater in other habitat types).

Service studies in 2004 determined that mesquite had the highest squirrel occupancy rate of any habitat type, but it was not the only habitat type occupied by *S. t. chlorus* (Ball *et al.* 2005). If the CVAG model were altered to contain only active dunes and active sand fields, it would contain virtually all of the habitat types, marginal and otherwise, that *S. t. chlorus* was found to inhabit (Ball *et al.* 2005). Within Conservation Areas, there are approximately 493 acres of active desert dune habitat and 4,095 acres of active sand fields (Service GIS data). Within the Plan Area and outside of Conservation Areas, there are approximately 103 acres of active desert dunes and 1,335 acres of active sand fields (Service GIS data).

Squirrel census number estimates, described below, include all of the habitat types that squirrels may inhabit (Ball *et al.* 2005; Service files, unpublished data) and provide an estimate of the number of squirrels in each Conservation Area. These estimates are preliminary; a more comprehensive range-wide study is required to validate them. We generated these estimates from results obtained from a Service study designed to further understand the relationship between the squirrel and vegetation, a capture-recapture project conducted in the Coachella Valley during the spring and summer of 2004 (Service unpublished data; Service files, unpublished data). This study revealed that 10 times more *S. t. chlorus* were caught in the mesquite on dunes and hummocks than among creosote on dunes and hummocks (Service unpublished data; Service files, unpublished data). Density estimates of squirrels for mesquite were: 3.25 squirrels/acre; all other forms of suitable habitat (e.g., creosote dune hummocks, active sand fields with desert scrub) were: 0.60 squirrels/acre (Service unpublished data; Service files, unpublished data). Detection rates of squirrels was 99 percent for mesquite, 33 percent for creosote, 8 percent for desert scrub, and 2 percent for all other types of suitable habitat (Ball *et al.* 2005).

Based on Service data (unpublished) we used the squirrel density data and detection rates (Ball *et al.* 2005) from the 2004 Service trapping study to estimate the maximum number of squirrels within Conservation Areas (Acres of each Modeled Habitat Type (excluding "Urban" modeled squirrel habitat) * Occupancy rate of squirrels within given habitat type * estimated density of squirrels for given vegetation type = estimate of maximum number of squirrels present within each Conservation Area). Caveats regarding the estimates include the following:

The stated "Occupancy rate" was determined by counting the number of squirrel calls detected. If squirrels call less frequently in different habitats (i.e. if squirrels in high densities in mesquite call to alert nearby family members of threats, it would be expected that calls would decrease in lower densities of squirrels, to the point that at low densities no squirrels would be detected while still present in the habitat), these rates are inaccurate and would significantly underestimate squirrel habitat usage.
The "other" habitat category within each conservation area may not be effectively represented by the "other" habitats surveyed. This source of error could lead to a significant underestimate of squirrel occupancy rates.
Estimates of squirrel densities in creosote and mesquite do not incorporate capture probabilities, so results are subject to some degree of change with a final data analysis.

Squirrel densities within mesquite or creosote dunes/hummocks may differ in other regions of Conservation Areas; the number of mark/recapture sampling areas was small (i.e., two) and the sites non-randomly selected
Most of the mesquite and creosote to which we are extrapolating was not part of the sampling frame in which we trapped squirrels; therefore, we cannot estimate the variance around our estimates of minimum numbers.
Estimates for the number of squirrels within Thousand Palms mesquite may represent a significant overestimate. Thousand Palms mesquite is unlikely to provide the same quality of foraging habitat as mesquite in Willow Hole, yet we used the Willow Hole mesquite hummock squirrel density estimate to estimate the number of squirrels in Thousand Palms mesquite hummocks.

Coachella Valley Round-Tailed Ground Squirrel Core Habitat Areas
The four areas that contain Core Habitat for *S. t. chlorus* consist primarily of land that was previously conserved (at various levels of protection) through the Coachella Valley fringe-toed lizard (CVFTL) HCP. The Core Habitat areas of the proposed MSHCP Reserve System for *S. t. chlorus* are within the existing Coachella Valley Preserve (within the Thousand Palms Conservation Area), the Willow Hole-Edom Hill Reserve, (within the Willow Hole Conservation Area), the Snow Creek/Windy Point Conservation Area, and the Whitewater Floodplain Reserve (within the Whitewater Floodplain Conservation Area). The existing Coachella Valley Preserve established by the CVFTL HCP totals 17,651 acres (not all of which is modeled as habitat for *S. t. chlorus*) and is located south of the central portion of the Indio Hills. The Willow Hole-Edom Hill Reserve (most of which is BLM land) is located at the west end of the Indio Hills and is 2,027 acres in size. Ownership within this Reserve consists of BLM (1,869 acres), Coachella Valley Mountains Conservancy (117 acres), and private land (41 acres). The Whitewater Floodplain Reserve is located south of Interstate 10 and east of Indian Avenue, and includes approximately 1,316 acres of BLM and CVWD land.

Thousand Palms Conservation Area with Core Habitat
Habitat Model: The Thousand Palms Conservation Area consists of 9,151 acres of modeled habitat for this species, of which, 8,616 acres are Core Habitat (Service GIS data). Of the total modeled habitat, 5,071 acres is Existing Conservation Lands that are controlled by BLM, CDFG, the Service, State Parks, The Nature Conservancy, and the Center for Natural Lands Management. The existing Coachella Valley Preserve established by the CVFT HCP totals 17,651 acres and is located south of the central portion of the Indio Hills. The Preserve includes the Coachella Valley Ecological Reserve lands owned by CDFG.

Mesquite: The Thousand Palms Conservation Area contains 54 acres of modeled mesquite habitat (Service GIS data). All of this acreage is currently protected. As discussed above, the actual acreage covered by mesquite is substantially less than 54 acres, due to large patches of dead or dying mesquite.

Active and Ephemeral sand dunes/fields: Of the 3,969 acres of active sand dunes/fields in the Thousand Palms Conservation Area (Service GIS data), 2,632 are currently conserved.

Number of Squirrels: As described above, given the detection data from Ball *et al.* (2005) and

preliminary mark-recapture findings from Willow Hole and Thousand Palms, we are able to extrapolate estimates of the squirrel population in the Thousand Palms Conservation Area. Squirrels were also live-trapped in Willow Hole and Thousand Palms in 2004 to estimate survival rates of squirrels throughout a year. More squirrels were caught in the mesquite of Willow Hole than in the creosote of Thousand Palms. Based on the calculations for squirrel census numbers described above, there are a maximum of 716 squirrels within the Thousand Palms Conservation Area (Table 1).

Table 1. Estimation of the numbers of squirrels, uncorrected for capture probability, on lands identified as modeled habitat for ground squirrels in the Thousand Palms Conservation Area.

Thousand Palms	**Acres**	**Occupancy Rate**	**Density Estimate**	**# of Squirrels**
		(%)	(squirrels/acre)	
Mesquite	54	0.99	3.25	174
Creosote	1734	0.33	0.6	343
Desert Scrub	3058	0.08	0.6	147
Other	4305	0.02	0.6	52
Total	9151			716

Threats: Much of the mesquite appears to be senescing or is already dead in Thousand Palms, and though squirrels still appear to inhabit patches of dead mesquite (Lianne Ball and Jeremy Groom, personal observations), it is likely that the squirrel population is declining in the Thousand Palms Conservation Area.

Large areas of mesquite hummocks have disappeared that were clearly visible within the Thousand Palms Reserve and environs in historic (1950s) photographs (Simons, Li, and Assoc. 1996; Ball *et al.* 2005; Lancaster *et al.* 1993; USFWS 1998). Mesquite hummocks present historically may have played an important role in dune formation on the Thousand Palms Reserve (Ball *et al.* 2005; Barrows 1996; Griffiths *et al.* 2002; Simons, Li, and Assoc. 1997), as they locally slowed the wind causing blowsands to drop out and accumulate. When they were alive and foliaged, these mesquite stands helped anchor the dunes/hummocks of the Thousand Palms Reserve (Griffiths *et al.* 2002; Simons, Li, and Assoc. 1997). Data from a well just south of the Thousand Palms dune field indicated an increase in the depth to groundwater of 16.2 meters (53.1 feet) during the period of 1952 to 1992, a change of 0.40 meters (1.3 feet) per year (Lancaster *et al.* 1993). In 1992, the mesquite trees in this area were found to be dead or dormant (though many of the dunes still exist as land forms); the U.S. Fish and Wildlife Service (1998) and Lancaster *et al.* (1993) opined that the decline in mesquite might be the result of falling water tables. Groundwater pumping of the aquifer has likely caused substantial drops in the groundwater level under the Reserve. Current groundwater levels are likely beyond the reach of the mesquite (Griffiths *et al.* 2002; Simons, Li, and Assoc. 1997). Because of the falling water table, mesquite hummocks may never be restored naturally to the Reserve (Barrows 1996).

Willow Hole Conservation Area with Core Habitat

The Willow Hole/Edom Hill area encompasses a 4-mile (6-kilometer) strand of mesquite dunes and isolated blowsand patches in the northwestern portion of the Valley. These mesquite dunes

or hummocks in the Willow Hole area occur along a fault line that locally impounds groundwater near the ground surface; this high groundwater supports the growth of the mesquite, resulting in a row of mesquite along the Banning Fault portion of the San Andreas Fault (see General Effects of the Action, Mesquite above). The mesquite traps blowing sand over time that forms dunes associated with the mesquite hummocks (Griffiths *et al.* 2002). Willow Hole lies within a large depression in the ground surface that traps blowsand; the Willow Hole portion of the Reserve encompasses the eastern end of the strand of mesquite hummocks along the fault line and the Willow Hole depression.

Habitat Model: The Willow Hole Conservation Area consists of 4,785 acres of modeled habitat for this species, of which, 3,190 acres are Core Habitat (Service GIS data). Of the total modeled habitat, 551 acres is Existing Conservation Lands that are controlled by BLM and CVMC.

Mesquite: Of the 128 acres of mesquite hummocks (Service GIS data) in the Willow Hole Conservation Area, 16 acres are currently conserved.

Active and Ephemeral sand dunes/fields: Of the 1,183 acres of active and ephemeral sand fields (Service GIS data), none are currently conserved.

Number of Squirrels: Based on the calculations for squirrel census numbers described above, there are a maximum of 570 squirrels within the Willow Hole Conservation Area (Table 2).

Table 2. Estimation of the numbers of squirrels, uncorrected for capture probability, on lands identified as modeled habitat for ground squirrels in the Willow Hole Conservation Area.

Willow Hole	**Acres**	**Occupancy Rate**	**Density Estimate**	**# of Squirrels**
Mesquite	128	0.99	3.25	412
Creosote	5	0.33	0.6	1
Desert Scrub	2819	0.08	0.6	135
Other	1833	0.02	0.6	22
Total	4785			570

Threats: This Conservation Area is subject to fragmentation as a result of roads, including Palm Drive, Mountain View Drive, and Varner Road. Roads likely reduce successful *S. t. chlorus* movement between habitat patches. The Willow Hole Conservation Area is also subject to illegal OHV activity. OHV activity continues to modify BLM land, while providing access to the adjacent Existing Conservation Lands and proposed CVAG Reserve Lands. Thus, a portion of the proposed Reserve System has been and will continue to be compromised by these activities unless the effectiveness of management measures is improved.

The mesquite plants that anchor the blowsand along the fault in this area are increasingly threatened by the loss of groundwater from extensive groundwater pumping of the subbasin aquifer (CVAG 2007). Water levels have been declining in the Mission Creek Groundwater

Subbasin under the Willow Hole area since the early 1950's due to naturally scarce annual precipitation and groundwater extractions (DWR 2004). Groundwater level data indicate that since 1952, water levels have declined at a rate of 0.5 foot to 1.5 feet per year (DWR 2004). The dieback in the Willow Hole area over the last decade is likely caused by a dropping water table in the groundwater subbasin that underlies and provides essential support to these mesquite hummocks.

Snow Creek/Windy Point Conservation Area with Core Habitat

Habitat model: The Snow Creek/Windy Point Conservation Area consists of 2,814 acres of modeled habitat for this species, all of which is Core Habitat for the squirrel (Service GIS data). Of the total modeled habitat, 360 acres is Existing Conservation Land that is controlled by BLM.

Mesquite: There is no mesquite in the Snow Creek/Windy Point Conservation Area.

Active and Ephemeral sand dunes/fields: Of the 1,215 acres of active and ephemeral sand dunes/fields (Service GIS data), 16 acres are already conserved.

Number of Squirrels: Based on the calculations for squirrel census numbers described above, there are a maximum of 262 squirrels within the Snow Creek/Windy Point Conservation Area (Table 3).

Table 3. Estimation of the numbers of squirrels, uncorrected for capture probability, on lands identified as modeled habitat for ground squirrels in the Snow Creek/Windy Point Conservation Area.

Snow Creek/Windy Point	**Acres**	**Occupancy Rate**	**Density Estimate**	**# of Squirrels**
Mesquite	0	0.99	3.25	0
Creosote	1228	0.33	0.6	243
Desert Scrub	0	0.08	0.6	0
Other	1587	0.02	0.6	19
Total	2814			262

Threats: The Snow Creek/Windy Point Conservation Area currently has an abundance of invasive plants. These invasive plants have partially stabilized soils within the Conservation Area. The wind continually blows additional invasive plant seeds into the Conservation Area from the west, potentially affecting the suitability of habitat for *S. t. chlorus*. In addition to the presence of invasive plants, this Conservation Area has been and continues to be subject to substantial illegal OHV activity that has resulted in the alteration of much of the potential *S. t. chlorus* habitat. One major OHV access point is currently through BLM lands. While the OHV activity continues on and across BLM land, access is also currently being provided to areas proposed as CVAG Reserve Lands. Thus, the Snow Creek/Windy Point Conservation Area portion of the proposed Reserve System has been and continues to be compromised by these activities. Although it was the intention of BLM's CDCA Plan Amendment (and the associated Terms and Conditions within our Biological Opinion for BLM's action) to manage these areas,

including management and enforcement activities such as patrolling and blocking access, these efforts to date have been ineffective.

Whitewater Floodplain Conservation Area with Core Habitat

Habitat Model: The Whitewater Floodplain Conservation Area consists of 6,159 acres of modeled habitat for the squirrel, of which, 6,119 acres are Core Habitat (Service GIS data). Of the total modeled habitat, 2,624 acres are Existing Conservation Lands controlled by CVWD and BLM.

Mesquite: There is no mesquite in the Whitewater Floodplain Conservation Area.

Active and Ephemeral sand dunes/fields: Of the 3,425 acres of active and ephemeral sand dunes/fields, none are currently conserved.

Number of Squirrels: Based on the calculations for squirrel census numbers described above, there are a maximum of 143 squirrels within the Whitewater Floodplain Conservation Area (Table 4).

Table 4. Estimation of the numbers of squirrels, uncorrected for capture probability, on lands identified as modeled habitat for ground squirrels in the Whitewater Floodplain Conservation Area.

Whitewater Floodplain	**Acres**	**Occupancy Rate**	**Density Estimate**	**# of Squirrels**
Mesquite	0	0.99	3.25	0
Creosote	354	0.33	0.6	70
Desert Scrub	91	0.08	0.6	4
Other	5714	0.02	0.6	69
Total	6159			143

Threats: The Whitewater River is the predominant watercourse that provides the sand source for the existing Whitewater Floodplain Reserve and for the Whitewater Floodplain Conservation Area. The construction of the dikes on the Whitewater River downstream from Windy Point has trapped fluvial sediments upstream from the Whitewater River depositional area, as well as blocked westerly aeolian sand transport from crossing much of the depositional area (Griffiths *et al.* 2002). The percolation ponds have altered much of the available habitat within this area making areas modeled as habitat unsuitable for *S. t. chlorus*. The suitability of habitat within this Conservation Area is compromised by armoring of soils caused by high winds that blow aeolian sand from the system. In addition to sand depletion that is occurring in the Conservation Area, OHV activity also affects the ability of this area to provide habitat for *S. t. chlorus*. CVWD owns land within Section 19 of the Whitewater Floodplain Conservation Area where OHVs gain access.

Outside Core Habitat Areas within Other Conservation Areas

There are 120 acres of mesquite hummocks modeled as squirrel habitat outside of Core Areas

within other Conservation Areas (Service GIS data). If the substrate in these Conservation Areas is suitable for this fossorial species, a some squirrels may be supported in Conservation Areas outside of Core Areas; however these areas are spaced throughout the Plan Area likely forming many small populations. Based on the calculations for squirrel census numbers described above, there are a maximum of 2,333 squirrels spread out across all other Conservation Areas outside of Core Areas (Table 5).

Table 5. Estimation of the numbers of squirrels, uncorrected for capture probability, on lands identified as modeled habitat for ground squirrels in Conservation Areas outside of Core Areas.

Conservation Areas outside Core Habitat	**Acres**	**Occupancy Rate**	**Density Estimate**	**# of Squirrels**
Mesquite	120	0.99	3.25	384
Creosote	8210	0.33	0.6	1626
Desert Scrub	5465	0.08	0.6	262
Other	5012	0.02	0.6	60
Total	18,807			2333

Outside all Conservation Areas
Within the Plan Area, but outside all Conservation Areas, there are 62,016 acres of modeled habitat, of which, 415 acres of mesquite is modeled as squirrel habitat (Service GIS data). The modeled habitat outside of Conservation Areas is spaced throughout the Coachella Valley floor, thus, linkages between populations are not likely (Service GIS mapping data). Based on the calculations for squirrel census numbers described above, there are a maximum of 6,577 squirrels spread out across all modeled habitat outside of Conservation Areas but within the Plan Area (Table 6).

Table 6. Estimation of the numbers of squirrels, uncorrected for capture probability, on lands identified as modeled habitat for ground squirrels in the Plan Area and outside all Conservation Areas.

Outside Con. Areas	**Acres**	**Occupancy Rate**	**Density Estimate**	**# of Squirrels**
(within the Plan Area)				
Mesquite	415	0.99	3.25	1335
Creosote	21,049	0.33	0.6	4168
Desert Scrub	16,321	0.08	0.6	783
Other	24,231	0.02	0.6	291
Total	62,016			6577

Total Estimated Maximum Census Number of Squirrels
Within the Plan Area, the maximum estimated number of squirrels that may occur is: 10,601 squirrels. However, an estimated 6,577 of these squirrels occur outside of Conservation Areas and will not be protected. There are an estimated 1,691 squirrels that occur within Conservation

Areas containing Core Habitat. In total, there are approximately 4,024 squirrels that occur within Conservation Areas of the Plan Area, but these populations are spread out across the Plan Area.

Within Tribal Reservation Lands, there are 8,277 acres of modeled squirrel habitat, of which, 99 acres of mesquite is modeled as habitat for the squirrel (Service GIS data). There may be an additional 659 squirrels occurring on Tribal Reservation Lands, but these lands are outside the Plan Area. Therefore, within the Action Area and throughout the species known range, the total estimated maximum number of extant squirrels is 11,260.

Management
Three of the Conservation Areas where *S. t. chlorus* occurs are within Reserve Management Unit 1. Per the CVFTL HCP, the primary management actions to date have ranged from some control of invasive species and limiting public access to compatible scientific, educational, and recreational uses. A successful tamarisk eradication program has been completed. Within the Willow Hole-Edom Hill Preserve, the BLM lands are designated as an Area of Critical Environmental Concern. The BLM ACEC lands are classified as Class "Limited" in the CDCA Plan. Management objectives include control of deleterious activities such as OHV use and perimeter fencing to limit OHV activity.

Factors Affecting the Species' Environment within the Action Area
As stated above, the single greatest factor affecting *S. t. chlorus* in the Action Area is the direct and indirect destruction of mesquite. Most mesquite within the Coachella Valley has been lost in the past 50 years to developmental pressures and 90 percent of the original mesquite cover is gone. In many areas, the remaining mesquite is water stressed, dying, or dead (Lianne Ball and Jeremy Groom, personal observations). The effect of mesquite depletion on *S. t. chlorus* is likely profound, as Ball *et al.* (2005) found that mesquite habitat was almost always occupied by squirrels whereas few other habitat types in the Core Areas were occupied as frequently. In addition, the squirrels appear to be at highest densities in the mesquite, compared to apparent low densities in creosote on dunes and sand hummocks (Service unpublished data).

Fragmentation of habitat by development and roads may prevent declining populations from being maintained by immigrant squirrels; source populations may be limited in the number of successful dispersers that they can produce. Consequences of reduced immigration/emigration include a reduction in genetic diversity, an increased probability of population extirpation, and potentially the long-term contraction of the species' range. As the matrix between habitat patches becomes more inhospitable, dispersal between patches will become more difficult. Seasonal movements of adult males and dispersing juveniles will decrease, which will negatively affect reproduction rates and colonization of available habitat. Patches of available habitat may not be readily re-colonized because squirrels may not be able to disperse across the landscape.

Most of the development in the Coachella Valley is residential housing and this type of urbanization has been associated with an increase in the numbers of cats, which prey upon ground squirrels. Cats were hypothesized to be an agent in the decline of a population of European ground squirrels (*Spermophilus citellus*) (Hoffmann *et al.* 2003).

Saharan mustard has substantially invaded the Coachella Valley Preserve and was estimated to cover about 40 percent of sampled sand fields in the Coachella Valley Preserve (C. Barrows, pers. comm., 2006). Active dunes had much less cover of Saharan mustard (5 percent). The effects of this invasive vegetation remain unknown; however, it may result in less suitable habitat available for *S. t. chlorus* in the Plan Area by out competing native plant food sources.

EFFECTS OF THE ACTION

Evaluation Assumptions

1. Existing Conservation Lands controlled by the Permittees (cities, County, CVWD, etc.), and those controlled by non-profit organizations (The Nature Conservancy, CNLM, etc.), that were set aside or designated for conservation associated with the CVFTL HCP, will be protected by an appropriate legal instrument in perpetuity, such as a conservation easement held by Service-approved third party consistent with California Civil Code 815 et seq., within 6 months of Permit issuance. These lands will be protected and managed in a natural, ecologically beneficial, open-space condition.

2. Existing Conservation Lands controlled by BLM, Service, or CDFG, that were set aside or designated for conservation as a result of the CVFTL HCP or section 7 consultations on BLM actions, will be conserved in perpetuity by these respective agencies, or by any organization/agencies that are given control over these lands from these agencies. These lands will be protected and managed in a natural, ecologically beneficial, open-space condition.

3. BLM will enter into an MOU with CVCC prior to permit issuance and no later than 3 years post Permit issuance to ensure management consistent with the MSHCP on the Reserve System lands.

4. BLM will control OHV trespass across BLM lands through implementation of the CDCA Plan Coachella Valley Amendment and associated section 7 consultation, consistent with the Terms and Conditions in the associated Biological Opinion, and re-initiation of consultation on previous BLM actions where necessary.

5. CVCC will execute a MOU (Joint Enforcement Agreement(s), Mutual Aid Agreement, or equivalent mechanism) with the applicable Permittees, BLM, USFS, CDFG, and applicable Non-Profit Organizations, which enables cross-jurisdictional capability to provide for enforcement in the cases of non-compliance with the requirements of the Plan. The MOU or equivalent mechanisms approved by the Service shall specifically provide for enforcement of the relevant ordinances, resolutions, regulations, or other legal requirements necessary for effective management of the Reserve Lands. The MOUs shall specify roles and responsibilities among the parties needed to effectively implement the pertinent requirements of the Plan including the Trails Plan (Section 7 of the MSHCP).

Mitigation and Minimization Measures

The mitigation measures proposed in the MSHCP are intended to conserve large blocks of viable habitat that support *S. t. chlorus*. A total of 33,826 acres of modeled squirrel habitat are proposed to be conserved or are already conserved throughout the Plan Area (CVAG 2007, Section 9). Specifically, the MSHCP proposes to protect four Core Habitat areas within Snow

Creek/Windy Point (2,569 acres), Whitewater Floodplain (5,769 acres), Willow Hole (2,886 acres), and Thousand Palms (8,045 acres) Conservation Areas. Additionally, the MSHCP proposes to protect Other Conserved Habitat in Cabazon (24 acres), Stubbe and Cottonwood Canyons (381 acres), Whitewater Canyon (101 acres), Hwy 111/I-10 (350 acres), Whitewater Floodplain (36 acres), Upper Mission Creek/Big Morongo Canyon (2,388 acres), Willow Hole (1,367 acres), Long Canyon (101 acres), Edom Hill (1,677 acres), Thousand Palms (506 acres), West Deception (10 acres), Indio Hills/Joshua Tree National Park Linkage (148 acres), Indio Hills Palms (136 acres), East Indio Hills (1,364 acres), Joshua Tree National Park (1 acre), Desert Tortoise and Linkage (39 acres), Mecca Hills/Orocopia Mountains (239 acres), Dos Palmas (4,304 acres), Coachella Valley Storm-water Channel and Delta (192 acres), and the Santa Rosa & San Jacinto Mountains (1,193 acres) Conservation Areas.

Of the 348 acres of mesquite hummocks to be protected in the Plan Area plus the restoration of an additional 40 acres (388 acres total), 175 acres (45 percent) lie within Conservation Areas other than Core Habitat areas (CVAG 2007). Of the 193 acres of mesquite hummocks in Conservation Areas with only Other Conserved Habitat, protection to mesquite hummocks would be provided in the Cabazon (12 acres), Indio Hills Palms (2 acres), East Indio Hills (39 acres), Dos Palmas (52 acres), Coachella Valley Stormwater Channel and Delta (67 acres), and the Santa Rosa and San Jacinto Mountains (4 acres) Conservation Areas (CVAG 2007).

The Plan includes measures to monitor and protect mesquite hummocks, the preferred habitat of *S. t. chlorus*. The goals for maintaining mesquite (Section 10.2.7.1) include protecting hydrological regimes necessary to support mesquite, and to provide restoration "where necessary". The measures for accomplishing these goals, as stated in the Plan, are as follows (Section 10.2.7.2):

1. Monitor the hydrological regimes that support mesquite hummocks. Monitor groundwater level relative to maintenance of mesquite hummocks as part of the Management and Monitoring Program. This effort could involve determination of the level of existing groundwater monitoring by water districts and other entities. See Section 6.8.3.4 on Changed Circumstances for additional information.
2. Identify actions to reduce impacts from, and control where feasible, invasive species if it is determined from monitoring results that there are impacts to the mesquite hummocks.
3. Implement monitoring to track, and ultimately distinguish between, changes due to human or natural causes. Significant variables may include groundwater levels; live perennial shrub abundance, and invasive weed abundance.
4. As part of the Management and Monitoring Program, establish a research element that evaluates the potential for a mesquite hummocks restoration strategy. This may include restoration of mesquite hummocks if research and monitoring results indicate restoration is warranted. A preliminary discussion of a mesquite hummocks restoration strategy, including draft criteria, is included in the MSHCP Reserve System Management and Monitoring Program in Section 8.0.
5. Implement monitoring to track the recruitment of young mesquite plants into the mesquite hummock natural community in the Conservation Areas identified in Goal 1 (Section 10.2.7.1) and where recruitment is not occurring at a level needed to meet the Conservation Area's acreage goal, implement Adaptive Management measures to achieve a recruitment level

needed to sustain the mesquite natural community.

We interpret the fourth measure as indicating that mesquite hummock restoration may not be feasible. Restoration efforts categorized as "unfeasible" would result in the decline of mesquite in the Plan Area and noncompliance with Plan goals and objectives for this species. This would likely have a substantial impact on the squirrel, as mesquite is the habitat type with the highest occupancy rates for this species (Ball *et al.* 2005).

Additionally, Section 6.8.3.4 stated, "should monitoring detect a substantial lowering or a decline in mesquite health," actions would be taken, including developing "feasible measures" to ameliorate declines in water tables and implementing the measures through the Adaptive Management program. It is stated in Section 10.2.7.1: "A mesquite hummock area in the East Indio Hills Conservation Area has a specific Conservation Objective (Section 4.3.15). The Conservation Objective requires that, consistent with the research program described in Section 8.4.1.2, 80 acres of mesquite hummocks will be restored if 80 percent of the mesquite hummocks natural community in the south half of Section 17, T5S, R8E, is not conserved under the Plan. If the 80% is conserved, the Conservation Objective shall be to restore 40 acres of mesquite hummocks."

The Required Avoidance, Minimization, and Mitigation Measures in Section 4.4 states that construction activities in the Cabazon, Willow Hole, Thousand Palms, Indio Hills Palms, East Indio Hills, Dos Palmas, Coachella Valley Stormwater Channel and Delta, and Santa Rosa and San Jacinto Mountains Conservation Areas would avoid mesquite hummocks to the maximum extent feasible. Because this language is vague and may result in unauthorized reductions in conservation measures, the Service is requiring a Permit Term and Condition to clarify how such determinations will affect the implementation of the Plan. Instead of performing this measure to the "maximum extent Feasible", the Permittees shall perform all obligations to the extent as otherwise noted within the Plan; if the applicable Permittee determines that performing that obligation to that extent is not Feasible, the Service and the Permittee shall meet to discuss what measures are necessary to achieve biologically equivalent conservation to performing the subject obligation.

The Plan proposes to conserve approximately 90 percent of private land that has been modeled as *S. t. chlorus* habitat within each Conservation Area. Thus, approximately 10 percent of habitat on private lands within each Conservation Area would be subject to loss. Although the majority of the private lands would be conserved within a given Conservation Area, the ultimate configuration of the Reserve System is unknown at this time. Reserve System configuration would be subject to the Conservation Objectives and Required Measures established in Section 4.0 of the MSHCP for each Conservation Area, which require take of *S. t. chlorus* habitat within the Conservation Areas to be consistent with the Conservation Objectives for this species to: 1) ensure Conservation of Core Habitat; 2) protect Essential Ecological Processes needed to maintain *S. t. chlorus* Habitat; 3) maximize connectivity by maintaining Biological Corridors and Linkages among conserved populations and minimize habitat fragmentation to provide for population fluctuation and enhance genetic diversity, and 4) minimize adverse impacts from OHV use, illegal dumping, edge effects, invasive species, and other disturbances in accordance with the Management and Monitoring Programs.

Urban Development

Direct effects

Analysis without permit conditions

In total, 61,243 acres (60 percent) of modeled *S. t. chlorus* habitat would be lost as a result of the proposed action (CVAG 2007, Table 4-114). A total of 545 acres (64 percent; CVAG 2007) of mesquite hummocks would be subject to loss within the Plan Area as a result of the proposed action.

The habitat outside the Conservation Areas is already fragmented, surrounded by existing development, and has a compromised sand source/transport system. The potential for *S. t. chlorus* populations to persist long-term in areas outside of Conservation Areas appears limited, based on current patterns of development and small effective population sizes. These fragmented blocks are more susceptible to edge effects, including mortality on roads and predation by domestic cats and dogs. Roads and low-density residential development generally fragment the area near Desert Hot Springs and the habitat patches in and around La Quinta. The proposed loss of 61,243 acres of *S. t. chlorus* modeled habitat, including 517 acres of mesquite hummocks would result primarily from Covered Activities, particularly development and associated infrastructure. The amount of *S. t. chlorus* modeled habitat that would be lost to development (compared to what would remain) within the next 75 years is substantial (60 percent of modeled habitat).

Little information is available on the status of the modeled mesquite habitat or squirrel occupancy outside of the Conservation Areas within the Plan Area. However, given the occupancy patterns of squirrels in mesquite in Conservation Areas, it is probable that this mesquite supports a substantial number of squirrels within the Plan Area, if not a majority of the squirrel population. The loss of any mesquite on dunes or hummocks due to exclusion from the Conservation Areas would have a direct negative impact on squirrels that live there because most or all of these areas likely would be developed over the 75-year Permit term.

Of the total modeled habitat for the squirrel that would be lost (61,243 acres), 2,478 acres of disturbance to modeled habitat (2 percent of modeled habitat) would occur within the Conservation Areas under the Plan (CVAG 2007). Approximately 1,319 acres of Core Habitat (approximately 6 percent of all Core Habitat) and 1,159 acres of Other Conserved Habitat (6 percent of all Other Conserved Habitat) would be subject to losses (CVAG 2007). Of the total amount of mesquite that would be lost under the Plan, 28 acres of mesquite hummocks occur within Conservation Areas (approximately 7 percent of the mesquite within the Conservation Areas).

The MSHCP creation of Conservation Areas for *S. t. chlorus* was based on the delineation of Core Habitat that (1) is large enough to support a viable population of the species independent of other Core Habitat areas; (2) is not fragmented by development, including roads; (3) contains lightly traveled two-lane roads that have limited potential for expansion; (4) has intact Essential Ecological Processes, including sand source and sand delivery systems; and (5) provides suitable areas to act as refugia in the event of large-scale flood events or other extreme conditions (climate change, extended drought).

Thousand Palms Conservation Area
Within the Thousand Palms Conservation Area, 8,551 acres of modeled *S. t. chlorus* Core and Other Conserved Habitat are proposed to be conserved through the implementation of the MSHCP out of the 9,045 acres of modeled habitat in this Conservation Area. Of this, 5,346 acres are classified as Existing Conservation Lands, and 494 acres are anticipated to be lost. The Conservation Area includes 58 acres of mesquite hummock habitat. Of this total, 58 acres of mesquite hummocks are proposed to be conserved through the implementation of the MSHCP, and all acres are classified as Existing Conservation Lands in the Thousand Palms Conservation Area.

Based on Ball *et al.* (2005) and Service trapping efforts in 2004 (Service unpublished data), we estimate that there is a maximum census number of 716 squirrels in the Thousand Palms Conservation Area.

Willow Hole Conservation Area
The Willow Hole Conservation Area includes approximately 4,664 acres of modeled habitat for the squirrel. Of this total, about 4,253 acres of modeled squirrel habitat are proposed to be conserved through the implementation of the MSHCP, 562 acres are classified as Existing Conservation Lands, and 411 acres are anticipated to be lost (CVAG 2007). The Conservation Area also includes 125 acres of mesquite hummock habitat. Of this total, 114 acres of mesquite hummocks are proposed to be conserved through the implementation of the MSHCP, 16 acres are classified as Existing Conservation Lands in the Willow Hole Conservation Area, and 11 acres are anticipated to be lost (CVAG 2007).

The MSHCP identifies potential road widening to four lanes within this Conservation Area. If the road widening occurs beyond two lanes then wildlife undercrossings in the Willow Hole Conservation Area would be provided to maintain the ability for wildlife movement. This would involve installing a bridge or wide culvert under the existing roadway to be used as a corridor by *S. t. chlorus* as well as other species.

Based on Ball *et al.* (2005) and Service trapping efforts in 2004 (Service unpublished data), we estimate that there is a maximum census number of 570 squirrels in the Willow Hole Conservation Area.

Snow Creek/Windy Point Conservation Area
Within the Snow Creek/Windy Point Conservation Area a total of 2,814 acres are modeled as *S. t. chlorus* Core Habitat. The Plan proposes to conserve 2,569 acres, and 245 acres are anticipated to be lost. About 360 acres of modeled *S. t. chlorus* habitat are classified as Existing Conservation Lands in the Snow Creek/Windy Point Conservation Area (CVAG 2007).

Based on Ball *et al.* (2005) and Service trapping efforts in 2004 (Service unpublished data), we estimate that there is a maximum census number of 262 squirrels in the Snow Creek/Windy Point Conservation Area.

Whitewater Floodplain Conservation Area

The Whitewater Floodplain Conservation Area includes 6,155 acres of modeled *S. t. chlorus* habitat. Within the Whitewater Floodplain Conservation Area, 5,805 acres of modeled *S. t. chlorus* Core and Other Conserved Habitat are proposed to be conserved, and 350 acres are anticipated to be lost. About 2,624 acres of modeled *S. t. chlorus* habitat are classified as Existing Conservation Lands in the Whitewater Floodplain Conservation Area (CVAG 2007). The Existing Conservation Lands are controlled or owned by BLM and CVWD and are anticipated to be included in the MSHCP Reserve System.

Based on Ball *et al.* (2005) and Service trapping efforts in 2004 (Service unpublished data), we estimate that there is a maximum census number of 143 squirrels in the Whitewater Floodplain Conservation Area.

As written, the Plan does not adequately require Permittees to demonstrate that there are at least three viable squirrel populations within Conservation Areas. Based on our review of the pertinent literature (see the species account for the fringe-toed lizard for a detailed description of these concepts), a minimum of three viable populations within the Conservation Areas is an appropriate target to ensure conservation of these species in the Plan Area. To ensure or re-establish and maintain a minimum of three viable populations within Core Habitat for this species, a Permit Term and Condition has been included that requires the Permittees to manage and enhance all modeled Core Habitats for this species, assess the extant Core Populations to determine if they are adequate to support long-term population viability, develop a long-term management strategy for this species that identify specific measures that will be implemented and a specific time line for implementation, and incorporate the measures identified in the long-term management strategy into the Joint Project Review process through appropriate revisions to the Conservation Objectives and Required Measures for the Conservation Areas that include Core Habitat. The complete version of the permit condition is provided at the end of the account.

In addition to the Core Habitat Areas within Conservation Areas, squirrels may persist in low numbers within suitable habitat in the Conservation Areas described below. Based on Ball *et al.* (2005) and Service trapping efforts in 2004 (Service unpublished data), we estimate that there is a maximum census number of 2,333 squirrels throughout all other Conservation Areas described below:

Cabazon Conservation Area
Within the Cabazon Conservation Area, 24 acres of modeled *S. t. chlorus* Other Conserved Habitat are proposed to be conserved; all 24 acres of modeled *S. t. chlorus* habitat are classified as Existing Conservation Lands in this Conservation Area (CVAG 2007). The Cabazon Conservation Area includes 13 acres of mesquite hummock habitat. Of this total, all 13 acres of mesquite hummocks are proposed to be conserved through the implementation of the MSHCP, and all 11 acres are classified as Existing Conservation Lands.

Stubbe and Cottonwood Canyons Conservation Area
Within the Stubbe and Cottonwood Canyons Conservation Area, 381 acres of modeled *S. t. chlorus* Other Conserved Habitat are proposed to be conserved and 40 acres are anticipated to be lost. About 21 acres of modeled *S. t. chlorus* habitat are classified as Existing Conservation

Lands in this Conservation Area (CVAG 2007).

Whitewater Canyon Conservation Area
Within the Whitewater Canyon Conservation Area, 101 acres of modeled *S. t. chlorus* Other Conserved Habitat are proposed to be conserved and 9 acres are anticipated to be lost. About 18 acres of modeled *S. t. chlorus* habitat are classified as Existing Conservation Lands in this Conservation Area (CVAG 2007).

Highway 111/I-10 Conservation Area
Within the Highway 111/I-10 Conservation Area, 350 acres of modeled *S. t. chlorus* Other Conserved Habitat are proposed to be conserved and 39 acres are anticipated to be lost. There is no modeled *S. t. chlorus* habitat classified as Existing Conservation Lands in this Conservation Area (CVAG 2007).

Upper Mission Creek/Big Morongo Canyon Conservation Area
Within the Upper Mission Creek/Big Morongo Canyon Conservation Area, 2,388 acres of modeled *S. t. chlorus* Other Conserved Habitat are proposed to be conserved and 248 acres are anticipated to be lost. About 160 acres of modeled *S. t. chlorus* habitat are classified as Existing Conservation Lands in this Conservation Area (CVAG 2007).

Long Canyon Conservation Area
Within the Long Canyon Conservation Area, 101 acres of modeled *S. t. chlorus* Other Conserved Habitat is proposed to be conserved; all 101 acres of modeled *S. t. chlorus* habitat are classified as Existing Conservation Lands in this Conservation Area (CVAG 2007).

Edom Hill Conservation Area
Within the Edom Hill Conservation Area, 1,677 acres of modeled *S. t. chlorus* Other Conserved Habitat are proposed to be conserved and 158 acres are anticipated to be lost. Approximately 254 acres of modeled *S. t. chlorus* habitat are classified as Existing Conservation Lands in this Conservation Area (CVAG 2007).

West Deception Conservation Area
Within the West Deception Conservation Area, 10 acres of modeled *S. t. chlorus* Other Conserved Habitat is proposed to be conserved; all 10 acres of modeled *S. t. chlorus* habitat are classified as Existing Conservation Lands in this Conservation Area (CVAG 2007).

Indio Hills/Joshua Tree National Park Linkage Conservation Area
Within the Indio Hills/Joshua Tree National Park Linkage Conservation Area, 148 acres of modeled *S. t. chlorus* Other Conserved Habitat are proposed to be conserved and 17 acres are anticipated to be lost. There is no modeled *S. t. chlorus* habitat classified as Existing Conservation Lands in this Conservation Area (CVAG 2007).

Indio Hills Palms Conservation Area
Within the Indio Hills Palms Conservation Area, 136 acres of modeled *S. t. chlorus* Other Conserved Habitat are proposed to be conserved and 9 acres are anticipated to be lost. There is no modeled *S. t. chlorus* habitat classified as Existing Conservation Lands in this Conservation

Area. The Conservation Area includes 3 acres of mesquite hummock habitat. Of this total, 2 acres of mesquite hummocks are proposed to be conserved through the implementation of the MSHCP, 1 acre of which is classified as Existing Conservation Lands in the Indio Hills Palms Conservation Area (CVAG 2007). Only 1 acre is anticipated to be lost. The Land Use Adjacency Guidelines are key to ensuring that development within this Conservation Area does not risk disrupting dispersal corridors, particularly among the mesquite hummocks along the San Andreas Fault. Corridors are necessary in this Conservation Area to connect the dune hummocks at the southeastern portion of the East Indio Hills Conservation Area with those in the Thousand Palms and Willow Hole Conservation Areas. In our analysis we have assumed that the Land Use Adjacency Guidelines are implemented as appropriate to minimize and mitigate the effects to covered species. A Permit Term and Condition has been included in the Permit to clarify that the Land Use Adjacency Guidelines are not optional where they are applicable.

East Indio Hills Conservation Area
Within the East Indio Hills Conservation Area, 1,364 acres of modeled *S. t. chlorus* Other Conserved Habitat are proposed to be conserved and 112 acres are anticipated to be lost. About 360 acres of modeled *S. t. chlorus* habitat are classified as Existing Conservation Lands in this Conservation Area. The East Indio Hills Conservation Area includes 43 acres of mesquite hummock habitat. Of this total, 39 acres of mesquite hummocks are proposed to be conserved through the implementation of the MSHCP; 4 acres are anticipated to be lost (CVAG 2007). There is no mesquite hummock vegetation classified as Existing Conservation Lands in this Conservation Area. The Land Use Adjacency Guidelines are key to ensuring that development within this Conservation Area does not risk disrupting dispersal corridors, particularly among the mesquite hummocks along the San Andreas Fault. Corridors are necessary in this Conservation Area to connect the dune hummocks at the southeastern portion of this Conservation Area with those in the Thousand Palms and Willow Hole Conservation Areas. In our analysis we have assumed that the Land Use Adjacency Guidelines are implemented as appropriate to minimize and mitigate the effects to covered species. A Permit Term and Condition has been included in the Permit to clarify that the Land Use Adjacency Guidelines are not optional where they are applicable.

Dos Palmas Conservation Area
Within the Dos Palmas Conservation Area, 4,304 acres of modeled *S. t. chlorus* Other Conserved Habitat are proposed to be conserved and 186 acres are anticipated to be lost. About 2,631 acres of modeled *S. t. chlorus* habitat are classified as Existing Conservation Lands in this Conservation Area. The Dos Palmas Conservation Area includes 55 acres of mesquite hummock habitat. Of this total, 52 acres of mesquite hummocks are proposed to be conserved through the implementation of the MSHCP, 29 acres of which are classified as Existing Conservation Lands, and 3 acres are anticipated to be lost (CVAG 2007).

Coachella Valley Stormwater Channel and Delta Conservation Area
Within the Coachella Valley Stormwater Channel and Delta Conservation Area, 192 acres of modeled *S. t. chlorus* Other Conserved Habitat are proposed to be conserved and 19 acres are anticipated to be lost. About 20 acres of modeled *S. t. chlorus* habitat are classified as Existing Conservation Lands in this Conservation Area. The Coachella Valley Stormwater Channel and Delta Conservation Area includes 74 acres of mesquite hummock habitat. Of this total, 67 acres

of mesquite hummocks are proposed to be conserved through the implementation of the MSHCP; 7 acres are anticipated to be lost (CVAG 2007). There is no mesquite hummock vegetation classified as Existing Conservation Lands in this Conservation Area.

Indirect Effects

Mesquite and Habitat Fragmentation

The more landscape that is lost between mesquite patches, the less likely *S. t. chlorus* is to cross the matrix and reach other squirrel colonies or patches of vegetation where they can re-establish a colony. As the urban infrastructure in the Valley increases, mortality to squirrels from roads and domestic cats will increase. This will decrease the species' ability to recolonize areas where they have been extirpated. In our analysis we have assumed that the Land Use Adjacency Guidelines are implemented as appropriate to minimize and mitigate the effects to covered species. A Permit Term and Condition has been included in the Permit to clarify that the Land Use Adjacency Guidelines are not optional where they are applicable.

The Conservation Objectives and Required Measures indicate that specific acreages of mesquite will be conserved in the specified Conservation Areas. However, the Plan acknowledges that changes in groundwater have occurred that are likely responsible for the mesquite degradation and loss in parts of the Plan Area. Although actions are to be taken to reduce these effects and the Plan calls for maintaining the hydrology needed to support the specified mesquite acreages, no specific adaptive management measures to achieve these objectives are identified nor are adequate alternative sources of water identified to ensure the maintenance of the necessary hydrology for this community. Therefore, there is the potential that overdraft will over time reduce the amount of mesquite available to *S. t. chlorus*, which in turn will directly affect available food, shade, and substrate.

In the short term, mesquite in Thousand Palms likely will continue to experience mortality with no recruitment. This will lead to a substantial reduction, if not extirpation, of mesquite in the valley floor portion of the Thousand Palms Conservation Area. This would result in negative effects to the reproductive output and survivorship of ground squirrels within this Core Habitat area. If the lack of resources results in increases of over-winter mortality in adult females (e.g., nutritional stress, Sherman and Runge 2002), the likely outcome is a downward population trend given the resultant decreased reproductive capacity of the population.

This circumstance triggers the need for a Permit Terms and Conditions to ensure conservation of the mesquite hummock community that is so important to *S. t. chlorus* including: use of the Management Contingency Fund under Section 8 of the Plan to address mesquite hummock restoration, creation, and maintenance within the Willow Hole and/or Thousand Palms Conservation Areas as an adaptive management priority; and ensuring that the "no net loss" policy is implemented for the mesquite hummock community as described in Plan.

Mesopredator Release

Although reduced patch size and time since isolation appear to be important factors associated with the loss of small mammal species within habitat fragments (Bolger *et al.* 1997a), the direct mechanisms responsible for species loss in fragments remain poorly understood (Andren 1994; Morrison *et al.* 2004; Patten and Bolger 2003). Several studies have noted that the pattern of

increased extinction vulnerability for species with low relative abundance in habitat fragments is consistent with the theory that small populations will be more vulnerable to edge effects and random environmental and demographic fluctuations (Bolger *et al.* 1997a; Bolger *et al.* 1997b; Crooks *et al.* 2001). However, small populations likely also will be vulnerable to even modest increases in predation pressure (Crooks and Soulé, 1999).

Loss of coyotes from habitat fragments in southern California has been shown to be a factor associated with increased numbers of smaller carnivores (i.e., "mesopredators") that are principle predators of birds and other small vertebrates (Crooks and Soulé 1999). In particular, coyote presence appears to have a strong negative effect on domestic cat, opossum and raccoon abundance. Ecological release of mesopredators from coyotes has been implicated as a factor that has led to higher mortality and extinction of scrub-breeding birds in southern California habitat fragments (Crooks and Soulé 1999), and may be associated with the loss of small mammals from habitat fragments as well (Clark 2002).

Domestic cats are extremely effective recreational hunters that will continue to hunt when prey availability is low (Crooks and Soulé 1999) and have potential to reduce a rodent population very quickly (Pearson 1964). Domestic cats may be a threat to squirrels within portions of Conservation Areas adjacent to developed areas. Cats may kill squirrels in these areas. Based on surveys of cat owners adjoining habitat fragments in San Diego County, Crooks and Soulé (1999) conservatively estimated that cats from a residential neighborhood of about 100 homes surrounding a moderately sized habitat fragment (~49 acres) have the capacity to return as many as 840 rodents to the residences each year, two-thirds of which may be native species. Several mesopredators, including cats, foxes and skunks, but especially cats, appear to temporally avoid habitat fragments when coyotes are present and increase their visitation rates when coyote visitation declines (Crooks and Soulé 1999). However, the expected continued fragmentation of remaining squirrel habitat in the Plan Area will likely reduce the normal effectiveness of coyotes controlling pet and mesopredator numbers (Crooks and Soulé 1999) in some areas.

Other indirect effects resulting from the MSHCP Covered Activities include road mortality of *S. t. chlorus*, light pollution increasing vulnerability to nocturnal predators, restriction of movement between Conservation Areas, other edge effects from nearby development, and the impediment of sand transport and deposition that may be necessary to create and maintain *S. t. chlorus* habitat. These indirect effects may reduce *S. t. chlorus* populations locally and regionally and hinder gene flow between populations.

Invasive Species and Fire

Roadways promote the dispersal and expansion of invasive species into adjoining habitat through frequent disturbance to roadside habitats and the function of vehicles as vectors for seed dispersal (Forman and Alexander 1998). Invasive species and disturbance-tolerant species, such as non-native grasses and other weeds, are often common along roadsides. Invasion by non-native annual grasses and other weedy species into Conservation Areas may be detrimental to *S. t. chlorus* by filling in openings in the vegetation canopy and altering the structure and composition of the plant community. Areas dominated by Saharan mustard or invasive grasses may also be more prone to ignite and carry fires.

In southern California shrublands, fire frequency is positively correlated with human population density (Keeley and Fotheringham 2001) and the pattern of that fire is tightly associated with roadways. Roadways provide a ready source for fire ignitions in adjoining native habitat by means of vehicle sparks and discarded cigarettes and allow for easy access for arsonists. Although fire does not currently appear to be a major threat to the squirrel, increased development of structures and roadways may lead to a greater number of invasive species (e.g., Saharan mustard) within the Conservation Areas that are essential for this species survival. Fire may have detrimental effects on squirrels occupying a burned area, but the long-term effects on the overall population are unknown.

Invasive plant guidelines in the Plan (Section 4.5.5) would help to prevent an increase in the number of invasive plants in and adjacent to Conservation Areas; however, a more proactive approach to eliminating existing invasive plant species within Conservation Areas would provide benefits by reducing competition with the native plant species that the squirrel likely relies upon for food, and potentially reducing the fire frequency within Conservation Areas. This necessitates the inclusion of a Permit Term and Condition to ensure that invasive non-native species are addressed adequately: CVCC or the applicable Permittees shall develop an invasive species management plan that addresses control of invasive plant species (e.g., Saharan mustard) in Snow Creek/Windy Point, Thousand Palms, Whitewater Floodplain, and Willow Hole Conservation Areas.

Analysis with permit conditions

The permit conditions will either ensure that there are at least three viable *S. t. chlorus* populations in the Plan area and/or provide for restoration and enhancement actions to improve the quality and quantity of habitat within the Conservation Areas such that they support a sufficient number of *S. t. chlorus* to reasonably ensure the species persistence over the life of the permit and to provide for the species long-term survival. Populations will likely be more resilient to environmental fluctuations if mesquite remains alive or is restored within Core Habitat areas, due to the resources provided by the mesquite and the larger number of squirrels supported in areas with enhanced mesquite habitat. Restoration and enhancement actions may also reduce the amount of invasive non-native plant species within squirrel habitat.

Monitoring and Adaptive Management Program

Analysis without permit conditions

Direct Effects

S. t. chlorus may be directly impacted by the Monitoring and Adaptive Management Program through the harming or killing of individuals through direct ground squirrel monitoring activities, the collapsing of burrows as a result of ground squirrel or other species monitoring, and the alteration of habitat through Adaptive Management action.

Indirect Effects

Monitoring and Adaptive Management measures mentioned in Section 4, 6.8.3.4, 8, and 10.2.7.1 mention mesquite restoration as an option, and discuss investigating methods for reintroduction and restoration. A Conservation Goal of the MSHCP Reserve System is to "maintain or restore self-sustaining populations or metapopulations of the species (Section 4.3)," including *S. t. chlorus*. This is to be accomplished through land conservation, mesquite conservation and

restoration, monitoring, and adaptive management.

Monitoring and Adaptive Management efforts to control invasive plant species would likely benefit the species by removing competitive exclusionary pressures the invasive species place on native plant species and by reducing the fuel load on habitat. The reduction in fuel load may reduce the frequency of fires and prevent fires from removing shade plants (e.g., creosote) from Conservation Areas. Shade is a crucial resource for this species as they are active above ground during the middle of the day in the summers when air temperatures reach 120° F in the shade and sun-exposed substrate temperatures are over 180° F.

Analysis with permit conditions

Direct effects

This species would benefit from the increased monitoring requirements of the permit conditions. Permittees would be required (subject to Service approval) to develop and implement actions to maximize the functions and values of the Core Habitat areas to be conserved in the identified Conservation Areas such that they can support at least three viable populations of squirrels within the Plan Area. Although a majority of the remaining mesquite within the Valley would be subject to removal through the Plan, additional restoration efforts in Conservation Areas would 1) provide increased quantity of mesquite habitat for *S. t. chlorus*; 2) maintain and improve the quality of drought-stressed mesquite; 3) ensure the survival and potentially recruitment within mesquite populations. The required actions in combination will ensure the persistence of *S. t. chlorus* in the Plan Area by ensuring that squirrel numbers are not substantially reduced throughout its range.

Indirect effects

If Permittees restore mesquite within Conservation Areas, then restoration efforts would benefit the species by providing more suitable habitat, thus, potentially increasing the numbers of squirrels in the restored areas. Restoration efforts would provide multiple resources for *S. t. chlorus*, including shade, food, and a burrowing substrate. Indirect effects resulting from invasive non-native species management may improved the effectiveness of habitat restoration and enhancement actions for squirrels.

Trails Plan

Trail creation may remove a small portion of *S. t. chlorus* habitat as well as destroy nearby burrows. Trail users that wander off-trail may crush *S. t. chlorus* burrows and burrow inhabitants. Permittees will minimize these impacts by designing trails and associated facilities that are consistent with the Conservation Goals and Objectives of the Plan; using fencing and signage where appropriate; conducting education and outreach programs; patrolling to ensure that visitors stay on trails; and maintaining trails, facilities, and barriers to discourage and prevent intrusion into adjacent environmentally sensitive areas (Section 7.4.3). The Plan includes criteria for site location and design of the trails and facilities including guidelines for public use and maintenance to mitigate potential adverse effects. Specifically, Section 7.3.4.4 of the MSHCP proposes *Guidelines for Public Access and Recreation on Reserve Lands* to avoid and minimize potential adverse effects of the Trails Plan and recreation activities.

Cumulative Effects

It is expected that an undetermined amount of *S. t. chlorus* habitat within the Plan Area, on non-federal lands and outside of any proposed Conservation Areas, would be subject to impacts by parties that are not under the control of proposed Permittees or those with Certificates of Inclusion (such as some local water agencies or school districts). These habitat alterations would not require ESA permitting or consultation unless the species is federally listed in the future. We expect that minimization and mitigation measures for the Coachella Valley fringe-toed lizard would result in an undetermined acreage of legal protection and management of suitable habitat in the Plan Area outside of proposed Conservation Areas that will simultaneously benefit the squirrel. To the extent that these actions are not subject to section 10 permitting or consultation, these impacts would remain cumulative.

Additionally, we expect that some mitigation for impacts to the blowsand ecosystem on Valley-floor Reservation lands (outside the Plan Area) to occur in the Plan Area outside of proposed Conservation Areas; this would include lands near the proposed Whitewater Floodplain and Thousand Palms Conservation Areas, where additional conservation would benefit *S. t. chlorus*.

It is anticipated that some continued degradation of *S. t. chlorus* habitat within the Plan Area will occur resulting from OHVs, illegal dumping, and invasive plants. It is likely that these activities and conditions will significantly suppress *S. t. chlorus* populations. Illegal dumping and OHV use (and impacts) in the Valley is expected to decrease over time as a portion of the remaining open lands are developed and greater control is gained over trespass and dumping by land managers (by presence and reporting, as well as fencing and blockading of access routes) and local law enforcement. It is likely that some invasive plants already introduced into the Valley will increase in area/density and ecological impact, partially as a result of human activities such as disturbance from OHV, construction/maintenance/agricultural equipment use and movement, road development and expansion, and equestrian use (a large portion of these activities are not Covered Activities and will remain cumulative to the effects of the proposed action); continuation of ongoing control efforts (some of which will be unrelated to the Plan, such as activities by Tribes) will likely reduce the ecological influence of other invasive plants. New introductions of invasive plants during the proposed permit term are likely with undetermined effects. It is expected that many of the cumulative human activities that would propagate and/or increase impacts from invasive plants will receive future permitting or consultation (such as maintenance by non-Permittees), with a resultant decrease in ecological effects.

Artificially enhanced predator populations, such as pets and mesopredators associated with housing developments that are not Covered Activities, likely will result in appreciable cumulative effects to *S. t. chlorus* where suitable habitat remains adjacent or nearby. As described above, the expected continued fragmentation of remaining squirrel habitat in the Action Area will likely reduce the normal effectiveness of coyotes controlling pet and mesopredator numbers (Crooks and Soulé 1999) in some areas.

The Agua Caliente Band of Cahuilla Indians is undertaking a Habitat Conservation Plan for all of their Tribal lands. The draft Plan and associated documents have been reviewed publicly. It is anticipated that the final Plan and associated environmental analysis will be complete in mid-2008 with permit issuance scheduled for late 2008. Although there will be habitat loss associated with that Plan, the overall net benefit to the species is positive. Because issuance of

that permit is a Federal action, an analysis of the impacts of that Plan will be completed in the required section 7 process. Additionally, a large portion of Section 6 (T3S R4E) is expected to be conserved for the fringe-toed lizard under the Tribal HCP and this conservation would provide habitat for the Coachella Valley round-tailed ground squirrel as well.

Conclusion

The Plan Area is essential to continued existence of the Coachella Valley round-tailed ground squirrel because this species is endemic to the Plan Area and surrounding tribal lands. A total of 20,469 acres of Coachella Valley round-tailed ground squirrel modeled habitat, areas that are currently unprotected, are proposed to be conserved in perpetuity under the Plan. This conservation would be provided under the Plan to mitigate the loss of up to 61,243 acres of modeled habitat that would result from proposed Covered Activities throughout the Plan Area. In addition to the proposed mitigation lands, the Conservation Areas contain Existing Conservation Lands (13,357 acres of squirrel modeled habitat) that would augment the reserve design of the Plan, and complement the Reserve System. As such, a total of 33,826 acres would be conserved, if the 13,357 acres of Existing Conservation Lands are combined with the 20,469 acres of land proposed for conservation. Also, a significant, but undetermined additional amount of conservation of Coachella Valley fringe-toed lizard habitat is expected to occur from acquisition and management of currently unprotected lands provided by the Service, the State, and conservation organizations that would partially benefit the squirrel. Thus, more than 33,826 acres of modeled or suitable habitat would ultimately be expected to be conserved in Valley (range-wide for the species) at the end of the proposed 75-year permit term; no occupied habitat would be expected to remain extant outside of these conserved areas at the end of this term. This approximate 33,826 acres of modeled or suitable habitat plus lands protected for other species that benefit the squirrel (e.g., Coachella Valley fringe-toed lizard) represents 33 percent of the currently remaining suitable or modeled habitat available range-wide and could contain the entire future range of the subspecies (pending resolution of the existing taxonomic issues).

Implementation of the avoidance, minimization, and mitigation measures identified in the MSHCP will reduce impacts to this species that would otherwise occur. We anticipate that the Coachella Valley round-tailed ground squirrel populations and habitat will be monitored and managed in perpetuity.

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 with permit conditions, is not likely to jeopardize the continued existence of the Coachella Valley round-tailed ground squirrel. We reached this conclusion because habitat areas and ecosystem processes essential to the continued existence of the species in the Plan Area are likely to be conserved and managed for the Coachella Valley round-tailed ground squirrel in perpetuity; this, combined with other actions likely to occur in the action area, would result in habitat areas and ecosystem processes essential to the species' continued existence range-wide being adequately conserved and managed. Thus, impacts to this species and its modeled habitat, when viewed in conjunction with the protection and management within the MSHCP Conservation Areas and associated permit conditions, 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 difficult to quantify the number of Coachella Valley round-tailed ground squirrels that would be taken as a result of the proposed action over the 75-year permit term due to the large Plan Area, the programmatic nature of the Plan and Covered Activities, and the lack of detailed monitoring information available on potentially occupied sites in the Plan Area. Therefore, the Service is quantifying the take as the number of acres of modeled habitat that would be impacted or lost from Covered Activities in the MSHCP Plan Area as a result of the proposed action. We anticipate that up to 61,243 acres of modeled habitat within the Plan Area would become unsuitable for the Coachella Valley round-tailed ground squirrel as a result of the proposed action. Given that our information suggests that the modeled acreage overestimates the habitat used by *S. t. chlorus*, we anticipate the occupied acreage disturbed as a result of the Plan to be considerably less. Additionally, a small, but undeterminable, number of Coachella Valley round-tailed ground squirrels are anticipated to be taken as a result of proposed monitoring and management actions. Take would likely be in the forms of capture, harm, and mortality.

PERMIT CONDITIONS

The following Permit Conditions have been identified through our analysis as being necessary and appropriate for coverage of this species in the Permit:

CVCC and the Land Manager, through the land management program, shall identify and document implementation compliance with the Land Use Adjacency Guidelines and work with the landowners and appropriate jurisdictions to address these concerns. This information shall be included in the Annual Report to the Wildlife Agencies and the Permittees.

Certain measures are identified in the Plan as obligations to be performed to the "maximum extent Feasible". If the applicable Permittee determines that performing an obligation to the extent described in the Plan is not Feasible, the meet and confer process as described in 23.6 A-D of the Implementing Agreement shall be followed.

The CVCC shall ensure that the mesquite hummocks Natural Community will be subject to a "no net loss" requirement as described in Section 8.2.4.1 of the Plan. The CVCC shall ensure that these requirements are implemented within 10 years of impacts, including providing suitable or potential habitat for Covered Species if such habitat is affected or lost due to Covered Activities.

Prioritization of the Monitoring Program shall include a focus on the development of scientifically valid, repeatable survey techniques that will support population estimation and determination of distribution for the Coachella Valley giant sand-treader cricket, Coachella Valley Jerusalem cricket, desert pupfish, Coachella Valley fringe-toed lizard, flat-tailed horned lizard, Coachella Valley round-tailed ground squirrel, and Palm Springs pocket mouse in the Plan Area (particularly in the Core Habitats) over the term of the Permit. These techniques shall be developed in coordination with the Wildlife Agencies prior to their implementation. The CVCC shall ensure that any monitoring and management of these species that are implemented through joint funding by multiple Permittees are coordinated to allow for comparison across the Plan Area and through time in support of the effectiveness monitoring and adaptive management

requirements of the Plan.

Use of the Management Contingency Fund under Section 8 of the Plan shall include addressing the following sand-dependant species priorities: 1) funding of activities addressed in Special Permit Term and Condition #26; 2) development and implementation of an invasive species management plan that assesses the status of and threats from invasive species, identifies knowledge gaps, and addresses control of invasive plant species (e.g., Saharan mustard) in Snow Creek/Windy Point, Thousand Palms, Whitewater Floodplain, and Willow Hole Conservation Areas; and, 3) funding of other sand-dependent species/habitat related Special Permit Terms and Conditions. The invasive species management plan shall be developed within 3 years of Permit issuance in coordination with the Wildlife Agencies; this management plan shall be implemented beginning in year 4 post-Permit issuance. The Management Contingency Fund may supplement, but not replace, the Monitoring and Management Program budget.

For Coachella Valley Fringe-toed Lizard, Coachella Valley Round-tailed Ground Squirrel, Palm Springs Pocket Mouse, and Coachella Valley Milk-vetch, to ensure that a minimum of three (3) viable populations (long-term persistence of self-sustaining populations) within Core Habitat for these species is maintained, or if necessary re-established and maintained, the following measures shall be implemented:

The CVCC shall manage and enhance modeled Core Habitats for these species to provide for persistent and sustainable populations and essential ecological processes, including broader patterns of sand transport and deposition in the Whitewater Floodplain and maintenance of sand transport and deposition in all Core Habitats to the maximum extent practicable (e.g., sand fencing as appropriate in any of the Conservation Areas and restoring mesquite in Thousand Palms Conservation Area) to achieve the Conservation Objectives for these species in the Plan.

The CVCC shall assess the animal species identified above to determine the presence of persistent and sustainable populations and essential ecological processes within the Core Habitats. This assessment shall be completed within 3 years of Permit issuance using methods developed jointly by the CVCC and Wildlife Agencies.

Specific studies shall be conducted as part of the baseline monitoring for the Coachella Valley milkvetch to assess: viability and extent of seed bank, substrate affinities, micro-habitat requirements, seed dispersal, pollination ecology, and impacts of invasive species within the Core Habitat areas to ensure that the appropriate measures to support long-term conservation of this species are identified. These studies shall be completed within 5 years of Permit issuance using methods developed jointly by the CVCC and Wildlife Agencies.

The CVCC shall develop long-term management strategies for each of these species that identify specific monitoring approaches (e.g., the use of probabilistic population estimates, relativistic population indices, and/or assessments of effective population size) and management actions (including actions to address habitat as described in a) above) that will be implemented and a specific time line for implementation to ensure a minimum of 3 viable populations including adequate distribution to support long-term viability of the populations within Core Habitat areas. These management strategies shall be completed and provided to the Wildlife Agencies for their

concurrence within 5 years of Permit issuance for the animal species and 7 years for the CV milkvetch.

Within 6 months of their completion, implementation of the measures associated with the management strategies shall begin through incorporation into the applicable Reserve Management Unit Plan(s) and Adaptive Management Program. Any changes to the Covered Species and Natural Communities Conservation Goals and Objectives and Required Measures for the Conservation Areas that include Core Habitat for each of the species identified above shall be submitted to the Wildlife Agencies for review and approval within 8 years of permit issuance and incorporated into the Joint Project Review process as appropriate.

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Palm Springs pocket mouse (*Perognathus longimembris bangsi*)

STATUS OF THE SPECIES

Legal/Listing Status

The Palm Springs pocket mouse is not a federally listed species. The State of California has designated this mouse as a Species of Special Concern.

Species Description

The Palm Springs pocket mouse (PSPM) is one of seven subspecies of *Perognathus longimembris* (PELO), the "little pocket mouse," that occurs in southern California. The species is the smallest of the Heteromyidae family that also includes kangaroo rats, kangaroo mice, and spiny pocket mice. Like all members of the Heteromyidae family, the PSPM is characterized as a nocturnal granivore with external, fur-lined cheek pouches. The body pelage of the this species is silky (spineless) and predominately brown, pinkish buff or ochraceous buff above and light brown, pale tawny, buff, or whitish below.

The PSPM was originally described by Mearns (1898) with the type locality in Palm Springs. This subspecies occurs in the lower Sonoran life zone from the San Gorgonio Pass area east to the Little San Bernardino Mountains and south along the eastern edge of the Peninsular Range to Borrego Valley and the east side of San Felipe Narrows (Hall 1981). For the purposes of this species account, we will refer to this subspecies as a "species".

The understanding of the ecology of the PSPM arises largely from the observations of mammalogists studying other mice species. Pocket mice of the PELO group are nocturnal, solitary, and generally exhibit strong intraspecific aggression (Dodd 1996). They spend the day in burrows they construct, which are comprised of a system of tunnels and a plugged entrance. This species generally breeds from January to August, with a peak of activity from March to May (Dodd 1996). Several studies suggest that reproduction in heteromyids may be dependent on availability of annual vegetation. Studies of other subspecies of the little pocket mouse indicate that they hibernate in winter and are active above ground in spring, summer, and fall (Bartholomew and Cade 1957).

Distribution

The Plan Area contains the major portion of the range of the PSPM, including the western, northern, and eastern limits of the species' range. The southern boundary of the range extends out of the Plan Area into Imperial and San Diego counties. This subspecies occurs in the lower Sonoran life zone from the San Gorgonio Pass area east to the Little San Bernardino Mountains and south along the eastern edge of the Peninsular Range to Borrego Valley and the east side of San Felipe Narrows (Hall 1981). Virtually all CNDDB records are from the Plan Area.

Modeled habitat for the PSPM extends from Cabazon to the southeastern portions of the Plan area. The modeled habitat is primarily located along the Coachella Valley floor and in desert washes and arroyos. The species has been sampled in several locations within the Plan area, with most sampling occurring in the northeastern portion of the Plan area with several sites located centrally, to the east, and to the south. Not all species occurrences are within modeled

habitat. Two occurrences, in the Desert Tortoise and Linkage Conservation Area along Highway 10, are located 4 to 20 kilometers outside of modeled habitat.

According to the survey results of Shana Dodd in 1995 and 1999 (Dodd 1996, 1999), the highest densities of this pocket mouse occur at the western end of the Plan Area, with lower densities occurring farther east. Dodd (1996, 1999) describes the PSPM as moderately abundant in the Highway 62/Mission Creek area, where the species is not currently protected. Considerable unprotected habitat also occurs adjacent to the Willow Hole-Edom Hill Preserve/Area of Critical Environmental Concern (ACEC). Dodd (1996) described the density of this species at Willow Hole as moderate. Additional density estimates were made for the PSPM, based on live trapping on two 1.2-acre (0.5-hectare) grids located west of Snow Creek Road, approximately 0.5 miles north of Snow Creek Village in the Snow Creek area (Spencer *et al.* 2000). The minimum PSPM density, on two adjacent grids, was 32.6 individuals per acre (81.6 individuals/ha) and 25.3 individuals per acre (63.3 individuals/ha), respectively.

The species occurs on three existing preserves: the Thousand Palms Preserve, the Whitewater Floodplain Preserve, and the Willow Hole-Edom Hill Preserve/ACEC. Within the Plan Area, it occurs at the highest reported densities in the Snow Creek area. Three individuals were captured in a small mammal-trapping grid (LaPre 1999) in the blowsand habitat adjoining the San Gorgonio River wash just north of One Horse Spring; this location is approximately 3 miles west of Snow Creek Road. Surveys completed for the Plan (Dodd 1999) confirmed that the species also occurs at Dos Palmas Preserve/ACEC and in the Cottonwood Canyon area of Joshua Tree National Park. Tests to determine that the subspecies captured in these areas is *P. l. bangsi* and not *P. l. longimembris* have not been finalized.

Habitat Affinities

PSPM habitat consists of level to gently sloping topography, sparse to moderate vegetative cover, and loosely packed or sandy soils. The species is found broadly distributed in the Plan Area on slopes ranging from 0-15 percent (Dodd 1996). Based on studies with Pacific pocket mice (*P. l. pacificus*) (Bailey 1939; Grinnell 1933; Mearns 1898), the two key habitat components that are likely important to PSPM are soils and vegetation.

The PSPM is primarily granivorous. Climatic factors may determine seed-bearing plant species composition and abundance, which likely affect population densities of this species. Vegetation structure may also limit abundance and distribution. PELO forage under shrubs and likely rely upon vegetation cover to avoid predation (Thompson 1982b; Kotler 1984). Other studies suggest that too much shrub cover may be detrimental to PELO (Thompson 1982b). The little pocket mouse in the Mojave Desert, avoids open areas and utilizes shrubs (Thompson 1982a); in contrast, many Pacific pocket mice, have been captured in open, sparsely vegetated areas, or in small open patches within dense stands of vegetation (von Bloeker Jr. 1931a; Williams 1986; Erickson 1993).

Soil texture may determine microhabitat suitability for the species, as soils “affect rodents directly through their influence on burrowing, locomotion, and foraging" (Brown and Harney 1993). The Pacific pocket mouse, a coastal dwelling relative, is closely associated with friable sandy soils that may provide adequate structure and substrate for digging and burrowing. Bornyasz (2003) evaluated Pacific pocket mouse occupied sites and found that each site was

dominated by loamy sands on the surface, and sands and loamy sands below the surface. Surface soils ranged from 80-94 percent sand and never exceeded 3 percent clay. He also found soil depths at extant Pacific pocket mouse sites range from 20-60 centimeters. Due to the more extreme desert environment that the PSPM inhabits, this subspecies may need greater soil depths for hibernation and aestivation than Pacific pocket mouse. The habitat model for the Plan Area created for the PSPM consisted of habitat, slope and varieties of sand substrate.

Life History

The life history of PELO has been studied extensively for other subspecies occurring in desert environments (Allred and Beck 1963; Bartholomew and Cade 1957; Beatley 1969; Bowers 1982; Bowers 1986; Burge and Jorgensen 1973; Chew and Butterworth 1964; Chew *et al.* 1967; Cramer and Chapman 1990; Flake and Jorgensen 1969; French 1976; French *et al.* 1974; French *et al.* 1967; French 1977; Jorgensen 1968a; Jorgensen 1968b; Kenagy 1973; Kenagy and Bartholomew 1985; Kotler 1984; Kotler 1985; Larsen 1986; Lemen and Freeman 1986; Maza *et al.* 1973; Price *et al.* 2000; Thompson 1982a; Thompson 1982b; Thompson 1985; Veech 2001). No studies have focused on the specific factors governing the life history of the PSPM. Therefore, the following discussion assumes that much of what is known about other desert occurring subspecies applies to PSPM, unless otherwise noted.

Births

Reproduction in PELO is highly correlated with rainfall and seed availability (Beatley 1969; French *et al.* 1974; Kenagy and Bartholomew 1985). PELO may breed only once in the spring between the months of April and June, though occasionally they may extend the breeding season and produce two litters in a year (Chew and Butterworth 1964; Cramer and Chapman 1990; Flake and Jorgensen 1969; French *et al.* 1967; Meserve 1972; O'Farrell *et al.* 1975; Kenagy and Bartholomew 1985). However, their seasonal dormancy restricts the length of the reproductive season, which may limit their ability to adjust the frequency of litters (Kenagy and Bartholomew 1985).

Gestation for PELO typically lasts 23 days and young are weaned after 30 days (Hayden *et al.* 1966). PELO become sexually mature at 41 days of age and can breed in their natal year during favorable conditions (Brylski 1993; French *et al.* 1974; Hayden *et al.* 1966). PELO produce between 4-6 offspring per litter if conditions are suitable (Cramer and Chapman 1990; Hayden *et al.* 1966; Kenagy and Bartholomew 1985). French *et al.* (1974) found mean litter sizes to vary from 5.1 for females less than one year old to 6.0 for animals three years of age, but comparisons did not reveal significant differences in litter size among age groups. In years of poor resource availability (e.g., drought), *Perognathus* may delay breeding or forego breeding altogether resulting in little to no recruitment to the overall population (Beatley 1969; Conley *et al.* 1977; French *et al.* 1967; Kenagy and Bartholomew 1985; O'Farrell *et al.* 1975). However, changes in the age structure of the population following years of good or poor recruitment appears to have little influence on the overall reproductive performance of the population (French *et al.* 1974; O'Farrell *et al.* 1975).

Overall, large litter sizes, the ability of adults to breed more than once in a year, the ability of young to reproduce during their natal year, and the ability of older animals to continue to reproduce give PELO the ability to rapidly recruit individuals into the population under

favorable conditions (Beatley 1969; Conley *et al.* 1977; French *et al.* 1974). In simulations, Conley *et al.* (1977) show that four-fold population increases are possible within one year with 90 percent of adults and no young reproducing, or with 50 percent of adults and 50 percent of young of the year reproducing. Even higher population growth rates are possible, if one assumes that greater than 50 percent of adults will reproduce when conditions are favorable enough to promote reproduction in young, and two litters for each adult female within the same year (Conley *et al.* 1977). This later scenario represents an ideal condition which may occur infrequently, thereby allowing PSPM populations to increase dramatically on a periodic basis.

Longevity/Survivorship/Death

PELO are an exceptionally long-lived for an animal of its size (Brown and Harney 1993; Conley *et al.* 1977; Edmonds and Fertig 1972; French *et al.* 1967). French *et al.* (1967) reported on 25 PELO that survived from 3 to 5 years in the wild. Egoscue *et al.* (1970) maintained wild caught individuals for up to 7 years 10 months in captivity. Edmonds and Fertig (1972) reported a wild caught, mature animal in captivity for 8 years and one month.

Adaptations that are likely to be associated with their longevity are their fossorial habitat and seed caching behavior in combination with their physiological capacity to enter torpor. The ability to remain below ground through the use of stored food and/or torpor is likely to be an effective predator avoidance strategy (Brown and Harney 1993). Facultative use of torpor also confers significant metabolic energy savings during periods of environmental stress (Bartholomew and Cade 1957; French 1976). In laboratory trials, PELO adjusted the amount of time they spent in torpor to food availability (Bartholomew and Cade 1957; French 1976). Because torpor slows metabolic processes, it is likely to delay cellular senescence (French *et al.* 1967; Hayden and Lindberg 1976).

The above records of animals surviving for 5+ years are likely to represent the maximum end of the longevity curve while mean individual survivorship is likely to be much lower. Hayden and Lindberg (1976) reported that most PELO are unlikely to survive more than a year. Chew and Butterworth (1964) recaptured 19 of 62 PELO (30.6 percent) 11-12 months following their date of first capture. Kenagy (1973) reported that overwinter survivorship was 82 percent, 56 percent, and 36 percent in 3 consecutive years, which he correlated with population size and resource availability (*i.e.*, larger population sizes and greater survivorship were positively associated with rainfall and annual plant seed availability). However, his methods did not account for the possibility that low animal return rates could be associated with dispersal or a failure to detect individuals during subsequent trapping bouts.

Contrary to the findings of Kenagy (1973), French *et al.* (1967) suggested that there is a correlation between longevity of PELO and seasonal adversity, with animals seeming to survive longer during poor environmental conditions. They hypothesize that during years of good resource availability animals remain active a greater proportion of the time, thus exposing themselves to higher risks of mortality. Similarly, if there is a cost in terms of reduced survivorship associated with reproduction, as is often suggested by reproductive theory, the ability of PELO to forego reproduction during years of poor plant production should improve their prospects for survival (Conley *et al.* 1977).

These factors suggest that PSPM may be capable of shifting demographic strategies depending on resource availability. Under periods of high rainfall and plant production, PSPM are likely to exhibit maximum reproduction and relatively low survival rates, while minimum reproductive rates and maximum survival rates would be expected during times of drought and poor primary production (Conley *et al.* 1977).

The direct causes of PSPM mortality are poorly known but, similar to other desert subspecies, PSPM are likely to be prey for a large suite of vertebrate predators including snakes, owls, foxes, weasels, raccoons, coyotes, bobcat, feral and/or domestic cats, and possibly lizards (Brylski 1993; French *et al.* 1967; Kotler 1985; Pietruszka *et al.* 1981; Price and Brown 1983; Service unpublished data). Feral and domestic cats have the ability to deplete a rodent population very quickly (Pearson 1964) and may pose a particular predatory threat to PSPM populations adjacent to residential developments where cat owners, by providing food, boost cat populations far beyond carrying capacity (Crooks and Soulé 1999).

Fire may represent an occasional source of mortality for PSPM, but this is likely a rare event. Fires, even grass fires, can cause mortality of mice due to heat and/or suffocation (Howard *et al.* 1959). Fires typically raise surface soil temps to 95-720^{o}C (203-1,328°F) and below surface temps, down to 3-4 cm (1.2-1.6 in) below ground, to 50-80^{o}C (122-176°F). The actual temperature and duration are dependent on fuel distribution and moisture content (DeBano *et al.* 1998). However, in an experiment to test the effects of fire on rodents, Howard *et al.* (1959) reported that some rodents died due to suffocation, while all others died when surrounding temperatures reached 59-60^{o}C (138-140°F). Because PELO have been known to use burrows only 1 cm (0.39 in) below the surface and the physiological capacity of heteromyid rodents to withstand temperatures above thermoneutrality is not great (Kenagy 1973), it is likely that fire could result in the direct mortality of PSPM inhabiting an area.

Unique physiological adaptations

PELO have several key adaptations that facilitate persistence under highly stochastic environmental conditions. These adaptations include spending much of their time beneath the ground in burrows where they hoard food and the use of daily or seasonal torpor (aestivation/hibernation). Hoarding behaviors evolve under selective pressures imposed by seasonal food shortages or by seasonal difficulties in foraging. PELO is an example of the latter whereby it cannot forage during the cold part of the year because of the extremely high energetic cost of maintaining homeothermy (Vaughan 1978). PELO, therefore, remain in their burrows during periods of inclement weather or food shortages and rely on seed caches stored during more favorable conditions.

PELO are among the smallest mammals known to hibernate, generally from September/October to March/April (Kenagy 1973; Kenagy and Bartholomew 1985; Meserve 1976a; O'Farrell 1974), although hibernation periods may vary with environmental conditions and food availability (Kenagy 1973; Kenagy and Bartholomew 1985). In contrast to other hibernators that accumulate fat reserves, PELO feed on seed caches stored in their burrows (Brown and Lieberman 1973; Kenagy 1973), and cessation of above-ground foraging activity is not obligatorily dependent on torpor, though both may occur simultaneously in cold temperatures (French 1977). Some individuals may remain active and forage above ground throughout winter if seeds are available

(Kenagy 1973). However, when deprived of food, PELO are observed to become torpid (Bartholomew and Cade 1957; French 1977).

Periods of inactivity, either through exploitation of seed caches or through hibernation and aestivation, may have neither a strictly daily or seasonal pattern. Emergence from hibernation in spring generally correlates with availability of forb and grass seeds (Meserve 1976b) but can vary among years (Kenagy 1973; Kenagy and Bartholomew 1985; O'Farrell 1974) and may relate to the vertical temperature gradient in the soil profile (French 1977). Based on laboratory studies, French (1977) reported that emergence from hibernation is a gradual process whereby animals initially emerge for short periods divided by periods of torpor, then gradually increase their time above ground over several weeks. Males are likely to emerge from hibernation prior to females (O'Farrell *et al.* 1975). The timing of onset of hibernation can vary widely (French *et al.* 1967) but generally follows a pattern of adult males beginning hibernation first, then adult females, then juveniles (French 1977).

Based on studies of a similar sized species of *Perognathus* in the Great Basin, O'Farrell *et al.* (1975) observed that individual components of the population had brief periods of activity above ground on an annual basis. Once they commenced above ground activities the Great Basin, pocket mice (*P. parvus*) were trappable for an average of 60 days during years of adequate food supplies and an average of 90 days during years that food was scarce. However, during productive years, trapping late in the year primarily captured subadults that were produced from late litters, and animals that had been captured earlier in the year had already ceased surface activity (O'Farrell *et al.* 1975). In laboratory trials, French (1977) observed that PELO stopped foraging even when food was always made available to them, suggesting that mice stay below ground once reproduction is completed and sufficient food stores are accumulated.

In conclusion, annual variation in timing of emergence and onset of hibernation, the asynchronous manner in which individuals enter or emerge from winter hibernation, and the potentially low probability of detecting individuals that are only active above ground for short intervals confound efforts to understand PSPM distribution, estimate population abundance, and track population dynamics, particularly during the early and late portion of their seasonal activity.

Home Range and Immigration/Emigration

Normal movements of small mammals are difficult to infer from trapping studies because 1) the spacing of traps can significantly affect the distance between captures and estimated animal range, 2) the size of the trapping area may be too small to detect larger distance movements, and 3) the regular movement pattern of the animal can be altered by the placement of traps and the additional food resources in their use area (Gurnell and Gipps 1989; Thompson 1982a; Hayne 1950). Trapping studies typically employ a grid or other systematic arrangement of traps. As trap spacing increases, the proportion of animals that are captured in only one trap (*e.g.*, a movement distance of zero meters) increases, thereby decreasing the overall range estimate for the population (Hayne 1950; Gurnell and Gipps 1989). Likewise, traps spaced too closely can result in animals being captured repeatedly before utilizing their entire home range, again decreasing mean range estimate (Stickel 1954; Allred and Beck 1963). If the size of the trapping grid is small relative to the movement distances of the animals, the estimated range will be

biased low due to the lack of captures at either end of the longer distance movements (*e.g.*, only more sedentary individuals are captured multiple times within the limited trapping area).

PELO are known to make occasional long-distance forays that appear to be exploratory sallies rather than part of their routine activity (Jorgensen 1968a; Maza *et al.* 1973). In another *Perognathus* species, Maza *et al.* (1973) observed that such excursions are predominantly made by males and are highest in frequency during spring months, suggesting a correlation between reproductive activity and long-distance excursions. Several studies have attempted to characterize the movements and home range of PELO, but there is no home range information available for PSPM specifically. Kenagy (1973) reported that nightly distances moved by individual PELO was much less than 50 m (164 ft), and animals were never observed to move between his trapping grids. Chew and Butterworth (1964) found that from one year to the next, 95 percent of recaptured PELO moved 100 m (328 ft) or less. In Joshua Tree National Park, home ranges of PELO ranged from 38.7 to 84.4 meters (Chew and Butterworth 1964) and densities of the mouse ranged from 0.85 to 1.74 individuals/ hectare. In Nevada, home ranges of male PELO ranged from 12.4 to 31.6 meters and home ranges of females from 13.7 to 40.5 meters (Maza *et al.* 1973). O'Farrell (1978) determined that home range for both sexes varied from 0.28 hectare in early spring to 0.80 hectare in late fall.

More rigorous efforts to characterize home ranges of PELO in desert environments have typically involved calculation of a circular home range that is based on a theoretical center to that range approximated from two or more capture locations. The area of the home range is then characterized by a radius within which a given proportion of recaptures would be expected to fall (Burge and Jorgensen; Jorgensen 1968b; Kenagy 1973). Based on recapture data from 26 males and 41 females, Jorgensen (1968b) calculated recapture radii of 41.89 m (137.4 ft) and 44.45 m (145.8 ft), respectively, within which 95 percent of PELO recaptures would be predicted to occur. Based on 480 recaptures of females and 341 recaptures of males, Burge and Jorgensen (1973) developed another method to predict with 99 percent confidence that 95 percent of female PELO would be recaptured within a radius of 36.09 m (118.4 ft) and 95 percent of males would be recaptured within a radius 38.8 m (127.3 ft). Based on 7 years of monthly trapping data, Maza *et al.* (1973) reported a mean circular home range for PELO that would be predicted to encompass 86 percent of an animal's activity within a radius of 38 m (124.7 ft), and 99 percent of an animal's activity within a radius of 57 m (187 ft). Maza *et al.* (1973) also found that home range size varied among years and was smaller at high population densities. It is unclear whether this represents a response to greater resource availability that is correlated with higher population densities, or is a response to increased social interactions (French *et al.* 1974).

Not much is known about the immigration/emigration and dispersal capabilities of PELO. Flake and Jorgensen (1969) removed all the PELO from a 6.3-ha (15.6-ac) area and measured the colonization rate of the trapped-out area. They found during the first year of their removals that adult PELO rapidly colonized the trapped-out area, with the highest rates of invasion (3.6 animals/day) immediately following animal removals. They suggest that initial invaders were likely to be animals with home ranges along the border of the study site that responded to the removal of animals with which their home ranges overlapped. The first year of their study coincided with poor reproduction in the surrounding PELO population, to which they attributed low invasion rates during subsequent months. However, in each year of their study they

observed a decrease in the mean age of invaders over the course of the summer that coincided with the appearance of young in the surrounding population. During the second year of their study, low initial densities in the surrounding population correlated with low initial invasion rates of the trapped-out area. However, extremely high invasion rates (24.8 animals/day) of young animals were observed late in the summer, coinciding with rapid population growth in the surrounding population. Overall, they were unable to detect significant differences in the ratio of invading males and females from the surrounding population or in the mean age of invaders, leading them to conclude that invasion rates varied widely and were mainly influenced by the structure and density of the surrounding population (Flake and Jorgensen 1969).

To study small mammal dispersal, Allred and Beck (1963) spaced traps at 22.8 m (75.0 ft) intervals on 6.3-ha (15.6-ac) grids, or similarly spaced traps in lines radiating from a central point, within a number of plant communities that were either undisturbed or within which nuclear detonations had taken place. Of the few PELO with which they were able to detect movements, they recorded maximum dispersal distances of 229 m (751.3 ft) and 235 m (771.0 ft) for a male and female, respectively, over about 1 month intervals. Average range of movement was 71 m (232.9 ft) for males and 57 m (187.0 ft) for females, but relatively few animals were recaptured at stations other than where they were first caught, suggesting their trap spacing exceeded the average range of movement of most mice.

Much remains to be learned about the dispersal capabilities of PSPM. Based on field studies of other PELO subspecies, PSPM may be capable of moving moderate distances over short time intervals. However, the likelihood that animals will travel long distances across unsuitable habitat in order to disperse into discontiguous areas with suitable soils is unknown.

Population Dynamics

In a review of literature on heteromyid population dynamics, Brown and Harney (1993) conclude that heteromyid populations exhibit "…large irregular fluctuations in response to a variable environment, but the magnitude of these fluctuations is moderated by life history traits that promote survival of adults through unfavorable periods at the expense of rapid recruitment of juveniles during favorable times" (p.624). More detailed studies confirm that PELO populations undergo dramatic fluctuations and suggest that PELO and other *Perognathus* species have the capacity to rapidly recruit juveniles into a population during periods of resource abundance (Beatley 1969; French *et al.*1974; Service unpublished data). Conley *et al.* (1977) simulated population dynamics for a "prototypical *Perognathus* species" using demographic parameters estimated from studies of a number of *Perognathus* species (including PELO) in Utah and concluded that "*Perognathus* populations have the capacity either to exhibit high rates of increase during years of favorable conditions or to persist during extended adverse periods without reproducing." In 2003, the Service documented an annual population increase of around eight-fold for the Pacific pocket mouse at one monitoring location (Service unpublished data), and French *et al.* (1974) documented over a five-fold increase in the number of PELO observed on one of their trapping grids between 1964 and 1966, figures consistent with Conley *et al.*'s (1977) simulated rates of potential population increase.

Conley *et al.*'s (1977) simulations also suggest that PELO population dynamics can lead to unstable age distributions. During periods of low resource abundance, populations will be

comprised predominantly of non-reproductive adults. These circumstances lead to the attrition of individuals from the population, and a population's persistence relies solely upon high survivorship and/or immigration from elsewhere.

A prolonged reproductive period when conditions are favorable or a prolonged reproductive life-span may be of little value to an increasing population, but it is of considerable importance to a declining population as it slows the rate of decline (French *et al.* 1974). In PELO, the long lifespan may be interpreted as an adaptation to fluctuating environmental conditions. PELO have therefore adapted to resisting population contraction rather than exploiting and colonizing new areas (French *et al.* 1974). They have, through their ability to become torpid when food is scarce and through a long reproductive lifespan, evolved methods of resisting environmental stress.

Bolger *et al.* (1997a) studied the effects of habitat fragmentation on rodents in southern California and found that species with highly stochastic populations were more frequently extirpated from smaller fragments. This may in part be because the reduction in area that is available for the species to occupy effectively reduces the size of the population that can be attained during population growth. With a reduced number of individuals in the population at the beginning of a period of decline, the population is less able to sustain itself until the next period of favorable conditions.

Biology of small and declining populations
Based on studies conducted on other subspecies of *P. longimembris* (e.g., Cramer and Chapman 1990; Hayden *et al.* 1966; Kenagy and Bartholomew 1985), PSPM populations likely fluctuate, periodically, to very low densities and absolute numbers depending on climate, rainfall, and seed availability. Range-wide habitat loss and fragmentation has resulted in artificial isolation of small remaining PSPM populations.

Some researchers now recommend that at least three "replicate" population reserves be conserved for each rare species, and that these populations be self-sustaining and at a minimum retain 90-95 percent of their genetic diversity for 100-200 years (e.g., Soule and Simberloff 1988; Murray *et al.* 1999; Nekola and White 1999, Margules and Pressey 2000; Fairbanks *et al.* 2001; Noss *et al.* 2002; Canadian Wildlife Service and U.S. Fish and Wildlife Service 2005).

Small, isolated populations of animals are vulnerable to accidents of demography and genetics, and to environmental fluctuations and catastrophes, underlining the need for large core areas and connectivity of important smaller habitat areas (Franklin 1980; Frankel and Soulé 1981). Relatively rare events, such as 1-in-50- or 100 year droughts, floods, fires, storms, likely have large effects on population viability of species like PSPM, particularly on fragmented populations (and variance estimates for stochastic models) (e.g., Ludwig 1996, 1999; Johst and Brandl 1997). Connectivity between populations is seen as necessary for providing genetic and demographic rescue, and for viability of species that reach low densities in small populations (Noss 1983; Harris 1984; Noss and Harris 1986; Soulé 1987; Hedtke *et al.* 2007). (Genetic and demographic rescue is the arrival of immigrants into a small population; it is generally beneficial because it slows the rates of loss of genetic variation and inbreeding and it lowers the chance of extinction caused by small numbers of individuals [Noss 1983; Harris 1984; Noss and Harris

1986; Soulé 1987]). Unfortunately, there is only one remaining primary biological corridor between two PSPM populations in the Coachella Valley and that is within Upper Mission Creek/Big Morongo Canyon that is at risk of being severed via development.

Small populations in the wild suffer from increased localized extinction, in part because of an unavoidable increase in matings between close relatives. Inbreeding reduces reproductive success in most species (Frankham 1995a; Frankham *et al.* 2005) and has been shown to increase extinction rates in laboratory populations of fruitflies and mice (Frankham 1995b). From their studies of metapopulations of Glanville fritallary butterflies (*Lelitaea cinxia*), Saccheri *et al.* (1994) empirically found that inbreeding contributes to extinction of wild populations. Genetic factors are likely involved in the extinction of wild populations of most species. In another example, studies of the New Zealand conifer *Halocarpus bidwillii* showed strong correlations of population size with genetic variability: large populations had the greatest levels of heterozygosity, highest percentage of polymorphic genes, etc. (Primack 1993). Census populations of this species smaller than 8,000 individuals likely suffered a loss of genetic variability, with the lowest variability in the smallest populations (Primack 1993).

Determination of the status of a population invariably involves an evaluation of population sizes. In conservation biology, the effective population size, not the census number, is of primary concern. Effective population size is defined as the number of individuals in an idealized population that experiences the same magnitude of genetic drift as the actual (census) population size (Cutrera *et al.* 2006). In other words, the idealized population would lose genetic diversity or become inbred at the same rate as the census population. Effective population size is typically about 10-11 percent of the census population size (Frankham *et al.* 2005; Lynch and Lande 1998; Reed *et al.* 2003). The effective size of a population, rather than the census size, determines its rate of genetic drift (Kalinowski and Waples 2002).

In the peer-reviewed literature, estimates of minimum viable effective population sizes, based solely on genetic threats, suggest a minimum of 500-5000 individuals (Frankham *et al.* 2005; Lande 1995; Franklin and Frankham 1998; Lynch and Lande 1998). Recommendations in the peer-reviewed literature for minimum viable effective populations sizes that consider the synergy of genetic, demographic, and environmental/catastrophic stochastic threats, suggest even larger effective populations sizes (i.e., starting at 1000's of individuals) (e.g., Lande 1995; Franklin and Frankham 1998; Lynch and Lande 1998; Thomas 1990). Minimum effective population size is important, because small populations of many species tend to randomly go extinct (e.g., Primack 2006; Noss and Cooperrider 1994).

Although the data required for a comprehensive population viability assessment are not currently available for the species, there are some general rules concerning minimum viable population size that can be applied for populations. Genetic evidence suggests that, in general, a genetically effective population of 1,000-5,000 individuals is required for long-term survival. Census population size is generally larger than effective population size, and an approximate 10:1 relationship between census population: effective population has been roughly established in animal populations elsewhere. Given this relationship and the prime importance and effects of fluctuations of census populations on the effective population size, the census size of 10,000 individuals during population ebbs is likely required for long-term survival of the species.

Additionally, recent literature suggests a minimum of three viable populations to ensure a species long-term survival.

Empirical evidence (Jones and Diamond 1976; Thomas 1990) suggests that *some* populations can persist at very low levels for many years. For example, some island bird populations, studied by Jones and Diamond (1976), survived for 80 years despite possessing median numbers of fewer than 10 pairs. Other small populations have survived and prospered: northern elephant seals recovered from 20-30 individuals to 30,000 individuals over a period of 75 years (Bonell and Selander 1974; Frankham *et al.* 2005). Several other species have survived at small population sizes for considerable periods of time (although many others have gone extinct) (Frankham *et al.* 2005). These examples indicate that small populations have value and can be important to the species long-term survival (Thomas 1990). More importantly, the persistence of a few small populations following severe genetic bottlenecks does not contradict the conclusions that inbreeding and loss of genetic diversity are normally deleterious, and that long-term effective population sizes in the high 100's are typically required for long-term genetic viability of a species (Frankham *et al.* 2005; Reed *et al.* 2003; Thomas 1990).

The loss of genetic diversity makes a population more prone to extinction or extirpation from new diseases or other environmental changes (Soulé and Mills 1998; Frankham *et al.* 2005). Further, the population will be partially inbred and will consequently manifest deleterious genes that decrease reproductive fitness, survival, and fecundity (Frankham *et al.* 2005). A portion of the genetic variability and heterozygosity within a species that accumulates over 1000's of years is lost in a genetic bottleneck (Vucetich and Waite 1998; Vucetich *et al.* 1997). Reductions in population size result in loss of genetic diversity and increased inbreeding (Primack 2006; Frankham *et al.* 2005; Vucetich and Waite 1998; Vucetich *et al.* 1997). Higher levels of genetic variability increase the likelihood that a genetic variant can cope with a new stressor (e.g., climate change or disease) (Frankham *et al.* 2005). Some genetic bottlenecks can be relatively harmless if (by chance) few deleterious mutations are present in the remaining population (Frankham *et al.* 2005). Conversely, in some bottleneck situations, deleterious mutations are fixed and the population declines to extirpation (Frankham *et al.* 2005). Frankham (1999) indicated that evolutionary potential (the potential for the species to adapt to change over time) of a species is reduced by genetic drift and inbreeding in small populations.

Population Trends

There is little population density or distribution data available for the PSPM. Some density information exists from work performed by Shana Dodd, and is presented in Table 9-33 in the Plan. These numbers support Dodd's assertion (Dodd 1996, 1999) that the species occurs at higher densities in the northwest portion of its range within the Coachella Valley of the Plan Area. Additionally, as mentioned above, it is likely that the PSPM has inherent population fluctuations that may be dependent on climate, rainfall, and seed availability.

Threats

Threats to this species and its habitat within the Coachella Valley include habitat loss and fragmentation from agricultural development, flood control projects, urban development, construction of roads, railroads, airports, and other structures; armoring of soils and loss of habitat functions (e.g., aeolian sand transport); OHV use; illegal trash dumping; and domestic

animal predators (CVAG 2007). Threats may also include indirect effects of invasive plants, such as Saharan mustard (*Brassica tornefortii*) and common Mediterranean grass (*Schismus barbatus*).

Habitat loss and fragmentation

Development threatens to remove existing PSPM populations and habitat. Development, particularly road construction and associated infrastructure may cause habitat fragmentation, leading to isolation of suitable habitat patches for this species. Housing developments may cause the additional impacts of edge effects: domestic animals such as cats may venture into the PSPM habitat and prey upon existing populations.

Depending on the design and future operation of anticipated flood control projects within the biological corridor that links the Upper Mission Creek/Big Morongo Canyon PSPM population to the Willow Hole population, this species could be significantly impacted.

Invasive plant species and fire

Invasive plants pose a host of potential threats to the species. In the spring of 2005, Saharan mustard exhibited an irruptive germination event following a winter of above-average rainfall. Many areas contained substantial densities of Saharan mustard. Other invasive species such as Mediterranean grass were likely abundant as well. It is not known whether the PSPM consumes Saharan mustard or Mediterranean grass seeds. These plants may serve as a food source for these granivores or these plants may compete with the native plant food sources consumed by this species. If these plants are not a major component of the diet for this species, these invasive species may negatively impact the food supply for the PSPM in years when native food sources would otherwise be abundant (Brown and Harney 1993). Barrows (2005) found through manipulative experimentation that Saharan mustard is capable of reducing the reproductive output of desert annuals such as desert sand verbena (*Abronia villosa*) and dune evening primrose (*Oenothera deltoides*). If the PSPM depends on these species for seed, its populations may be depressed as a result of invasive species competing with native plant species. It is unknown how suppression of mouse density irruptions affects the species. It may interfere with the production of dispersing individuals, which would in turn affect the ability of populations to colonize habitat patches that experienced population declines or extirpation events (condition-dependent dispersal; Ims and Hjermann 2001).

Areas dominated by Saharan mustard or invasive grasses may also be more prone to ignite and carry fires. Fire may affect soil porosity by removing organic matter (Gebow and Halvorson 2005) and removing native vegetation that the species may depend on for food or cover from predators (Thompson 1982a).

Mesopredator release

Domestic cats are extremely effective recreational hunters that will continue to hunt when prey availability is low (Crooks and Soulé 1999), and they have potential to reduce a rodent population very quickly (Pearson 1964). Based on surveys of cat owners adjoining habitat fragments in San Diego County, Crooks and Soulé (1999) conservatively estimated that cats from a residential neighborhood of about 100 homes surrounding a moderately sized habitat fragment (~49 ac (~20 ha)) have the capacity to return as many as 840 rodents to the residences

each year, two-thirds of which may be native species. Domestic cats may be a threat to PSPM, especially adjacent to developed areas. The level of this threat to PSPM is unknown at this time but will likely increase as development increases in the Plan Area.

Synopsis of Status
The status of PSPM It is unknown at this time. No range-wide intensive study has been conducted to determine habitat associations and ecological requirements of the species. The effects of invasive plant species on the PSPM remain unknown. However, development pressures over time have rendered otherwise habitable areas (as modeled by the Science Advisory Committee) unavailable for the species and/or have severed connections between existing populations, thus, precluding genetic exchange between those populations. Given the level of development within the Coachella Valley, it is probable that the overall population size of the species has declined from historical levels.

ENVIRONMENTAL BASELINE
Distribution
The Plan Area encompasses the majority of this species range, including the northern, western and eastern limits of its range (CVAG 2007). The species' range encompasses the Coachella Valley, and extends from Borrego Springs to the northern extent of Joshua Tree National Park (Hall 1981). Population estimates for the PSPM are unknown range-wide due to insufficient data. Data have been gathered by Dodd (1996, 1999) within the Coachella Valley. Trapping grids were set up in several locations within the Plan Area, roughly extending across the modeled habitat for the PSPM. There is no evidence that this species' range is different from what has been described in the past (Dodd 1996), although its habitat has likely been greatly reduced due to urbanization and agricultural development in the Coachella Valley. The northwestern portion of the Plan Area may represent important habitat for the species, as the densities of this species within the Coachella Valley appear to be highest there (Dodd 1996, 1999). The existence or density of this species is currently unknown in Borrego Springs or Joshua Tree National Park.

There are 142,539 acres of modeled habitat for PSPM within the Plan Area, of which, approximately 29,727 acres are identified as Core Habitat. There is additional 7,595 acres of PSPM modeled habitat on Tribal Reservation Lands within the Action Area. In total, there is 150,134 acres of modeled habitat for this species in the Action Area; however, suitable habitat for this species may be closely associated to fewer soil types (i.e., microhabitats – friable, sandy soils) than was used in the calculations for modeled habitat.

Palm Springs Pocket Mouse "Core Areas"
Three of the five Core Areas (within Conservation Areas) for the PSPM proposed in the MSHCP consist primarily of land that was previously conserved (at various levels of protection) through the Coachella Valley fringe-toed lizard (CVFTL) HCP. The Core Habitat areas of the proposed MSHCP Reserve System for the PSPM consist of the existing Thousand Palms Preserve (within the Thousand Palms Conservation Area), the Willow Hole-Edom Hill Preserve, (within the Willow Hole Conservation Area), and the Whitewater Floodplain Reserve (within the Whitewater Floodplain Conservation Area). The existing Thousand Palms (Coachella Valley) Preserve established by the CVFTL HCP totals 17,651 acres (not all of which is modeled as PSPM habitat) and is located south of the central portion of the Indio Hills. The Willow Hole-

Edom Hill Preserve (most of which is BLM land) is located at the west end of the Indio Hills and is 2,027 acres in size. Ownership within this preserve area consists of BLM (1,869 acres), Coachella Valley Mountains Conservancy (117 acres), and private land (41 acres). The Whitewater Floodplain Reserve is located south of Interstate 10 and east of Indian Avenue, and includes approximately 1,316 acres of BLM and CVWD land. Snow Creek/Windy Point and the Upper Mission Creek/Big Morongo Canyon Conservation Areas also contain Core Habitat for the mouse.

Dodd (1996, 1999) survey results indicate that the PSPM is most abundant throughout the Snow Creek/Windy Point Conservation Area; the Highway 62/Mission Creek area, where it is currently not protected; and in and adjacent to the Willow Hole/Edom Hill Preserve, including areas where it is also not currently protected. Based on available occurrence data for this species (CVAG 2007, CNDDB, USFWS unpublished data; See also Section 9, Table 9-33; Dodd 1996, 1999), the three largest existing population areas (Core Areas) for this species within the Plan Area are: 1) Snow Creek/Windy Point Conservation Area; 2) Upper Mission Creek/Big Morongo Canyon Conservation Area and adjacent wash; and 3) Willow Hole Conservation Area. The Thousand Palms Conservation Area and the Whitewater Floodplain Conservation Area are also important for aeolian sand transport systems to maintain the species habitat and for potential movement/dispersal corridors for the PSPM. There are sparse locations with low numbers of known individuals from Indio Hills to Joshua Tree National Park, in Shavers Valley, and in Dos Palmas.

Snow Creek/Windy Point Conservation Area with Core Habitat
The Snow Creek/Windy Point Conservation Area consists of 2,797 acres of modeled habitat for this species, of which 2,744 acres are Core Habitat. Of the total modeled habitat, 334 acres of modeled mouse habitat is Existing Conservation Land that is controlled by BLM; an additional 26 acres of BLM land is within the Conservation Area. The Snow Creek/Windy Point Conservation Area currently has an abundance of invasive plants. These invasive plants have stabilized soils within the Conservation Area. In addition to the seed bank existing within this Conservation Area, the wind continually blows additional invasive plant seeds into the Conservation Area, potentially degrading or reducing the amount of suitable habitat available for the PSPM.

This Conservation Area has been and continues to have substantial illegal OHV activity that has resulted in the alteration of much of the potential mouse habitat. One current major OHV access point is located on BLM lands. While the OHV activity continues on and across BLM land, access also is currently being provided to areas proposed as CVAG Reserve lands. Thus, the Snow Creek/Windy Point Conservation Area portion of the proposed Reserve System has been and continues to be compromised by these activities. Although it was the intention of the BLM's California Desert Conservation Area (CDCA) Plan Amendment (and the associated Terms and Conditions within our Biological Opinion for BLM's action) to manage these areas, including management and enforcement activities such as patrolling and blocking access, these efforts to date have been unsuccessful in reducing OHV activity.

Dodd's (1996, 1999) density estimates range from 17.56 to 29.4 animals per acre. There was a drought in the Coachella Valley from 1993-2005, thus, trapping occurred in low rainfall years.

Based on the lower estimate and CVAG-modeled habitat, the MSHCP (CVAG 2007) extrapolates these numbers to equal approximately 47,061 PSPM living within the Conservation Area; however this is likely a substantial overestimation of PSPM numbers in this Conservation Area, because 100 percent occupancy of modeled habitat was assumed in the calculation. It is highly unlikely that this species' spatial distribution is equal throughout modeled habitat because, as described above, there are a variety of factors (e.g., soil surface texture, subsoil texture, vegetation) that can affect occupancy of areas by fossorial mammals.

Upper Mission Creek/Big Morongo Canyon Conservation Area with Core Habitat
The Upper Mission Creek/Big Morongo Canyon Conservation Area consists of 4,038 acres of modeled habitat for the PSPM, of which 3,685 acres are Core Habitat. Of the total modeled habitat, 498 acres of modeled habitat is Existing Conservation Lands that are managed by BLM.

The Big Morongo Canyon wash is of particular importance to the PSPM, because it serves as a biological corridor for movement and genetic exchange across generations between the Upper Mission Creek/Big Morongo Canyon Core Area and the Willow Hole Core Area. As the Plan Area is developed, this corridor will become even more critical.

Invasive plants are highly prevalent in the Upper Mission Creek/Big Morongo Canyon Conservation Area. They may be increasing fire frequency in the area which would in turn alter soil chemistry and porosity. Such alterations may decrease the amount of suitable habitat and availability of food sources for the PSPM within this Conservation Area.

OHV activity may additionally negatively impact PSPM habitat in the Upper Mission Creek/Big Morongo Canyon Conservation Area. Most of the modeled habitat in this Conservation Area is private and has not necessarily been subject to access restrictions.

Trapping efforts by Dodd (1996) on the west side of Highway 62 and south of the Mission Creek drainage indicate density estimates of approximately 14.54 PSPM per acre in occupied areas. There was a drought in the Coachella Valley from 1993-2005, thus, trapping occurred in low rainfall years. Dodd (1999) trapped 30 individuals on the east side of Highway 62 in the Mission Creek Channel. This site is adjacent to an undercrossing of Highway 62 that allows for connectivity between habitat on both sides of the highway if this species uses undercrossings. Because no comprehensive occupancy studies have been conducted for PSPM, it is not currently possible to estimate the number of PSPM that occur within the Conservation Area.

Willow Hole Conservation Area with Core Habitat
The Willow Hole Conservation Area consists of 4,827 acres of modeled habitat for this species, of which, 4,610 acres are Core Habitat. Of the total modeled habitat, 577 acres are Existing Conservation Lands controlled by BLM and CVMC. This Conservation Area is subject to fragmentation as a result of roads, including Palm Drive, Mountain View Drive, and Varner Road. These roads likely reduce the unimpeded movement of PSPM from one habitat patch to another; culverts under Palm Drive may provide connectivity between the habitat east and west of Palm Drive (CVAG 2007), assuming that this species will use undercrossings.

Like the Snow Creek/Windy Point Conservation Area, the Willow Hole Conservation Area is

subject to illegal OHV activity. OHV activity continues to modify BLM land, while providing access to the adjacent Existing Conservation Lands and proposed CVAG Reserve lands. Thus, a portion of the proposed Reserve System has been and will continue to be compromised by these activities unless intervention occurs. Although it was the intention of BLM's CDCA Plan Amendment and its associated Terms and Conditions within the Biological Opinion to manage these areas, it appears that those management and enforcement activities, such as patrolling and blocking access, have not adequately addressed the issue.

Dodd (1996) trapped for the PSPM in the Willow Hole area, but the results were insufficient to estimate the density of animals on the site.

Thousand Palms Conservation Area with Core Habitat
The Thousand Palms Conservation Area consists of 12,132 acres of modeled habitat for this species, of which 11,707 acres are Core Habitat. Of the total modeled habitat, 7,870 acres of modeled mouse habitat are within Existing Conservation Lands that are controlled by BLM, CDFG, the Service, State Parks, The Nature Conservancy, and the Center for Natural Lands Management. The existing Thousand Palms Preserve established by the CVFTL HCP totals 17,651 acres and is located south of the central portion of the Indio Hills. The Preserve includes the Coachella Valley Ecological Reserve lands owned by CDFG.

Saharan mustard has substantially invaded the Thousand Palms Preserve and was estimated to cover 40 percent of sampled sand fields in the Thousand Palms Preserve (C. Barrows, pers. comm., 2006). Active dunes had much less cover of Saharan mustard (5 percent). The effects of invasive vegetation likely results in less suitable habitat available for the PSPM.

Dodd (1996) trapped in the vicinity of Willis Palms north of Ramon Road, but the results were not sufficient to estimate density of individuals in the area. Dodd (1996, 1999) suggests that densities do not likely exceed 6.4 individuals per acre, but PSPM has not been studied well in this Conservation Area, thus, there is not enough data to make a population estimation. This area was included as Core Habitat in the MSHCP. Most of the known occurrences of the species within the Thousand Palms Conservation Area occur north of Ramon Road and west and east of Thousand Palms Canyon Road.

Whitewater Floodplain Conservation Area with Core Habitat
The Whitewater Floodplain Conservation Area consists of 7,000 acres of modeled habitat, of which 6,981 acres are Core Habitat. Of the total modeled habitat, 2,914 acres are Existing Conservation Lands controlled by CVWD and BLM.

The predominant watercourse that provides the sand for the existing Whitewater Floodplain Reserve and for the Whitewater Floodplain Conservation Area is the Whitewater River. The construction of the dikes on the Whitewater River downstream from Windy Point has both trapped fluvial sediments upstream from the Whitewater River depositional area as well as blocked westerly aeolian sand transport from crossing much of the depositional area (Griffiths *et al.* 2002). Based on Griffiths *et al.* (2002), the CVWD percolation ponds affect the Whitewater River depositional area by directing fluvial sand transport and deposition downstream out of the desired depositional areas. The result is less sand being deposited onto the Whitewater

Floodplain Reserve and in the Whitewater Floodplain Conservation Area as a whole. The reduction in available channel and floodplain during mid-size flood events has significantly altered fluvial deposition of sediments. In addition to sand depletion that is occurring in the Conservation Area, OHV activity also affects the ability of this area to provide habitat for PSPM. CVWD owns land within Section 19 of the Whitewater Floodplain Conservation Area where OHVs gain access.

Two locations where animals were found occur within the existing Reserve (Dodd 1996). One animal was trapped on a transect at the eastern edge of Date Palm Drive, an area of relatively active blowsand, and 10 animals were trapped in the southwestern portion of the Reserve in an area of low sand hummocks. No PSPM have been found east of Gene Autry Trail during recent surveys; however, some individuals have been trapped north of the railroad tracks, between the tracks and Interstate 10. PSPM has not been studied well in this Conservation Area, thus, there are not enough data to make a population estimation.

Other Conservation Areas
In addition to the Conservation Areas containing Core Habitat described above, there are 34,802 acres of modeled habitat that may be suitable habitat for PSPM within other Conservation Areas in the Plan Area. These patches of modeled PSPM habitat are typically disjunct and located throughout the Plan Area.

Management
Three Conservation Areas where the PSPM occurs are within Reserve Management Unit 1. Per the CVFTL HCP, the primary management actions to date have ranged from some control of invasive species and limiting public access to compatible scientific, educational, and recreational uses. A successful tamarisk eradication program has been completed. Within the Willow Hole-Edom Hill Preserve, the BLM lands are designated as an Area of Critical Environmental Concern. The BLM ACEC lands are classified as Class "Limited" in the CDCA Plan. Management objectives include control of deleterious activities such as OHV use and perimeter fencing to limit OHV activity.

Factors Affecting the Species' Environment within the Action Area
As stated above, the primary factors affecting the PSPM are the loss of habitat and biological movement/dispersal corridors from urban development, conversion of habitat to incompatible uses, OHV activity, armoring of soils, and obstructions within the sand movement corridors. Invasive non-native species and feral or domestic animals are potentially negatively affecting population densities of the species. These factors result in considerably less remaining habitat that is capable of supporting populations of the PSPM.

Fragmentation of habitat by development and roads may prevent declining populations from being maintained by immigrant PSPM; source populations may be limited in the number of successful dispersers that they can produce. Consequences of reduced immigration/emigration include a reduction in genetic diversity, an increased probability of population extirpation, and potentially the long-term contraction of the species' range. As the matrix between habitat patches becomes more inhospitable, dispersal between patches will become more difficult. Seasonal movements of adult males and dispersing juveniles will decrease, which will negatively

affect reproduction rates and colonization of available habitat. Patches of available habitat may not be readily re-colonized because PSPM may not be able to disperse across the landscape.

We do not have enough data to estimate population sizes for PSPM within the Plan Area, but based on available information (Dodd 1996, 1999) and the ongoing threats to the species described above, extant populations are anticipated to be declining as more development occurs in the Coachella Valley.

EFFECTS OF THE ACTION

Evaluation Assumptions

1. Morongo Wash Flood Control Facility (Covered Facility): All Conservation Objectives and Required Measures (Section 4.3.7 and 4.3.8); Avoidance, Minimization, and Mitigation Measures (Section 4.4); and the specific criteria in Section 7.3.1 for the Riverside County Flood Control and Water Conservation District's proposed Covered Facility shall be applied to all portions of the project.

2. Existing Conservation Lands controlled by BLM, Service, or CDFG, that were set aside or designated for conservation as a result of the CVFTL HCP or section 7 consultations on BLM actions, will be conserved in perpetuity by these respective agencies, or by any organization/agencies that are given control over these lands from these agencies. These lands will be protected and managed in a natural, ecologically-beneficial, open-space condition.

3. BLM will enter into an MOU with CVCC prior to permit issuance and no later than 3 years post Permit issuance to ensure management consistent with the MSHCP on the Reserve System lands.

4. BLM will control OHV trespass across BLM lands through implementation of the CDCA Plan Coachella Valley Amendment and associated section 7 consultation, consistent with the Terms and Conditions in the associated Biological Opinion, and re-initiation of consultation on previous BLM actions where necessary.

5. CVCC will execute a MOU (Joint Enforcement Agreement(s), Mutual Aid Agreement, or equivalent mechanism) with the applicable Permittees, BLM, USFS, CDFG, and applicable Non-Profit Organizations which enables cross-jurisdictional capability to provide for enforcement in the cases of non-compliance with the requirements of the Plan. The MOU or equivalent mechanisms approved by the Service shall specifically provide for enforcement of the relevant ordinances, resolutions, regulations, or other legal requirements necessary for effective management of the Reserve Lands. The MOUs shall specify roles and responsibilities among the parties needed to effectively implement the pertinent requirements of the Plan including the Trails Plan (Section 7 of the MSHCP).

Mitigation and Minimization Measures

The mitigation measures proposed in the MSHCP are intended to conserve large blocks of habitat that support PSPM. A total of 56,856 acres of modeled PSPM habitat are proposed to be conserved or are already conserved throughout the Plan Area (CVAG 2007, Table 4-114). Specifically, the MSHCP proposes to protect five Core Areas within Snow Creek/Windy Point

(2,503 acres), Whitewater Floodplain (6,574 acres), Upper Mission Creek/Big Morongo Canyon (3,263 acres), Willow Hole (4,205 acres), and Thousand Palms (11,189 acres) Conservation Areas. Additionally, the MSHCP proposes to protect Other Conserved Habitat in Cabazon (24 acres), Stubbe and Cottonwood Canyons (1,092 acres), Snow Creek/Windy Point (48 acres), Whitewater Canyon (152 acres), Hwy 111/I-10 (350 acres), Whitewater Floodplain (17 acres), Upper Mission Creek/Big Morongo Canyon (326 acres), Willow Hole (197 acres), Long Canyon (101 acres), Edom Hill (1,227 acres), Thousand Palms (410 acres), West Deception (11 acres), Indio Hills/Joshua Tree National Park Linkage (6,398 acres), Indio Hills Palms (439 acres), East Indio Hills (1,534 acres), Joshua Tree National Park (31 acres), Desert Tortoise and Linkage (1,953 acres), Mecca Hills/Orocopia Mountains (1,798 acres), Dos Palmas (7,794 acres), Coachella Valley Storm-water Channel and Delta (157 acres), and the Santa Rosa & San Jacinto Mountains (5,063 acres) Conservation Areas. Biological corridors and linkages between conserved populations of this species will be maintained as described in Section 4.0 of the MSHCP.

Minimization measures have also been developed to reduce impacts to this species. The measures include Required Avoidance, Minimization Measures, and Mitigation Measures such as maintaining fluvial sand transport (Section 4.4 of the MSHCP) and Land Use Adjacency Guidelines (Section 4.5 of the MSHCP) such as limiting noise, avoiding invasive plant species in landscaping, and directing lighting away from Conservation Areas. Currently, some of the language in Section 4.5 of the MSHCP appears to be discretionary or optional, and, if interpreted as such, it would not fully minimize or mitigate the impacts of the taking. In our analysis we have assumed that the Land Use Adjacency Guidelines are implemented as appropriate to minimize and mitigate the effects to covered species. A Permit Term and Condition has been included in the Permit to clarify that the Land Use Adjacency Guidelines are not optional where they are applicable.

Urban Development

There are 142,539 acres of modeled habitat for PSPM within the Plan Area, of which, 29,727 acres are identified as Core Habitat; however, as stated above, suitable habitat for this species may be closely associated to fewer soil types (i.e., microhabitats – friable, sandy soils) than was used in the calculations for modeled habitat. There is an additional 7,595 acres of PSPM modeled habitat on Tribal Reservation Lands within the Action Area. The Plan would conserve of 93 percent (27,734 acres) of the Core Areas and 81 percent (29,122 acres) of the Other Conserved Habitat for this species. Each of the Core Areas would be greater than 2,500 acres. Approximately 21,251 acres (15 percent) of the modeled habitat within the Plan Area is within Existing Conservation Lands and would be managed as part of the Reserve System. Overall, the Plan would conserve an additional 35,605 acres (25 percent) of the modeled habitat for PSPM in the Plan Area.

The Plan proposes to conserve approximately 90 percent of private land that has been modeled as PSPM habitat within each Conservation Area. Thus, approximately 10 percent of habitat on private lands within each Conservation Area would be subject to loss. Although the majority of the private lands would be conserved within a given Conservation Area, the ultimate configuration of the Reserve System is unknown at this time. Reserve System configuration would be subject to the Conservation Objectives and Required Measures established in Section

4.0 of the MSHCP for each Conservation Area, which require take of PSPM habitat within the Conservation Areas to be consistent with the Conservation Objectives for this species to: 1) ensure Conservation of Core Habitat; 2) protect Essential Ecological Processes needed to maintain PSPM habitat; and 3) maintain Biological Corridors and Linkages among conserved populations to provide for population fluctuation and enhance genetic diversity.

Direct effects

The status of PSPM within the Plan Area and throughout its range is unknown. In total, 75,304 acres (53 percent) of modeled PSPM habitat in the Plan Area will be lost as a result of the proposed action. To reduce the impacts of habitat loss to the PSPM, Permittees will conserve an additional 25 percent of modeled PSPM habitat within the Plan Area, including the conservation of at least 1,403 acres of Core Habitat for the mouse within the Desert Hot Springs portion of the area (including at least 1,324 acres in the Special Provisions Area), at least 22 acres in the Palm Springs portion of the area, and at least 1,363 acres in the Riverside County portion of the area (including at least 203 acres of the Special Provisions area).

Biological Corridors, Linkages, and Habitat Fragmentation

The Ninth U.S. Circuit Court of Appeals (1990) defined a corridor as: "...avenues along which wide-ranging animals can travel, plants can propagate, genetic interchange can occur, populations can move in response to environmental changes and natural disasters, and threatened species can be replenished from other areas." For relatively sedentary species, such as the PSPM, connectivity of habitat patches is probably the most important landscape feature for maintaining species diversity of native biota. Corridors counteract the effects of fragmentation, and should eliminate or minimize the attrition of species over time by facilitating dispersal and recolonization (Brown and Kodric-Brown 1977; Noss and Harris 1986; Soulé and Simberloff 1986; Diamond *et al.* 1987; Noss 1987). Corridors that support resident populations of animals are more likely to function effectively as long-distance dispersal conduits for those species (Bennett 1990). Conservation of a suitable biological corridor (i.e., width, habitat type(s), hydrology, intact sand transport system) is essential for maintaining the overall genetic diversity of this species and, thus, essential to the survival of the PSPM throughout its range.

For Morongo Wash to function as a Biological Corridor between two Core Areas (Upper Mission Creek/Big Morongo Canyon and Willow Hole) and to ensure the conservation of these Core Areas for the PSPM, continuous habitat must exist along the corridor, including refugia for the mouse during flood events, so that, over time, genetic material can be transmitted between the two populations. It is assumed that there are no complete barriers currently existing within the corridor, although some mortality may occur if individuals attempt to cross roads or paths. It is also assumed that existing edge effects, including predation from domestic pets or feral animals, and habitat degradation from OHV trespass, dumping, introduction of invasive plants are not sufficient to preclude mouse movement through this corridor. Additional edge effects from the aforementioned threats are anticipated as development increases in the area outside the Conservation Areas. Therefore, it is imperative to maintain undisturbed suitable habitat for the PSPM within the Morongo Wash Biological Corridor to provide an avenue for genetic exchange across multiple generations of pocket mice.

Based on range maps (Hall 1981) and trapping data for the species (Dodd 1995, 1999), the Plan

Area contains the major portion of the range of the PSPM, including the western, northern, and eastern limits (CVAG 2007), but due to the limited number of studies on this species, the exact percentage of its range encompassed by the Plan Area is unknown. Based on live trapping data (Dodd 1996, 1999), the three largest population locations for this species are: 1) Snow Creek/Windy Point Conservation Area; 2) Upper Mission Creek/Big Morongo Canyon Conservation Area and Morongo Wash Special Provisions Area; and 3) Willow Hole Conservation Area. Prior to the current agricultural and urban developments in the Coachella Valley, the potential for exchange of individuals between Upper Mission Creek/Big Morongo Canyon and Willow Hole Core Areas was likely greatest during periods of PSPM population expansion when the distance between the two populations was minimized and available food resources were maximized. Based on limited trapping data (Dodd 1996, 1999), Snow Creek contains the largest known PSPM population. Upper Mission Creek/Big Morongo Canyon and Willow Hole PSPM populations are likely smaller and it is not known whether these two populations are independently self-sustaining and viable, or if there is necessary genetic exchange via the Morongo Wash. As discussed above, based on the information available on PELO movements, any travel along Morongo Wash would likely be a generational movement, and require habitat capable of supporting the PSPM, even at a marginal level, along the entire path of the connection. If the Permittees maintain a functional corridor (as defined in Required Measures Section 4.3.7) and the Covered Facility is constructed, they would follow all measures described in the Plan, including the maintenance of a 1,200-foot wide corridor and Refugia areas to accommodate generational movements of PSPM in the wash (corridor) during flood events (Covered Activities, Section 7.3.1.).

Indirect effects

Lighting

Light levels are thought to be an important determinant of predation risk for nocturnal small mammals (Kotler 1984; Kotler 1985; Longland and Price 1991; Price *et al.* 1984). Increased light levels have been shown to improve the success and reduce the time required for owls to search for and capture deer mice (Clarke 1983; Dice 1947). The distribution of a number of nocturnal small mammals within their environment has been shown to be influenced by light level (Brown *et al.* 1988; Kotler 1984; Price *et al.* 1984). This is consistent with the theory that foraging behavior is responsive to predation risk (Kotler 1984). In general, greater illumination leads a number of species to spend more of their time foraging beneath shrubs (Kotler 1984; Price *et al.* 1984), and to reduce their foraging time and effort within a patch (Bird *et al.* 2004; Brown *et al.* 1988). Interestingly, in the desert where PELO is associated with foraging beneath shrubs (Kotler 1984; Thompson 1982a), Kotler (1984) found this species had a tendency to forage more in the open under increased illumination. Price *et al.* (1984) found a similar result for a similar sized species of *Perognathus* in Arizona. This may be due to competitive displacement of these species from their preferred habitat by larger bodied dominant species that switch their microhabitat use during high light levels (Kotler 1984). This may place PSPM at higher risk of predation under conditions of increased light.

In habitat enclosures with great horned owls present, Longland and Price (1991) were unable to detect increases in predation risk for five small mammal species in association with increased light levels. This appears contrary to the findings of others that owls are more efficient predators under increased illumination (Clarke 1983; Dice 1947), and may be because small mammals

behaviorally compensate for increased predation risk during high light levels by altering their foraging behavior from the open to beneath shrubs (Longland and Price 1991). However, in Longland and Price's (1991) trials, all species exhibited greater predation risk from owls in open habitat, which is where PELO have been documented foraging shown under conditions of increased light (Kotler 1984).

Owls and coyotes are common nocturnal predators within the Plan Area. Covered Activity project features such as sound walls, fencing and light standards, provide many perching opportunities for avian predators, and increased light levels associated with Covered Activities (e.g., development, roads, trails) should increase their foraging efficiency. If PSPM rely upon seed resources in open habitat and/or are unable to behaviorally compensate for increased light levels associated with Covered Activities, it is likely that they will suffer increased predation risk from owls and other visually aided predators (e.g., cats and coyotes) in association with the proposed project. The species-specific avoidance, minimization, and mitigation measures for lighting (in or adjacent to Conservation Areas) in Section 4.4 of the Plan will reduce some impacts to the species.

Invasive Species and Fire
Roadways promote the dispersal and expansion of invasive species into adjoining habitat through frequent disturbance to roadside habitats and the function of vehicles as vectors for seed dispersal (Forman and Alexander 1998). Invasive species and disturbance tolerant species, such as non-native grasses and other weeds, are often common along roadsides. Invasion by non-native annual grasses and other weedy species into Conservation Areas will likely be detrimental to PSPM by altering the structure and composition of the plant community.

Type conversion of the PSPM habitat within Conservation Areas or Biological Corridors to invasive-dominated vegetation (e.g., Saharan mustard, Mediterranean grass) would likely result in a loss of habitat suitability for PSPM at these locations. Areas dominated by invasive grasses and forbs are often dense, have complete vegetative cover and accumulate thatch. These conditions appear to favor other small mammals, such as the western harvest mouse, and decrease suitability for burrowing mammals such as PSPM. Areas dominated by Saharan mustard or invasive grasses may also be more prone to ignite and carry fires.

In southern California shrublands, fire frequency is positively correlated with human population density (Keeley and Fotheringham 2001) and the pattern of that fire is tightly associated with roadways. Roadways provide a ready source for fire ignitions in adjoining native habitat by means of vehicle sparks and discarded cigarettes and allow for easy access for arsonists. Although fire does not currently appear to be a major threat to PSPM, increased development of structures and roadways may lead to a greater number of invasive species (e.g., Saharan mustard) within the Conservation Areas that are essential for this species survival.

As mentioned above, invasive species may cause areas to be more prone to fire. Fire can cause direct mortality of mice due to heat and/or suffocation (Howard *et al.* 1959). Fires typically raise surface soil temps to 95-720^{o} C and below surface temps, down to 3-4 cm below ground, to 50-80^{o} C. The actual temperature and duration are dependent on fuel distribution and moisture content (DeBano *et al.* 1998). In an experiment to test the effects of fire on rodents above

ground, Howard *et al.* (1959) reported that some rodents died due to suffocation, and that all mice died when surrounding temperatures reached 59-63^{o} C.

PELO select the warmest possible environment below about 30^{o} C (French 1976) and do so when in their burrows by changing the depth at which they rest on both a daily and seasonal basis (Kenagy 1973). Resting areas for PELO within their burrows can be as little as 1 cm in depth (Kenagy 1973). These factors suggest that fire could result in the direct mortality of animals even while in their burrows.

If PSPM are able to escape direct mortality from fire, both the short and long-term effects of fire on their habitat could be detrimental to the persistence of the populations within the Plan Area. Over the short-term, fire results in the elimination of above-ground plant biomass which mice rely upon for seeds, vegetative plant parts, and cover. Depending on fire intensity, mice may be able to persist over the short-term on their seed caches and the remaining soil seed bank. However, elimination of their preferred cover will likely expose PSPM to greater predation risk (Longland and Price 1991). Additionally, because reproductive success of PELO appears to be tightly associated with annual seed availability (Beatley 1969; Brown and Harney 1993; French *et al.* 1974; Kenagy and Bartholomew 1985), the influence of fire on PSPM is likely to be similar to that of drought and could lead to reproductive failure of the population following a fire event. Due to their isolation, persistence of the PSPM populations following a fire will likely rely upon the ability of adults to ration seed caches and survive the elimination of food and cover until vegetation recovery allows for the resumption of breeding activity.

Fire may have detrimental effects on PSPM occupying the burned area, but the long-term effects on the overall population are unknown. For example, wildfire may be beneficial to PSPM if fire frequency and intensity remains low enough to support open-canopy vegetation that may be preferred by PSPM, and enough individuals survive to repopulate the burned area. However, if fires occur frequently or at the wrong time of year, seed availability will be significantly diminished and/or non-native grasses and forbs will be favored over native forbs and shrubs that provide food and cover for PSPM.

Mesopredator Release

Although reduced patch size and time since isolation appear to be important factors associated with the loss of small mammal species within habitat fragments (Bolger *et al.* 1997a), the direct mechanisms responsible for species loss in fragments remains poorly understood (Andrén 1994; Morrison *et al.* 2004; Patten and Bolger 2003). As discussed above, several studies have noted that the pattern of increased extinction vulnerability for species with low relative abundance in habitat fragments is consistent with the theory that small populations will be more vulnerable to edge effects and random environmental and demographic fluctuations (Bolger *et al.* 1997a; Bolger *et al.* 1997b; Crooks *et al.* 2001). However, small populations will likely also be vulnerable to even modest increases in predation pressure (Crooks and Soulé 1999).

Loss of coyotes from habitat fragments in southern California has been shown to be a factor associated with increased numbers of smaller carnivores (i.e. “mesopredators”) that are principle predators of birds and other small vertebrates (Crooks and Soulé 1999). In particular, coyote presence appears to have a strong negative effect on domestic cat, opossum and raccoon

abundance. Ecological release of mesopredators from coyotes has been implicated as a factor that has led to higher mortality and extinction of scrub-breeding birds in southern California habitat fragments (Crooks and Soulé 1999), and may be associated with the loss of small mammals from habitat fragments as well (Clark 2002).

Domestic cats are extremely effective recreational hunters that will continue to hunt when prey availability is low (Crooks and Soulé 1999) and have potential to reduce a rodent population very quickly (Pearson 1964). Based on surveys of cat owners adjoining habitat fragments in San Diego County, Crooks and Soulé (1999) conservatively estimated that cats from a residential neighborhood of about 100 homes surrounding a moderately sized habitat fragment (~49 acres) have the capacity to return as many as 840 rodents to the residences each year, two-thirds of which may be native species. Several mesopredators, including cats, foxes and skunks, but especially cats, appear to temporally avoid habitat fragments when coyotes are present and increase their visitation rates when coyote visitation declines (Crooks and Soulé 1999). Domestic cats may be a threat to PSPM within Conservation Areas, Morongo Wash, and the proposed Refugia. As discussed above, cats can be very effective predators and could kill PSPM and greatly diminish the conserved habitat value within Conservation Areas and, ultimately, the effectiveness of the biological corridor for the PSPM.

Other indirect effects resulting from the MSHCP Covered Activities include road-related mortality of PSPM, other edge effects from nearby development, and the impediment of sand transport and deposition that may be necessary to create and maintain PSPM habitat. These indirect effects may reduce PSPM populations locally and regionally and hinder genetic movement between populations.

Inside Conservation Areas

Direct effects

Within the Conservation Areas, there are 4,336 acres of modeled PSPM habitat (3 percent of all modeled habitat) that may be lost. There would be approximately 1,993 acres of Core Habitat (7 percent of all Core Habitat) and 2,343 acres of Other Conserved Habitat (7 percent of all Other Conserved Habitat) subject to loss.

Of the 142,539 acres of modeled habitat in the Plan Area, 1,216 acres (< 1 percent) are classified as Existing Use. The proposed Conservation Areas in the Plan would protect the Core Habitat areas for this species from Snow Cree/Windy Point to Thousand Palms, including 77 percent of the known occurrences for the PSPM; however, this percent of known occurrences is based on very limited trapping data for this species.

The MSHCP creation of Conservation Areas for the PSPM was based on the delineation of Core Habitat that 1) is large enough to support a viable population of the species independent of other Core Habitat areas; 2) is not fragmented by development, including roads; 3) contains lightly traveled two-lane roads that have limited potential for expansion; 4) has intact Essential Ecological Processes, including sand source and sand delivery systems; and 5) provides suitable areas to act as refugia in the event of large-scale flood events or other extreme conditions (climate change, extended drought).

Snow Creek/Windy Point Conservation Area: Within the Snow Creek/Windy Point Conservation Area 2,551 acres of modeled PSPM Core and Other Conserved Habitat is proposed to be conserved, and 246 acres is anticipated to be lost. Approximately 334 acres of modeled PSPM habitat are classified as Existing Conservation Lands in the Snow Creek/Windy Point Conservation Area. The largest known population of PSPM exists in this area (Dodd 1996, 1999).

Upper Mission Creek/Big Morongo Canyon Conservation Area: Within the Upper Mission Creek/Big Morongo Canyon Conservation Area, 3,589 acres of modeled PSPM Core and Other Conserved Habitat is proposed to be conserved, and 449 acres is anticipated to be lost. Approximately 583 acres of modeled PSPM habitat is classified as Existing Conservation Lands in the Upper Mission Creek/Big Morongo Canyon Conservation Area. This area is of particular importance because of the Biological Corridor that links this known PSPM population to the Willow Hole PSPM population.

OHV activity may additionally negatively impact PSPM habitat in the Upper Mission Creek/Big Morongo Canyon Conservation Area. Most of the modeled habitat in this Conservation Area is private and has not necessarily been subject to access restrictions, therefore, the impact to PSPM habitat by OHVs is unknown.

Willow Hole Conservation Area: Within the Willow Hole Conservation Area, 4,402 acres of modeled PSPM Core and Other Conserved Habitat are proposed to be conserved, and 425 acres are anticipated to be lost. Approximately 577 acres of modeled PSPM habitat is classified as Existing Conservation Lands in the Willow Hole Conservation Area.

The MSHCP identifies potential road widening to four lanes within this Conservation Area. If the road widening occurs beyond two lanes then widened culverts or undercrossings in the Willow Hole Conservation Area would be provided to maintain the ability for wildlife movement. This would involve installing a bridge or wide culvert under the existing roadway to be used as a corridor by the PSPM as well as other species.

In their study of tunnels, culverts and underpasses in southern California, Ng *et al*. (2004) recorded successful passage of deer mice (*Peromyscus* spp.) and woodrats (*Neotoma* spp.) beneath roadways using some of the undercrossings they studied. This confirms that some rodent species will take advantage of roadway undercrossings. However, their results showed that suitable habitat on either side of a passage was an important factor for predicting use by wildlife (Ng *et al*. 2004). Additionally, deer mice and woodrats are from much larger bodied genera with different life histories, and Ng *et al*. (2004) do not provide information about the undercrossing attributes (*e.g*., height, length, substrate, surrounding habitat) where successful crossings were observed. Because the effectiveness of undercrossings or culverts for PSPM or other subspecies of PELO has not been demonstrated, we cannot conclude that the undercrossing or culverts will be effective at conveying PPM under the roadway.

Thousand Palms Conservation Area: Within the Thousand Palms Conservation Area, 11,599 acres of modeled PSPM Core and Other Conserved Habitat is proposed to be conserved, and 533 acres is anticipated to be lost. Approximately 7,870 acres of modeled PSPM habitat are

classified as Existing Conservation Lands in the Thousand Palms Conservation Area. The Existing Conservation Lands are controlled or owned by BLM, State Parks, TNC, CDFG, and the Service and are anticipated to be included in the MSHCP Reserve System.

Whitewater Floodplain Conservation Area: Within the Whitewater Floodplain Conservation Area, 6,591 acres of modeled PSPM core and other conserved habitat is proposed to be conserved, and 409 acres is anticipated to be lost. Approximately 2,914 acres of modeled PSPM habitat are classified as Existing Conservation Lands in the Whitewater Floodplain Conservation Area. The Existing Conservation Lands are controlled or owned by BLM and CVWD and are anticipated to be included in the MSHCP Reserve System.

Illegal OHV activity may be a threat to PSPM and its habitat. In order to adequately conserve this Conservation Area, OHV activity needs to be controlled and the effects of these activities managed. We assume that BLM will control OHV trespass across BLM lands through implementation of the CDCA Plan Coachella Valley Amendment and associated section 7 consultation, consistent with the Terms and Conditions in our associated Biological Opinion.

Outside Conservation Areas

Outside of the Conservation Areas, there are 70,968 acres (50 percent) of modeled habitat that will be lost. These areas are primarily in the remnants of the Big Dune south of Interstate 10, in the area south of Desert Hot Springs, west and east of Highway 62, along Dillon Road north of the Indio Hills and east of Pushawalla Canyon, and south of the Mecca Hills and the Coachella Canal.

There are 5,933 acres of modeled habitat on Federal land within the Plan Area that are not within Conservation Areas. They are not authorized for take under the Plan. However, under the CDCA amendment (BLM 2002a) it appears likely that 6,266 acres of BLM lands will be subject to take as BLM performs land transfers as part of the process of securing private land in Conservation Areas (US DOI 2002a, 2002b). When we account for these lands as additional future take, it raises the percentage of total habitat outside of Conservation Areas subject to take in the future.

The proposed loss of 50 percent of PSPM modeled habitat outside of the Conservation Areas would predominately result from Covered Activities, particularly development and associated infrastructure. The Big Dune area no longer has a viable sand transport/wind corridor, is surrounded by existing development, and is highly fragmented by major roads. These fragmented blocks are likely to be subject to edge effects, including mortality on roads and predation by domestic and feral animals. Roads and low-density residential development generally fragment the area near Desert Hot Springs. PSPM modeled habitat not included in the Conservation Areas east of Highway 62 purportedly contains coarser soils although neither the density of PSPM in this area nor the specific habitat requirements for the species are known.

Monitoring and Adaptive Management Program

Analysis without permit conditions

Direct effects

PSPM may be directly impacted by the Monitoring and Adaptive Management Program through

the harming or killing of individuals through PSPM monitoring activities, the collapsing of burrows as a result of PSPM or other species monitoring, and the alteration of habitat through Adaptive Management action. The number of mice killed from monitoring activities is expected to be low and the data attained from these actions will benefit the species by providing more information to manage the species and its habitat appropriately. Additionally, potential linkages and sand transport corridors are anticipated to be protected under the Plan in conjunction with the Conservation Areas that will aid in protection of this species.

Indirect effects
Management and Adaptive Management efforts to control invasive plant species may potentially benefit the species by removing competitive exclusionary pressures the invasive species place on native plant species and by reducing the fuel load on habitat. The reduction in fuel load may both reduce the frequency of fires and prevent fires from changing the physical and chemical properties of the soil. PSPM are likely dependent on specific soil types for creating burrows; therefore, controlling the effects of fires may benefit the species.

Analysis with permit conditions
This species would benefit through increased monitoring requirements within the Plan Area. There is little information available for this species, so focuses surveys would help attain more information upon which to make management decisions. Focused surveys should yield data to make population estimations for this species. Through a Permit Term and Condition, the Permittees would be required to ensure that there are at least three independently viable populations of PSPM within Conservation Areas. The Permittees shall ensure the viability of a minimum of three Core Habitat populations of the species as a means to support long-term population sustainability in the Plan Area.

Trails Plan
Trail creation may remove a small portion of PSPM habitat as well as destroy nearby burrows. Trail users that wander off-trail may crush PSPM burrows and burrow inhabitants. Permittees will minimize these impacts by designing trails and associated facilities that are consistent with the Conservation Goals and Objectives of the Plan; using fencing and signage where appropriate; conducting education and outreach programs; patrolling to ensure that visitors stay on trails; and maintaining trails, facilities, and barriers to discourage and prevent intrusion into adjacent environmentally sensitive areas (Section 7.4.3). The Plan includes criteria for site location and design of the trails and facilities and guidelines for public use and maintenance to mitigate potential adverse effects. Specifically, Section 7.3.4.4 of the MSHCP proposes *Guidelines for Public Access and Recreation on Reserve Lands* to avoid and minimize potential adverse effects of the Trails Plan and recreation activities.

Changed Circumstances
Changed Circumstances are future events that are reasonably foreseeable to occur during the life of the MSHCP Permit, and that such an event may negatively affect the Covered Species and/or their associated habitat within the Reserve System. The MSHCP proposed to address the following Changed Circumstances: drought, fire, invasion by a new invasive species, lowering of the water table, and new listing of a species not covered by the MSHCP. Drought, fire, and invasion by a new invasive species could affect the PSPM. Although PSPM populations can

likely survive drought periods by caching seeds and aestivating, prolonged drought may result in severe population declines of already fragmented small populations. Although fire events on the valley floor have been rare in the past, they could become more frequent in the future with the advent of invasive non-native plants. Long-term adverse effects to the PSPM from fire are unknown. Invasion of a new invasive species could out-compete the seed resources vital to PSPM survival, affect pollinators, or result in less suitable habitat available for their life history requirements.

The MSHCP proposes to implement actions, such as preventative measures and planned responses, as described in Sections 6.8.3.1 through 6.8.3.5, to avoid and minimize potential adverse effects of Changed Circumstances. Implementation of the planned responses, in conjunction with Adaptive Management (Section 8 of the MSHCP), and the Permit Conditions described above (and provided in their entirety below), would likely minimize adverse effects to the PSPM from the Changed Circumstances.

Cumulative Effects

It is expected that an undetermined amount of PSPM habitat within the Plan Area, on non-federal lands and outside of any proposed Conservation Areas, would be subject to impacts by parties that are not under the control of proposed Permittees or those with Certificates of Inclusion (such as some local water agencies or school districts). These habitat alterations would not require ESA permitting or consultation unless the species is federally listed in the future. We expect that minimization and mitigation measures for the Coachella Valley fringe-toed lizard would result in an undetermined acreage of legal protection and management of suitable habitat in the Plan Area outside of proposed Conservation Areas that will simultaneously benefit PSPM. To the extent that these actions are not subject to section 10 permitting or consultation, these impacts would remain cumulative.

Additionally, we expect that some mitigation for impacts to the blowsand ecosystem on Valley-floor Reservation lands (outside the Plan Area) to occur in the Plan Area outside of proposed Conservation Areas; this would include lands near the proposed Whitewater Floodplain and Thousand Palms Conservation Areas, where additional conservation would benefit PSPM.

It is anticipated that some continued degradation of PSPM habitat within the Plan Area will occur resulting from OHVs, illegal dumping, and invasive plants. It is likely that these activities and conditions will significantly suppress PSPM populations. Illegal dumping and OHV use (and impacts) in the Valley are expected to decrease over time as a portion of the remaining open lands are developed and greater control is gained over trespass and dumping by land managers (by presence and reporting, as well as fencing and blockading of access routes) and local law enforcement. It is likely that some invasive plants already introduced into the Valley will increase in area/density and ecological impact, partially as a result of human activities such as disturbance from OHV, construction/maintenance/agricultural equipment use and movement, road development and expansion, and equestrian use (a large portion of these activities are not Covered Activities and will remain cumulative to the effects of the proposed action); continuation of ongoing control efforts (some of which will be unrelated to the Plan, such as activities by Tribes) will likely reduce the ecological influence of other invasive plants. New introductions of invasive plants during the proposed permit term are likely with undetermined

effects. It is expected that many of the cumulative human activities that would propagate and/or increase impacts from invasive plants will receive future permitting or consultation (such as maintenance by non-Permittees), with a resultant decrease in ecological effects.

Artificially enhanced predator populations, such as pets and mesopredators associated with housing developments that are not Covered Activities, likely will result in appreciable cumulative effects to PSPM where suitable habitat remains adjacent or nearby. As described above, the expected continued fragmentation of remaining PSPM habitat in the Action Area will likely reduce the normal effectiveness of coyotes controlling pet and mesopredator numbers (Crooks and Soulé 1999) in some areas.

The Agua Caliente Band of Cahuilla Indians is undertaking a Habitat Conservation Plan for all of their Tribal lands. The draft Plan and associated documents have been reviewed publicly. It is anticipated that the final Plan and associated environmental analysis will be complete in mid-2008 with permit issuance scheduled for late 2008. Although there will be habitat loss associated with that Plan, the overall net benefit to the species is positive. Because issuance of that permit is a Federal action, an analysis of the impacts of that Plan will be completed in the required section 7 process. Additionally, a large portion of Section 6 (T3S R4E) is expected to be conserved for the fringe-toed lizard under the Tribal HCP and this conservation would provide habitat for the Palm Springs pocket mouse as well.

Conclusion

The Plan Area is essential to continued existence of the Palm Springs pocket mouse because the majority of this species range is within the Plan Area and surrounding tribal lands, and all recent occurrence data is from the Plan Area. A total of 35,605 acres of PSPM modeled habitat, areas that are currently unprotected, are proposed to be conserved in perpetuity under the Plan. This conservation would be provided under the Plan to mitigate the loss of (theoretically) up to 75,304 acres (53 percent) of modeled habitat that would result from proposed Covered Activities throughout the Plan Area. In addition to the proposed mitigation lands, the Conservation Areas contain Existing Conservation Lands (21,251 acres of PSPM modeled habitat) that would augment the reserve design of the Plan, and complement the Reserve System. As such, a total of 56,856 acres would be conserved, if the 21,251 acres of Existing Conservation Lands are combined with the 35,605 acres of proposed mitigation lands. Also, a significant, but undetermined additional amount of conservation of Coachella Valley fringe-toed lizard habitat is expected to occur from acquisition and management of currently unprotected lands provided by the Service, the State, and conservation organizations that would partially benefit PSPM. Thus, more than 56,856 acres of modeled or suitable habitat would ultimately be expected to be conserved in Valley (range-wide for the species) at the end of the proposed 75-year permit term; no occupied habitat would be expected to remain extant outside of these conserved areas at the end of this term. This approximate 56,856 acres of modeled or suitable habitat plus lands protected for other species that benefit PSPM (e.g., Coachella Valley fringe-toed lizard) represents 40 percent of the currently remaining suitable or modeled habitat available within the Plan Area and would contain the majority of the future range of the species.

Implementation of the avoidance, minimization, and mitigation measures identified in the MSHCP will reduce impacts to this species that would otherwise be expected to occur. We

anticipate that the Palm Springs pocket mouse populations and habitat will be monitored and managed in perpetuity

Without permit conditions
The majority of the PSPM habitat and the species' known range occurs within the Plan Area and 53 percent of modeled habitat within the Plan Area will be lost. This is a considerable loss due to the species limited range. The only other potential PSPM habitat expected to be conserved for the species in the future is within the northern portion of the Coachella Valley on one section of the Agua Caliente Indian Reservation, thus, the 56,856 acres that would be conserved for this species by the MSHCP would contain the majority of the entire future range of the species. The Conservation Areas include habitat blocks that support the majority of known PSPM populations within the Plan Area; however, there are not assurances under the Plan to maintain suitable habitat within the Morongo Wash Biological Corridor between the Upper Mission Creek/Big Morongo Canyon and Willow Hole Conservation Areas. The Conservation Areas are proposed to be linked to the extent that existing and planned infrastructure would permit. The Reserve System includes Federal lands and other Existing Conservation Lands that are anticipated to be managed consistent with the MSHCP conservation goals and objectives in the future, but not assured.

As noted above, remaining populations of the Palm Springs pocket mouse have been reduced to fragmented, isolated populations, which likely contain small numbers of individuals; however, there is insufficient data available to develop population estimates for this species. Populations expected to remain under the proposed Plan are likely to become smaller (and become fewer in number) due to proposed development within the Coachella Valley. In addition to protecting more suitable habitat for this species, increasing suitable habitat acreages or increasing habitat function (maintaining/expanding corridors) for each population are likely the remaining ways to improve population viability. Since substantially expanding the proposed Conservation Areas to gain additional PSPM habitat is also not likely practicable, that leaves maintaining a functional biological corridor between populations, increasing the acreage of suitable habitat, and/or increasing the habitat function of extant habitat (e.g., by increasing productivity), within Conservation Areas, as the remaining ways to improve population viability.

With permit conditions
The permit conditions will minimize and mitigate the impact of take to the maximum extent practicable and provide for the species continued survival throughout its range, because the Permittees must ensure that there are a minimum of three viable populations within the Conservation Areas and take actions to improve the status of the species to reach/maintain this goal. To maintain coverage for PSPM, Permittees would have to demonstrate that there are a minimum of three viable populations within Conservation Areas. To ensure or re-establish and maintain a minimum of three viable populations within Core Habitat for this species, a Permit Term and Condition has been included that requires the Permittees to manage and enhance all modeled Core Habitats for this species, assess the extant Core Populations to determine if they are adequate to support long-term population viability, develop a long-term management strategy for this species that identify specific measures that will be implemented and a specific time line for implementation, and incorporate the measures identified in the long-term management strategy into the Joint Project Review process through appropriate revisions to the Conservation

Objectives and Required Measures for the Conservation Areas that include Core Habitat.

If the Morongo Wash Biological Corridor is to be maintained as a functional corridor, suitable habitat for the PSPM must be developed as defined in the permit condition. The Permit condition will ensure that the refugia areas are usable by the PSPM during a flood event, and that suitable habitat is present within the corridor for the mouse. Additionally, if the Morongo Wash is maintained as a functional corridor, then Permittees may count the Willow Hole and Upper Mission Creek/Big Morongo Canyon PSPM populations as two seperate populations (towards the minimum of three viable populations required, as described above) even if these populations form a larger inter-related metapopulation that is only considered viable due to the genetic exchange between these two interdependent populations.

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, with permit conditions, would not jeopardize the continued existence of the Palm Springs pocket mouse. We reached this conclusion because, the Permit Terms and Conditions adequately provide for the conservation of viable populations of the species in the Plan Area and a functional biological corridor and refugia in Morongo Wash, a key corridor for this species. However, if the corridor is lost and the Permittees offset this loss with expanded conservation as proposed that will ensure at least three viable populations within Conservation Areas as required by the Permit Term and Condition, the species is still likely to persist within the Plan Area and throughout its range. We reached this conclusion because habitat areas and ecosystem processes essential to the continued existence of the species in the Plan Area are likely to be conserved and managed for the Palm Springs pocket mouse in perpetuity; this, combined with other actions likely to occur in the Action Area, would result in habitat areas and ecosystem processes essential to the species' continued existence range-wide being adequately conserved and managed. Thus, impacts to this species and its modeled habitat, when viewed in conjunction with the protection and management within the MSHCP Conservation Areas and associated Permit Terms and Conditions, 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 difficult to quantify the number of Palm Springs pocket mice that would be taken as a result of the proposed action over the 75-year permit term due to the large Plan Area, the programmatic nature of the Plan and Covered Activities, the natural population fluctuations (and density fluctuations) expected across the range of the species over time, the difficulty in detecting the species, and the lack of detailed monitoring information available on potentially occupied sites in the Plan Area. Therefore, the Service is quantifying the take as the number of acres of modeled habitat that would be impacted or lost from Covered Activities in the MSHCP Plan Area as a result of the proposed action. We anticipate that up to 75,304 acres of modeled habitat within the Plan Area would become unsuitable for the Palm Springs pocket mouse as a result of the proposed action. Additionally, a small, but undeterminable, number of Palm Springs pocket mice are anticipated to be taken as a result of proposed monitoring and management actions. Take would be in the forms of capture, harm, and mortality.

PERMIT TERMS AND CONDITIONS

The following Permit Conditions have been identified through our analysis as being necessary and appropriate for coverage of this species in the Permit:

CVCC and the Land Manager, through the land management program, shall identify and document implementation compliance with the Land Use Adjacency Guidelines and work with the landowners and appropriate jurisdictions to address these concerns. This information shall be included in the Annual Report to the Wildlife Agencies and the Permittees.

The CVCC, after coordination with its Implementation Manual Subcommittee, shall provide the Implementation Manual for review and concurrence by the Wildlife Agencies prior to its finalization and distribution to the Permittees.

Within all areas of the Morongo Wash Biological Corridor (discussed in Plan Sections 4.3.7 and 7.3.1), the CVCC through the Reserve Monitoring and Management Program including the Reserve Management Plan shall provide for appropriate habitat requirements based on best available information including the CDFG-funded 2008 study for Palm Springs Pocket Mouse.

For Coachella Valley Fringe-toed Lizard, Coachella Valley Round-tailed Ground Squirrel, Palm Springs Pocket Mouse, and Coachella Valley Milk-vetch, to ensure that a minimum of three (3) viable populations (long-term persistence of self-sustaining populations) within Core Habitat for these species is maintained, or if necessary re-established and maintained, the following measures shall be implemented:

The CVCC shall manage and enhance modeled Core Habitats for these species to provide for persistent and sustainable populations and essential ecological processes, including broader patterns of sand transport and deposition in the Whitewater Floodplain and maintenance of sand transport and deposition in all Core Habitats to the maximum extent practicable (e.g., sand fencing as appropriate in any of the Conservation Areas and restoring mesquite in Thousand Palms Conservation Area) to achieve the Conservation Objectives for these species in the Plan.

The CVCC shall assess the animal species identified above to determine the presence of persistent and sustainable populations and essential ecological processes within the Core Habitats. This assessment shall be completed within 3 years of Permit issuance using methods developed jointly by the CVCC and Wildlife Agencies.

Specific studies shall be conducted as part of the baseline monitoring for the Coachella Valley milkvetch to assess: viability and extent of seed bank, substrate affinities, micro-habitat requirements, seed dispersal, pollination ecology, and impacts of invasive species within the Core Habitat areas to ensure that the appropriate measures to support long-term conservation of this species are identified. These studies shall be completed within 5 years of Permit issuance using methods developed jointly by the CVCC and Wildlife Agencies.

The CVCC shall develop long-term management strategies for each of these species that identify specific monitoring approaches (e.g., the use of probabilistic population estimates, relativistic population indices, and/or assessments of effective population size) and management actions (including actions to address habitat as described in a) above) that will be implemented and a

specific time line for implementation to ensure a minimum of 3 viable populations including adequate distribution to support long-term viability of the populations within Core Habitat areas. These management strategies shall be completed and provided to the Wildlife Agencies for their concurrence within 5 years of Permit issuance for the animal species and 7 years for the CV milkvetch.

Within 6 months of their completion, implementation of the measures associated with the management strategies shall begin through incorporation into the applicable Reserve Management Unit Plan(s) and Adaptive Management Program. Any changes to the Covered Species and Natural Communities Conservation Goals and Objectives and Required Measures for the Conservation Areas that include Core Habitat for each of the species identified above shall be submitted to the Wildlife Agencies for review and approval within 8 years of permit issuance and incorporated into the Joint Project Review process as appropriate.

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Peninsular bighorn sheep (*Ovis canadensis nelsoni*)

STATUS OF THE SPECIES/CRITICAL HABITAT

Legal/Listing Status

The Peninsular bighorn sheep was federally listed as endangered on March 18, 1998 (63 FR 13134), and a recovery Plan was approved in October 2000. 844,897 acres of critical habitat were designated on February 1, 2001 (66 FR 8649). The decision to list the Peninsular bighorn sheep was made because of declining population numbers and continuing habitat loss, degradation, and fragmentation throughout a significant portion of bighorn sheep habitat within the Peninsular Ranges. In addition, periods of depressed recruitment, likely associated with disease and high predation, coincided with low population numbers endangering the continued existence of these animals in southern California. The California Fish and Game Commission listed bighorn sheep inhabiting the Peninsular Ranges as "rare" in 1971. In 1984, the designation was changed to "threatened" by the CDFG to conform to the terminology in the amended California Endangered Species Act.

On March 7, 2005, the Agua Caliente Band of Cahuilla Indians filed a complaint against the Service's economic analysis of designated critical habitat. Other parties subsequently intervened as plaintiffs in the case. On July 31, 2006, a court approved consent decree imposed a partial vacature of critical habitat designation on Tribal lands and remanded the critical habitat designation back to the Service for a new rulemaking. The court-ordered critical habitat designation of approximately 384,410 acres was proposed on October 10, 2007. Currently, the October 10, 2007 proposed critical habitat has not been designated, pending the outcome of public comments and hearings. It is anticipated that final critical habitat will be designated by September 30, 2008.

Species Description

Bighorn sheep inhabiting the Peninsular Ranges were once considered a separate subspecies (*Ovis canadensis cremnobates*) and were one of the 4 desert subspecies (*O. c. nelsoni, O. c. mexicana, O. c. cremnobates,* and *O. c. weemsi*) recognized by Cowan (1940). The validity of these subspecies delineations was questioned and reassessed when modern techniques became available. Based on morphometric and genetic results, Wehausen and Ramey (1993) and Ramey (1995) placed Peninsular bighorn within the *O. c. nelsoni* subspecies, which is the current taxonomy. The range of *O. c. nelsoni* or Nelson bighorn sheep is relatively widespread covering much of Nevada, Utah, southern California, and northwest Arizona (Monson and Sumner 1980). Consequently, bighorn sheep in the Peninsular Ranges of the U. S. were listed as a distinct population segment under the ESA, and not as a separate subspecies. However, bighorn sheep inhabiting the Peninsular Mountain Ranges are still commonly referred to as Peninsular bighorn sheep.

The Peninsular Ranges of California are northern extensions of the mountain ranges of Baja California, Mexico, and in recent years the majority of Peninsular bighorn sheep have been located in Mexico (DeForge *et al.* 1993; Rubin *et al.* 1998). Peninsular bighorn sheep are found along steep, east-facing escarpments in the desert regions of the Baja Peninsula, south to the Las Virgenes Mountains near the town of San Ignacio (Weaver 1975; DeForge *et al.* 1993). The

mountain ranges of Baja are remote and rugged, thus obtaining accurate population estimates is very difficult. Biologists estimate that approximately 2,500 Peninsular bighorn sheep inhabit northern Baja (DeForge *et al.* 1993), much less than the estimates of over 28,000 from the turn of the century. Poaching, competition with domestic and feral livestock, predation, and diseases introduced from domestic livestock continue to impact these herds (DeForge *et al.* 1993).

Distribution

Though the overall range of Peninsular bighorn sheep extends from the San Jacinto Mountains near Palm Springs, California south into Baja California, Mexico, only the distinct vertebrate population segment within the United States is listed as endangered and addressed in this document. For a population to be listed under the Act as a distinct vertebrate population segment, three elements are considered (61 FR 4722): 1) the discreteness of the population segment in relation to the remainder of the species to which it belongs; 2) the significance of the population segment to the species to which it belongs, and 3) the population segment's conservation status in relation to the Act's standards for listing. Within the United States, the range extends along the Peninsular Ranges from the San Jacinto Mountains of southern California south to the United States - Mexico border. Bighorn sheep habitat in the Peninsular Ranges of California is restricted to the east facing, lower elevation slopes typically below 4,600 feet along the northwestern edge of the Colorado Division of the Sonoran Desert.

An examination of past records and current data suggests that the distribution of Peninsular bighorn sheep in California has been altered during the past 25 years. Ewe groups along the Mexican border and in the northern San Jacinto Mountains (north of Chino Canyon) were apparently extirpated in the late 1980's (DeForge *et al.* 1997; Rubin *et al.* 1998). DeForge *et al.* (1997) suggested disturbance and habitat fragmentation were the primary factors driving the changes in bighorn distribution in the northern San Jacinto Mountains. Blong (1967) reported that construction of the Tram Road through Chino Canyon severely reduced bighorn movement in this area. Ewes ceased regularly occupying the northern San Jacinto Mountains about 20 years after construction of the Palm Springs Aerial Tramway in Chino Canyon, though rams continued to occasionally cross Chino Canyon and use the area formerly occupied by the ewe group (DeForge *et al.* 1997). However, ewes were documented crossing Chino Canyon in route to Blaisdell Canyon in 2005, where they remained for several days before re-crossing Chino Canyon returning to Tachevah Canyon (Bighorn Institute 2005). The group, consisting of adult ewes, female lambs and yearlings, and male yearlings, has been regularly observed within Chino Canyon since 2005 (Bighorn Institute 2005, 2007).

The potential extirpation of the bighorn subpopulation between Interstate 8 and the U.S.-Mexico border was poorly documented, but the construction of the interstate in the mid-1960's, railroad activity, livestock grazing, poaching, and fire suppression appear the most likely factors contributing to the isolation and decline of bighorn sheep in the area (Rubin *et al.* 1998). Recently, bighorn sheep sightings and their sign have become common around the Mountain Spring area of Interstate 8 (Service and CDFG, unpublished data). Bighorns were observed crossing Interstate 8 (California Highway Patrol, pers. comm.), and bighorn sheep were observed by the U. S. Border Patrol further south in the Jacumba Mountains.

In the northern Santa Rosa Mountains, the number and distribution of bighorn sheep is

substantially reduced from the 1970's and 80's, with formerly important use areas, such as Carrizo and Dead Indian Canyons (Blong and Pollard 1968), currently supporting few animals (DeForge and Scott 1982; DeForge *et al.* 1995; Bighorn Institute 1998, 1999). In addition, the attraction of bighorn sheep to urban sources of food and water in conjunction with increased human traffic on the Dunn Road caused bighorns to reduce their home ranges in the northern Santa Rosa Mountains (Ostermann 2001).

Rubin *et al.* (1998) suggested that in portions of the range, roads or increased traffic have contributed to habitat fragmentation by restricting ewe movement, as evidenced by four ewe groups having home ranges delineated by roadways. In the 1970s, ewes were observed crossing Highway 74 in the Santa Rosa Mountains (V. Bleich, pers. comm.). However, no radio-collared ewes were observed crossing this road from 1993 to 2001 (DeForge *in litt.* 1997). California Department of Transportation records indicated Highway 74 traffic approximately tripled from 1970 onward. However, in recent years ewes have begun crossing Highway 74 in at least two locations documented by the Bighorn Institute. The number of crossings by rams near Vista Point has also increased, and several were struck by automobiles. As a result, Caltrans has installed wildlife crossing signs in the area.

Habitat Affinities

Bighorn sheep in the Peninsular Ranges and throughout the desert southwest have important habitat requirements that relate to topography, visibility, water availability, and forage quality and quantity. Bighorn sheep evolved predator evasion behaviors that use escape terrain, which is generally defined as steep, rugged slopes (Hansen 1980a, Cunningham 1989). Escape terrain is critical because bighorn sheep typically do not depend upon speed alone to outrun their predators, but use their exceptional climbing abilities to out maneuver predators on steep, rocky outcrops and talus slopes (Geist 1971, McQuivey 1978). When ewes are ready to give birth they will typically seek out the most precipitous terrain, where they and their lambs will be safest (Geist 1971). The presence of such steep terrain for predator evasion and lambing is, therefore, a crucial component of bighorn sheep habitat. Variation in slope and aspect also help bighorn sheep to survive in a harsh environment. During hot weather, desert bighorn seek shade under boulders, over hanging rocks, and cliffs, or they may move to north facing slopes (Merritt 1974, Andrew 1994) where temperatures are moderated. During inclement weather bighorn may again seek protected caves, overhangs, or slopes that are protected from strong winds, and on cold winter days, bighorn sheep may move to sunny, south facing slopes (Andrew 1994).

The predator evasion behavior of bighorn sheep also depends on the ability to visually detect danger at a distance. Bighorn sheep will avoid habitat in which dense vegetation reduces visibility (Risenhoover and Bailey 1985, Etchberger *et al.* 1989). This appears to be the case in the Peninsular Ranges, where bighorn sheep usually remain below the elevation of chaparral and other dense vegetation associations. In the Peninsular Ranges, bighorn sheep habitat occurs along the east-facing desert slopes, typically below approximately 4,600-foot (1,400-meter) elevations (Jorgensen and Turner 1975, DeForge *et al.* 1997). The elevational patterns of vegetation associations in the Peninsular Ranges, in combination with bighorn sheep predator avoidance behavior, result in habitat use patterns that are more restricted to lower elevations than in most other bighorn populations. The available habitat of Peninsular bighorn sheep can, therefore, be described as a long, narrow band that runs north-south along the lower elevations of

the Peninsular Ranges.

In addition to mountainous terrain, other types of habitat are fundamental to bighorn sheep populations. Areas of gentle terrain, such as valley floors, serve as important linkages between neighboring mountainous regions, thereby providing bighorn sheep temporary access to resources (e.g., forage, water, or lambing habitat) in neighboring areas, and allowing gene flow to occur between subpopulations (Krausman and Leopold 1986, Schwartz *et al.* 1986, Bleich *et al.* 1990, Bleich *et al.* 1996). Alluvial fans and washes contain a greater diversity of browse species than steeper terrain, and this diverse vegetation furnishes important sources of high quality forage (Leslie and Douglas 1979). In summer and times of drought, wash vegetation remains green longer than vegetation in other areas, providing forage higher in nutrients and digestibility than the dry, brown forages found on the mountainsides under these conditions (Andrew 1994). Leslie and Douglas (1979) noted that these areas became increasingly important to bighorn sheep not only in summer, but during any period of limited forage availability. Bighorn sheep in the Peninsular Ranges have been observed foraging on alluvial fans for extended periods of time in Coyote Canyon and other undeveloped washes and alluvial fans within Anza-Borrego Desert State Park (Ostermann, Rubin, Jorgensen unpublished data). In the northern Santa Rosa and San Jacinto Mountains, much of the alluvial fan and wash habitat has been lost to residential and golf course development (U.S. Fish and Wildlife Service 2000).

In hot, arid deserts, water is an important resource for bighorn sheep (Jones *et al.* 1957, Blong and Pollard 1968, Leslie and Douglas 1979, Turner and Weaver 1980, Elenowitz 1984, Cunningham and Ohmart 1986). A number of studies have shown that desert bighorn sheep will concentrate around water sources in the summer, with most animals found within a two to three-mile (three to five-kilometer) radius of water (Jones *et al.* 1957, Leslie and Douglas 1979, Cunningham and Ohmart 1986). During periods of more abundant rainfall and cooler temperatures, sheep distribution is less coincident with permanent water sources (Leslie and Douglas 1979). Apparently, bighorn sheep obtain enough water from forage to meet their requirements during cooler, wetter portions of the year. Lactating ewes and lambs appear to be more dependent on free-standing water and are often found closer to water sources (Blong and Pollard 1968, Leslie and Douglas 1979, Bleich *et al.* 1997). Water sources are most valuable to bighorn sheep if they occur in proximity to adequate escape terrain with good visibility. Therefore, the juxtaposition of open escape terrain to water sources is an important factor in their utilization (Cunningham 1989, Andrew 1994). The critical importance of free-standing water to bighorn sheep has been questioned (Krausman and Leopold 1986, Broyles 1995), and some small populations apparently exist without free-standing water (Krausman *et al.* 1985, Krausman and Leopold 1986, Broyles 1995). However, in most populations, bighorn sheep will drink regularly when water is available and concentrate near water sources during the warmer months. In the Peninsular Ranges, bighorns migrate seasonally during the hot season, leaving mountain ranges where no standing water is known to exist, such as the Coyote Mountains, and moving to adjacent mountain ranges where standing water is available year-round. They then center their activity on standing water for the hot season. This behavior may indicate that vegetation alone does not provide sufficient water during the hot season. At least in some mountain ranges, standing water may be a requirement.

In the Peninsular Ranges, bighorn sheep use a wide variety of plant species as their food source

(Weaver *et al.* 1968, Jorgensen and Turner 1973). Turner (1973) recorded the use of at least 43 species, with browse being the food category most frequently consumed. Cunningham and Ohmart (1986) determined that the bighorn sheep diet in Carrizo Canyon (at the south end of the U.S. Peninsular Ranges) consisted of 57 percent shrubs, 32 percent forbs, 8 percent cacti, and 2 percent grasses. Scott (1986) and Turner (1976) reported similar diet compositions at the north end of the range. Diet composition varied among seasons (Cunningham and Ohmart 1986, Scott 1986), presumably because of variability in forage availability, selection of specific plant species during different times of the year (Scott 1986), and seasonal movements of bighorn sheep.

The time period surrounding late gestation, lambing, and nursing is very demanding in terms of the energy and protein required by bighorn ewes. Failure to acquire sufficient nutrients during late gestation and during nursing adversely affects the survival of newborn ungulates (Thorne *et al.* 1976, Julander *et al.* 1961, Holl *et al.* 1979). Crude protein and digestible energy values of early green-up species are usually much higher than those of dormant forages during the critical late gestation, lambing, and rearing seasons. With their high nutrient content, even minor volumes of these forages within the overall diet composition may contribute important nutritional value at critical life stages (Wagner 2000). However, during the reproductive season, due to the varied topography of bighorn sheep habitat, these forages typically are concentrated on specific sites, such as alluvial fans and washes, where more productive soils support greater herbaceous growth than steeper, rockier soils. Furthermore, forage green-up follows an elevational gradient with lower elevations beginning spring growth earlier than higher elevations (Wehausen 1980, Berger 1991). Access to a range of elevations provides bighorn sheep enhanced opportunities to acquire nutrients during critical seasons (Hebert 1973, Wehausen 1980, Berger 1991).

Life History

The movement patterns and habits of ewes are learned by their offspring (Geist 1971). By following older animals, young bighorn sheep gather knowledge about escape terrain, water sources, foraging areas, and lambing habitat (Geist 1971). As young rams reach 2 to 4 years of age, they begin to follow older rams away from their natal group (Geist 1971, Festa-Bianchet 1991). Because bighorn sheep rely on vigilance to detect predators, they benefit from gregariousness and group alertness (Geist 1971, Berger 1978).

The adult sexes tend to loosely segregate during much of the year, coming together primarily during the rut (Geist 1971, Bleich *et al.* 1997), which typically peaks from August through October in the Peninsular Ranges (Rubin *et al.* 2000). During the rut, rams join the ewe groups and compete to breed with receptive ewes. The largest rams presumably are the most successful breeders, but smaller rams have been reported to breed as well (Hogg 1984). During the period of sexual segregation, ewes and their lambs are typically found in steeper, more secure habitat, while rams may be found in less steep or rugged terrain (Geist 1971, Bleich *et al.* 1997).

Desert bighorn sheep are primarily diurnal (Krausman *et al.* 1985) but may be active at any time of day or night (Miller *et al.* 1984). Their daily activity pattern includes alternating feeding and resting/ruminating periods. Forage quality influences activity patterns because when forages are low in digestibility, bighorn sheep must spend more time ruminating and digesting. Consequently, bighorn sheep may establish a cycle of feeding and ruminating that reflects forage

quality and optimizes nutrient intake (Wagner and Peek 1999, Wagner 2000).

In general, bighorn sheep are wide-ranging species that require large swaths of relatively pristine land. For example, in the San Jacinto Mountains, fixed-kernel home range sizes averaged 25 km^2 for rams and 20 km^2 for ewes (DeForge *et al.* 1997). Large home ranges allow for animals to move in response to variation in predation pressure and changes in resource availability. The size of individual or group home ranges depends on the juxtaposition of required resources (water, forage, escape, or lambing habitat) and, therefore, varies geographically. Home range size also is affected by forage quantity and quality, season, sex, and age of the animal (Leslie 1977, McQuivey 1978). Although most desert bighorn sheep do not seasonally migrate along elevational gradients like many populations in higher latitude mountain ranges, they do exhibit seasonal differences in habitat use patterns. In many populations, animals will have a smaller home range in summer (McQuivey 1978, Leslie and Douglas 1979, Elenowitz 1983), presumably due to their limited movement away from permanent water sources. During the cooler or wetter months of the year, bighorn sheep often exhibit an expanded range as animals move farther from water sources (Simmons 1980). Ewes generally display a higher degree of philopatry to their seasonal home ranges than do rams. Rams tend to range more widely, often moving among ewe groups (Boyce *et al.* 1997, DeForge *et al.* 1997, Rubin *et al.* 1998). In most populations of desert bighorn sheep, ram home ranges have been found to be larger than those of ewes (Simmons 1980, DeForge *et al.* 1997).

The gregarious and philopatric behavior of ewes limits their dispersal and exploratory ability compared to rams (Geist 1967, 1971). Geist (1971) theorized, however, that a young ewe might switch to a new ewe group if she encountered neighboring sheep and followed them away from her natal ewe group. In the Peninsular Ranges, movement of radio-collared ewes between ewe groups is rare, however, inter-group movement does occasionally occur. During a 3-year study, one ewe moved over 30 kilometers (18.6 miles) and temporarily joined another ewe group (Rubin *et al.* 1998). No emigration of ewes has been observed even though radio-collared animals have been regularly monitored in the northern Santa Rosa Mountains since 1981 (Ostermann *et al.* 2001) and throughout the range since 1993 (E. Rubin, pers. comm.; DeForge *et al.* 1997). Bighorn sheep evolved movement patterns that were adapted to exploiting stable patches of habitat, consequently compared to other North American ungulates they are regarded as poor dispersers (Geist 1971). Nevertheless, dispersal and exploratory movements do occur, and genetic analyses reflect a low rate of ewe dispersal across the Peninsular Ranges in the evolutionary past (Boyce *et al.* 1999). In 2005, two yearling ewes crossed Chino Canyon, and temporarily occupied the area north of the canyon in an exploratory movement documented by the Bighorn Institute.

The breeding period, or rut, occurs in the late summer and fall months. In the Peninsular Ranges, ewes estimated to be between 2 and 16 years of age have been documented to produce lambs (Rubin *et al*. 2000, Ostermann *et al.* 2001). As parturition approaches, ewes seek secluded sites with shelter, escape terrain, and unobstructed views (Turner and Hansen 1980). They isolate themselves from other females while bearing their lambs (Etchberger and Krausman 1999). Lambs are born after a gestation of approximately 6 months or 171 to 185 days (Turner and Hansen 1980, Shackleton *et al.* 1984, Hass 1995). During a 4-year (1993 to 1996) study conducted in the Peninsular Ranges south of the San Jacinto Mountains, the lambing season

extended from February through August; however, 87 percent of the lambs were born from February to April, and 55 percent of the lambs were born in March (Rubin *et al.* 2000). DeForge *et al.* (1997) and Cunningham (1982) reported a similar onset of the lambing season in the San Jacinto Mountains and in Carrizo Canyon, respectively. In the San Jacinto and northern Santa Rosa Mountains ewe groups, the lambing season begins in January during some years (Bighorn Institute 1997). Lambs usually are weaned by 6 months of age (Hansen and Deming 1980, Wehausen 1980).

From 1993 to 1996, the reproductive patterns of five ewe groups (Carrizo Canyon, south San Ysidro Mountains, north San Ysidro Mountains, Santa Rosa Mountains [Deep Canyon], and northern Santa Rosa Mountains) were monitored and annual lamb production averaged 77 percent (0.77 lambs born per "ewe-year") for the 4-year period (E. Rubin, pers. comm.). Using a fecal-based enzyme immunoassay, Borjesson *et al.* (2000) determined that in the fall of 1992, at least 85 percent of sampled adult ewes were pregnant. Both of these observations suggest that conception rates are not currently limiting population growth in the Peninsular Ranges.

Lamb survival (to 6 months of age) was variable among groups and across years. A year of high lamb survival in one group was not necessarily a high survival year in another group (Rubin *et al.* 2000). Of the four groups studied the northern Santa Rosa Mountains group typically had the lowest lamb survival, while the neighboring Deep Canyon group, located less than 5 miles (8 kilometers) away, had the highest lamb survival. Lamb recruitment in the northern Santa Rosa Mountains was found to be very low between the years of 1977 and 1997 (DeForge *et al.* 1982, DeForge and Scott 1982, Turner and Payson 1982; Ostermann *et al.* 2001). Shorter periods of low lamb to ewe ratios, as well as clinical signs of pneumonia among lambs, have occasionally been observed in Anza-Borrego Desert State Park (Jorgensen and Turner 1973, Jorgensen and Turner 1975, Hicks 1978), but years of high lamb to ewe ratios (Cunningham 1982; M. Jorgensen, pers. comm.) have been observed in these areas as well (Rubin *et al.* 2000).

Wehausen (1992) suggested that periods of low recruitment may not warrant alarm because long-lived animals such as bighorn sheep can exist in viable populations if periods of low offspring recruitment are interrupted by periodic pulses of high offspring recruitment. In ruminants, reproductive success is related to the mother's body weight, access to resources, quality of home range, and age (Etchberger and Krausman 1999). Survival of offspring also depends on birth weight and parturition date. Festa-Bianchet and Jorgenson (1996) found that female sheep reduce the care of lambs when resources are scarce to favor their own nutritional requirements over their lamb's development. Ewes that fail to acquire a minimum level of energy reserves (i.e., body weight) may not conceive (Wehausen 1984) or will produce smaller offspring with a poorer chance of survival (Price and White 1985). Several studies have documented a positive relationship between winter precipitation and lamb recruitment in the following year (Douglas and Leslie 1986, Wehausen *et al.* 1987). However, the relationships between climate, lamb recruitment, and population trends likely differ among different bighorn sheep populations, and are not fully understood (Rubin *et al.* 2000).

Lamb and yearling age classes experience high mortality rates relative to adult bighorns. After reaching adulthood at two years of age, bighorn sheep survival is high until ten years of age (Hansen 1980b), or until shortly before the age of ecological longevity (Cowan and Geist 1971).

However, observed values of annual adult survivorship in the Peninsular bighorn sheep appear low relative to other reported desert populations. During November 1992 to May 1998, survivorship of 113 adult radio-collared bighorn sheep (97 ewes and 16 rams) was monitored between Highway 74 (in the Santa Rosa Mountains) and the U.S.-Mexico border. During this period, overall annual adult survival was 0.79, with no significant difference among three age classes of adults (Hayes *et al.* 2000). Annual survivorship of individual ewe groups ranged from 0.70 to 0.87, and a year of high survivorship in one group was not necessarily a year of high survivorship in other groups (Rubin *et al.* 1998). In the northern Santa Rosa Mountains ewe group, adult survivorship was monitored during a 14-year period (1985 to 1998), and was found to range between 0.50 and 1.00 annually (Ostermann *et al*. 2001). In the San Jacinto Mountains, DeForge *et al.* (1997) monitored the survival of adult (2 or more years of age) radio-collared bighorn sheep during 1993 to 1996 and estimated annual adult survival to be 0.75.

Survival of desert bighorn sheep in greater southeastern California averaged 0.91 (Andrew 1994), 0.86 or greater in northwest Arizona (when highway mortalities were excluded, (Cunningham and deVos 1992), 0.82 in New Mexico (Logan *et al.* 1996), and 0.85 or greater for four populations studied in the Mojave Desert (Wehausen 1992).

Population Trends

Bighorn sheep have been documented in the Peninsular Ranges since early explorers, such as Anza, observed them in the 1700's (Bolton 1930). Grinnell and Swarth (1913) described the area of Deep Canyon in the southern Santa Rosa Mountains, "...well worn trails, footprints, and feces were plentiful. In places it looked as though a herd of domestic sheep had been over the region." Range-wide population estimates were not made until the 1970's. Published estimates were as high as 971 in 1972 (Weaver 1972), and 1,171 in 1974 (Weaver 1975). U.S. range-wide population estimates were 570 in 1988 (Weaver 1989), 400 in 1992 (USFWS), and between 327 and 524 in 1993 (Torres *et al.* 1994). Starting in 1994 a biennial helicopter census has been conducted throughout the Peninsular Ranges using radio-collared animals to estimate sighting probabilities. The range-wide population estimates were 347, 276, 334, 400, 667, 708, and 793 for the even years 1994-2006, respectively. From the historic highs of the 1970's, population estimates declined to a low of 276 adults in 1996 (USFWS 2000); since 1996, the population has steadily increased. Currently, at least 8 ewe groups (or subpopulations) exist in the overall U. S. range, however, the population trajectory of each ewe group appears to be determined independently (Rubin *et al.* 1998).

Threats

Threats to bighorn sheep in the Peninsular Ranges include habitat loss and fragmentation, urban sources of mortality, human disturbance, disease, and mountain lion predation (USFWS 2000), and environmental conditions. As discussed above, the population dynamics of ewe groups operate independently, and threats to the various ewe groups vary spatially and temporally.

Habitat loss and fragmentation

Habitat loss is a leading cause of current species extinctions and endangerment worldwide (Burgman *et al.* 1993). It represents a threat to Peninsular bighorn sheep, because they live in a narrow band of lower elevation habitat that it is desirable for development. At least 18,500 acres (7,490 hectares or about 30 square miles) of suitable habitat has been lost to urbanization and

agriculture within the range of the three ewe groups that occur along the urban interface between Palm Springs and La Quinta, and development is spreading southward towards Anza-Borrego Desert State Park. Within the narrow band of habitat, bighorn sheep make use of sparse and sometimes sporadically available resources found within their home ranges. As humans encroach into this habitat, these resources are eliminated or reduced in value, and the survival of ewe groups is threatened. Bighorn sheep are also sensitive to habitat loss or modification because they are relatively poor dispersers (Geist 1967, 1971a), largely learning their ranging patterns from older animals. When habitat is lost or modified, the affected group is likely to remain within their familiar surroundings but with a reduced likelihood of population persistence, due to the reduced quantity and/or quality of resources.

Encroaching urban development and anthropogenic disturbances have the dual effect of restricting animals to a smaller area and severing connections between ewe groups. Fragmentation poses a particularly severe threat to species with a metapopulation structure, such as Peninsular bighorn sheep, because overall survival depends on interaction among subpopulations. Isolated, small groups of animals are subject to greater risks of extinction, while inter-connected, small groups acquire much of the resilience of larger populations. The movement of rams and occasional ewes between ewe groups maintains genetic diversity and augments populations of individual ewe groups (Brown and Kodric-Brown 1977, Soulé 1980, Krausman and Leopold 1986, Schwartz *et al.* 1986, Burgman *et al.* 1993). Temporary moves by females between neighboring ewe groups could also provide new habitat knowledge facilitating future range expansion (Geist 1971). Increased fragmentation reduces such possibilities and may reduce ewe group resilience.

Beyond physical barriers to movement, fragmentation also can result from less obvious forms of habitat modification. Increased traffic on roads apparently make bighorn sheep, especially ewes, hesitant to cross these roads (Rubin *et al.* 1998). Animals that do cross suffer an additional risk of mortality from automobile collisions (Turner 1976, McQuivey 1978, Cunningham and deVos 1992, DeForge and Ostermann 1998a, Bighorn Institute 1999), with the result that a group whose range is bisected by a road can have reduced viability in the long-term (Cunningham and deVos 1992).

Urbanization

Bighorn sheep in the northern Santa Rosa Mountains became attracted to urban sources of food and water as housing developments moved up from the valley floor. Over time these bighorn became accustomed to entering the housing developments and began displaying atypical feeding and behavioral patterns. Although often thought to be the product of releasing captive-reared animals into the wild, bighorn sheep habituation to urban areas began in the 1950's around Rancho Mirage, several decades before population augmentation began in 1985 (Tevis 1959, DeForge and Scott 1982, Ostermann *et al*. 2001, V. Bleich, pers. comm.). Bighorns frequenting housing developments experienced mortality associated with urban areas in addition to their usual natural mortality sources, such as predation and disease. A study of cause-specific mortality conducted from 1991 to 1996 revealed that 34 percent of mortalities were directly caused by urbanization and 28 percent were caused by predation, mainly by mountain lions (DeForge and Ostermann 1998a, 1998b). The remaining mortalities were due to disease (3 percent) and undetermined causes (34 percent). Of the 11 adult mortalities attributed to

urbanization, 5 were due to automobile collisions, 5 were caused by exotic plant poisoning, and 1 bighorn ram was strangled in a home-made wire fence. An additional four bighorn sheep were struck but not killed by vehicles. Toxic plants causing mortality included oleander (*Nerium oleander*) and laurel cherry (*Prunus* sp.) (Bighorn Institute 1995, 1996). Preliminary results from a study of radio-collared lambs indicate that urbanization also affected lamb survival in this ewe group. Of the nine lamb mortalities recorded in 1998 and 1999, eight occurred within 300 meters (980 feet) of the urban interface (Bighorn Institute 1999). Five of these mortalities were attributed to coyote or bobcat predation, one to mountain lion predation, and three to the direct and indirect effects of urbanization (automobile collisions and drowning in swimming pools). Dogs also have been observed to chase bighorn ewes and their lambs near residential areas (E. Rubin, pers. comm.). Dogs likely caused the death of 2 yearlings in April 2001, and were observed attacking a young ram in December 2007 (J. DeForge, pers. comm.). The combined effects of natural and urban-caused sources of mortality likely contributed to the decline of the bighorn sheep population in the northern Santa Rosa Mountains. In 2002, a bighorn sheep-proof fence was constructed along the urban-wildland interface to exclude bighorn sheep from urban areas. Subsequent to completion of the fence, lamb and adult survival in the northern Santa Rosa Mountains increased dramatically (Bighorn Institute 2004). Bighorn rapidly reverted to a natural diet of desert vegetation, and began expanding their movement patterns to utilize more of the available habitat. As development moves southward and continues to abut or invade bighorn sheep habitat, there is a potential for urban sources of mortality to become a factor in population dynamics. Other instances of human-caused mortality have been documented throughout the Peninsular Ranges: train collisions (Jorgensen and Turner 1973), automobile collisions (Turner 1975, Hicks 1978), and poaching (Jones *et al.* 1957, Jorgensen and Turner 1973, Cunningham 1982).

Predation

Mountain lion predation is another important threat to Peninsular bighorn sheep. Though mule deer (*Odocoileus hemionus*) are the primary prey of mountain lions in North America (Anderson 1983), and the range of bighorn sheep in the Peninsular Ranges largely avoids overlap with mule deer, lion predation may threaten individual ewe groups in the Peninsular Ranges (Hayes *et al.* 2000), and has the potential to affect population recovery. From November 1992 to May 1998, Hayes *et al.* (2000) found the primary cause of death of radio-collared adult bighorn sheep between Highway 74 (in the Santa Rosa Mountains) and the U.S.-Mexico border was predation by mountain lions. Lion predation accounted for at least 69 percent of the 61 adult mortalities and occurred in each of the ewe groups in this portion of the range (Hayes *et al.* 2000). Annually, lion predation accounted for 50 to 100 percent of the bighorn sheep mortality, and did not exhibit a decreasing or increasing trend during 1993 to 1997. Lion predation appeared to show a seasonal pattern, with the majority of incidents occurring during the cooler and wetter months of the year. A bighorn sheep's risk of predation did not appear to be related to its age. Cause specific mortality in the San Jacinto Mountains was studied from 1992 to 2004 (DeForge *et al.* 1997; Bighorn Institute 1997-2004). During this period, 22 adult bighorn mortalities were recorded. Of these 22 mortalities, 16 were native sheep and 6 were captive-reared at Bighorn Institute. A total of 50% of the native bighorn deaths and 33% of captive-reared bighorn deaths were attributed to mountain lion predation.

It is unknown how current levels of lion predation observed throughout the Peninsular Ranges

compare to historic levels. Reported incidents of lion predation were not common in the past and predation was not considered to be a serious risk to bighorn sheep (Jorgensen and Turner 1975, Cunningham 1982). It is important to note that the increase in the number of radio-collared bighorn sheep since 1993 has greatly increased the detection of such mortalities, and it is possible that other factors influencing Peninsular bighorn sheep and alternate prey species have altered the proportion of mortalities caused by lion predation. Since 2000, the number of radio-collared animals has remained relatively high, but losses to lion predation have moderated in most ewe groups. High levels of mountain lion predation appear to occur in sporadic bursts in the Peninsular Ranges and other areas of western North America. Apparently, in the Peninsular Ranges only some lions drop down to lower elevations and learn to specialize on bighorn sheep. However, when such a specialist predator focuses on a particular ewe group, the losses of breeding age adults can dramatically affect population dynamics and extinction risk.

Bighorn sheep evolved in the presence of predators, and developed effective physical and behavioral mechanisms for dealing with them. Similar to other desert bighorn populations, sheep in the Peninsular Ranges have likely experienced varying levels of lion predation for thousands of years. However, when other factors, such as drought, habitat loss and fragmentation due to urbanization, diseases, and other mortality factors reduce populations to low levels and/or alter the abundance and distribution of alternate prey species, such as mule deer, then the influence of predation on population dynamics may increase (Logan and Sweanor 2001). For example, prey populations frequently respond to the presence of mountain lions by changing their distribution at a landscape scale (Hornocker 1970). Where habitats have become fragmented by human developments, bighorns may not be able to move away from areas of high predation risk. In the Peninsular Ranges coyotes (*Canis latrans*), golden eagles (*Aquila chrysaetos*) and bobcats (*Lynx rufus*) are also potential predators of bighorn sheep (Jorgensen and Turner 1975, DeForge and Scott 1982).

Disease

The westward spread of Europeans and their domestic livestock across North America was thought to play a significant role in reducing the distribution and abundance of bighorn sheep due to the introduction of new infectious diseases (Spraker 1977, Onderka and Wishart 1984). In particular, domestic sheep have been repeatedly implicated in *Pasteurella* pneumonia die-offs of bighorn sheep. It has been hypothesized that disease has played an important role in the population dynamics of bighorn sheep in the Peninsular Ranges (DeForge *et al.* 1982, DeForge and Scott 1982, Turner and Payson 1982, Wehausen *et al.* 1987). Numerous pathogens have been isolated or detected by serologic assay from bighorn sheep in these ranges. These pathogens include bluetongue virus, contagious ecthyma virus, parainfluenza-3 virus, bovine respiratory syncytial virus (BRSV), *Anaplasma*, *Chlamydia*, *Leptospira*, *Pasteurella*, *Psoroptes,* and *Dermacentor* (DeForge *et al.*, 1982; Clark *et al.* 1985, 1993; Mazet *et al*. 1992; Elliott *et al.* 1994; Boyce 1995; Crosbie *et al.*, 1997, DeForge *et al.* 1997).

DeForge *et al.* (1982) found multiple pathogens (contagious ecthyma virus, blue tongue, *Pasteurella*, and parainfluenza virus) and low lamb recruitment in association with overall population declines. Between 1982 and 1998, 39 lambs showing signs of illness (lethargy, droopy ears, nasal discharge, and lung consolidation) were collected from the Santa Rosa (northern and southern), Jacumba, and In-Ko-Pah Mountains for disease research and

rehabilitation at the Bighorn Institute (Ostermann *et al*. 2001). Additionally, DeForge *et al.* (1995) documented a population decline throughout the Santa Rosa Mountains during 1983 to 1994, resulting from inadequate recruitment. Although a cause and effect relationship between disease and population decline has not been clearly established in the Peninsular Ranges, results from several studies provide support for this hypothesis (DeForge *et al.* 1982, Clark *et al.* 1985, Wehausen *et al.* 1987, Clark *et al*. 1993, Elliott *et al.* 1994, DeForge *et al.* 1995). Analysis of spatial variation in pathogen exposure among bighorn sheep sampled between 1978 to 1990 showed that Peninsular bighorn sheep populations and other populations in southern California have higher levels of pathogen exposure than other populations of bighorn sheep in the State (Elliott *et al.* 1994). The presence of feral goats in portions of the Santa Rosa Mountains until the late 1970's to early 1980's may have contributed to exposure of wild bighorn to disease during this period of population decline (D. Jessup, *in litt*. 1999). All evidence indicated that the influence of disease in the Peninsular Ranges subsided during the 1990's. Sampling and examination of bighorn sheep throughout the range during the 1990's indicated that most animals were clinically normal (Boyce 1995; DeForge *et al.* 1997; Bighorn Institute 1997, 1998, 1999).

A disease outbreak occurred in the San Jacinto and northern Santa Rosa Mountains in 2005. During July and August 2005, the Bighorn Institute recovered 7 dead adult bighorn from the San Jacinto Mountains (SJM; $n = 1$) and Santa Rosa Mountains (SRM; $n = 6$). Necropsies were performed on 6 of the animals: 4 at the California Animal Health and Food Safety (CAHFS) Laboratory in San Bernardino, and 2 in the field. The sixth animal was not radio-collared and was found several days after its death. Necropsy results confirm bronchopneumonia with a bacterial etiology to be the cause of death for six of seven animals. Three of the 7 dead animals were captive-reared yearlings released during spring 2005; the remaining four were wild-born adults (2-7 years of age). As part of an investigation of the disease outbreak, results included the increasing distribution of BRSV titers in the Santa Rosa Mountains between 2004 and 2005, although titers to BRSV were not present in the San Jacinto Mountains. Titers to adenovirus were widespread, but the implications of these titers are unknown at this point. Data analysis of the disease testing results is underway. Additional research is necessary to better understand the relationship between disease and population trajectories. Furthermore, it appears that risk of disease and parasites might differ among ewe groups based on their exposure and habitat use patterns; therefore, future research should address these questions at the level of the ewe group and population.

Human activity

An important consideration in the natural history of bighorn sheep is their behavioral response to human activity. Bighorn sheep were classified as a wilderness species by Aldo Leopold (1933) because they usually declined when confronted with expanding human developments and activities. Over the past 75 years, numerous other scientists and land managers have expressed concerns regarding the impact of human activities on bighorn sheep populations (Horesji 1976, Hicks and Elder 1979*,* Graham 1980, Leslie and Douglas 1980, Hamilton *et al.* 1982, Stemp 1983, Miller and Smith 1985*,* Gionfriddo and Krausman 1986, Krausman and Leopold 1986*,* Smith and Krausman 1988, Etchberger *et al.* 1989, Krausman *et al.* 2001, Papouchis *et al*. 2001). These concerns have been echoed in the Peninsular Ranges where bighorn sheep have altered their movement and habitat use patterns in response to human activity (Jorgensen and Turner

1973, Hicks 1978, Olech 1979, Cunningham 1982, DeForge and Scott 1982, Gross 1987, Sanchez *et al.* 1988).

Bighorn sheep have fared poorly when urban areas have expanded around and within their ranges. In the Sandia Mountains of New Mexico and the Santa Catalina Mountains of Arizona, two populations of desert bighorn sheep were impacted by urbanization. The bighorn sheep population in the Sandia Mountains declined to extinction, and the population in the Santa Catalina Mountains appears to be extinct (Krausman *et al.* 2001). Factors, such as predation or disease, do not appear to have played a significant role in either of the above extinctions. Instead, in both cases the level of human activity appears to have been too great for bighorn sheep to survive. In the Sandia Mountains, human activity doubled from 1975 to 1990, as hiking trails, ski areas, restaurants, and a tramway were built (Krausman *et al.* 2001). In the Santa Catalina Mountains, real estate development eliminated bighorn sheep habitat (Krausman 1993), hiking activity, dog use, and other recreational activities increased in more remote areas (Schoenecker 1997), and fire suppression allowed the vegetation in some areas to become too dense for bighorn sheep (Gionfriddo and Krausman 1985, Krausman *et al.* 1996). As a result, Krausman *et al.* (2001) concluded, based on this experience and the extirpation of bighorn sheep in the Sandia Mountains near the City of Albuquerque, that "When development occurs adjacent to and in mountain sheep habitat, the sheep eventually decline and ultimately become extinct."

The ewe groups adjacent to the urbanized Coachella Valley have experienced greater challenges maintaining population levels. In the San Jacinto Mountains where bighorn are adjacent to the city of Palm Springs, the subpopulation declined from historic estimates of over 200 animals, then remained approximately stable (17-33 individuals) between 1992 and 2004; however, the unbalanced sex ratio caused concern (Bighorn Institute 2000). In 2005, the San Jacinto Mountains ewe group was estimated to number 23 adult bighorn (10F, 13M), with only four ewes originating from wild sheep and the remaining six ewes being captive-releases (Bighorn Institute, unpublished data). In the nearby Santa Rosa Mountains, the three ewe groups declined 69 percent from 1984 to 1990, remained stable at 115-120 individuals from 1990-1995, and declined in 1996 to approximately 95 adults. Currently, these 3 ewe groups total approximately 391 adults (CDFG 2006 helicopter surveys, unpublished data), with 49 adults occurring in the northern Santa Rosa Mountains, the area with the greatest urban/wildland interface. The ewe groups in the northern Santa Rosas and southern San Jacinto Mountains continue to receive intensive monitoring from the Bighorn Institute, and both have periodically been augmented with captive-reared individuals.

Bighorn response to human activity is variable and depends on many factors, including but not limited to: the type and predictability of the activity, presence of domestic dogs, the animal's previous experience with humans, size or composition of the bighorn sheep group, location of bighorn sheep relative to the elevation of the activity, distance to escape terrain, and distance to the activity (Weaver 1973; McQuivey 1978; Hicks 1977, 1978; Hicks and Elder 1979; MacArthur *et al.* 1979, 1982; Wehausen 1980; Hamilton *et al*. 1982; Whitacker and Knight 1998; Papouchis *et al.* 1999). However, the history of sheep and human interactions has shown that not all bighorn sheep react in the same way to human disturbance. As in humans, there are individual differences in behavior and different groups of sheep have had different experiences with humans and exhibit different "cultures" of behavior (King and Workman 1986). Ewes with

lambs typically are more sensitive to disturbance (Light and Weaver 1973, Wehausen 1980). A portion of the individuals in some populations do not react as strongly to disturbance (Hicks and Elder 1979, Leslie and Douglas 1980, Papouchis *et al.* 2001) and can habituate (the waning of a response to a repeated, neutral stimuli*)* to certain human activities, eventually losing their natural aversion to human presence. Attraction, habituation, and avoidance are behavioral events that should be placed in careful context with descriptions of the conditions under which the animal displayed a particular response. Individual animals or populations should not be labeled based on the limited responses of a few animals (Whittaker and Knight 1998).

A variety of recreational activities such as hiking, mountain biking, hang gliding, horseback riding, camping, hunting, dog-walking, and use of aircraft and off-road-vehicles have the potential to disrupt normal bighorn sheep social behaviors and use of essential resources, and may cause bighorn sheep to abandon traditional habitat (Graham 1971*,* Jorgensen 1973 and 1974*,* McQuivey 1978, MacArthur *et al*. 1979, Olech 1979, Wehausen 1979, Graham 1980, Leslie and Douglas 1980, Monson and Sumner 1980, Wilson *et al.* 1980, MacArthur *et al*. 1982, Bates and Workman 1983, Wehausen 1983, Miller and Smith 1985, Cunningham and Ohmart 1986, Krausman and Leopold 1986, Armentrout and Brigham 1988, Krausman *et al.* 1989, Goodson 1999, Papouchis *et al*. 1999, 2001). For example, Graham (1971) found that areas with more than 500 visitor-days of use per year resulted in a decline of use by bighorn sheep. Jorgensen (1974) reported that Peninsular bighorn sheep use of an area of Anza Borrego Desert State Park was reduced by about 50 percent on days when more recreational vehicle traffic occurred, versus periods of low or no vehicle use. Etchberger *et al.* (1989) found that habitat abandoned by bighorn sheep in the Pusch Ridge Wilderness had greater human disturbance and differences in vegetation and visibility as a result of fire suppression when compared to currently occupied habitat. In addition to recreation, construction, industrial, and agricultural activities may also disturb bighorn sheep. For example, Etchberger and Krausman (1999) observed the abandonment of lambing habitat while construction activities were ongoing within the home range of the ewe group. Ewes eventually returned to the area following cessation of construction activities.

Cases have been cited in which bighorn sheep populations did not appear to be greatly affected by human activity. However, even when bighorn sheep appear to be tolerant, continued and frequent human use of an area can cause them to eventually avoid the area, interfering with use of resources, such as water, mineral licks, lambing or feeding areas, or use of traditional movement routes (Jorgensen and Turner 1973, McQuivey 1978, Graham 1980, Leslie and Douglas 1980, DeForge and Scott 1982, Hamilton *et al.* 1982, Krausman and Leopold 1986, Rubin *et al.* 1998).

In addition to spatial displacement, human activity can result in physiological responses, such as elevated heart rate, even when no behavioral response is discernable. The cumulative energetic cost of such responses may potentially affect the nutritional status of individuals and potentially populations (Stemp 1983, MacArthur *et al.* 1979, 1982). Responses can range from cautious curiosity to immediate flight. Cardiac and behavioral responses of bighorn sheep to an approaching human were determined to be greatest when a person was accompanied by a dog or approached from over a ridge (MacArthur *et al.* 1979, 1982). When individuals perceive danger, changes can occur within the endocrine system along with increased heart rates. These changes

are actually adaptive and evolved to deal with imminent danger, such as a mountain lion attack. However, long-term chronic activation of this "flight or fight" mechanism may cause physiological reactions that impair immune function, endocrine regulation, and growth and development (Desert Bighorn Council 1991). Additionally, bighorn sheep prevented from using their normal habitat or activity patterns by frequent human disturbance or dogs may be subject to nutritional deprivation, which can also adversely affect the immune system (Festa-Bianchet 1988, Wagner and Peek 1999).

Domestic livestock and feral animals can reduce the availability and quality of resources (water and forage) required by bighorn sheep, and can function as potential vectors for diseases such as bluetongue virus (Mullens *et al.* 1986). In portions of the range, water has been pumped from aquifers and diverted away from springs for use by ranches and private residences, reducing and eliminating the water sources upon which bighorn sheep in the Peninsular Ranges depend (Tevis 1961; Blong 1967; Turner 1976; M. Jorgensen, pers. comm., Anza-Borrego State Park).

In the Peninsular Ranges, the presence of tamarisk (*Tamarix* spp.), also known as saltcedar, represents a threat to bighorn sheep. This exotic plant consumes large amounts of water and has rapid reproductive and dispersal rates (Sanchez 1975), enabling it to out compete native plant species in canyon bottoms and washes. It has the following negative effects on bighorn sheep: 1) it reduces or eliminates the standing water on which bighorn sheep depend, 2) it out competes plant species on which bighorn sheep feed, and 3) it occurs in thick, often impenetrable stands that block access to water sources and provide cover for predators.

Fire suppression can influence the distribution and habitat use patterns of bighorn sheep by causing avoidance of areas with low visibility (Risenhoover and Bailey 1985, Etchberger *et al.* 1989, Etchberger *et al*. 1990, Krausman 1993, Krausman *et al*. 1996). Long-term fire suppression results in taller, denser stands of vegetation, thereby reducing openness and visibility making bighorn sheep more susceptible to predation (Sierra Nevada Bighorn Sheep Interagency Advisory Group 1997). In addition, Graf (1980) suggested that fire suppression reduces forage conditions in some bighorn sheep ranges. In the Peninsular Ranges, changes in vegetation succession are evident in some portions of bighorn sheep range, primarily in higher elevation chaparral and pinyon-juniper woodland habitats, and have apparently decreased bighorn sheep use of certain canyons and springs (M. Jorgensen, pers. comm.).

The number of illegal immigrants entering the U.S. from Mexico continues to increase. Some of these immigrants travel through the Peninsular Ranges and camp at water sources where they may occasionally kill and consume bighorn sheep, or displace them. U.S. Customs and Border Protection is also increasing its activity along the border and in the southern Peninsular Ranges. Consequently the level of human activity in the area is increasing. This scenario may cause bighorn sheep to avoid areas they once utilized and may potentially sever bighorn sheep population connectivity between the United States and Mexico. In addition, the U. S. is planning to construct an intermittent fence along the border, and the design of the fence will prevent the movement of large mammals, as well as humans. The locations of the constructed portions will likely funnel immigrants into the Jacumba Mountains increasing the number of immigrants traversing these mountains to enter the United States.

Climatic conditions

Similar to predation, prolonged drought is a natural factor that can have negative impacts on desert bighorn sheep populations, either by limiting water sources or by affecting forage quality and quantity (Hansen 1980a, Monson 1980, Douglas and Leslie 1986, Wehausen *et al.* 1987). During drought years, the concentration of bighorn sheep near remaining water sources may increase competition for forage as well as water, thereby limiting population growth through density-dependent regulation. In addition, increased density potentially renders animals more susceptible to diseases or parasites.

Climatic patterns are correlated across the Peninsular Ranges, suggesting that other local factors specific to each ewe group play important roles in determining long-term abundance trends (Rubin *et al.* 1998). Independent population trends also were observed among ewe groups in the Mojave Desert (Wehausen 1992). Bighorn sheep are relatively long-lived animals that have the potential to reproduce over an extended period of time (2-16 years). Therefore, periods of above average recruitment may compensate for periods of low recruitment (Wehausen 1992). Forage quality and quantity vary with environmental conditions; therefore, female condition, and conception, parturition and lamb survival rates reflect this natural variation. However, if mortality agents begin impacting adult survival, then subpopulation levels may drop dramatically and may endanger the existence of a ewe group. Consequently, a ewe group's persistence is always vulnerable to disease outbreaks, high levels of predation, mortality caused by urbanization, and habitat loss from development and human disturbance.

Status of Critical Habitat

This analysis will examine both the designated critical habitat of 2001 as modified by the court order and the proposed critical habitat of 2007.

On February 1, 2001 (66 FR 8649), 844,897 acres of critical habitat were designated in the Peninsular Ranges of the United States in the counties of Riverside, Imperial, and San Diego. The designation of critical habitat attempted to follow as closely as possible the line delineating essential habitat as presented in the Recovery Plan (U.S Fish and Wildlife Service 2000).

On March 7, 2005, the Agua Caliente Band of Cahuilla Indians filed a complaint against the Service's economic analysis of designated critical habitat. Other parties, the Desert Riders and mining companies, subsequently intervened as plaintiffs in the case. On July 31, 2006, a court approved consent decree revised the existing critical habitat designation and remanded the critical habitat designation to the Service for a new rulemaking. A second critical habitat designation of approximately 384,410 acres was proposed on October 10, 2007. The proposed critical habitat has not been designated, pending the outcome of public comments and hearings. Therefore, the current version of designated critical habitat consists of the original designation minus lands of the Agua Caliente Band of Cahuilla Indians and other plaintiffs. Both the current and proposed critical habitat boundaries encompass large areas located south of the Plan boundaries, mainly areas in Anza-Borrego Desert State Park and adjacent BLM lands.

The primary constituent elements of designated critical habitat include the general categories of: "space for individual and population growth, and normal behavior; food, water, air, light, minerals, or other nutritional or physiological requirements; cover or shelter; sites for breeding,

reproduction and rearing of offspring; and habitats that are protected from disturbance or are representative of the historic geographical and ecological distribution (66 FR 8649)." Specifically for Peninsular bighorn sheep the primary biological and physical constituent elements listed as essential to the conservation of bighorn sheep in the February 1, 2001 (66 FR 8649), designation included: "space for normal behavior of groups and individuals; protection from disturbance; availability of various native desert plant communities found on different topographic slopes, aspects, and landforms, such as steep slopes, rolling foothills, alluvial fans, and canyon bottoms; a range of habitats that provide forage, especially during periods of drought; steep, remote habitat for lambing, rearing of young, and escape from disturbance and/or predation; water sources; suitable linkages allowing individual bighorn to move freely between ewe groups; and maintain connections between subpopulations within the Peninsular Range metapopulation; and other essential habitat components to accommodate population expansion to a recovery level."

In the proposed critical habitat (72 FR 57739) published on October 10, 2007, the primary constituent elements were stated as: 1) moderate to steep, open slopes (20 to 60 percent) and canyons, with canopy cover of 30 percent or less (below 4,600 feet (1,402 meters) elevation in the Peninsular Ranges) that provide space for sheltering, predator detection, rearing of young, foraging and watering, mating, and movement within and between ewe groups; 2) presence of a variety of forage plants, indicated by the presence of shrubs (e.g., *Ambrosia* spp., *Acacia greggii, Caesalpinia* spp., *Hyptis* spp., *Sphaeralcea* spp., *Simmondsia* spp.), that provide a primary food source year round, grasses (e.g., *Aristida* spp., *Bromus* spp.) and cacti (e.g., *Opuntia* spp.) that provide a source of forage in the fall, and forbs (e.g. *Plantago* spp., *Ditaxis* spp.) that provide a source of forage in the spring; 3) steep, rugged slopes (60 percent slope or greater) (below 4,600 feet (1,402 meters) elevation in the Peninsular Ranges) that provide secluded space for lambing as well as terrain for predator evasion; 4) alluvial fans, washes, and valley bottoms that provide important foraging areas where nutritious and digestible plants can be more readily found during times of drought and lactation and that provide and maintain habitat connectivity by serving as travel routes between and within ewe groups, adjacent mountain ranges, and important resource areas, such as foraging areas and escape terrain; and 5) intermittent and permanent water sources that are available during extended dry periods and that provide relatively nutritious plants and drinking water.

The designated and proposed critical habitats were designed to maintain habitat connectivity across the nine recovery regions ensuring that metapopulation dynamics among these subpopulations would continue to function, with demographic and genetic augmentation among groups stimulating population growth to recovery levels. Within the designated and proposed critical habitat, the primary constituent elements included space for the normal behavior of groups and individuals; protection from disturbance; availability of various native desert plant communities found on different topographic slopes, aspects, and landforms, such as steep slopes, rolling foothills, alluvial fans, and canyon bottoms; a range of habitats that provide forage, especially during periods of drought; steep, remote habitat for lambing, rearing of young, and escape from disturbance and/or predation; water sources; and suitable linkages allowing individual bighorn to move freely between ewe groups and maintain connections between subpopulations. These constituent elements were recognized as essential to meet the biological needs of feeding, resting, reproduction and population recruitment, dispersal, connectivity, and

isolation from detrimental disturbances.

ENVIRONMENTAL BASELINE

Status of the Species in the Action Area

In recent years, there has been a general increase in bighorn sheep abundance in the Santa Rosa Mountains (Bighorn Institute unpublished data; CDFG unpublished data). Three of the ewe subpopulations in the Plan Area have increased since the time of listing in 1998, but most likely for different reasons. In general, diseases and mountain lion predation have been relatively quiescent among sheep subpopulations in the northern Peninsular Ranges in recent years, and the pace of habitat loss to development has slowed somewhat since listing. These factors have contributed to the overall population growth of bighorn sheep within the Plan area (Table 1).

The best available information suggests the Plan Area supports the following ewe groups: the San Jacinto Mountains ewe group (Recovery Region 1), Bradley/Magnesia/Cathedral Canyon ewe group (Recovery Region 2a), Carrizo/Dead Indian Canyon ewe group (Recovery Region 2b), the La Quinta Area ewe group (Recovery Region 3), and Martinez Canyon ewe group (Recovery Region 4). The summary below discusses each of the ewe groups.

Table 1. Adult population estimates for PBS ewe groups and subpopulations in the Santa Rosa and San Jacinto Mountains Conservation Area

Year	***Recovery Region 1 – San Jacinto Mountains***	***Recovery Region 2a – Bradley/Magnesia/ Cathedral Canyons***	***Recovery Region 2b– Carrizo/Dead Indian Canyons***	***Recovery Region 3 – La Quinta Area***	***Recovery Region 4 – Martinez Canyon***
2006	26*	53	5	163	n/a
2005	24*	53*	3	201-541***	201-541***
2004	32*	57	4	234**	234**
2003	25	44*	3	87	100
2002	24*	35	3	115	84
2001	31	41	4	57	96
2000	26	27	3	53	51
1999	21	26	3	87	36
1998	23	17	3	55	24
1997	22	21	n/a	36	38
1996	19	18	n/a	35	17

*An asterisk denotes the population was augmented with captive-reared bighorn sheep from Bighorn Institute.

**In 2004, separate population estimates for Recovery Regions 3 and 4 were not available and the estimate is for both regions combined.

*** In 2005, separate population estimates for Recovery Regions 3 and 4 were not available and the estimate is for both regions combined. The wide confidence intervals for the 2005 estimate (371 + 170 adult bighorn) resulted in no significant difference between the 2004 and 2005 population estimates for this area.

San Jacinto Mountains Ewe Group

The historical home range of the San Jacinto Mountains ewe group includes the canyon bottoms and surrounding mountain slopes of Andreas, Little Eagle, Tahquitz, Tachevah, Chino, Blaisdell, Hurricane, and Snow Creek Canyons (DeForge *et al.* 1997). Using annual helicopter surveys begun in 1983, DeForge *et al.* (1997) found the ewe group distributed north and south of Chino Canyon until 1988; from 1989 to the present, ewes have rarely been found north of Chino Canyon. The population's range contraction corresponded with a population decline from an estimate of over 200 animals in the 1970s to the current level of 20-30 adult animals. Approximately 60% of the ewe group's historic range is located south of Chino Canyon. The San Jacinto Mountains population currently consists of 26 adult bighorn sheep; 8 adult ewes, 4 yearling ewes, 12 adult males, 2 yearling males, and 1 female lamb and 1 male lamb (Bighorn Institute pers. comm.).

Since 1993, annual population estimates of the number of ewes in the San Jacinto Mountains have fluctuated between 4 and 13 adults (DeForge *et al*. 1997, Bighorn Institute annual reports from 1998 to 2005). Augmentation with captive-reared yearlings from the Bighorn Institute began on a regular basis when the wild ewe population dropped to four adults in 2002. Currently, only one adult ewe is of wild-born origin, and the population would most likely have been extirpated without the augmentation program. With population numbers hovering at low levels over an extended period of time and the resultant range contraction, this ewe group has struggled to persist. The potential for survival and recovery is uncertain because the mechanisms limiting population growth are not fully known. Mountain lion predation is the leading known cause of bighorn mortality (DeForge *et al.* 1997, Bighorn Institute annual reports), accounting for 50% of the documented mortalities in the San Jacinto Mountains ewe group. The other causes of mortality are unknown, due in part to the challenges associated with determining cause-specific mortality in the extremely steep, rugged terrain. In addition to natural mortality sources, the ewe group has suffered from habitat loss and fragmentation resulting from development and road construction.

Chino Canyon spans the elevational zone inhabited by bighorn sheep, bisecting part of the historical home range of the ewe group. Undeveloped portions of the San Jacinto Mountains contain abundant forage, water, escape, and dispersal habitat for rams and ewes. In the 1960s and 1970s, M. Jorgensen (Anza-Borrego Desert State Park, in litt.) reported groups of 10 or more rams and ewes using Chino Canyon, including areas around the cienega. Throughout the 1970s and 1980s, Mike Hamilton (CDPR, in litt.) also regularly observed sheep in Chino Canyon. Seven ewes and lambs were reported using Chino Canyon as recently as 1982. Apparently, as the population declined it occupied less habitat and bighorn ewes remained south of Chino Canyon the majority of time. During a biological survey in 1997, P. Krausman (in litt.) detected "a lot" of bighorn sheep tracks and pellets and a femur on the site of a large project proposed for the canyon floor.

From 1997 through 2005 observations of bighorn sheep in Chino Canyon were rare. Two captive-reared yearling rams, released in 2006, currently inhabit the area north of Chino Canyon. One of these rams crossed Chino Canyon, was captured and radio-collared, and then immediately re-crossed the canyon during the rut of 2007. These 2 rams have lived for approximately two and a half years north of Chino Canyon, which suggests that the area meets

the habitat requirements of bighorn sheep. It is likely that this habitat area may support more than the two bighorn sheep currently occupying the area. The recent increased use of the canyon and documented exploratory movements across Chino Canyon by ewes and rams demonstrate that it is still possible for bighorn sheep to cross Chino Canyon. The potential for the ewe group to eventually regain former movement patterns is high. Taking a long-term perspective, the ewe population in the San Jacinto Mountains has not increased within 60 percent of its historic home range. Reasons for this are unknown. It is anticipated that this ewe group will need additional augmentation either through release of captive sheep or translocation of wild sheep.

Northern Santa Rosa Mountains - Bradley/Magnesia/Cathedral Canyon Ewe Group
Bighorn sheep inhabiting the northern Santa Rosa Mountains have been impacted by urbanization more than ewe groups in the Peninsular Ranges to the south. At least 18,500 acres (7,490 hectares or approximately 30 square miles) of habitat have been lost to urbanization and agriculture along the urban interface from Palm Springs to La Quinta (U.S. Fish and Wildlife Service 2000). The Bradley/Magnesia/Cathedral Canyon ewe group has experienced much of this habitat loss. The ewe group's home range contains more recreational trail miles and a greater trail density than any other ewe group. Similar to the San Jacinto ewe group, they have struggled to persist, and quite possibly would have been extirpated without intensive efforts on the part of the Bighorn Institute, CDFG, Service, Coachella Valley Mountains Conservancy, and the City of Rancho Mirage.

Land ownership patterns in the northern Santa Rosa Mountains present a challenge for conservation and management of the ewe group. Unlike the southern Peninsular Ranges, where the majority of bighorn habitat is contained within large blocks of State or Federal land, the northern Santa Rosa Mountains consist of a checkerboard of ownerships. Parcels owned by private individuals, development corporations, State of California, BLM, Forest Service, Mountains Conservancy, Agua Caliente Band of Cahuilla Indians, cities, and various other entities are largely intermixed, thus complicating bighorn sheep conservation and management. A number of the privately owned parcels located in the mountains are prime development sites, and if converted to human uses would further reduce and fragment the habitat of this ewe group.

Starting in the late 1950s and early 1960s residential development began encroaching into the core use areas of bighorn habitat. Particularly in the Rancho Mirage area, the lush green ornamental vegetation and abundant water attracted bighorn sheep to residential areas. The normally wary bighorn sheep gradually lost their fear and began spending much of their time feeding and resting among the homes, especially during daylight hours. This atypical behavior exposed the ewe group to urban sources of mortality, such as collisions with automobiles, drowning in swimming pools, and ingesting poisonous plants. They were also potentially exposed to greater disease risks due to their artificially high density and the presence of parasites associated with urban areas, such as nematode worms (*Strongyle* sp.) found in irrigated lawns (Georgi 1969). Additionally, during the 1980s the ewe group was plagued by high lamb mortality from an apparent disease epizootic (DeForge and Scott 1982, Wehausen *et al.* 1987, DeForge *et al.* 1995). The combination of urban and other natural sources of mortality, such as mountain lion predation, outstripped annual recruitment and the population began declining.

The Bighorn Institute began releasing captive-reared bighorn sheep into the northern Santa Rosa

Mountains ewe group in 1984. The Bighorn Institute's facility was designed to produce sheep fit for survival in the wild. Typically, 4-6 yearlings have been released each year, and these releases most likely prevented the ewe group's extinction (Ostermann *et al.* 2001). Additionally, a sheep-proof fence was constructed along the wildland-urban interface separating bighorn sheep from residential areas, and it effectively eliminated the majority of mortality caused by urban sources. Following the completion of the fence in 2002, the ewe group quickly returned to a diet of desert plants and began exhibiting the movement patterns and behaviors typical of desert bighorn sheep. The substantial reduction in urban-related mortality and a concomitant general decrease in mortality from natural sources have allowed the sub-population to gradually increase in recent years. However, a disease outbreak of unknown cause and origin was documented in the Santa Rosa Mountains in the summer of 2005, and may have reduced the population in the northern Santa Rosa Mountains by about 38 percent (Bighorn Institute, unpubl. data). The disease outbreak has apparently abated, and bighorn sheep are not showing clinical signs of disease, beyond what is normally expected. In 2007, there were 57 adult bighorn sheep: 28 adult ewes, 1 yearling ewe, 28 adult males, 0 yearling males, with 4 female lambs and 2 male lambs (Bighorn Institute, pers. comm.).

Northern Santa Rosa Mountains –Carrizo/Dead Indian Canyon Ewe Group
In the spring of 1955, a CDFG crew camped in Dead Indian Canyon and reported daily observations of 14 ewes and lambs. On field trips to this area in 1969, researchers found 19 ewes with 9 lambs (Weaver and Mensch 1970). This group of sheep persisted through the early 1970s and was considered a healthy and relatively abundant subpopulation (Vern Bleich, pers. comm.). Following the construction of Highway 74, the Art Smith Trail, and several housing developments, plus increased motorized recreation, camping at water sources, and possible disease outbreaks, the group began declining and disappeared altogether by the mid-1980s. Bighorn rams were occasionally reported traversing the area, but no bighorn ewes were considered resident until 1994, when a single adult female established a home range in Dead Indian Canyon. By 2002, the group had grown to 3 adult ewes, 4 mature rams, and 1 yearling ram, with successful lamb recruitment occurring in 1998 and 2000 (Bighorn Institute 1998, 2000).

Over the years, the ewe group has continued to consist of few animals. However, monitoring by the Bighorn Institute showed their movement patterns, habitat selection, and population dynamics were independent of the Bradley/Magnesia/Cathedral Canyon ewe group. The Carrizo/Dead Indian Canyon bighorn sheep did not frequent residential areas, and little spatial overlap in habitat use existed between the two groups. Hence, these bighorn were designated a separate ewe group.

Since the 1970s, portions of the habitat for the Carrizo/Dead Indian Canyon ewe group have been developed into residential areas, traffic on Highway 74 has tripled, and the Dunn Road and Art Smith Trail, two of the Valley's most popular trails, were illegally constructed through their home range. More recently, specific management actions have been taken to benefit the ewe group. In 2005, a portion of the Art Smith Trail was moved away from an area of high sheep use located near the mouth of Dead Indian Canyon. The California Department of Fish and Game has purchased property in Carrizo Canyon specifically for bighorn sheep conservation. Currently, two adult ewes form the nucleus of the ewe group. A variable number of rams and

ewes from the Deep Canyon area of the Central Santa Rosa ewe group cross Highway 74 to associate with the two ewes residing in Carrizo and Dead Indian Canyons.

Central Santa Rosa Mountains – La Quinta Area Ewe Group
Compared to ewe groups in the San Jacinto and northern Santa Rosa Mountains, bighorns inhabiting the area east of Highway 74 have maintained relatively stable population levels. Currently, there are approximately 163 adult bighorns in the ewe group. This area includes Deep Canyon, which furnishes excellent bighorn sheep habitat, with abundant escape terrain, water, and forage. The upper reaches of Deep Canyon are buffered from human activity by the University of California's Boyd Deep Canyon Desert Research Center and the almost vertical walls of the canyon. In general the mountains in the surrounding La Quinta area are steeper, and contain less developable private land than the northern Santa Rosa Mountains. Land ownership patterns also differ from the northern Santa Rosa Mountains, with larger intact blocks of State and Federal land. In the past, development has been largely confined to La Quinta Cove and portions of the valley floor adjacent to the Cove.

Southern Santa Rosa Mountains – Martinez Canyon Ewe Group
The southern Santa Rosa Mountains extend outside the Plan area southward into Imperial County and parts of Anza-Borrego Desert State Park. However, the northern portion of these mountains is located within the Plan area, where Martinez Canyon is the major geological feature. The Martinez Canyon watershed has experienced fewer human impacts than areas to the north. The alluvial fans at the mouth of the canyon have been used principally for agriculture, and there is not a nearby human population center. Currently, the unpaved road entering the mouth of the canyon quickly changes into a trail, which receives relatively little use. Large portions of the lower elevations of the Martinez Canyon basin are characterized by gentle topography, and off-road vehicles remain an issue. Other areas of the basin are quite mountainous, and bighorn sheep have probably been little disturbed in these areas. Mountain lion predation (Hayes *et al.* 2000) and diseases have been the predominant factors affecting the population dynamics of bighorn sheep in the ewe group. However, there are a number of private parcels located within Martinez Canyon. Other parcels, located immediately adjacent to the canyon mouth, are privately owned and proposed for development. Recent population estimates are not available; based on past aerial surveys the overall population has averaged approximately 90 adults from 2000 through 2003.

Environmental Baseline for Designated and Proposed Critical Habitat
Compared to the portion of designated critical habitat located south of the Plan's boundary (the Riverside/Imperial County line) the northern portions of critical habitat have been much more heavily impacted by human activities. Designated critical habitat falls within the Snow Creek/Windy Point, Santa Rosa and San Jacinto Mountains, and Cabazon Conservation Areas of the MSHCP. These conservation areas correspond with the following ewe groups: San Jacinto ewe group – Snow Creek/Windy Point Conservation area and Santa Rosa and San Jacinto Mountains Conservation Areas; Santa Rosa and Cabazon ewe groups – Santa Rosa and San Jacinto Mountains Conservation Area.

Designated critical habitat is one unit of 844,897 acres. The following paragraphs refer to the 2007 proposed critical habitat which is delineated into units. All of the areas described within

units of the proposed critical habitat are currently within the designated critical habitat.

Proposed critical habitat is 384,410 acres and is divided into 3 units. Unit 1 is entirely within the boundary of the Plan. Unit 2 is partially within the Plan area. The majority of Unit 2 is south of the Plan in San Diego and Imperial Counties. Unit 3 is entirely outside the Plan boundary.

Unit 1 – San Jacinto Mountains
Proposed critical habitat within the San Jacinto Mountains is bifurcated in Chino Canyon by Tramway Road. Blong (1967) considered the construction of the Tramway Road a major adverse impact to bighorn sheep in the area, when he observed almost immediate changes in bighorn sheep movement patterns as the level of human activity increased. Bighorn sheep use of Chino Canyon and areas to the north continued to gradually decline over several decades following the construction of the road (DeForge et al. 1997).

The area north of Chino Canyon contains the relatively large canyons of Snow Creek, Hurricane, and Blaisdell, along with several lesser canyons of moderate size. These canyons are well watered and vegetated. The rugged, steep topography associated with bighorn sheep habitat is plentiful. These canyons once supported healthy populations of Peninsular bighorn sheep (DeForge *et al*. 1997); no substantial changes have occurred to the area's primary constituent habitat features since that time. The bighorn ewe group living south of Chino Canyon apparently lost the herd memory of these northern canyons as a result of habitat fragmentation caused by the Tramway Road, or when disease and predation events eliminated key individuals. Human activity is relatively low, due in part to the fact that the area does not have a complex of inter-connected hiking trails like the southern San Jacinto and northern Santa Rosa Mountains. All of the elements needed for quality bighorn sheep habitat are still present, as evidenced by the continued survival of two rams introduced into the area in 2006.

The City of Palm Springs lies along the southern base of the San Jacinto Mountains and within Palm Canyon Wash. Development has occurred on most of the alluvial fan and wash habitat and some of the lower mountain slopes. The development in the valley floor portion of Palm Canyon impedes bighorn sheep movements between the San Jacinto Mountains and Northern Santa Rosa Mountains, but does not eliminate it entirely (Bighorn Institute annual reports 1997 -2007). The majority of the southern San Jacinto Mountains are especially steep and rugged, and these portions have not been developed even though they are immediately adjacent to the urban area.

Unit 2 -- Northern Santa Rosa Mountains
The Northern Santa Rosa Mountains contain the highest concentration of roads and trails in the Peninsular Ranges. High density urban areas abut the toe-of-slope and in many cases follow canyons upward into the mountains within all jurisdictions occupying this area (Palm Springs, Cathedral City, Rancho Mirage, and Palm Desert). In other areas, such as the Cahuilla Hills of Palm Desert, lower density development is dispersed across the mountains. Unauthorized trails have resulted from hikers following the easiest routes, and mountain bikers have "constructed" unauthorized trails in some areas. Unlike the San Jacinto Mountains, the Northern Santa Rosa Mountains contain relatively large expanses of more gentle terrain within their interior. The land ownership pattern is diverse and resembles a "checkerboard" of private, tribal, city, State, and Federal land.

The Dunn Road bisects the Northern Santa Rosa Mountains, and it has increased the level of human activity occurring within the home ranges of bighorn sheep. Over the past several years, parcels have been acquired and conserved by the Friends of the Desert Mountains, CDFG, and Coachella Valley Mountains Conservancy, and the area has been included in the Santa Rosa and San Jacinto Mountains National Monument. A citizen's referendum in 2005 rescinded the City Council's approval of a General Plan amendment that would have allowed for changes to slope building guidance.

The new General Plan would expand the Open Space designation into three categories: Open Space Mountain with 1 dwelling unit per 40 acres, Open Space Conservation with 1 dwelling unit per 20 acres, and Open Space Desert with 1 dwelling unit per 10 acres. The majority of the land area is classified as Open Space Mountain or Open Space Conservation, and the study estimated approximately 800 dwelling units could be constructed in the area, corresponding to approximately 1,600 people. These estimates included adjustments for areas that exceed slopes of 30%, where building is restricted. Other portions of this area are within the jurisdiction of Riverside County, which allows for at least one dwelling to be constructed on a private parcel.

Central Santa Rosa Mountains

The area referred to as the Central Santa Rosa Mountains extends southward from Highway 74 to Martinez Canyon. Portions of the cities of Palm Desert, Indian Wells, and La Quinta occupy the toe-of-slope, alluvial fans and washes, and extend into the mountains. In the northern half of this area public lands predominate within the interior, and most of the developable land, such as La Quinta Cove, has already been developed.

Deep Canyon, located immediately south of Highway 74 contains excellent bighorn sheep habitat in its upper reaches, consisting of a deep gorge containing perennial water sources. The gorge opens out into a broad wash that is within the boundaries of the University of California's Boyd Deep Canyon Research Center. This area furnishes a protected area with all of the attributes of bighorn sheep habitat. However, the lower reaches of the wash are occupied by heavily developed portions of Palm Desert and Indian Wells. To the south of Deep Canyon, the rugged mountains surrounding La Quinta Cove are mostly public land and provide quality habitat for bighorn sheep. The northern portions of the Coral Reef Mountains contain private parcels, but the topography is quite steep, and development has been largely confined to below the toe-of-slope.

South of downtown La Quinta, valley-floor development of agricultural areas has been expanding towards the Salton Sea. Some of these developments are adjacent to bighorn sheep habitat, and may bring increased human activity to bighorn sheep groups that have been relatively undisturbed until now. The area of Martinez Canyon is similar to the Northern Santa Rosa Mountains in that it contains a checkerboard of public and private ownership, and there are large areas within critical habitat containing gently sloping topography. At the present time access is limited and there is no nearby infrastructure. As development moves southward, the infrastructure to develop these private parcels may be within reach. Martinez Canyon is currently in nearly pristine condition and contains healthy populations of bighorn sheep.

EFFECTS OF THE ACTION

Bighorn sheep are large herbivorous mammals living in a harsh desert environment. Compared to some species, bighorn sheep require large areas to find the forage resources required to maintain them. In addition, they have specialized habitat requirements for predator evasion and for coping with the extremes of their desert environment. Conservation of expansive areas of quality habitat and specific key resources will be required if bighorn sheep are to persist in the mountains surrounding the Coachella Valley.

Implementing the Coachella Valley Multiple Species Habitat Conservation Plan will affect Peninsular bighorn sheep by: 1) permitting development in bighorn sheep habitat, and 2) permitting levels of recreation having the potential to alter bighorn sheep distribution and behavior, 3) limiting development to specific sites; 4) providing funds for habitat acquisition and ensuring that 90% of the private land under city and Riverside County jurisdiction is conserved within a Conservation Area; and 5) providing funds for research, monitoring, and possible enhancement of populations.

Effects of Development on Peninsular Bighorn Sheep

Bighorn sheep habitat is found within three conservation areas (Cabazon, Snow Creek/Windy Point, Santa Rosa and San Jacinto Mountains). When permitting development and related activities, the Plan requires that Local Permittees comply with the: 1) Conservation Area Objectives and Required Measures in Section 4.3, (2) Avoidance, Minimization, and Mitigation Measures in Section 4.4, (3) Land Use Adjacency Guidelines in Section 4.5, (4) Joint Project Review Process in Section 6.6.1.1, and (5) HANS process in Section 6.6.1.2. Collectively, the measures described in these five sections of the Plan provide a basis for evaluating, restricting, and configuring development proposals and related activities to ensure such projects are consistent with the Species Conservation Goals and Objectives in Section 9.8.4.1 of the Plan. Additionally, the Plan (see Plan Section 9.8.4.1) requires consistency with the recovery strategy outlined in the Recovery Plan for Bighorn Sheep in the Peninsular Ranges, California (U.S Fish and Wildlife Service 2000, Sections II C and II D).

This effects analysis is based upon the following assumptions:

1. All Existing Conservation Lands and Conservation Lands added over the life of the permit in Peninsular bighorn sheep habitat will be conserved in perpetuity.
2. At least 99 percent of BLM lands in Peninsular bighorn sheep habitat will be conserved in perpetuity.
3. The proposed Conservation Areas do not contain vested projects that have not yet been constructed.
4. The current General Plan development densities of the Local Permittees on HANS-regulated parcels will be consistent with the CVMSHCP.
5. The Implementation Manual (IM) is an integral part of the MSHCP, and signatories to the Implementing Agreement are required to follow the contents of the IM to remain in compliance with the permit issued under section 10 of the ESA.

<u>Effects of Conservation Area Objectives and Required Measures in Section 4.3</u>

Conservation Area Objectives

Bighorn sheep habitat exists within the Cabazon (264 acres), Snow Creek/Windy Point (705

acres), and Santa Rosa and San Jacinto Mountains Conservation Areas (168,935 acres). Of the total 169,904 acres of bighorn sheep habitat within the Plan area, 135,630 acres are classified as Existing Conservation Lands, meaning they receive some level of conservation protection. Under the Plan, 2,562 acres within the Santa Rosa and San Jacinto Mountains Conservation Area, 65 acres within the Snow Creek/Windy Point Conservation Area, and 181 acres within the Cabazon Conservation Area will be available for development, leaving 31,466 acres to be added to the MSHCP Reserve System within the Plan area. This equates to approximately 8% of the bighorn sheep habitat that is currently non-Federal and privately owned being developed over the next 75 years.

Required Measures
The estimated loss of habitat is approximately 8% within the Plan area. All bighorn sheep habitat, however, is not equal in value. Development may encroach upon some of the more important and least abundant resources needed by bighorn sheep, such as water sources, alluvial fans and washes, and travel routes. The indirect effects of development can extend much further into bighorn sheep habitat than the actual footprint of a project. For example, development which blocks a known travel route could result in fragmenting large habitat areas from the remainder of bighorn sheep habitat, even though the actual footprint of the project may appear relatively small. Measures can be taken to minimize and mitigate for these kinds of effects and will be implemented, where applicable, by the Permittees.

A series of Required Measures were developed to ameliorate the negative effects of development on bighorn sheep habitat and ecology. The Required Measures contain criteria for locating or siting development, conditional provisions regarding unauthorized trails, areas where 10% of the private land may be developed, special provision areas, parcels subject to the Habitat Evaluation and Acquisition Negotiation Strategy (HANS), Major Amendment areas, and special disturbance areas relating to water and flood control agencies.

A GIS-based analysis showed that approximately 26,485 acres of alluvial fan habitat exist in designated and proposed critical habitat. Alluvial fans and washes contain a greater diversity of browse species than steeper terrain, and this diverse vegetation furnishes important sources of high quality forage (Leslie and Douglas 1979). Because groundwater is generally closer to the surface and in greater quantity in washes and on alluvial fans, there is a tendency for the same plants that grow on the mountain sides to remain green longer in washes. But more significantly, the greater availability of groundwater supports a suite of plant species that do not grow on the mountain sides. A number of these wash obligate species remain green through the heat of summer and green through all but the worst drought. Therefore, washes and alluvial fans play an important role in allowing desert bighorn sheep to acquire quality forage during the heat of summer and through times of extended drought (Andrew 1994). Leslie and Douglas (1979) noted that these areas became increasingly important to bighorn sheep not only in summer, but during any period of limited forage availability. The water contained in this greener forage also plays a role in meeting the water requirements of bighorn sheep; this can be especially important for lactating ewes.

Required Measures 1.a. and 1.b. (Page 4-154)
These measures were designed to minimize the impacts of developing alluvial fans and washes

within a parcel by clustering Development, placing it close to existing Development, and siting Development at the lowest possible elevation while avoiding the mouth of any canyon. Bighorn sheep are more likely to use less precipitous habitat if it is adjacent to escape terrain; therefore, siting development on the lower and broader expanses of alluvial fans and washes should benefit bighorn sheep by conserving more of the alluvial and wash habitat closest to escape terrain. In concept, the two Required Measures should minimize and mitigate these negative effects. Except for Special Provision Areas, a site-specific effects analysis of anticipated future development of alluvial fan and wash habitat is infeasible, because the actual siting of future development is unknown and the effects will vary with each unique situation. The Required Measures apply at the parcel level.

Required Measure 1.c
This measure is designed to protect water sources remaining within the Plan area. The quarter-mile buffer given to water sources has become a rule of thumb used in the southwestern U. S. where water sources are considered important to bighorn sheep and other desert wildlife. Studies of bighorn sheep behavior have shown that distance is an important factor influencing the reactions of bighorn sheep to perceived danger. Based upon observed flight distances of bighorn sheep, wildlife professionals generally believe a quarter-mile provides bighorn sheep with sufficient security to ensure they will continue using a water source. Additional factors besides distance drive the behavioral responses of bighorn sheep, such as the proximity of escape terrain, density of vegetation that could hide predators, and the presence and relative position of humans and their pets. Bighorns have been documented avoiding water sources while humans were present (Campbell and Remington 1981, Hamilton *et al.* 1982).

The local jurisdictions, with input from the Joint Project Review process, including comments from the Wildlife Agencies and analysis by the CVCC, have the responsibility to make decisions that ensure bighorn sheep have access to water sources even if such decisions are not favorable to development interests. In addition to this measure, existing water sources will be enhanced with the addition of 2 water sources should the Shadowrock project proceed.

Required Measure 1.d
Once residential areas are constructed next to bighorn sheep habitat, a network of new trails frequently proliferates across the landscape. Required Measure 1.d conditions development to prohibit the construction of unauthorized trails in essential bighorn sheep habitat, unless approved through a Minor Amendment with Wildlife Agency concurrence

Required Measure 1.e
The Required Measure stipulates that development shall not preclude habitat connectivity or movement, and that the determination shall be made by the Lead Agency for Development. Additionally, the Required Measure states the determination shall be based on factual data provided by the RMOC, RMUC, Wildlife Agencies, or other sources.

The corridor proposed as part of the Shadowrock Project is the only corridor specifically identified for conserving any specific existing land areas for purposes of habitat connectivity. It is anticipated that during the Joint Review Process, any development that potentially impacts sheep corridors will be identified and modified in order to meet the Conservation and Species

Goals and Objectives. Due to the potential for the San Jacinto ewe group to recolonize North of Chino Canyon, Permit Conditions have been developed that will ensure actions will be taken by the Permittee to ensure the continued use of the area.

Required Measure 1.f and 10
The Required Measure references the Land Use Adjacency Guidelines as described in Section 4.5. They are intended to avoid or minimize the indirect or "edge" effects of Development adjacent to and within Conservation Areas. Bighorn sheep and their habitat are affected by the proliferation of unauthorized trails, increased number of encounters with domestic dogs and their owners, possible predation from unsupervised domestic dogs, increased probability of invasive plant species becoming established, increased probability of unauthorized OHV use of habitat, increased disease risk from pets and livestock, reduction in available groundwater, increased highway traffic resulting in collisions and habitat fragmentation, and general overall increases in human activities within bighorn sheep habitat.

Under 4.5.2 Toxics, the Plan states, "Land uses …shall incorporate *measures* to ensure that application of such chemicals does not result in discharge to the adjacent Conservation Areas." There is no description or list of the specific "measures" mentioned, therefore, it is impossible to judge whether or not they would achieve their intended purpose. In the case of 4.5.3 Lighting and 4.5.4 Noise, the reader is referred to the Implementation Manual for details. Due to the importance of the Land Use Adjacency Guidelines, a permit condition has been created to enable the Service to review and provide concurrence on the Implementation Manual.

Bighorn sheep throughout the Peninsular Ranges have been exposed to a broad spectrum of pathogens, as evidenced by serologic assay and isolation techniques. Disease played a major role in the population die-off that occurred in the 1980s (DeForge *et al.* 1982, DeForge and Scott 1982, Turner and Payson 1982, Wehausen *et al.* 1987). Numerous pathogens have been identified in the Peninsular Ranges to date, including bluetongue virus, contagious ecthyma virus, parainfluenza-3 virus, bovine respiratory syncytial virus, *Anaplasma, Chlamydia, Leptospira, Pasteurella*, and *Psoroptes* (literature cited in U.S. Fish and Wildlife Service 2000). Most of these diseases originate from domestic livestock, and indicate the potential for epizootic outbreaks resulting from disease transmission from domestic livestock is a very real threat.

Based on the scientific literature, the Recovery Plan recommended against husbandry of domestic sheep and goats within 9 miles of bighorn sheep habitat in situations where they are herded or grazed outside of enclosures. Since husbandry of domestic sheep and goats is a legal use on private lands throughout the range of Peninsular bighorn sheep in the Plan Area, prudent wildlife management dictates that cautionary measures be implemented to minimize the potential for future epizootics. Required Measure 10 adequately addresses these concerns and should benefit bighorn sheep by greatly reducing disease risk.

Section 4.5.6 and Required Measure 11
Section 4.5.6 identifies that barriers of some type will be incorporated into individual project design to minimize unauthorized public access, domestic animal predation, illegal trespass or dumping in a Conservation Area. Such barriers may include native landscaping, rocks/boulders, fencing, walls, and/or signage. Effective barriers between human communities and bighorn

sheep habitat all but eliminated several sources of urban-related mortality in the Northern Santa Rosa Bradley/Magnesia/Cathedral Canyon ewe group.

Sheep in the La Quinta area appear to have shown at least occasional attraction to urban settings which indicates that the potential for sheep use of urban areas exists beyond the northern Santa Rosa Mountains ewe group. As a result, the City of La Quinta has recognized the issue and mitigated potential adverse effects by requiring contingency fencing plans on several recent project approvals. In addition, the proponents of numerous other individual development projects recently approved through section 7 and/or CEQA review have agreed to either install appropriate barriers at the time of construction, or as a contingency strategy with pre-approved easements, funding, and responsible parties.

Required Measure 11 emulates the contingency fencing plans developed by the City of La Quinta, and adequately addresses the concerns regarding urban sources of mortality. This Required Measure should benefit bighorn sheep when implemented.

Required Measure 2 (Santa Rosa and San Jacinto Mountains Conservation Area)
Required Measure 2 for the Santa Rosa and San Jacinto Mountains Conservation Area addresses the Special Provision Areas. There are no Special Provisions Areas in the other two Conservation Areas containing bighorn sheep habitat. According to Tables 4-11a-g, 1,099 acres of bighorn sheep habitat loss would be covered under Special Provision Areas designated in this Conservation Area. This would be allocated as follows:

2.a West of Chino Canyon along Highway 111, City of Palm Springs - Figure 4-26e(1)
The land use prescription for parcels in this Special Provision Area would allow 92 acres of habitat loss in the area below toe-of-slope if the area above toe-of-slope is permanently conserved through conveyance of a conservation easement or fee title to the CVCC or other appropriate conservation entity.

The elimination of alluvial habitat along the toe-of-slope is generally not beneficial for conservation of bighorn sheep, because of the loss of forage diversity usually found on alluvial habitat. Steep, rocky slopes cannot support the unique plant assemblages found on the deeper, more mesic soils associated with alluvial fans and washes. However, the plant community located along the toe-of-slope in this Special Provisions Area is dominated by creosote bush, a species containing high levels of secondary plant compounds that reduce its digestibility. Therefore, the diverse and nutritious plants usually associated with an alluvial fan are not abundant. As a result, the loss of 92 acres of the flatter topography on this site would not measurably reduce foraging opportunities for bighorn sheep occurring in the area, and therefore, would not conflict with the long-term conservation of bighorn sheep. A few scattered existing residences and the immediately adjacent State Route 111, a 4-lane highway, already compromise the habitat value of these alluvial flats. As a result, habitat loss as proposed for this Special Provision Area would not have an appreciable biological effect on bighorn sheep or the designated or proposed critical habitat.

2.b T4S, R4E, Section 7, Chino Canyon, City of Palm Springs – Figure 4-26e(1)
The proposed land use prescription would allow one single-family residence and ancillary

structures to be built within a Development envelop not to exceed 2.5 acres, plus an additional maximum of 2.5 acres for an access road and minor improvements within a larger area of 40 acres to be retained by the land owner. The balance of the approximately 506 acre parcel shall have a conservation easement recorded on it to ensure its permanent conservation. Assuming proper location of the proposed 5-acre facility per Required Measure 1 in Section 4.3.21 of the Plan, the facility to be authorized likely would not disrupt future bighorn sheep use of the slopes above the residential site. Nor would it appreciably affect the designated or proposed critical habitat.

2.c Palm Hills, City of Palm Springs – Figure 4-26e(2)A
Palm Hills is a proposed development that would be sited in the mountains above the valley floor, south of Highway 111, and north of Eagle Canyon and Murray Hill. Approximately 252 acres of development in bighorn sheep habitat, as depicted in Figure 4-26e(2)A of the Plan, would be permitted for Palm Hills under Required Measure 2.c. The project as proposed is no longer legally feasible to construct due to a citizen's referendum. On April 2, 2008, the City Council rescinded the approval of the Palm Hills EIR. However, the effects of the project will be analyzed here, because the project is still described as a Special Provisions Area under the Plan.

Jim Cornett (1999) conducted a Biological Assessment and Impact Analysis for the Palm Hills Land Corporation, and documented bighorn sheep and their sign on and around the project site, including the incised portions of Eagle Canyon, where a seasonal water source exists. Cornett (1999) stated recent historical observations were unequivocal in demonstrating that the project site was bighorn habitat, and concluded mitigation measures were unlikely to reduce the project's detrimental impacts to a level of acceptability. Additionally, Terry Russi, a BLM biologist who worked in the area from 1977 to 1982, observed bighorn sheep using the project site and Eagle Canyon on numerous occasions (T. Russi pers. comm., 2001). In recent years, the area has become heavily used by mountain bikers and hikers, resulting in many unauthorized trails on private, tribal, and public land in the area. Bighorn sheep sightings continue to occur regularly in the Palm Hills area, but the number of such sightings is reduced from the levels described in the 1970s and '80s, before the range-wide decline in the population that reached its low in the mid-1990s. The increased recreational use of the area, degradation of the water source, and the decline in bighorn sheep numbers are among the possible explanations for the reduced number of bighorn sheep sightings in recent years. If developed as covered by the Plan, the project would likely displace this recreation. A perimeter trail is proposed around the new development and much of the displaced use would be collected there.

According to the EIR the project would dedicate a right-of-way for building Palm Hills Drive southward across Eagle Canyon, and this extension would require building a bridge over the canyon. Such bridges are depicted on several drawings connected with the project. The EIR also mentioned paving and fully constructing the Dunn Road, a bull-dozed dirt road bisecting the northern Santa Rosa Mountains. The full construction of Dunn Road and an extension of Palm Hills Drive to connect with it were listed in the Circulation Element of the City's former General Plan. Provision 2.c.(1)(m) states the extension of Dunn Road is not a covered activity under the Plan. Furthermore, it is Palm Hills Drive that would be extended to connect with Dunn Road (which has already been constructed), and this action would be covered by the Plan. A permit

condition specific to the Palm Hills development has been created to address this concern.

Provision 2.c.(1)(h) states the developer shall dedicate 1,233 acres of habitat to conservation within the Palm Hills Land Corp. ownership in the northern Santa Rosa Mountains ewe group's Recovery Region. The Plan requires that the land shall be of comparable or better quality habitat within the Palm Hills Land Corp ownership that is located in the north Santa Rosa ewe group recovery region in addition to the property required for on-site conservation. The properties identified for this analysis are T5S R5E Section 17 and T5S R5E Section 21. On April 2, 2008, the Palm Springs City Council rescinded approval of the Palm Hills EIR. Thus, the project in the Plan, the one that was previously approved by the Council, is no longer vested and a new project proposal will be developed. In order to ensure that development is minimized, permit conditions have been accepted by the City of Palm Springs. The permit condition states: Any future project that occurs in the Palm Hills Special Provisions area, including access from East Palm Canyon Drive and internal circulation, shall comply with the Plan, IA, Permit and Special Permit Terms and Conditions and will be considered a Covered Activity. All mitigation identified in the Plan regarding the Palm Hills project is retained as part of the conservation commitment in the Plan. The applicable Permittee shall ensure that all portions of the project, including any golf course or portions of the golf course will be located north of Eagle Canyon and no closer than one quarter mile to the water source located in Eagle Canyon (Section 31 T4S R4E). The extension of any road across or south of Eagle Canyon and any improvements to and/or the maintenance of the Dunn Road are not Covered Activities under the Plan and shall not be considered as a Minor Amendment. This permit condition ameliorates the issues regarding future development potential south of Eagle Canyon and along Dunn Road.

2.d Highway 74, Riverside County - Figures 4-26e(2) and 4-26e(3)
The Figures depict 7 parcels, encompassing 553 acres, in which the County would work with landowners to transfer density from the east side of the highway to the west side of the highway to the maximum extent Feasible. To transfer density, land east of the highway must be permanently conserved by conveyance of fee simple interest or a conservation easement to CVCC or its designee or to another conservation organization. This provision would allow future development to be clustered at a higher density with other development west of the highway to reduce or avoid development east of the highway on the rim overlooking Deep Canyon. This topographic bench is particularly important to bighorn sheep, because it is a favored foraging area of Deep Canyon bighorns, and continued sheep use on this bench allows connectivity between the two ewe groups occurring on either side of the highway.

The highway posed a movement barrier for ewes for several decades (Rubin *et al.* 1998). However, population growth has stimulated increased movement between ewe groups, as evidenced by recent, regular observations of sheep crossing the highway reestablishing connectivity. Ram movement across the highway will most likely continue into the future. The ewes would likely avoid the crossing point for a certain period of time, and after years, may begin to reuse the area.

2.e Travertine Specific Plan, City of La Quinta – Figure 4-26e(3)A
Adverse effects to bighorn sheep from the proposed Travertine project were addressed under separate section 7 consultation with BLM and BOR, dated December 7, 2005, and they are now

considered part of the environmental baseline.

2.f Section 25, T7S, R7E, Riverside County – Figure 4-26e(3)
This provision would require off-site mitigation for impacts incurred within the designated area at a 3:1 ratio. Mitigation lands would be required to be within Recovery Region 3. As such, this provision permits the loss of over 300 acres of alluvial habitat immediately adjacent to a mountainous area. The large amount of alluvial fan habitat in and associated with Martinez Canyon to the south likely would be sufficient for the sheep in this area.

2.g Shadowrock Project, City of Palm Springs – Figure 4-26e(1)A
The MSHCP states the Shadowrock project may obtain Take under the ESA in one of two ways: (1) through a separate section 7 consultation prior to issuance of the MSHCP permit, or (2) through section 10 of the ESA and the MSHCP itself. Though a Biological Opinion was issued in 2007, the Army Corp of Engineers withdrew the authorization of the permit on March 26, 2008. Furthermore, a citizen's initiative passed during the election of November 6, 2007, rescinding the City of Palm Spring's extension of the Shadowrock development permit. On April 2, 2008, the Palm Springs City Council will withdraw the extension of the development agreement, thus removing the uncertainty about the status of the project. Consequently, the project will be redesigned before the project proponents obtain approvals under State and local land-use authorities. This analysis assumes the project would be a Covered Activity under the Plan.

Based on the configuration depicted in Figure 4-26e(1)A, about 205 acres of the current project design fall under the jurisdiction of the proposed Plan in bighorn sheep habitat. Ongoing discussions with the Tribe and perhaps other landowners will determine the amount of project acreage falling outside the jurisdiction of the Plan and on the Reservation. Due to the proximity of section 4 (Tribal property) to Highway 111, it is likely that most of section will be developed over time with or without the Shadowrock development. The draft Tribal HCP anticipates that development will occur in section 4 which is east of the Shadowrock project.

Mountain lions are the natural predator of bighorn sheep in the Peninsular ranges. Mountain lion predation has been documented repeatedly in the San Jacinto Mountains since the late 1980s. Some mountain lions learn to specialize on bighorn sheep, as evidenced in the Peninsular Ranges (E. Rubin pers. comm., D. Harkleroad in litt.), and such specialists can devastate a small ewe group in a short period of time. The proposed Shadowrock project may impair the ability of bighorn sheep to respond to mountain lion predation by removing 200 acres of alluvial fan habitat and constricting crossing points in Chino Canyon. Shadowrock and the subsequent development of the downslope areas of the alluvial fan constrict movement through a designated wildlife corridor northward through this area. Escape terrain is available north, south, and west of where the ewe group is currently located. Should mountain lions attack, sheep can move south toward the northern Santa Rosa ewe group or north through the wildlife corridor. There are areas east of the project and towards the tramway that will never be developed. This is another option of escape for the sheep.

Special Provisions 2g(1)a-e describes the identification of a movement corridor upslope from the proposed Shadowrock project (Figure PBS2) to provide habitat connectivity for bighorn sheep.

This upslope area contains several natural and artificial obstacles to sheep movement and habitat use patterns. Within the proposed movement corridor, riparian vegetation exists along Chino Creek. The vegetation is likely to interfere with connectivity across the canyon, because sheep avoid using areas with poor visibility due to the threat of predators. Immediately west of the proposed movement corridor in Section 7 (Figure PBS4), a natural barrier is formed by a large riparian forest or cienaga that would also affect bighorn sheep movement (E. Rubin, M. Jorgensen, J. DeForge, S. Ostermann-Kelm pers. comm.). The Permit Conditions for the CVMSHCP require that vegetation along the riparian corridor be modified and managed overtime for the purpose of sheep crossing the area. The vegetation will be pruned as necessary to ensure that sheep can view across the area identified as a wildlife crossing.

The proposed movement corridor across Chino Canyon between the western edge of the proposed project site and the cienaga to the west would be situated partially on Desert Water Agency, privately-owned, and tribal properties (Figure PBS5). To provide the corridor, Shadowrock has dedicated a portion of its land and has acquired conservation easements from the Tribe, Desert Water Agency, and a private landowner in Section 7.

The Plan also proposes lining the edge of the golf course with dense vegetation or earthen berms, screening bighorn sheep habitat from human activity (Special Provison 2.g.(8)). This approach is based on the assumption sheep movement through the corridor would be enhanced by obscuring the sheep's view of the various disturbances on the proposed project site, even though sheep rely on sight as their primary means of predator detection (Hansen 1980). Bighorns prefer to directly view subjects of concern, and become nervous when perceived threats are hidden. Sheep biologists have offered conflicting advice regarding the usefulness of screening. The permit condition requires this screening, but should the screening become a problem, the Service can ask for the removal of the vegetation.

Special Provision 2g(2) addresses the issue of the Tramway Road and its impact on habitat connectivity. Wilson (1968), Yoakum (1971), and Papouchis *et al.* (1999) documented that road development and associated traffic resulted in displacement of sheep and habitat abandonment in some cases. In the Peninsular Ranges, Rubin *et al.* (1998) documented a reluctance of ewes to cross highways in some ewe groups, but not others. Human disturbance in the form of traffic, pedestrian use, and recreational hiking along Tramway Road, could further decrease the likelihood of bighorn sheep using the corridor for a number of years until they have become acclimated to the human activity use. Permit conditions have been developed to minimize and mitigate these effects (gates, traffic attenuation, screening) and increase the use of the corridor by the sheep (funneling fence, additional water holes, pruning riparian vegetation).

Bighorn sheep cross highways regularly in other parts of their range, including the Peninsular Ranges where they regularly cross State Highway S2 and Highway 78 in Anza Borrego Desert State Park (R. Botta, CDFG, pers. comm., 2007). The present cohort of adult San Jacinto ewes appears to have limited herd knowledge of crossing Chino Canyon and using the area to the north. Where bighorns have lost herd memory for crossing a highway, they can and have regained the ability. Ewes were not documented crossing Highway 74 near Palm Desert for over 20 years (J. DeForge, pers. comm.), during which time traffic volumes almost tripled (Service 2000). However, rams continued to cross Highway 74, and in recent years both sexes have been

crossing the highway on a regular basis. Likewise, in Chino Canyon rams have been crossing the Tramway Road through the years, and ewes were documented crossing the Chino Canyon area in 2005, and living in the Canyon during the summer of 2007 (Aimee Byard, Bighorn Institute, pers. comm.).

Since bighorns regularly cross highways elsewhere, it is logical to believe the ewes of the San Jacinto Mountains are capable of reestablishing a regular travel route across the Tramway Road under current conditions. DeForge and Ostermann (1998) reported nine Peninsular bighorn sheep were hit, and five were killed by automobiles between 1991 and 1996 along Highway 111. To address this issue the City of Palm Springs has agreed to do traffic attenuation. The following permit conditions apply: 1) the security gates for the proposed Project on Tramway Road shall be installed outside and downslope of the Wildlife Corridor. Currently, the Winter Park Authority closes the existing security gate to the Palm Springs Aerial Tramway facility (tram) near Highway 111 at 10 p.m. each night to prevent unauthorized use of Tramway Road. The Project proponent has agreed with the Winter Park Authority that the guard at the Project site entry gate shall move down to the tram gate at 10 p.m. to control road access. The guard shall return to the Project gate when the Tramway Road reopens at 6 a.m. daily. The Project proponent shall build a gatehouse to provide shelter for the guard at that location. No other gates are contemplated and 2) The security gates for the proposed Project on Tramway Road shall be installed outside and downslope of the Wildlife Corridor. Currently, the Winter Park Authority closes the existing security gate to the Palm Springs Aerial Tramway facility (tram) near Highway 111 at 10 p.m. each night to prevent unauthorized use of Tramway Road. The Project proponent has agreed with the Winter Park Authority that the guard at the Project site entry gate shall move down to the tram gate at 10 p.m. to control road access. The guard shall return to the Project gate when the Tramway Road reopens at 6 a.m. daily. The Project proponent shall build a gatehouse to provide shelter for the guard at that location. No other gates are contemplated.

Cumulative Effects of the Shadowrock Project
Cumulative effects include additional development on tribal lands, domestic sheep and goats, increase in traffic around the habitat. Regarding the proposed urbanization of the Chino cone down-slope from the project site, the installation of utilities and infrastructure for Shadowrock would be sized to accommodate commercial development upslope and downslope from the project site (*Tramway Road Access and Maintenance Agreement*, dated September 2006; T. Davis, Planning Director, Agua Caliente Band of Cahuilla Indians, pers. comm.). The future development of section 4 will be determined by the Tribe and the City of Palm Springs. The City of Palm Springs has recently adopted a General Plan, but the overriding approval is through the Tribe. The Tribal draft HCP anticipates development of this area.

Additionally, the keeping of domestic sheep and goats on existing developed parcels in or adjacent to bighorn sheep habitat is known to occur. As previously discussed domestic sheep and goats carry pathogens to which bighorn sheep have evolved little or no immunity. Several such animals have been documented in bighorn sheep habitat over the last decade, but the origin of these animals remains unknown. We are aware of one parcel in Blaisdell Canyon (North of Chino Canyon) harboring a band of domestic goats. Though the keeping of domestic goats is legal under local ordinances, the threat of disease exposure remains as long as the goats are present. In addition, bands of domestic sheep were released by itinerant sheep herders on at least

two occasions on seasonal winter ranges in and adjacent to bighorn sheep habitat in the San Jacinto Mountains (BLM and Bighorn Institute, in litt., pers. comm.). Thus, the release of domestic sheep could have been the source and cause of the disease outbreak and range-wide die-offs of the 1980s. Over the last ten years, the California Department of Fish and Game has twice documented domestic sheep or goats in the Santa Rosa Mountains during aerial bighorn sheep surveys. Given the difficulties of controlling unauthorized or unregulated activities, we anticipate that such disease incidences will recur periodically in the future. Standards have been established in the Plan and will be implemented by the local jurisdictions

Conclusions Regarding the Shadowrock Project
The Shadowrock project, at a minimum, removes a foraging area that was observed to have been used for at least one day by many sheep in 1997, during a period of documented drought. It may constrict a logical, but undocumented, wildlife crossing. Conversely, it provides for the manipulation of vegetation to enhance a wildlife crossing west of the project and secures conservation easements on property that has documented sheep use and eliminates development on these parcels. It provides for traffic attenuation of vehicles and speeds along Tramway Road and, if needed, a wildlife overpass. The project also requires 2 additional waterholes to be established - one on each side of Tramway Road. Although there are negative impacts to sheep, the project impacts have been mitigated to the maximum extent practicable and the project with associated mitigation maintains the existing population and habitat and provides access to potential future use of historical habitat.

<u>Required Measure 3 – Joint Project Review Process and HANS Process</u>
Required Measure 3 specifies where the HANS process will be used to meet Conservation Objectives: at least 90% of the private land as of June 2003, within the relevant Recovery Zone and jurisdiction, must be conserved. The HANS process works in combination with the Joint Project Review Process, which guides local Permittees during Plan implementation, making certain they adhere to the Implementing Agreement and requirements of the CV MSHCP. Through these two processes, the land areas needed for conservation purposes are to be identified. Within this framework the HANS process functions as a conflict resolution process when there are disputes concerning appraisal values or disagreements over whether a project conforms to the Conservation Objectives and Required Measures.

According to the Tables in the Plan, the amount of acres identified as available for development is 2,447 acres in bighorn sheep habitat. The specific location of is unknown although there are guidelines that require development to be minimized and/or mitigated in and around sheep habitat. The Plan guidelines and restrictions and the Joint Project Review Process will determine which lands are needed for conservation purposes and which will become developed.

The proposed standards for Planning development are based on general principles, such as minimizing edge effects and siting development within a parcel. As such, they deal with the edge effects of a project following its completion or apply broad concepts to project Planning at the scale of a single parcel. The guidelines were developed taking into account the specific ecological requirements that bighorn sheep need to survive and recover, such as protection of lambing and rearing habitat, existing home ranges, ewe group core use areas, ram pastures, key foraging areas, escape terrain, bedding sites, and buffers to human disturbance, among others.

The majority of the HANS acreage consists of General Plan densities of 1 unit per 10 to 40 acres. A very few widely scattered homes may not produce large acreage impacts, but the threshold beyond which bighorn sheep behavior could be temporally or permanently altered could be exceeded. Simply stated, in terms of sheep behavior, low density housing can have as deleterious direct and indirect impact as higher density housing. For example, construction of a long road or driveway to construct houses on a mountainside would be expected to result in the indirect loss adjustment of use of much of the habitat at lower elevations within view of the structures and associated human activity, given the tendency of sheep to avoid areas where they experience disturbance above them (see for example Wehausen 1976, Hicks and Elder 1977, Monson and Sumner 1980, MacArthur *et al.* 1982). Location of development -- not only how much development occurs--is important in providing for the conservation of bighorn sheep. Most jurisdictions have Planning guidelines that allow for and promote clustering of development. The principles of planning, along with the likely clustering of potential developments into less sensitive areas, and economic constraints leads to the conclusion that, wherever possible, clustering and minimizing impact to the habitat will be accomplished.

Avoidance, Minimization, and Mitigation Measures (Section 4.4)
The proposed measures would (1) prohibit construction of Covered Activities in Peninsular bighorn sheep habitat during the January 1 to June 30 lambing season unless otherwise authorized through a Minor Amendment with Wildlife Agency concurrence, (2) prohibit landscaping with toxic plants for Covered Activities in sheep habitat, and (3) require Permittees with existing facilities that have toxic plants to complete a plan and schedule for removing or preventing access to toxic plants within one year of Permit issuance.

Beyond new development approved under the Plan, these measures also would apply to new water tank construction and operation and maintenance (O&M) of existing facilities by Coachella Valley Water District (CVWD), and O&M of existing facilities by Riverside County Flood Control and Water Conservation District (RCFCWCD). The number of new water tanks that may need to be constructed is unknown because of the unknown extent of future development that would occur along the base of the Santa Rosa Mountains. These tanks are typically sited well above the elevation of the intended service areas to provide adequate water pressure and would require a minor amendment with concurrence by the Service. The Plan requires 1:1 mitigation by acreage for these projects and consistent with past practice on similar projects agreed to by our respective agencies, we anticipate that public access would be prohibited, native landscaping would be planted, and tanks would be located away from particularly sensitive areas, such as lambing areas, water sources, etc., where potential conflicts would be more significant. In addition to such measures for new construction and our ability to address unique situations through our concurrence authority on minor amendments, the proposed avoidance, minimization, and mitigation measures associated with O&M activities should offset potentially adverse effects and promote recovery of bighorn sheep populations by eliminating existing and future sources of disturbance and mortality.

Effects of Development on Designated and Proposed Critical Habitat
The proposed Plan has both positive and negative impacts. Overall, the Plan would increase the security of current and future habitat. There are areas of designated and proposed critical habitat

that will be negatively affected. Conversely, significant amounts of land will be conserved and protected that will enhance the designated and proposed critical habitat.

The proposed Shadowrock project would eliminate approximately 200 acres of alluvial habitat and the effects of the project may extend beyond the footprint of the project. Since 2005, occurrence data suggests that a small group of bighorn ewes, lambs, and yearlings have periodically used the area around Chino Canyon. Two ewes crossed the area around Chino Canyon in 2005, and temporarily utilized the northern area. (Bighorn Institute, 2007). Given enough time, the ewe group would likely make additional movements to the habitat area north of Chino Canyon, and may re-establish movement patterns. Other desert bighorn populations have re-colonized habitat that was much further away from their home ranges than the distance across Chino Canyon. Should the Shadowrock development occur, the sheep would lose 200 acres of currently infrequently used foraging habitat and a portion of their historic habitat. The primary constituent elements (1 through 5 in 72 FR 57739) it contains will be impacted, as discussed below.

Desert washes and alluvial fans provide important nutritional benefits to bighorn sheep that are not otherwise available on steep, dry mountain slopes, which do not support the forage quantity and quality found on deeper more productive alluvial soils (Leslie and Douglas 1979). Bighorn sheep would lose direct foraging opportunities in the Chino Canyon area and the permanent loss of 200 acres of designated and proposed critical habitat and associated the primary constituent elements: "various native desert Plant communities found on different topographic slopes, aspects, and landforms, such as … alluvial fans and canyon bottoms; a range of habitats that provide forage, especially during times of drought (66 FR 8649)" and the "2) Presence of a variety of forage Plants, indicated by the presence of shrubs (e.g., *Ambrosia* spp., *Caesalpinia* spp., *Hyptis* spp., *Sphaeralcea* spp., *Simmondsia* spp.), that provide a primary food source year round, grasses (e.g., *Aristida* spp., *Bromus* spp.) and cacti (e.g., *Opuntia* spp.) that provide a source of forage in the fall, and forbs (e.g. *Plantago* spp., *Ditaxis* spp.) that provide a source of forage in the spring" plus the "4) Alluvial fans, washes, and valley bottoms that provide important foraging areas where nutritious and digestible Plants can be more readily found during times of drought and lactation and that provide and maintain habitat connectivity by serving as travel routes between and within ewe groups, adjacent mountain ranges, and important resource areas, such as foraging areas and escape terrain (72 FR 57739)"

The proposed project would also indirectly impact "steep, remote habitat for lambing and rearing of young (66 FR 8649)" and "3) Steep, rugged slopes (60 percent slope or greater) (below 4,600 feet (1,402 meters) elevation in the Peninsular Ranges) that provide secluded space for lambing as well as terrain for predator evasion (72 FR 57739)." Constant human-related disturbance during and after project construction, likely would not be tolerated by late-term females or mothers with lambs seeking seclusion. The temporal loss or negative indirect impact of lambing and rearing habitat also may have an effect.

Within Recovery Zone 1, which contains Shadowrock and the San Jacinto ewe group, there are 15,273 acres of proposed critical habitat including Tribal lands, and 10,761 acres excluding Tribal lands (72FR57749). Not considering the elimination of forage, the Shadowrock footprint would directly and indirectly impact (as described above), a total area of 1,481 acres, or about 10

percent of the proposed critical habitat Unit 1. Two hundred acres would be permanently removed and a larger, but undetermined, number of acres could be impacted with temporal affects. Whether or not the sheep regain use of the temporally affected area will be determined over a period of time. To date, this area being used by the 2 recently released rams in Blaisdell Canyon.

In Recovery Zone 1 there are 2,745 acres classified as HANS under the Plan and approximately 733 acres of Special Provisions Areas within proposed critical habitat Unit 1. Applying the 10 percent value to the sum yields 323 acres of developed land representing 2.2 percent of the total land area in proposed critical habitat within Recovery Zone 1. Several of the HANS parcels are located in the southern Santa Rosa Mountains in the heart of the current ewe group's home range (Figure PBS1). The topography is generally steep and considered by many as "undevelopable". The most vulnerable area to development is the HANS parcels located in and around Blaisdell Canyon, where some development has already occurred. Prior to the 1980's, Blaisdell Canyon historically held healthy populations of bighorn sheep (DeForge *et al*. 1997), and is the location where rams were introduced in 2006 (Figure PBS3).

Recovery Zone 2 contains 4,719 acres classified as HANS and 145 acres of Special Provision Areas within proposed critical habitat Unit 2A. Applying the 10% allowable take value to the sum (4,864) acres yields approximately 486.4 acres of land permitted for development or 2.7% of the total land area (17,928 acres) of proposed critical habitat within Recovery Zone 2. If development occurs at the individual parcel scale of the Plan, and residential housing is dispersed across the mountains rather than consolidated and sited next to existing developed areas, sheep could be more impacted than if development is clustered. Being that all of the jurisdictions have professional planners applying planning principles and have identified tools of transferable development rights, clustering home sites, and other mechanisms, the likelihood of dispersed development occurring is low. Economically it would be very difficult to develop most parcels in the Conservation Areas due to access issues.

At the present time, it is unknown which private property owners will develop their land, sell their land to conservation entities, or just maintain their property in its current state. One could develop a "worst case scenario" for bighorn sheep by assuming development and roads would occur in specific areas where the topography is conducive to building. The City of Palm Springs General Plan Initial Study (The Planning Center 2006) classified most of the area in Recovery Zone 2 as Open Space Mountain (1 dwelling unit/40 acres) or Open Space Conservation (1 dwelling unit/20 acres). Riverside County's present policy allows one single family home on any private parcel. Only a portion of this development would occur in proposed critical habitat, but all of it could occur within currently designated critical habitat. Again, being that all of the jurisdictions have professional planners applying planning principles and have identified tools of transferable development rights, clustering home sites, and other mechanisms, the likelihood that lots of dispersed development occurring is low. Economics also play a role and high infrastructure costs are usually the deterrent in the mountains. With the permitting of the Plan, many of these sites will be targeted for acquisition.

Recovery Zone 3 stretches from Highway 74 to Martinez Canyon, and contains 5,467 acres classified as HANS, 305 acres of Special Provision Areas, and 209 acres of water district

property. This large area includes 43,818 acres of proposed critical habitat Unit 2A. Except for the Martinez Canyon area most of the HANS parcels are located on the periphery of the zone in the La Quinta area. In Martinez Canyon the ownership pattern emulates that of the northern Santa Rosa Mountains, consisting of a checkerboard of private and public land dispersed over a wide area. The two areas differ in their history of development. Over the years, only a handful of structures have been built in Martinez Canyon, and access has been limited to a trail for many years. However, the gentle terrain present in some areas invites illegal off-road vehicle use. There are additional standards for bighorn sheep habitat conservation, such as avoiding development in the mouth of canyons that would minimize or eliminate the development of this important area. The County has a process by which they can promote the consolidation of development and direct the development so it is appropriate for bighorn sheep conservation. These mechanisms and the Plan language will likely keep the Martinez Canyon area from development in sheep habitat.

Recovery Zone 4 contains 102 acres classified as HANS and 45 acres of 10% take within a total of 54,553 acres of proposed critical habitat Unit 2A. Most of the HANS acreage consists of one parcel located in the western portion of the zone, where access is currently limited. A large area proposed for development exists just outside the proposed critical habitat boundary, with a portion of the proposed development occurring within currently designated critical habitat. In designated critical habitat 1,893 acres are classified as 10% take and 664 acres are classified as HANS. Should development be permitted, residential housing may be introduced into an area that has been historically used for agriculture, where bighorns in the nearby mountains and canyons have been relatively little disturbed for many years.

In summary, the primary constituent elements of proposed and critical habitat will be impacted both positively and negatively by the Plan. The negative aspects of the Plan are that up to 10% of PCEs 1-4 will be lost to development or other uses. Some areas will be more affected than others. The loss associated with the Shadowrock development is the most glaring. The second most negative impact is the uncertainly as to where development may occur. The Shadowrock project received a no jeopardy/no adverse modification biological opinion in 2007. Since then, Corps nationwide permit has been rescinded, voiding that biological opinion and the associated conservation measures. In order to minimize and mitigate to the maximum extent practicable, the City of Palm Springs has agreed to condition any future development with conditions identified in the former BO along with some additional conditions to facilitate future management and recovery of the sheep. The positive aspects of the Plan includes conservation of 90% of sheep habitat; acquisition funds and targeted efforts to acquire sensitive habitat; management and monitoring of the area; and commitment and funds to adaptively manage for the species. PCE 5 is essential unaffected by the Plan with the exception of the addition of 2 watering sources in association with the Shadowrock project and a commitment to monitor and adaptively manage for the species, which could mean the addition of new or expansion/enhancement of existing sites. Although there will be some impacts to individual sites and PCEs, the overall impact of the Plan will support and enhance the ecological functions of the PCEs and both the designated and proposed critical habitat.

Effects of Trail Recreation on Peninsular Bighorn Sheep
Background

Bighorn sheep habitat in the Peninsular Ranges of California has become increasingly fragmented by development, road construction, vehicular traffic and recreational infrastructure. Compared to southern subpopulations in and around Anza Borrego Desert State Park, the northern ewe groups may be the most impacted by urban areas. They have experienced the greatest difficulty in maintaining population levels. Northern ewe groups also experience higher levels of recreation within their home ranges. Sheep can be negatively impacted by recreational trail use.

Bighorn sheep, like any prey species, must balance predation risk with securing the resources needed for growth and survival. For example, while foraging, bighorns must spend a certain amount of time scanning for predators, or in other words remaining vigilant, and by foraging in groups they can decrease their vulnerability to predators (Berger 1978). If bighorns feel insecure, due to their distance from escape terrain or the proximity of a perceived threat, they are likely to change their activity patterns and spend less time foraging and more time remaining vigilant. In contrast to studying changes in hormone levels in a field situation, it is possible to document changes in activity patterns that reflect a free-ranging animal's response to perceived threats (Berger 1978, Manor and Saltz 2003).

King (1985) compared the activity budgets of two herds of bighorn sheep; one group had historically experienced high levels of human disturbance, and the other group low levels of human disturbance. Both groups were intentionally harassed by vehicles and hikers. Activity budgets of both groups were similar under "unharassed" conditions. However, activity budgets differed significantly after harassment. The herd that historically experienced high levels of human disturbance was vigilant longer and fed less than the herd that seldom experienced disturbance, which is evidence of increased sensitivity. Past some threshold, the loss of feeding time, plus the additional energy expended in fleeing, could result in a decline in body condition. Among ungulates, female body condition is a determinant of reproductive potential and may affect the health and survival of young (Cameron *et al*. 1993, Cameron 1994, Cook 2000, Cook *et al*. 2001, Hamilton and Blaxter 1982, Holl *et al*. 1979, Keech *et al*. 2000, Price and White 1985, Testa and Adams 1998, Thomas 1982, Thorne *et al*. 1976).

Perhaps the most pervasive reaction reported when bighorn sheep encounter perceived threats is: they simply leave the area. King and Workman (1986) observed, "Running flight by ewes with lambs was the most common response, the distance fled by ewes with one-to two-week-old lambs often exceeded several miles. Extreme energy expenditure in cases like these cannot be beneficial for small lambs." Such behavioral responses occur on the individual or small group level, and are much easier to observe than physiological reactions. As a consequence, the literature documents numerous instances of bighorn sheep fleeing or leaving an area after being disturbed by human activities (Blong 1967, Blong and Pollard 1968, Campbell and Remington 1981, Cunningham 1982, Cunningham and Ohmart 1986, DeForge 1972, DeForge and Scott 1982, Etchberger *et al*. 1989, Ferrier 1974, Goodson *et al*. 1999, Jorgensen 1974, King 1985, King and Workman 1986, Krausman and Leopold 1986, Krausman *et al*. 1995, Leslie and Douglas 1980, Light and Weaver 1973, Papouchis *et al*. 1999, 2001).

Bighorn sheep often select specific habitat areas because such sites contain something of value, such as a water source or better forage, which increases their chances of surviving and

reproducing (Hamilton *et al*. 1982). Therefore, if they are displaced from chosen areas or prevented from accessing them, then a probability exists that those other areas may be poorer habitat. Logically, if bighorns are too often forced into habitat of lesser value, then the consequences may eventually become manifest in higher predation or disease rates, decreased body condition, poor reproductive performance, and eventual population declines (Geist 1975). If the frequency of spatial displacement is excessive, bighorns may completely abandon otherwise suitable habitat, thus reducing the amount of available resources needed to maintain population levels (Etchberger *et al*. 1989, Geist 1975, Krausman *et al*. 2001, Papouchis 2001).

Desert bighorn sheep regularly move across the landscape, and they are occasionally forced to leave an area under natural conditions, as when a predator is present. Likewise, it is natural for sheep to sometimes experience fear or concern, with its concomitant activation of the "flight or fight" mechanism. Therefore, it is logical to reason that occasional disturbances from human recreationists would not adversely affect bighorn sheep. Furthermore, groups of bighorn sheep exhibit a variety of behaviors, and some fear humans more than others. Many people have encountered the outwardly "tame" bighorn sheep in the national parks of Canada and the U. S., while in other locations sheep usually retreat at the sight of humans.

Some studies of human/bighorn interaction have concluded that bighorns were not experiencing lasting adverse effects from encounters with recreationists (Hicks and Elder 1979, Hamilton *et al*. 1982), at least at the levels of human use observed. As a consequence, attributing the decline of bighorn sheep in the Sierra Nevada to recreation (Dunaway 1970, 1971a, 1971b, Jones 1950) was questioned by Wehausen (1977), and the findings of Light and Weaver (1973) for the San Gabriel Mountains were examined and questioned by Holl and Bleich (1983). In each case, alternate explanations for the decline or distribution of bighorn sheep were presented. In the Sierra Nevada, bighorn herds abandoned key winter range as a result of mountain lion predation (Wehausen 1996), and this resulted in a population level effect. In the San Gabriel Mountains, bighorn distribution appeared to be mainly driven by structural habitat variables, such as vegetation and escape terrain (Holl and Bleich 1983). Nevertheless, other populations declined or were extirpated where high levels of recreation contributed to the demise of bighorn sheep, and alternate explanations excluding recreation do not seem plausible (Krausman *et al*. 2001).

Several key concepts stand out from 3 studies, Hicks and Elder, 1979, Hamilton, et al, 1982, and Papouchis et al, 2001, and repeat themselves from the review of the above three studies, and the contents of additional applicable literature would reinforce them. First, if bighorn sheep are to coexist with human recreational activity, bighorns will need areas of refuge that are spatially separated from areas of high human use. Second, bighorn sheep also need temporal isolation from human activity, especially during sensitive times, such as during lambing season or the hotter months of the year. Third, human recreational activity should occur at predictable locations and times. Fourth, the topography, routes of trails, and relative elevation and juxtaposition of bighorn sheep to human activity are important. Ewes with lambs are especially sensitive to encountering humans above them, and trails should not impact key resources, such as water holes, lambing habitat, and core use areas. Fifth, the absolute number of recreationists using an area is important, but if the factors listed above are favorable to bighorn sheep, then the level is not as important.

The Trails Plan seeks coverage for the existing trails and their locations and design attributes. Much of the available literature is opinion and anecdotal information. Other studies consist of sets of observations from which inferences have been drawn of varying strength. There have been few long-term studies of bighorn/human interactions conducted in a rigorous, experimental manner, and such an intensive study has not been conducted in the Plan area. The Plan requires an extensive research program that will document issues related to sheep and recreation use. This research will shape the future management of the area regarding recreation use, trail location and any necessary restrictions in sensitive areas.

Analysis of Trail System in Relation to Bighorn Sheep Behavioral Ecology

The proposed research program (Element 2) would evaluate the trail system in relation to the behavioral ecology of bighorn sheep. Ewe groups within the Plan area experience the greatest amount of human recreation during the lambing season (Element 1). The desert bighorn lambing season is extended over many months, from January through late May in the Plan Area. This corresponds to the same period as the hiking season. Therefore, some lambing areas and core use areas may be bisected and fragmented by trails and will likely be impacted.

In Anza-Borrego Desert State Park, thousands of visitors hike up Palm Canyon to a permanent water source that serves a resident group of bighorn sheep. These sheep have persisted and have done relatively well in spite of the large amount of human traffic. Similar to the bighorns studied by Hamilton *et al*. (1982) in the San Gabriel Mountains, they inhabit the rugged terrain above the canyon floor where they can see approaching hikers below them. They almost never experience humans anywhere but the predictable locations on the canyon floor. In contrast, many trails in the Coachella Valley climb, "switch back", follow ridges, and connect with other trails, thus placing humans above bighorn sheep, bisecting their home ranges and core use areas, and allowing humans to surprise sheep. Since the trail system has already been constructed, and largely been in place for many years, the "treatment" has already occurred, and sheep have most likely already adjusted to the trail system.

The Trails Plan proposes an adaptive management approach with an initial emphasis on research in the early years of Plan implementation. To balance the high-risk approach of having trails open year-round, the Trails Plan includes thresholds, which if reached, require implementation of management actions aimed at quickly reducing human disturbance in bighorn sheep habitat. Once the trails-related research program is complete and analyzed, the Trails Plan will be revised to become a long-range Public Use and Trails Management Plan that is subject to revision at regular intervals. The Trails Plan consists of eight elements which are analyzed individually below.

Analysis of Trails Plan Elements

Element 1: Trails Open All Year

Element 1 of the Trails Plan calls for all trails to be open to public use during the research phase (approximately Plan Years 1-8), unless use levels are otherwise managed for research purposes. Our analysis of Trails Plan Element 1 begins with consideration of the distribution of trails relative to the distribution of bighorn sheep, the timing of disturbance relative to the bighorn sheep life cycle, the disturbance frequency and timing, and the nature of the effect.

Proximity and distribution of the action to the species
Recreational trails are widely distributed in the Coachella Valley. According to a GIS analysis conducted by the Service, the Plan Area contains 157 miles of trails specifically recognized in the proposed Plan within bighorn sheep Recovery Regions 1-4, and 195 miles of recognized trails outside bighorn sheep habitat. Additionally, 13 and 22 miles of new trails are proposed in Recovery Regions 2 and 3, respectively. The Recovery Plan listed the following 15 trails proposed for coverage in the Plan Area as having potential conflicts with bighorn sheep lambing areas and watering areas: North Lykken Trail, Skyline Trail, South Lykken Trail, Picnic Table Trail, Dunn Road, Murray Hill complex, Cathedral Canyon Trail, Mirage Trail, Art Smith and Shey Trail, Carrizo Canyon Trail, Bear Creek Canyon Trail, Boo Hoff Trail, Guadalupe Trail, and Morrow Trail. A partial inventory of trails by the BLM revealed numerous trails that were well-established, but previously undocumented, and therefore not included in the mileage calculations above. Take authorization is not provided for these unnamed and previously undocumented trails.

Timing of the effect relative to the species life cycle
Because of the extreme summer temperatures in the Coachella Valley, trail use is seasonal with most use occurring between November and May. This high-use period overlaps with the lambing season (January – June). As noted previously, bighorn ewes with lambs react much more severely to approaching humans than rams or ewe groups not accompanied by lambs.

Disturbance frequency and intensity
The extent to which human disturbance may influence lamb production and recruitment is a function of the amount, location and type of disturbance, as well as naturally fluctuating local environmental conditions. The effects of human disturbance on lamb production and recruitment are likely to be of greater magnitude in years of environmental stress, such as drought or high predation. Currently, it is difficult to anticipate the levels of trail use expected during the spring lambing season in Plan Years 1-9; however, it is likely that trail use will increase with an increase in human population.

Nature of the effect
In determining whether or not recreational use of trails (hiking, mountain biking, horseback riding) disturbs bighorn sheep, and if so, what the effects of this disturbance may be, it is first necessary to recognize the difficulty of answering these questions quantitatively. The difficulty is caused by at least three s: (1) the natural variability of bighorn sheep demographic parameters, (2) the multiple and confounding factors contributing to the variability in demographic parameters (e.g., climate, predation, disease, etc.), and (3) the expense and difficulty of conducting bighorn sheep field studies. The occurrence of habitat shifts by bighorn sheep in response to human disturbance in the Plan Area is likely, given the evidence of this type of reaction to recreational trail use by bighorn sheep in the northern Santa Rosa Mountains (Ostermann 2001) and other areas (Papouchis *et al*. 2001), and by other ungulates (Fairbanks and Tullous 2002). The amount of habitat potentially impacted by trails listed in the proposed Plan (11,159 acres) makes the management of the Trails system an important part of bighorn sheep conservation and recovery.

The Physiological Effect

The physiological effect of disturbance was originally described by Wehausen (1980) as the combined effects of the loss of energy in flight from humans, and the reduced ability of bighorn sheep to utilize available forage due to disrupted feeding patterns (Wehausen 1980). Because the physiological effects of disturbance also includes increased secretion of stress hormones (i.e., glucocorticoids; Moberg 2000. Because recreational trail use does not cause direct mortality of bighorn sheep, quantifying the effects of trail use on bighorn sheep will likely remain difficult for many years to come.

Element 2: Research Program

According to the Trails Plan, a research program to evaluate the effects of recreational trail use on Peninsular bighorn sheep within the Plan Area would be initiated during Plan Implementation Year 1. This research program would address the proximate response of bighorn sheep to recreational disturbance, as well as broader questions about population-level effects and impacts to the long-term persistence of bighorn sheep. A separate research program would focus on the effects of recreational trail use on captive bighorn sheep. Upon completion of the research programs, study results and management recommendations would be integrated into a revised public use and trails management program.

The research element is one of the most critical components of the Trails Plan because results from the research would determine the future trails management strategy. Hence, the future trails plan would be determined, in part, by the research study design, funding, personnel, and the quality of the research. Appropriate study design is a cornerstone of rigorous scientific research. To minimize negative impacts to bighorn sheep, the trails research program will be initiated in Plan Implementation Year 1 and that field research begin no later than Plan Implementation Year 2. The field component of the research will require many years, and subsequent data analysis would likely require a full year. Complete results and interpretations of the data would likely not be available for incorporation into a revised Trails Program until Plan Implementation Year 8 at the earliest, making it likely that a revised Trails Program would not be completed and implemented until Plan Implementation Year 10. Uncertainty exists concerning the effects of recreation on bighorn sheep within the Plan Area that further research should decrease.

Element 3: Monitoring of trail use and bighorn sheep

As described in the Plan, the monitoring program for the Trails Plan has two foci: humans and bighorn sheep. Monitoring of humans will involve quantifying recreational use of trails by hikers, equestrians, and mountain bikers on the trails of management concern in the Plan Area. Monitoring of bighorn sheep will involve quantifying the distribution, abundance, recruitment, survival, and cause-specific mortality of bighorn sheep in the Plan Area.

Overall, monitoring of humans and bighorn sheep is beneficial because it encourages data-supported trails management. To quantify human demand for the various trails and types of trail use, trails must remain open without restriction, which may cause disturbance in lambing habitat. Based on the Plan's description of human monitoring, we assume that a statistically valid monitoring protocol would be used and that useful data would be generated in a relatively short time frame. Monitoring human use of trails would be beneficial, so long as bighorn sheep are also monitored and emergency management actions (i.e., trail closures) are implemented when necessary.

Regarding bighorn sheep monitoring, the Plan calls for monitoring the distribution, abundance, recruitment, survival and cause-specific mortality, with intensified monitoring during the research phase of the Trail Plan. The Trails Management Subcommittee would rely on monitoring data to recommend changes to the trails management program and to implement emergency trail closures, if necessary. In addition, bighorn sheep distribution, abundance and survival data are necessary for adaptive management and the HANS process. According to the Plan, monitoring of bighorn sheep would be a cooperative effort involving CDFG, the Service, BLM, CVCC, and other partners, with funding provided by CDFG (to the extent possible) and CVCC.

Monitoring is a mandatory element of all HCPs (see 50 CFR 17.22(b)(1), 17.32(b)(1)). The Five-Point policy states that "The Services and the applicant must ensure that the monitoring program provides information to (1) evaluate compliance, (2) determine if biological goals and objectives are being met; and (3) provide feedback to an adaptive management strategy, if used." The Permittees will not only evaluate, but are also obligated to ensure compliance with the Plan and the Trails Plan. The Trails Management Committee, the Monitoring Manager and the CVCC will determine if the biological goals and objectives are being met, and there is a mechanism to adaptively manage the entire Plan area or subsections of it to meet the goals and objectives of the Plan.

Element 4: Hot Season Trail Closures

According to the Plan, three trails would be closed to recreational activities during the June 15 through September 30th hot season to minimize potential impediments for access to water by bighorn sheep and other wildlife. Compliance with the hot season closures would be evaluated as part of the human use monitoring described in Element 3. Hot season trail closures are a management measure being taken to avoid and minimize impacts to bighorn sheep. Permittees with jurisdiction over trails will be responsible for implementing and enforcing closures identified in the Trails Plan.

The hot season (June through September) is considered the most physiologically stressful season for adult desert bighorn sheep due to environmental conditions. Water sources are limited during the heat of the summer. Human disturbance must be minimized near water sources during the summer if bighorn sheep are to have unimpeded access to water during this critical period (Jorgensen 1974). The Trails Plan closes the three trails that are near water sources to recreational activities between June 15 and September 30 of each year to avoid potential impediments for access to water for bighorn sheep. With the assumption that trail closures would be enforced as necessary and would therefore be effective, Element 4 of the Trails Plan adequately avoids and minimizes recreational impacts to bighorn sheep during the summer water stress period.

Element 5: Construction of New Trails

According to the Plan, proposed new trails consist of perimeter trails and the Palm Desert to La Quinta Connector Trail. Results from separate research programs, in conjunction with the most recent scientific literature, would be used to determine whether perimeter trails and the Connector Trail would negatively impact free-ranging and captive bighorn sheep. Research on

free-ranging sheep is not directly applicable to captive bighorn sheep, or vice-versa. The effects of recreation on captive bighorn sheep are likely to differ from the effects on free-ranging sheep. As discussed under Element 1 above, the physiological effect is more likely to occur with captive bighorn sheep than with free-ranging bighorn sheep.

The Plan provides general guidelines for perimeter trails, which include that perimeter trails should rise no more than 200 feet above the toe of the slope except where necessary to avoid developed areas or topographically inaccessible terrain. According to the Plan, construction of new trails in the Plan Area would only occur if research results indicate that the proposed trails would not adversely affect bighorn sheep. The Plan allows for the construction of perimeter trails even if research demonstrates that three of the four population parameters being monitored would be negatively impacted by perimeter trails. A permit condition has been created to clarify and modify these statements in the Plan. If study shows that recreational use of the Palm Desert to La Quinta Connector Trail would not adversely impact free-ranging or captive populations of bighorn sheep, construction of the primary and alternative access trails may be initiated after completion of the proposed research programs (Element 2). A Permit Condition further restricts the possibility of the installation of the Palm Desert to La Quinta trail by requiring research on captive sheep and permission of the Bighorn Institute to conduct captive research.

Element 6: Public awareness and education

Assuming that correct and up-to-date information is disseminated, no adverse effects to bighorn sheep are expected to result from Element 6 of the Trails Plan. The public awareness and education component of the Trails Plan is anticipated to aid compliance with the Trails Plan, and to benefit conservation efforts for Peninsular bighorn sheep. For recreation management, education and awareness are tools used to direct or redirect use and to assist in creating an awareness and respect for wildlife. It is anticipated that this will have a positive benefit for the sheep.

Element 7: Review of trails program

The Trails Management Subcommittee would annually review the effectiveness of the public use and trails management program. Information to be reviewed annually would include progress reports and recommendations from the researcher(s) working on bighorn sheep within the Plan Area; an assessment of bighorn sheep population trends; recreational trail use data; compliance with the hot season closures, mandatory self-issue permits and trail management prescriptions; and other new data acquired. The Subcommittee would make recommendations to the RMOC and Santa Rosa and San Jacinto Mountains National Monument Advisory Committee regarding modifications to the public use and trails management program.

Should any changes be necessary to the Trails Plan based on status of the sheep population, Plan research or other research, changes will be made to the Trails Plan. The ability of the Trails Plan to minimize and mitigate impacts to bighorn sheep over the 75-year life of the permit is accomplished through baseline triggers for management action, should sheep reach certain population levels, focused research on key questions that will help define future management, and species specific and conservation area goals and objectives and adaptive management based on the research.

Element 8: Rerouting and decommissioning of trails

The proposed Trails Plan lists several trails that may be rerouted to avoid disturbance to wildlife, although there are no timelines for action. The Plan also lists trails that may be decommissioned and removed if their use is determined to be detrimental to wildlife. To minimize and mitigate impacts the maximum extent practicable, permit conditions have been added to address concerns.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, tribal, local, or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

Future activities by non-permittees also would be considered cumulative effects. Incidental take of listed species by non-permittee actions in the future could be authorized separately under section 10 or section 7 of the Act.

The Bureau of Land Management is an active manager of recreational trail use in the Coachella Valley. A separate biological opinion for the BLM Trails Plan will be issued.

The Agua Caliente Band of Cahuilla Indians is undertaking a Habitat Conservation Plan for all of their Tribal lands. The draft Plan and associated documents have been reviewed publicly. It is anticipated that the final Plan and associated environmental analysis will be complete in mid-2008 with permit issuance scheduled for late 2008. Although there will be habitat loss associated with that Plan, the overall net benefit to the species is positive.

The number of illegal immigrants entering the U.S. from Mexico continues to increase. Some of these immigrants travel through the Peninsular Ranges and camp at water sources where they may occasionally kill and consume bighorn sheep, or displace them. Customs and Border Protection is also increasing its activity along the border and in the southern Peninsular Ranges. Consequently the level of human activity in the area is increasing. This scenario may cause bighorn sheep to avoid areas they once utilized and may potentially sever bighorn sheep population connectivity between the United States and Mexico. In addition, the U. S. is planning to construct an intermittent fence along the border, and the design of the fence will prevent the movement of large mammals, as well as humans. The locations of the constructed portions will likely funnel immigrants into the Jacumba Mountains increasing the number of immigrants traversing these mountains to enter the United States.

Overall, we do not anticipate that the various cumulative effects that may occur over the life of the Permit would alter the conclusion of this opinion for Peninsular bighorn sheep because underlying take prohibitions under the Act in many cases would require separate take authorization for non-Covered Activities. If this assumption proves false, we anticipate that the Permittees would cooperate with the Service to amend the Plan or otherwise devise regulatory mechanisms that would ensure achievement of the goals and objectives of the Plan.

SUMMARY OF EFFECTS

Major threats to bighorn sheep include the encroachment of development and associated human

use and edge effects into or near year-round, seasonal, and lamb rearing habitats, as well as essential hot weather water sources. Development proposed within Conservation Areas with bighorn sheep habitat will be subject to rigorous analysis by the Permittees and Wildlife Agencies. Most areas are subject to the Habitat Evaluation and Acquisition Negotiation Strategy (HANS) process (Section 6.6.1.2). Land Use Adjacency Guidelines (Section 4.5) establish parameters by which potential impacts to sheep and their habitat will be judged. These include adverse alterations to natural drainages, introduction of toxic or hazardous materials, light and noise, and the introduction of toxic and invasive Plants. Trails will be managed based on sheep and human interaction research and trails or trail use will be modified as necessary to protect sheep.

The Goals and Objectives applied to bighorn sheep in the Plan provide for the continued acquisition of the full range of sheep habitat necessary to assure their persistence and recovery. The avoidance, minimization and mitigation measures set forth in the Plan would also address potential future threats from development, as would the aforementioned Land Use Adjacency Guidelines of the Plan. These measures are designed to avoid habitat fragmentation, maximize linkages to avoid genetic isolation, and provide for an Adaptive Management program.

The Plan provides a number of Required Measures for the Conservation Areas and special provisions in Section 4.4, Required Avoidance, Minimization, and Mitigation Measures, which protect bighorn from disturbance in the lambing season and from poisonous plants. The prohibition on invasive plant species (Section 4.5, Table 4-113) should also benefit bighorn and their habitat.

The Species Objectives for bighorn sheep (Section 9.8.4.1) include ensuring that implementation of the Plan is consistent with the recovery strategy described in the Recovery Plan to the maximum extent Feasible. Conservation Objectives for two of the three Conservation Areas overlapping the recovery units address conservation of bighorn habitat (Sections 4.3.3, 4.3.21). The Plan imposes measures that help implement the recovery strategy in other ways, including areas where special provisions are required, and stipulations on certain Permittees and projects, such as CVWD and the widening of East Palm Canyon Drive (Sections 7.2.2, 7.3.1).

The Plan also clearly addresses the individual recovery units containing separate ewe bands in the discussion of the San Jacinto/Santa Rosa Mountains Conservation Area. This level of detail shows close consistency with the recovery strategies described in the Recovery Plan.

Critical Habitat Summary
Critical Habitat is designated over a large area of the Santa Rosa and eastern San Jacinto Mountains, from the undeveloped alluvial fans and toe of slope up to the mid elevations. Very little of the designated or proposed critical habitat for bighorn sheep in the Plan would be lost. Plan Table 4-114 indicates that less than 3% of the total habitat in the Plan Area would be subject to loss. Of the remaining acres to be conserved, Complementary Conservation would account for a portion, as the state and Federal governments would acquire an additional 21,850 acres (Section 4.2.2.1), many of which will likely be in bighorn sheep designated or proposed critical habitat. The PCEs, although affected in some areas, are protected in over 90% of the habitat. None of the PCEs are compromised to a point where the ecological function is lost. On

the contrary, the Plan ensures the long-term protection of the habitat and the protection and enhancement of the PCEs.

CONCLUSION
After reviewing the current status, environmental baseline, effects of the proposed action, and cumulative effects, it is our opinion that the issuance of an Incidental Take Permit to the Permittees under the Coachella Valley MSHCP is not likely to jeopardize the continued existence of the Peninsular bighorn sheep nor will it adversely modify designated or proposed critical habitat. Several proposed permit conditions strengthen wording in the Plan and clarify triggers and management actions needed to ensure this conclusion. The proposed permit conditions, in combination with the implementation of the MSHCP, including all conservation measures, land use adjacency guidelines, monitoring and adaptive management identified therein, is expected to provide for the conservation of the species in the Plan Area over the permit term.

AMOUNT OR EXTENT OF TAKE
It is currently impossible to quantify the number of Peninsular bighorn sheep that would be impacted as a result of the proposed action over the 75-year permit term due to the large size of the Plan Area and the ongoing recovery of the species. Therefore, the Service is quantifying the take as the number of acres of modeled habitat that would be impacted in the proposed Plan Area as a result of the proposed action. We anticipate that up to 6,533 acres of modeled habitat within the Plan Area (2,666 acres outside of the Conservation Areas and 3,867 acres inside the Conservation Areas) could become unavailable as a result of the proposed action. Finally, a small, but undeterminable, number of Peninsular bighorn sheep are anticipated to be taken as a result of monitoring and management actions.

Permit Conditions
The CVCC, after coordination with its Implementation Manual Subcommittee, shall provide the Implementation Manual for review and concurrence by the Wildlife Agencies prior to its finalization and distribution to the Permittees.

The CVCC shall work with the appropriate Permittees to implement the Trails Plan and the conditionally compatible uses identified in Section 7.3.4 of the Plan, consistent with Section 13.2 (A) of the IA.

Should CDFG, Service, or BLM be unable to provide funds or personnel to the bighorn sheep monitoring program as described in the Plan, the CVCC shall ensure that the population level monitoring identified as necessary in Section 7.3.3.2.1 Element 3, including the hiring of qualified personnel, is conducted and is consistent with the budget as described in Section 8.8.3 of the Plan. Any changes in the scope, extent or frequency of this monitoring shall be developed jointly among the CVCC and the Wildlife Agencies.

In coordination with the Wildlife Agencies, all capture and handling of bighorn sheep shall be conducted in accordance with State of California regulations and applicable Federal permit requirements. This Permit does not authorize the Permittees or their agents to capture or handle bighorn sheep.

Consistent with section 7.3.3.2, if a ewe group or subgroup of bighorn sheep (as identified in Tables 7-12 and 7-13 of the Plan), drops below 15, the CVCC shall convene a meeting of the Trails Management Subcommittee, RMUC, and appropriate researchers within 30 days of notification by CDFG or Service of the population estimate. The group shall review data and develop management actions to address further declines in adult female abundance. The RMOC shall forward a recommendation within 30 days of the initial meeting to the CVCC for a decision so that implementation of appropriate management actions can commence within the following 30 days consistent with State and Federal regulations. If the population estimate indicates that a ewe group has 5 or fewer adult females, immediate management action (including but not limited to trail rerouting, adjustments in use levels, enforcement actions, and/or trail closures) to address the decline and/or reduce potential stress to the sheep population as described in Section 7.3.3.2 of the Plan shall be taken within 3 days. Concurrent with any action taken, CVCC shall initiate the process described above to identify long-term management action to address this condition.

Development of the Request for Proposals (RFP) for trails research and selection of contractors shall be by qualified representatives from the Wildlife Agencies, CVCC, BLM, and outside objective reviewers. The Service, CDFG, CVCC, and BLM shall be limited to one member each, and three outside reviewers shall be chosen by the consensus of the agency representatives. The seven-member group must reach agreement on the selection of the research design and contractor(s) to conduct research on the effects of recreational trail use on bighorn sheep. The above group shall (1) oversee implementation of the research program in coordination with the RMUC for the Santa Rosa and San Jacinto Mountains Conservation Area and the Trails Management Subcommittee, (2) provide advice and guidance on issues that arise during the field phase of the research, and (3) provide review of draft reports and articles. The selected researcher shall provide the review panel with semi-annual oral/written reports.

If the portion of the proposed Palm Desert to La Quinta Connector Trail between the Visitor Center and the Living Desert is pursued, it shall be reviewed jointly by the CVCC and Wildlife Agencies after the trails research program on the effects of recreational trail use on wild sheep and additional research evaluating the effects of the Connector Trail on captive sheep located at the Bighorn Institute are completed. Research evaluating the effects of the Connector Trail on captive sheep located at the Bighorn Institute is required for construction of the Connector Trail to be considered a Covered Activity. The research program evaluating the effects of the Connector Trail on captive bighorn sheep shall be conducted subsequent to the research program involving wild sheep. Research on the captive sheep is contingent upon obtaining the full cooperation of the Bighorn Institute.

Following completion of the trails research program, construction of the proposed perimeter trails listed under the Trails Plan could occur if research results demonstrate that expected future recreational use of these proposed trails is not likely to adversely impact the health, demography, population sustainability, and population connectivity of Peninsular bighorn sheep.

Any new trail within the perimeter trail corridor running along the east side of the Santa Rosa Wilderness from Coral Mountain Regional Park to Martinez Canyon shall be limited to the

identified trail corridor. Any new trail branching from this identified corridor that would enter bighorn sheep habitat would require a Minor Amendment requiring Wildlife Agency concurrence as described in Section 6.12.3 of the Plan.

The Trails Management Subcommittee shall evaluate and prioritize for decommissioning, all trails, paths, routes, or ways on Reserve Lands within the Santa Rosa and San Jacinto Mountains Conservation Area not specifically authorized in the Trails Plan within 5 years of Permit issuance. State and Federal regulatory processes must be completed and a final decision about trails to be decommissioned will be made by year 10 as part of the Trails Plan. Trails not currently authorized that are being considered for inclusion in the Trails Plan shall be treated the same as proposed new trails requiring the Minor Amendment process for authorization. All trails, paths, routes, or ways not given authorization under the Minor Amendment process shall be decommissioned and removed by the CVCC or appropriate Permittee in coordination with the land owner and the affected state and federal land management agencies no later than Plan Year 15. All unauthorized trails, routes, paths, or ways on lands acquired post Permit issuance shall be decommissioned within 3 years of parcel acquisition or detection of any unauthorized trails/paths/routes/ways. Should these timeframes not be met, the CVCC and the Wildlife Agencies shall meet to determine appropriate actions. Should any trails be illegally created between permit issuance and the decommissioning of trails, the CVCC shall coordinate with the Permittees and the appropriate state and federal land management agencies to assure removal of the trail.

Upon completion of the trails research program described in Element 2 of the proposed Trails Plan (Section 7.3.3.2), the Trails Management Subcommittee, RMUC, and RMOC shall develop a trails management plan to be implemented by Plan Year 10. Should these timeframes not be met, the CVCC and the Wildlife Agencies shall meet to determine appropriate actions. The revised public use and trails management plan shall be based on results from the research program (Element 2 of the Trails Plan), abundance levels of bighorn sheep, and the best available science, in addition to professional judgment and wildlife conservation principles where study results are less than definitive. Implementation of the public use and trails management plan for the portions of trails on non-federal land, shall be subject to the review and approval by the RMOC, of which the Wildlife Agencies are members. The resolution process related to the development and implementation of the Trails Plan through the RMOC shall not limit the Wildlife Agencies ability to ensure the Trails Management Plan is in compliance with the Plan, IA, and Permits.

For the parcels shown in Figure 4-26e (1, 2, 3, and 4) of the Plan, the HANS process shall be applied prior to Joint Project Review Process. Criteria for the HANS Process shall be developed by the Wildlife Agencies and CVCC in consultations with the affected Permittees within 6 months of Permit issuance incorporating an analysis regarding known core use areas, home ranges, water sources, escape terrain, lambing and rearing habitat, seasonally important foraging areas, or movement/dispersal zones that shall be completed to minimize adverse effects to these resources. These criteria shall be included in the Implementation Manual. In the interim, prior to the adoption of these criteria, CVCC shall jointly analyze projects with the affected Permittees and the Wildlife Agencies.

In Peninsular bighorn sheep habitat, the CVCC shall assist Permittees to identify adopted policies or other options to locate and/or consolidate future development within Conservation Areas adjacent to existing development areas. Options identified shall be considered during the HANS and Joint Project Review Process. These options may include but are not limited to Transfers of Development Rights, Purchases of Development Rights, and Conservation Easements in order to provide for consolidation of development to ensure large intact blocks of bighorn sheep habitat. CVCC shall facilitate efforts across jurisdictions to maximize conservation of sheep habitat. This shall be an ongoing effort by the CVCC and the affected Permittees to meet the species conservation goals and objectives for bighorn sheep. Analysis to be used for these options shall include the following: bighorn sheep home ranges, core use areas, movement and dispersal zones, changing environmental conditions, and essential resources, including escape terrain, foraging areas, lambing and rearing habitat, habitat connectivity, water sources, and space for population expansion.

The Service shall participate fully in the RMUC for the Santa Rosa and San Jacinto Mountains, Snow Creek/Windy Point, and Cabazon Conservation Areas regarding discussions and recommendations that could affect bighorn sheep.

Palm Hills Specific

Any future project that occurs in the Palm Hills Special Provisions area, including access from East Palm Canyon Drive and internal circulation, shall comply with the Plan, IA, Permit and Special Permit Terms and Conditions and will be considered a Covered Activity. All mitigation identified in the Plan regarding the Palm Hills project is retained as part of the conservation commitment in the Plan. The applicable Permittee shall ensure that all portions of the project, including any golf course or portions of the golf course, will be located north of Eagle Canyon and no closer than one quarter mile to the water source located in Eagle Canyon (Section 31 T4S R4E). The extension of any road across or south of Eagle Canyon and any improvements to and/or the maintenance of the Dunn Road are not Covered Activities under the Plan and shall not be considered as a Minor Amendment.

Shadowrock Specific

a. The overall footprint of the Project shall not exceed 288 acres and shall conform to the "development area" depicted in Figure 4-26(e)(1)(A) including all on-site and off-site utility and street infrastructure improvements necessary to serve the Project.
b. Establish conservation easements in form substantially similar to the Model Conservation Easement, (as that form may be amended) over specific lands identified on Figure PBS-5 to create a PBS wildlife corridor across Chino Canyon. Corridor will include constructed escape terrain to facilitate PBS movement as described in [s] below. Easements must be implemented before grading permits may be issued for the Project. If easements not obtained in time, line demarcating take authorization will revert to original reasonable and prudent alternative location from the 1998 Conference Biological Opinion.
c. Prior to issuance of grading permits for the Project, all land in Sections 5, 8, and 9 owned by the City of Palm Springs and/or the City of Palm Springs' Parks, Open Space, and Trails (POST) fund as of October 22, 2005, including the land in the Mountain Falls area lease, must be permanently protected for PBS conservation purposes through a conservation easement to the CVCC, in a form substantially similar to the Model Conservation Easement,

as that form may be amended, that guarantees conservation in perpetuity and precludes the possibility of constructing golf courses, new trails, or other facilities.

d. At the north and south ends of the wildlife corridor, the Project Proponent shall install artificial water sources for the PBS, with the design to be reviewed and approved by the Permittee who shall provide the Wildlife Agencies an opportunity to comment.
e. The Project proponent shall work with the appropriate entities to design and implement a transportation plan that establishes a shuttle service for the Tramway. The transportation plan shall be reviewed and approved by the Permittee, who shall provide the Service an opportunity to comment. The Project shall have the ongoing obligation to minimize traffic on Tramway Road for the life of the Project.
f. The security gates for the proposed Project on Tramway Road shall be installed outside and downslope of the Wildlife Corridor. Currently, the Winter Park Authority closes the existing security gate to the Palm Springs Aerial Tramway facility (tram) near Highway 111 at 10 p.m. each night to prevent unauthorized use of Tramway Road. The Project proponent has agreed with the Winter Park Authority that the guard at the Project site entry gate shall move down to the tram gate at 10 p.m. to control road access. The guard shall return to the Project gate when the Tramway Road reopens at 6 a.m. daily. The Project proponent shall build a gatehouse to provide shelter for the guard at that location. No other gates are contemplated.
g. A vegetation management plan for the riparian area in the wildlife movement corridor, depicted in Figure 4-26e(1)A on Shadowrock land and on the land described in (1)c must be developed by the Project proponent, in cooperation with the City of Palm Springs, and approved by the Wildlife Agencies prior to issuance of grading permits. The vegetation management plan shall include the modification of riparian habitat, necessary to facilitate the wildlife corridor, off-setting measures to ensure no-net loss as described in the Plan, and any modifications to the small cliff along the edge of the riparian area to facilitate sheep movement across the corridor.
h. The planting of toxic plants, such as oleander, nightshade species, and various *Prunus* sp., shall be prohibited within the proposed Project boundaries in perpetuity. Landscaping crews shall be trained in identifying these plants and shall remove them upon sighting.
i. Any artificial water features associated with the proposed Project shall be designed to preclude shallow, vegetated edges that provide breeding habitat for Culicoides midges, an invertebrate disease vector for the bluetongue virus, a disease of bighorn sheep. This requirement applies for the life of the Project.
j. The entire developed portion of the Project site shall be fenced and maintained in perpetuity to preclude PBS access to the development area. The fence shall be 8 feet high from its footings and shall not contain gaps larger than 4 inches so as to prevent entanglement of bighorn sheep. In addition, berms, vegetative hedges, or such other design features as the Permittee may require shall be established along the entire length of the Wildlife Corridor to preclude the visibility of activities on the project site to PBS and to encourage the PBS use of the wildlife corridor. The final fence plan, and any exceptions to the specified installation or location, shall be reviewed by the Service.
k. The Project proponent shall deposit into a fund of a 501 (c)(3) as designated by the Service the amount of $500,000 at the commencement of project vertical construction to be used for listed species conservation purposes to be determined by the Service.
l. The Project proponent shall ensure that 1 percent of the gross proceeds from the sale of all retail goods within the hotel stores at the Project be deposited annually into an interest-

bearing account, with an entity to be determined by the Service, for the life of the Project; these funds shall be used for listed species conservation purposes at the sole discretion of the Service. The Service will have sole discretion over these funds and a written legal instrument shall be provided to assure this. In the event a hotel is not built, one percent of the total building valuation (computed using the latest building valuation determined in the manner provided in PSMC Sec. 3.37.070(d) as may be amended from time to time) of the Project shall be deposited in an interest bearing account for the purposes described above prior to the issuance of occupancy for each phase of the Project as approved by the Permittee.

m. The Project Proponent shall collect and deposit into an escrow fund of a 501 (c)(3) as designated by the Service and shall disperse at the direction of the Service all funds generated from all project-related sources from the Project for listed species conservation purposes. The contract shall require that the Project Proponent, and any successors and assigns, provide the specified services herein in perpetuity. The Project Proponent shall bear any of the administrative costs of this condition.
n. No mass grading shall occur within 100 feet of the Chino Creek riparian area from March 15 through September 15 within the Project site. For any construction work performed within the area specified in this paragraph during the period of March 15 through September 15 of a given year, the Project proponent shall install sound attenuation devices or implement measures, so as to minimize noise impacts on the Least Bell's Vireo by reducing sound levels below 60 dBA.
o. Any Project fill material to be imported shall only come from off-site borrow areas permitted by local, State and Federal governmental agencies. The Project proponent shall notify the Service as to where and when fill material will be obtained prior to importation, so that the Service can determine whether listed species could be adversely affected and any incidental take has been properly authorized.
p. If new water wells are developed by the Project proponent on the site, they shall comply with the restrictions established by the Permittee. The restrictions require that wells, if any, be located at least 5,000 feet downhill from the cienega west of the Project site.
q. No vertical construction activities or facilities shall occur within a minimum 100-foot setback from the Chino Creek riparian corridor within the Project site.
r. No rock crushing shall take place within 500 feet of the Chino Creek riparian area on the Project site.
s. A biological resources monitor shall be onsite during construction of the Project. The duties of the biological resources monitor shall include, but are not limited to: conducting desert tortoise clearance surveys per the Service's protocol; directing where to install temporary fencing that avoids sensitive areas such as the riparian habitat; and conducting an education program for the construction crew regarding sensitive habitat and listed species. The monitor shall have the authority to stop construction activities, if necessary, to ensure compliance with any of the conservation measures discussed herein.
t. A special lighting system shall be installed within the Project site to ensure to the extent feasible, that light does not "spill over" into the Chino Creek riparian area, PBS habitat, and other natural habitats surrounding the site. The lighting system shall include low-set lighting and shields that prevent artificial light sources from shining directly into natural habitat areas to minimize disturbance to and vulnerability of listed species to increased predation. Any golf driving range shall be limited to use during daytime hours only with no lights installed for night-time usage.

u. No construction-related activities, involving blasting and/or use of equipment that produces noises or sounds louder than 90 dbA at the source shall occur between January 1 through June 30 of any year, to address, in part, the adverse impacts of construction during the PBS lambing season.

v. The Permittee shall work with the Mt. San Jacinto Winter Park Authority and the Service to reduce potential sheep mortality due to collisions with vehicles along Tramway Road and to enhance the currently reduced movement corridor for PBS across Chino Canyon, which is restricted due to current and Project-related traffic levels. To the extent that a hotel is constructed on site, the Project proponent shall establish a shuttle service that ferries people from the Project site to the tram for the life of the Project. The speed of the traffic on the road shall be limited to 25 miles per hour and signs shall be posted reminding drivers of the presence of PBS in the area for the life of the Project. Within the wildlife corridor, traffic speeds shall be limited to 5 mph for the life of the Project. In addition, the area where people are picked up and dropped off shall be consolidated in the immediate vicinity of the tram. The Project proponent shall enter into a legally enforceable agreement with the Desert Water Agency, Mount San Jacinto Winter Park Authority, Service, and any other necessary parties, which includes construction and operation of a gate system that effectively prohibits all human access along Tramway Road within the designated movement corridor, other than for operation and maintenance of the Palm Springs Aerial Tramway and Tramway Road, and for access to all landowners within and uphill of the designated movement corridor that require access to their properties, including the California Department of Parks and Recreation, California Department of Fish and Game, U.S. Forest Service, and BLM. The Project proponent shall also enter into an agreement with the Tram Authority, and any other affected parties to establish a coordinated shuttle system for all recreational visitors to the tramway that minimizes traffic through the wildlife corridor.

w. An education program, to be reviewed and approved by the Service, shall be developed and implemented for clients and residents of the Project for the life of the Project that provides information on the status, sensitivity, and conservation needs of the bighorn sheep.

x. The Project proponent shall not object to actions that the Permittee or CVCC may require to facilitate the use of the wildlife corridor. Such actions may include the construction of road improvements to avoid and minimize adverse effects on PBS caused by traffic, a crossing for sheep usage, or sheep augmentation within the San Jacinto Mountain range.

y. The need for escape terrain will be evaluated in conjunction with the environmental analysis to be conducted with any project entitlement. If improvements to facilitate escape terrain are identified as needed pursuant to the environmental analysis, the Project proponent shall be responsible for such improvements.

z. In the event the Permittee or CVCC determine that sheep do not use the designated wildlife corridor, the Permittee may require Project Proponent to implement additional measures to facilitate sheep movement through or around the project to ensure continued connectivity.

aa. The development of the Project shall be located solely within the Development Area depicted on Figure 4-26e(1)(A) (excluding required access and off-site infrastructure improvements) or such smaller area therein as the Permittee requires pursuant to the Permittee's adopted plans and policies or as the Permittee determines is necessary or appropriate to accommodate sheep movement as provided in Item z above. The construction of all on-site and off-site utility and street infrastructure improvements below and east of the Project site necessary to serve the Project shall be consistent with the other requirements of this condition and of the

CV MSHCP.

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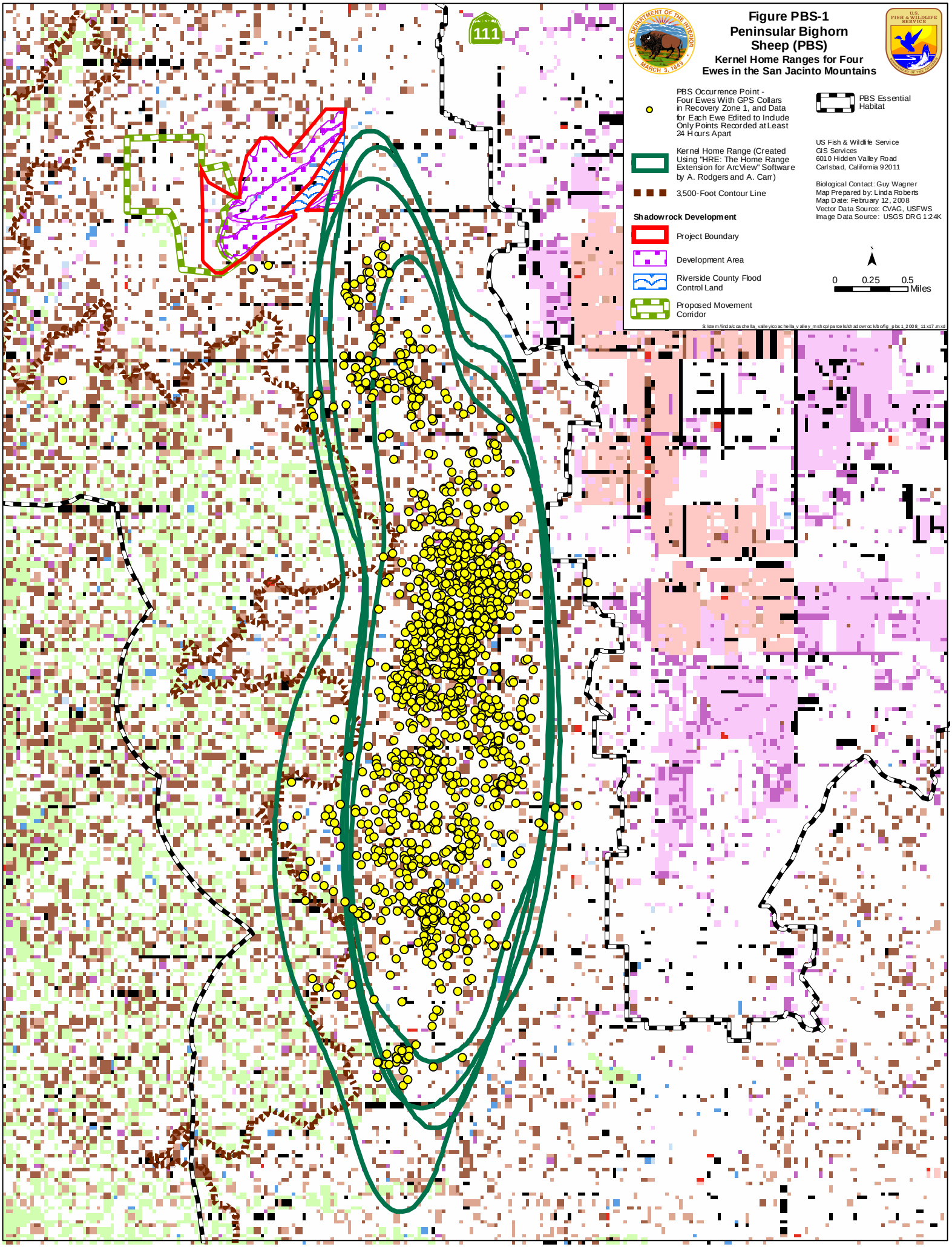
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Figure PBS-1
Peninsular Bighorn Sheep (PBS)
Kernel Home Ranges for Four Ewes in the San Jacinto Mountains
PBS Occurrence Point - Four Ewes With GPS Collars in Recovery Zone 1, and Data for Each Ewe Edited to Include Only Points Recorded at Least 24 Hours Apart
Kernel Home Range (Created Using "HRE: The Home Range Extension for ArcView" Software by A. Rodgers and A. Carr)
3,500-Foot Contour Line
PBS Essential Habitat
Shadowrock Development
Project Boundary
Development Area
Riverside County Flood Control Land
Proposed Movement Corridor
US Fish & Wildlife Service
GIS Services
6010 Hidden Valley Road
Carlsbad, California 92011
Biological Contact: Guy Wagner
Map Prepared by: Linda Roberts
Map Date: February 12, 2008
Vector Data Source: CVAG, USFWS
Image Data Source: USGS DRG 1:24K
0 0.25 0.5 Miles
S:\stem\final\coachella_valley\coachella_valley_mshcp\parcels\shadowrock\fig_pbs1_2008_11x17.mxd

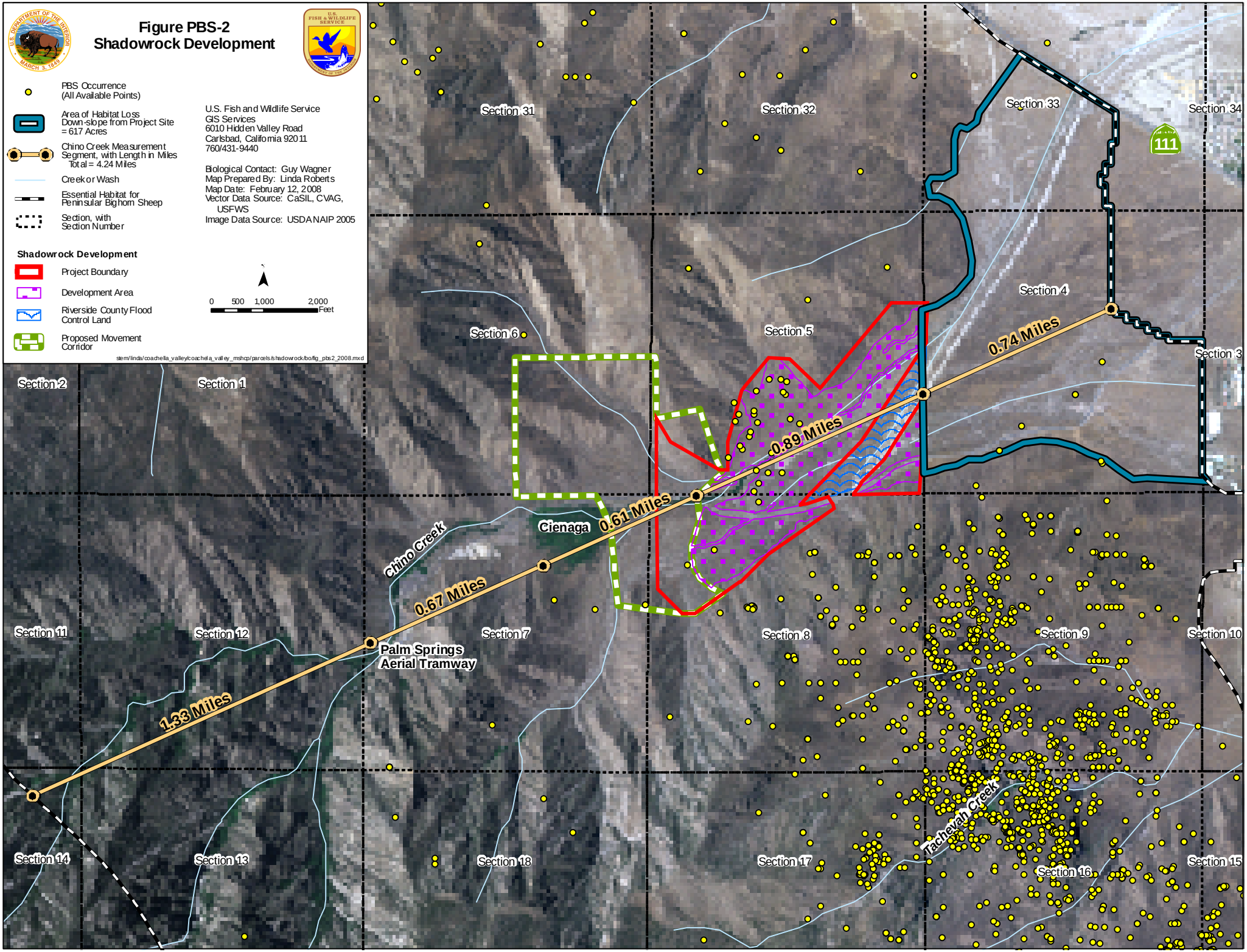
Figure PBS-2
Shadowrock Development
PBS Occurrence
(All Available Points)
Area of Habitat Loss
Down-slope from Project Site
= 617 Acres
Chino Creek Measurement
Segment, with Length in Miles
Total = 4.24 Miles
Creek or Wash
Essential Habitat for
Peninsular Bighorn Sheep
Section, with
Section Number
Shadowrock Development
Project Boundary
Development Area
Riverside County Flood
Control Land
Proposed Movement
Corridor
U.S. Fish and Wildlife Service
GIS Services
6010 Hidden Valley Road
Carlsbad, California 92011
760/431-9440
Biological Contact: Guy Wagner
Map Prepared By: Linda Roberts
Map Date: February 12, 2008
Vector Data Source: CaSIL, CVAG, USFWS
Image Data Source: USDA NAIP 2005
0 500 1,000 2,000 Feet
stem/linda/coachella_valley/coachella_valley_mshcp/parcels/shadowrock/bo/fig_pbs2_2008.mxd
Section 31
Section 32
Section 33
Section 34
111
Section 4
Section 6
Section 5
Section 3
0.74 Miles
0.89 Miles
Section 2
Section 1
0.61 Miles
Cienaga
Chino Creek
0.67 Miles
Section 11
Section 12
Section 7
Section 8
Section 9
Section 10
Palm Springs
Aerial Tramway
1.33 Miles
Tachevah Creek
Section 14
Section 13
Section 18
Section 17
Section 16
Section 15

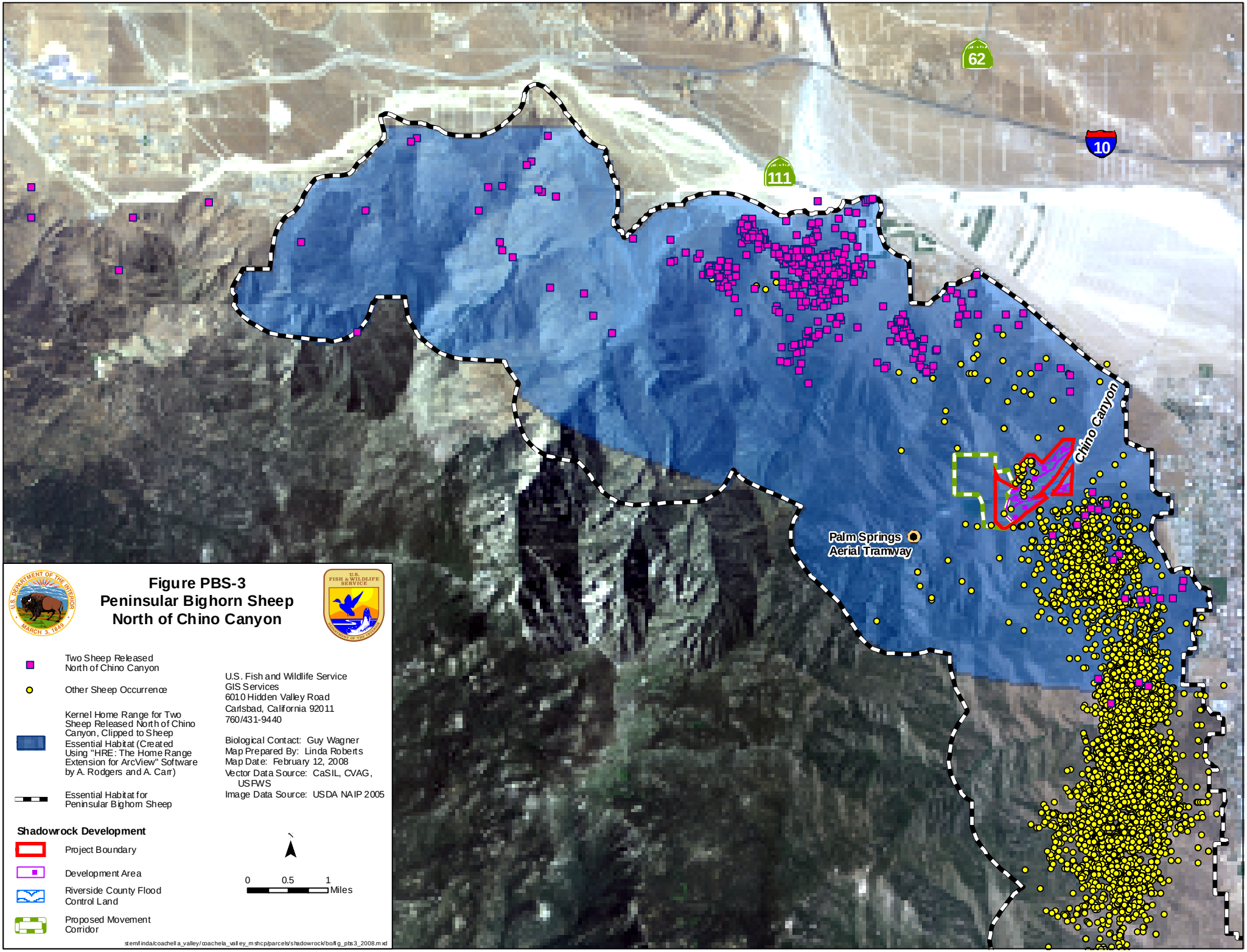

Figure PBS-3
Peninsular Bighorn Sheep
North of Chino Canyon

Two Sheep Released North of Chino Canyon

Other Sheep Occurrence

Kernel Home Range for Two Sheep Released North of Chino Canyon, Clipped to Sheep Essential Habitat (Created Using "HRE: The Home Range Extension for ArcView" Software by A. Rodgers and A. Carr)

Essential Habitat for Peninsular Bighorn Sheep

Shadowrock Development

Project Boundary

Development Area

Riverside County Flood Control Land

Proposed Movement Corridor

U.S. Fish and Wildlife Service
GIS Services
6010 Hidden Valley Road
Carlsbad, California 92011
760/431-9440

Biological Contact: Guy Wagner
Map Prepared By: Linda Roberts
Map Date: February 12, 2008
Vector Data Source: CaSIL, CVAG, USFWS
Image Data Source: USDA NAIP 2005

0 0.5 1 Miles

stem\linda\coachella_valley\coachella_valley_mshcp\parcels\shadowrock\bo\fig_pbs3_2008.mxd

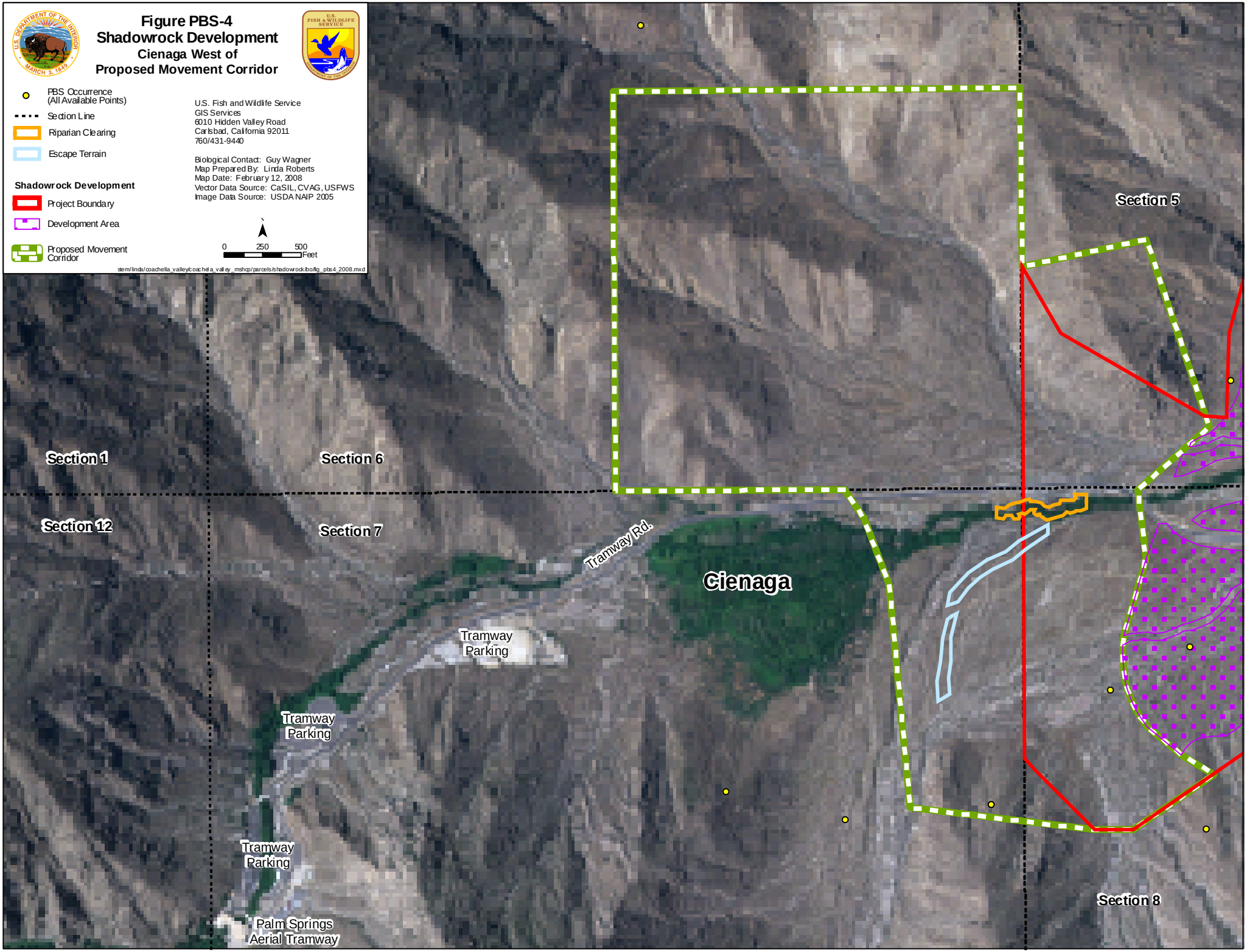
Figure PBS-4
Shadowrock Development
Cienaga West of
Proposed Movement Corridor
PBS Occurrence
(All Available Points)
Section Line
Riparian Clearing
Escape Terrain
Shadowrock Development
Project Boundary
Development Area
Proposed Movement
Corridor
U.S. Fish and Wildlife Service
GIS Services
6010 Hidden Valley Road
Carlsbad, California 92011
760/431-9440
Biological Contact: Guy Wagner
Map Prepared By: Linda Roberts
Map Date: February 12, 2008
Vector Data Source: CaSIL, CVAG, USFWS
Image Data Source: USDA NAIP 2005
0 250 500
Feet
stem/linda/coachella_valley/coachella_valley_mshcp/parcels/shadowrock/bo/fig_pbs4_2008.mxd
Section 1
Section 6
Section 5
Section 12
Section 7
Section 8
Tramway Rd.
Cienaga
Tramway
Parking
Tramway
Parking
Tramway
Parking
Palm Springs
Aerial Tramway

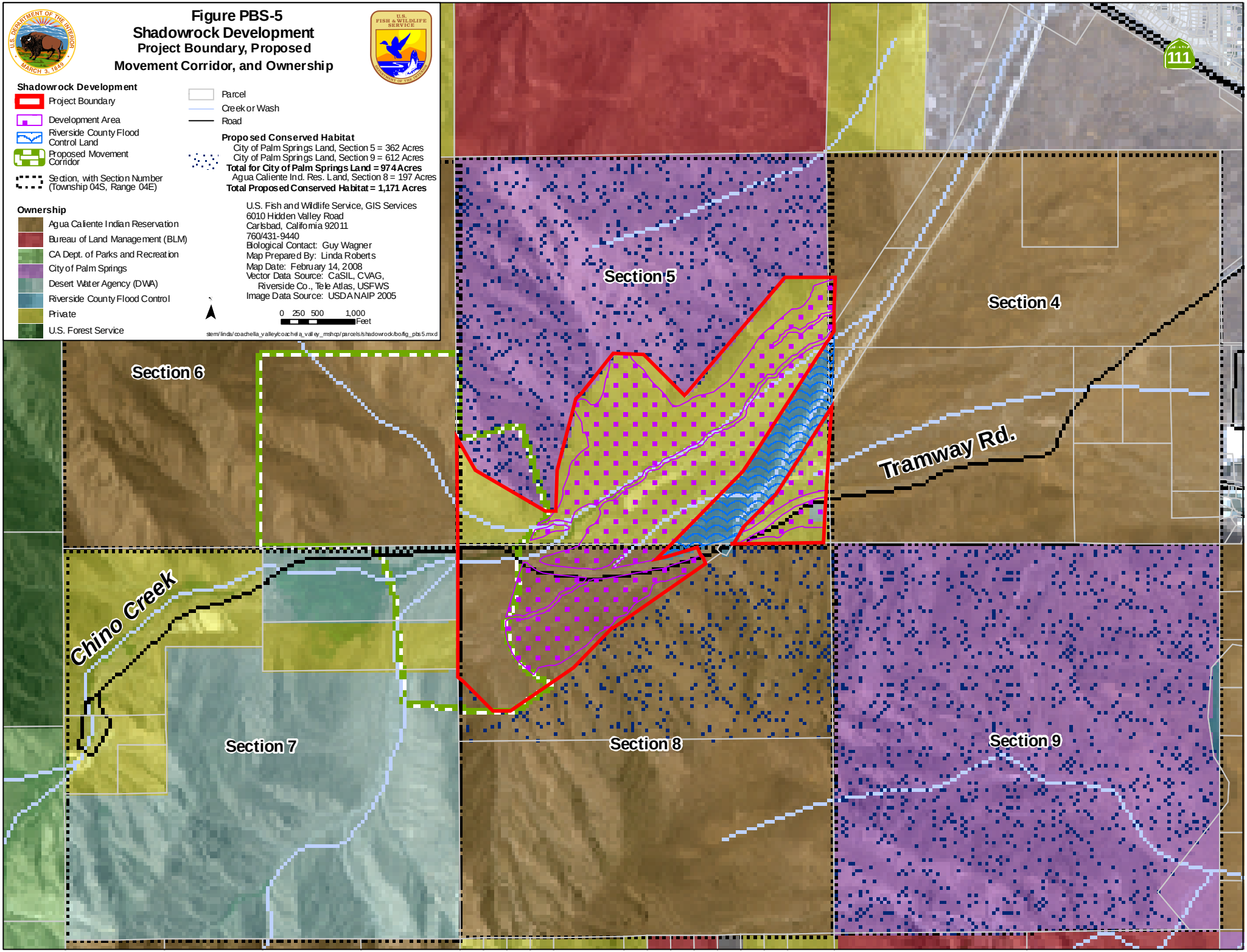
Figure PBS-5
Shadowrock Development
Project Boundary, Proposed
Movement Corridor, and Ownership
Shadowrock Development
Project Boundary
Development Area
Riverside County Flood Control Land
Proposed Movement Corridor
Section, with Section Number (Township 04S, Range 04E)
Ownership
Agua Caliente Indian Reservation
Bureau of Land Management (BLM)
CA Dept. of Parks and Recreation
City of Palm Springs
Desert Water Agency (DWA)
Riverside County Flood Control
Private
U.S. Forest Service
Parcel
Creek or Wash
Road
Proposed Conserved Habitat
City of Palm Springs Land, Section 5 = 362 Acres
City of Palm Springs Land, Section 9 = 612 Acres
Total for City of Palm Springs Land = 974 Acres
Agua Caliente Ind. Res. Land, Section 8 = 197 Acres
Total Proposed Conserved Habitat = 1,171 Acres
U.S. Fish and Wildlife Service, GIS Services
6010 Hidden Valley Road
Carlsbad, California 92011
760/431-9440
Biological Contact: Guy Wagner
Map Prepared By: Linda Roberts
Map Date: February 14, 2008
Vector Data Source: CaSIL, CVAG, Riverside Co., Tele Atlas, USFWS
Image Data Source: USDA NAIP 2005
0 250 500 1,000 Feet
stem/linda/coachella_valley/coachella_valley_mshcp/parcels/shadowrock/bo/fig_pbs5.mxd
111
Section 5
Section 4
Section 6
Tramway Rd.
Chino Creek
Section 7
Section 8
Section 9

CVMSHCP IMPLEMENTATION MANUAL
Outline/Status - February 4, 2008

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Acronyms

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    - b. Reserve Management Oversight Committee (RMOC)
      - i. Reserve Management Unit Committees (RMUCs)
      - ii. Trails Management Subcommittee

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    a. Survey Protocol
3. Crissal Thrasher
    a. Survey Protocol
4. Desert Tortoise
    a. Survey Protocol
5. Le Conte's Thrasher
    a. Survey Protocol
6. Little San Bernardino Mountains Linanthus
    a. Salvage coordination procedure
7. Palm Springs Pocket Mouse
    a. Survey Protocol
7. Triple-ribbed Milkvetch
    a. Survey Protocol

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VII. Like Exchanges

VIII. Minor Amendments

IX. Major Amendments

X. Annexations

XI. California Streambed Alteration Agreements

XI. Federal Clean Water Permits

Draft Sections Complete & Reviewed by IM Subcommittee

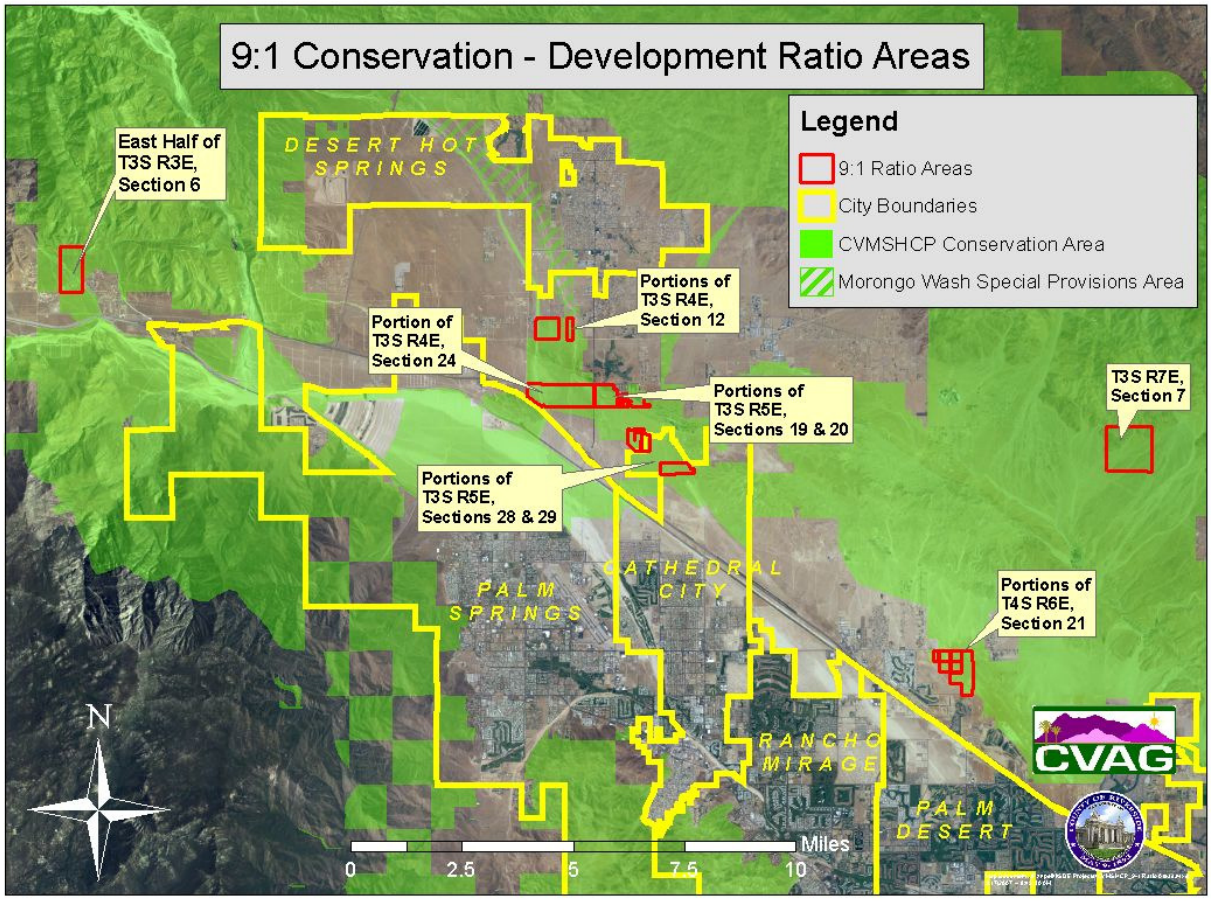
9:1 Ratio Areas

PBS Measures

Land Use Adjacency Guidelines
- Lighting
- Noise
- Invasives

DRAFT
Implementation Manual Language
for
9:1 Conservation to Development Areas

Section 4.3 of the Plan describes Required Measures within the established 9:1 Conservation to Development areas. The 9:1 Conservation to Development ratio was applied, where even limited Development could impede attainment of fluvial (water borne) and/or aeolian (wind blown) sand transport Conservation Objectives and/or the functionality of the Biological Corridor. The ratio ensures that the Conservation Objectives will be attained by requiring that for every acre of Development allowed in the specified area, 9 acres of Conservation will occur. To minimize obstruction to these ecological processes, the Local Permittee(s) shall incorporate feasible design, orientation, or other criteria where Development is approved. These criteria would not apply to single-family homes, emergency response activities, or any non-commercial accessory uses and structures including but not limited to second units on an existing legal lot. If it appears that the ratio may not be met, the appropriate Local Permittees will meet with the Wildlife Agencies and identify additional means that will be implemented to maintain the ecological processes and/or Biological Corridor.


9:1 Conservation - Development Ratio Areas
Legend
9:1 Ratio Areas
City Boundaries
CVMSHCP Conservation Area
Morongo Wash Special Provisions Area
East Half of T3S R3E, Section 6
Portions of T3S R4E, Section 12
Portion of T3S R4E, Section 24
Portions of T3S R5E, Sections 19 & 20
T3S R7E, Section 7
Portions of T3S R5E, Sections 28 & 29
Portions of T4S R6E, Section 21
DESERT HOT SPRINGS
PALM SPRINGS
CATHEDRAL CITY
RANCHO MIRAGE
PALM DESERT
CVAG
N
0
2.5
5
7.5
10
Miles

Willow Hole Conservation Area
Sections 19 T3S R5E; 20 T3S R5E; 24 T3S R4E; 28 T3S R5E; and 29 T3S R5E
Thousand Palms Conservation Area
Section 21 T4S R6E; 7 T4S R6E; and 8 T4S R6E

The following criteria pertain to portions of Sections 19 T3S R5E; 20 T3S R5E; 24 T3S R4E; 28 T3S R5E; and 29 T3S R5E in the Willow Hole Conservation Area (Plan Figure 4-13f), and Section 21 T4S R6E; 7 T4S R6E; and 8 T4S R6E in the Thousand Palms Conservation Area (Plan Figure 4-16f). These criteria would not apply to single-family homes, emergency response activities, or any non-commercial accessory uses and structures including but not limited to second units on an existing legal lot.

The Local Permittee(s) shall (a) require that all new Development be constructed to minimize obstruction of fluvial and aeolian sand transport through appropriate design and orientation of all structures, landscaping, fencing, and juxtaposition of said features relative to any sand transport impediments on neighboring parcels; and (b) require that Development in the 9:1 Conservation to Development areas is configured such that fluvial and aeolian sand transport is not blocked, consistent with the following criteria:

Implementation Criterion 1: Required for Fluvial (water-borne) sand transport - Development on the property shall not impede water-borne sand transport across the parcel in its natural direction of flow. A drainage plan for the site shall be required such that natural flows onto the parcel shall be conveyed offsite in the natural pre-disturbance direction and volume of flow. Water-borne sediments shall not be artificially retained onsite to the degree that water quality standards (best management practices) are not violated.

The CDFG has delineated areas of streambeds as defined by California law in this 9:1 Conservation to Development area (see Implementation Manual Exhibit A). Development on parcels with a delineated streambed shall not be permitted without a streambed alteration agreement from CDFG or a letter from CDFG stating that such a permit is not required.

Implementation Criterion 2: Required for aeolian (wind blown) sand transport. Onsite driveways shall be at grade, without gutters, curbs, berms, or other elevated areas that may impede or divert the passage of water-borne or wind-borne sand. The driveway shall be sited upwind or downwind of the primary structure unless the location of the access road prohibits such siting.

Implementation Criterion 3: The orientation of the primary structure located on a parcel shall be such that the longest dimension of the primary structure shall be parallel to the prevailing wind direction. For purposes of this implementation criterion, the prevailing wind direction is to the southeast at 45 degrees (Figure A).

Implementation Criterion 4: Ancillary structures shall not block aeolian sand transport among parcels. Ancillary structures shall be placed within an area that is either upwind

or downwind of the primary structure as shown in Figure B. No equipment, vehicles, materials, or other items shall be placed, stored, or otherwise kept on the parcel outside the designated Development portion of the parcel.

Implementation Criterion 5: Public and private streets and road that are unpaved as of September 10, 2007 shall not be paved. New Public and private streets and roads shall not be paved.

Implementation Criterion 6: Fences should be constructed of materials that maximize movement of sand over or through the fence. Fencing along the property line shall be limited as described below. Block walls are not permitted except within the wind shadow area as depicted in Figure B.

The following table identifies potential fence materials that are acceptable. Other fence materials and designs may be considered acceptable after review by the CVCC.

Fencing Designs:

Fence Type	Minimum Spacing Vertical posts	Minimum Spacing Horizontal elements	Maximum width of vertical Posts	Minimum ground clearance	Maximum width of horizontal elements
Rail Fence	2 feet	18 inches	5 inches	1 foot	5 inches
Round or barbed wire	2 feet	18 inches	5 inches	1 foot	5 inches
Cross buck	4 feet	4.5 feet*	5 inches	1 foot	6 inches

* The center of the rail on the top to the center of the rail along the bottom. Horizontal cross rails may be installed along the top and bottom of the diagonal rails. The spacing between the top of the bottom rail and the bottom of the top rail shall not be less that our (4) feet.

Implementation Criterion 7: Landscaping outside interior fencing shall be limited to the plant species identified below and other species determined by CVCC to be native to the relevant Conservation Area. The plants shall not be placed in such a manner as to create a wind break or hedge.

Creosote bush (*Larrea tridentata*),
Smoke tree (*Psorothamnus spinosus*),
Desert lavender (*Hyptis emoryi*),
Palo verde (*Cercidium floridum*),
Dye weed (*Psorothamnus emoryi*),
Saltbush (*Atriplex polycarpa. Atriplex canescens*),
Indigo bush (*Psorothamnus schotti*),
Dicoria (*Dicoria* spp.),
Brittlebush (*Encelia farinosa*),
Sweetbush (*Bebbia juncea*),

Cheesebush (*Hymenoclea salsola*),
Burrobush (*Ambrosia dumosa*)
Desert trumpet (*Eriogonum inflatum*),
Desert velvet (*Psathyrotes ramosissima*),
Plicate coldenia (*Tiquilia plicata*)

Figure A: Prevailing Wind Direction

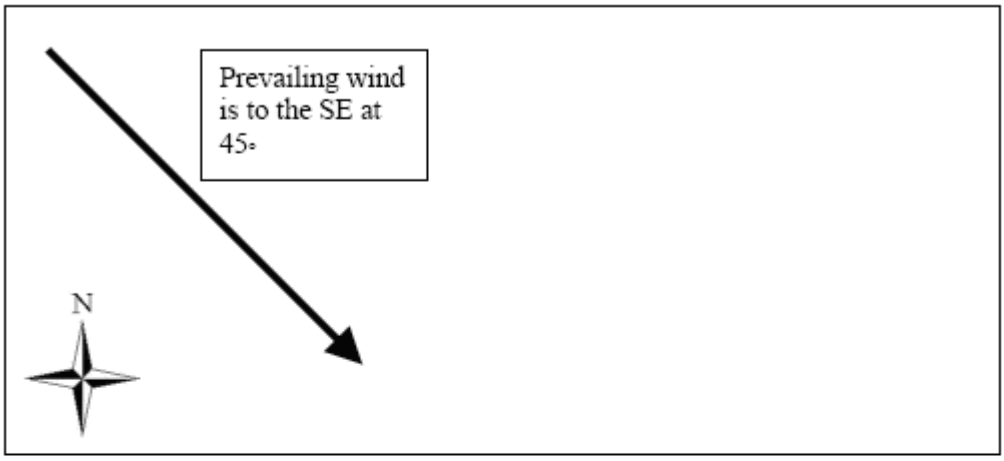
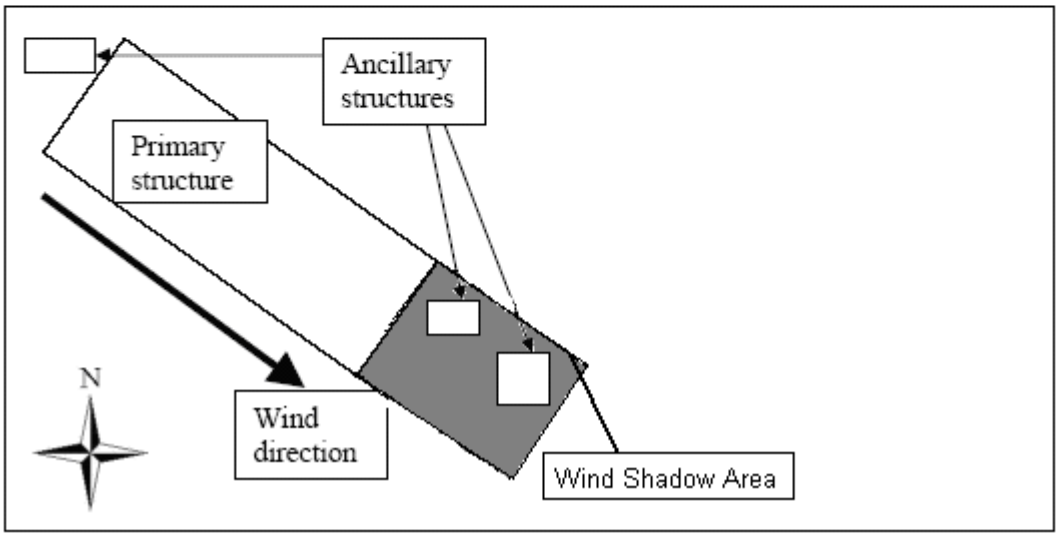
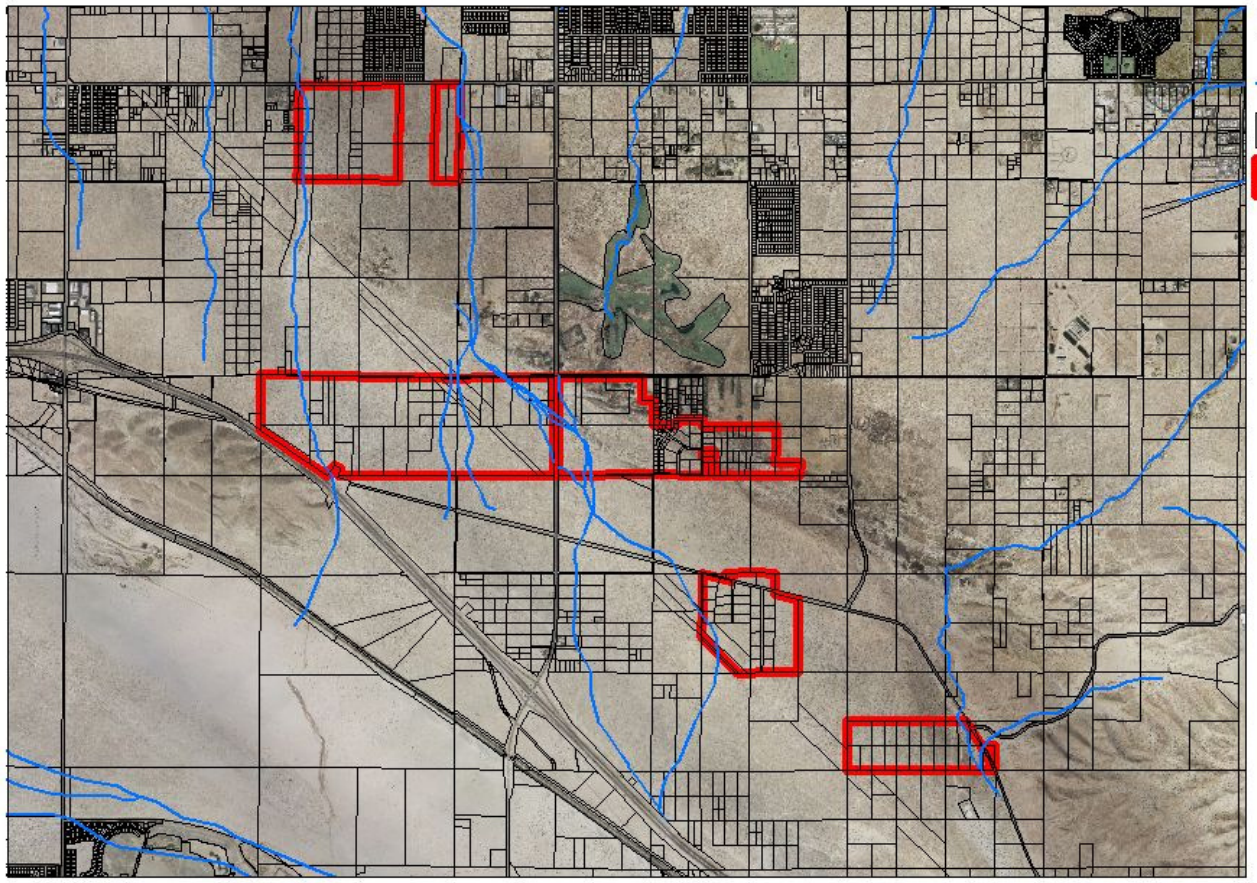


Figure B: Placement of Ancillary Structures



Implementation Manual Exhibit A
Willow Hole Conservation Area



Legend

- Streambeds
- Parcel Boundaries
- 9:1 Ratio Areas

N

CVAG

Map By
Nicholas Peihl,
Coachella Valley Association
of Governments

Aerial Background is
Digital Mapping, Inc, 2007

Miles

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Implementation Manual Language
for Section 6, T3S R3E (east half)
Stubbe and Cottonwood Canyons Conservation Area

Section 4.3 of the Plan describes Required Measures within the established 9:1 Conservation to Development areas. The ratio ensures that the Conservation Objectives for maintaining sand transport and a functional Biological Corridor will be attained by requiring that for every acre of Development allowed in the specified area, 9 acres of Conservation will occur. To minimize obstruction to these ecological processes, the Local Permittee(s) shall incorporate feasible design, orientation, or other criteria where Development is approved. These criteria would not apply to single-family homes, emergency response activities, or any non-commercial accessory uses and structures including but not limited to second units on an existing legal lot. The following criteria pertain to the eastern half of Section 6, T3S R3E in the Stubbe and Cottonwood Canyons Conservation Area (Plan Figure 4-7f).

The Local Permittee(s) shall require that all new Development be constructed to minimize obstruction of sand transport and to provide a functional Biological Corridor through appropriate design and orientation of all structures, landscaping, fencing, and juxtaposition of said features relative to sand transport impediments on neighboring parcels and a functional Biological Corridor, consistent with the following criteria:

Implementation Criterion 1: Detention basins shall not be permitted.

Implementation Criterion 2: Required for Fluvial (water-borne) sand transport - Development on the property shall not impede water-borne sand transport across the parcel in its natural direction of flow. A drainage plan for the site shall be required such that natural flows onto the parcel shall be conveyed offsite in the natural pre-disturbance direction and volume of flow. Water-borne sediments shall not be artificially retained onsite to the degree that water quality standards (best management practices) are not violated.

The CDFG has delineated areas of streambeds as defined by California law in this 9:1 Conservation to Development area (see Implementation Manual Exhibit B). Development on parcels with a delineated streambed shall not be permitted without a streambed alteration agreement from CDFG or a letter from CDFG stating that such a permit is not required.

Implementation Criterion 3: Fencing along the property line shall be limited as described below.

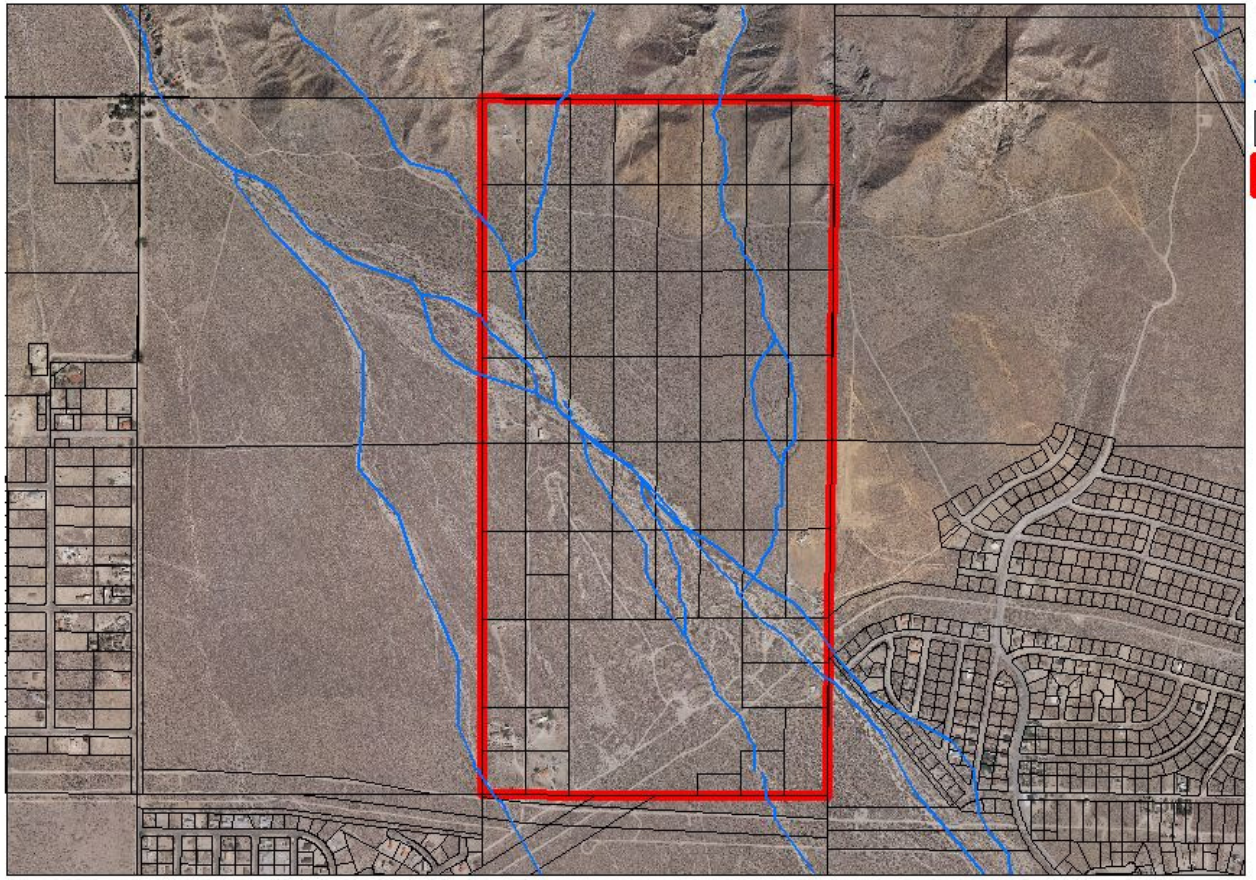
The following table identifies potential fence materials that are acceptable. Other fence materials and designs may be considered acceptable after review by the CVCC.

Fencing Designs:

Fence Type	Minimum Spacing Vertical posts	Minimum Spacing Horizontal posts	Maximum width of vertical Posts	Minimum ground clearance	Maximum width of horizontal rails
Rail Fence	2 feet	18 inches	5 inches	1 foot	5 inches
Round or barbed wire	2 feet	18 inches	5 inches	1 foot	5 inches
Cross buck	4 feet	4.5 feet*	5 inches	1 foot	6 inches

* The center of the rail on the top to the center of the rail along the bottom. Horizontal cross rails may be installed along the top and bottom of the diagonal rails. The spacing between the top of the bottom rail and the bottom of the top rail shall not be less than four (4) feet.

Implementation Manual Exhibit B
Stubbe and Cottonwood Canyons Conservation Area



Legend

- Streambeds
- Parcel Boundaries
- 9:1 Ratio Areas

N

CVAG

Map By
Nicholas Peihl,
Coachella Valley Association
of Governments

Aerial Background is
Digital Mapping, Inc, 2007

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Section 30, T3S R7E
Indio Hills/Joshua Tree National Park Linkage Conservation Area
(Plan Figure 4-18f)

Section 4.3 of the Plan describes Required Measures within the established 9:1 Conservation to Development areas. The ratio ensures that the Conservation Objectives for maintaining fluvial sand transport will be attained by requiring that for every acre of Development allowed in the specified area, 9 acres of Conservation will occur. To minimize obstruction to this ecological process, the Local Permittee(s) shall incorporate feasible design, orientation, or other criteria where Development is approved. These criteria would not apply to single-family homes, emergency response activities, or any non-commercial accessory uses and structures including but not limited to second units on an existing legal lot. The following criteria pertain to Section 30, T3S R7E (maintain fluvial sand transport) in the Indio Hill/Joshua Tree National Park Linkage Conservation Area.

The Local Permittee(s) shall (a) require that all new Development be constructed to minimize obstruction of fluvial sand transport through appropriate design and orientation of all structures, landscaping, fencing, and juxtaposition of said features relative to any fluvial sand transport impediments on neighboring parcels; and (b) require that Development in the 9:1 Conservation to Development areas is configured such that fluvial sand transport is not occluded, consistent with the following criteria:

Implementation Criterion 1: Detention basins shall not be permitted.

Implementation Criterion 2: Required for Fluvial (water-borne) sand transport - Development on the property shall not impede water-borne sand transport across the parcel in its natural direction of flow. A drainage plan for the site shall be required such that natural flows onto the parcel shall be conveyed offsite in the natural pre-disturbance direction and volume of flow. Water-borne sediments shall not be artificially retained onsite to the degree that water quality standards (best management practices) are not violated.

The CDFG has delineated areas of streambeds as defined by California law in this 9:1 Conservation to Development area (see Implementation Manual Exhibit C). Development on parcels with a delineated streambed shall not be permitted without a streambed alteration agreement from CDFG or a letter from CDFG stating that such a permit is not required.

Implementation Criterion 3: Fencing along the property line shall be limited as described below.

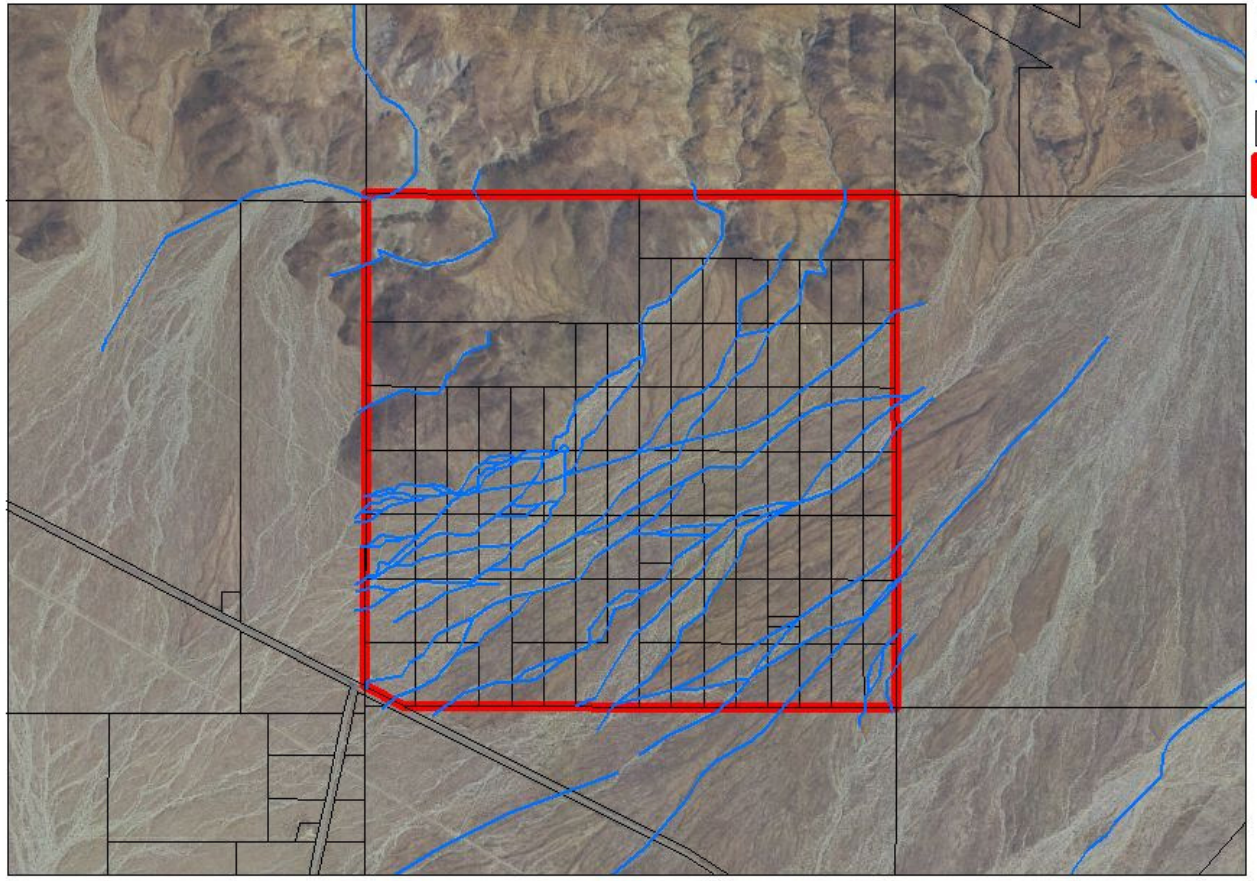
The following table identifies potential fence materials that are acceptable. Other fence materials and designs may be considered acceptable after review by the CVCC.

Fencing Designs:

Fence Type	Minimum Spacing Vertical posts	Minimum Spacing Horizontal posts	Maximum width of vertical Posts	Minimum ground clearance	Maximum width of horizontal rails
Rail Fence	2 feet	18 inches	5 inches	1 foot	5 inches
Round or barbed wire	2 feet	18 inches	5 inches	1 foot	5 inches
Cross buck	4 feet	4.5 feet*	5 inches	1 foot	6 inches

* The center of the rail on the top to the center of the rail along the bottom. Horizontal cross rails may be installed along the top and bottom of the diagonal rails. The spacing between the top of the bottom rail and the bottom of the top rail shall not be less than four (4) feet.

Implementation Manual Exhibit C
Indio Hills / Joshua Tree National Park & Linkage Conservation Area



Legend

- Streambeds
- Parcel Boundaries
- 9:1 Ratio Areas

N

CVAG

Map By
Nicholas Peihl,
Coachella Valley Association
of Governments

Aerial Background is
NAIP, 2005

Miles
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Implementation Manual Language for PBS
(Revised 11/26/07)

The text below will be included in the Implementation Manual requiring development in PBS habitat to be sited accordingly.

For new Development in the Conservation Areas, within Essential bighorn sheep Habitat in the Snow Creek/Windy Point, Santa Rosa and San Jacinto Mountains, and Cabazon Conservation Areas, the following checklist shall be used to apply Required Measure 3 from Section 4.3 of the MSHCP. As noted in Section 4.3, guidance and clarification on this Required Measure is provided by the items shown in italics:

Development shall be clustered in one area of a site as close as possible to existing Development

- *Refers to existing Development on site or on adjacent parcels.*

Development on alluvial fans shall be sited at the lowest possible elevation on the site.

- *Development shall avoid the mouths of canyons, consistent with public safety and flood control requirements.*
- *Development sited to be out of view of bighorn sheep using down-slope habitat areas will help ensure that bighorn sheep habitat use at lower elevations is not inhibited by human activities.*

Development shall be sited a minimum of a quarter (0.25) mile from known Peninsular bighorn sheep water sources identified on a reference map on file with CVCC (see Figure 4-26f of the MSHCP), except where topographic features shield the view of the water source and access to it from proposed Development or trails, thereby minimizing potential impacts to the Peninsular bighorn sheep's ability to access water.

Development shall be conditioned to prohibit the construction of trails in Essential Peninsular bighorn sheep Habitat unless approved through a Minor Amendment with Wildlife Agency concurrence.

Development shall not preclude Habitat connectivity or movement. Determination of whether Habitat connectivity or movement is precluded shall be made by the Lead Agency for the Development based on factual data provided by the RMOC, RMUC, Wildlife Agencies, or other source.

- *Connectivity to be maintained within and between ewe group core use areas.*
- *Development in Essential Peninsular bighorn sheep habitat shall be designed to maintain sheep movement across elevation gradients.*
- *Note: It would be helpful to have a statement with baseline information on what we know about areas are used for connectivity by PBS (e.g. washes, ridgelines, canyons). Do we have information on how the bighorn sheep use habitat for connectivity?*

Development shall comply with Land Use Adjacency Guidelines as described in Section 4.5 of the Plan.

Development shall not occur on slopes greater than 25 percent.
Note: Discussion involved potential to have some development on slopes >20% (Palm Springs standard is no development on slopes >30%, County = 25%)

4.5.3 Lighting

Numerous studies have shown artificial light to negatively impact a variety of wildlife species (see, for example, Ecological consequences of artificial night lighting 2006, Rich, C. and Longcore, T. (eds.). Island Press: Washington, D.C.**).** The purpose of this guideline is to minimize the impact of artificial light on wildlife within Conservation Areas. For proposed Development adjacent to or within a Conservation Area, lighting shall be shielded and directed toward the developed area. Landscape shielding or other appropriate methods shall be incorporated in project designs to minimize the effects of lighting adjacent to or within the adjacent Conservation Area. Projects requiring discretionary approval shall provide the permitting jurisdiction with a light study showing the proposed methods to minimize escape of light from the project into Conservation Areas. This study shall include all exterior lighting including street lights and security lighting.

4.5.4 Noise

Noise has been shown to negatively impact numerous species of wildlife (see, for example, Bowles**, A.E. 1995. Responses of wildlife to noise. pp. 109-156. In: Knight, R.L. and K.J. Gutzwiller. (eds.) Wildlife and Recreationists: Coexistence through Management and Research. Island Press: Washington, D.C.**). The purpose of this guideline is to minimize the impact the noise on wildlife within Conservation Areas. Proposed Development adjacent to or within a Conservation Area that generates noise in excess of 75 dBA L_{eq} hourly, as measured at the property line, shall incorporate setbacks, berms, or walls, as appropriate, to minimize the effects of noise on the adjacent Conservation Area. Required Measures in any Conservation Area that preclude or limit berms or walls shall have precedence over this guideline. This guideline is intended to apply to land uses that generate noise on a permanent basis such as race tracks, night clubs and shooting ranges and does not apply to temporary noise due to construction or special events. Public safety activities are exempt from this guideline.

4.5.5 Invasives

Invasive species are a known threat to native wildlife and wildlife habitat in the Coachella Valley. Impacts of invasive species on wildlife in the Coachella Valley have been documented in research conducted by the Center for Conservation Biology at the University of California, Riverside. Invasive, non-native plant species shall not be incorporated in the landscape for land uses adjacent to or within a Conservation Area. Landscape treatments within or adjacent to a Conservation Area shall incorporate native plant materials to the maximum extent Feasible; recommended native species are listed in

Table 4-112. The plants listed in Table 4-113 shall not be used within or adjacent to a Conservation Area. This list may be amended from time to time through a Minor Amendment with Wildlife Agencies' concurrence.

CVAG
COACHELLA VALLEY ASSOCIATION of GOVERNMENTS
Blythe • Cathedral City • Coachella • Desert Hot Springs • Indian Wells • Indio • La Quinta • Palm Desert • Palm Springs • Rancho Mirage
County of Riverside • Agua Caliente Band of Cahuilla Indians • Cabazon Band of Mission Indians • Torres Martinez Desert Cahuilla Indians

July 2, 2008

Therese O'Rourke, Assistant Field Supervisor
U.S. Fish and Wildlife Service
6010 Hidden Valley Road
Carlsbad, California 92011

Subject: Project Description and Evaluation Assumptions for the Coachella Valley Multiple Species Habitat Conservation Plan's Biological Opinion

Dear Ms. O'Rourke:

We originally reviewed the Project Description and the Evaluation Assumption list provided to us by the U.S. Fish and Wildlife Service (Service) in February 2008. The Project Description and Evaluation Assumptions are included in the Service's Biological Opinion for the Coachella Valley Multiple Species Habitat Conservation Plan (CVMSHCP) and provide the basis for the Service's analysis. On behalf of the Coachella Valley Association of Governments, and the other Permit Applicants, I acknowledge that both the Project Description and Evaluation Assumptions are an accurate interpretation of the obligations set forth in the CVMSHCP and provide appropriate clarifications to the CVMSHCP. The Evaluation Assumptions, which are attached, incorporate minor revisions since February 2008 which we have reviewed. If you have any questions, please contact me or Katie Barrows.

Sincerely,

John Wohlmuth
Executive Director

cc: Katie Barrows, Director of Environmental Resources

Attachments

73-710 Fred Waring Drive, Suite 200 • Palm Desert, CA 92260 • (760) 346-1127 • FAX (760) 340-5949

Biological Opinion Evaluation Assumptions

The following assumptions are made in order to clarify any unclear intent, statements or interpretations in evaluating the impacts to Covered Species:

1) All of the provisions and obligations set forth in the MSHCP, Implementing Agreement, and the Special Permit Terms and Conditions will be fully carried out and implemented by all of the Permittees.

2) Specific natural communities and/or physical environmental features (e.g., soils) are correlated with the habitats 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 the conservation of, Covered Species, the extent of impacts to or conservation of the natural community or environmental feature necessary for a species is expected to result in commensurate impacts to or conservation of the species itself. The species-habitat models were developed using the available vegetation and physiographic features information and represent a reasonable surrogate with which to assess the impacts to and conservation of Covered Species within the action area.

3) The Permittees obligation in reserve assembly under the Plan will include 96,940 acres (inclusive of Caltrans' and the State Parks' obligations) in the Conservation Areas as generally described in Section 4 of the MSHCP. Of this, 7,500 acres are already owned by the Local Permittees and will be conserved through a recorded Legal Instrument as described in the MSHCP. Per the MSHCP, most of the remaining 88,900 acres will be conserved through land acquisition (4,200 acres have been conserved since 1996). The Permittees obligations include conserving the appropriate amount and configuration of natural communities and species populations/occurrences/locations identified in the MSHCP, or from new species/habitat information gathered in association with the Plan, so as to achieve the Conservation Goals and Objectives and Required Measures for the Conservation Areas (Section 4 of the MSHCP) and Covered Species Conservation Goals and Objectives (Section 9 of the MSHCP).

4) In the general effects analysis (not species specific), we assume Covered Species Conservation Goals and Objectives (Section 9 of the MSHCP) will be achieved, in part, by instituting the Joint Project Review Process (Section 6.6.1.1 of the MSHCP) and Monitoring/Adaptive Management programs (as described in Sections 8 and 9 of the MSHCP).

5) The Existing Conservation Lands described in the Plan provide essential habitats that support the long-term conservation of Covered Species, such that the impacts and conservation proposed in the Plan, in the context of the Existing Conservation Lands, meet our minimum findings requirements as described. These lands will be managed consistent with the Conservation Goals and Objectives identified in the MSHCP. The Permittees will obtain: a) either fee title or conservation easements

(Legal Instrument) on these lands, and b) enter into MOUs and/or cooperative agreements with the entities having jurisdiction over these lands to ensure monitoring and management consistent with the Plan and to provide for enforcement in the cases of non-compliance with the requirements of the Plan for the State and Federal Existing Conservation Lands, where appropriate.

6) The MSHCP does not conflict with, supersede, or amend the provisions of any completed section 7 consultation. However, this assumption does not preclude the processing and/or approval of a future amendment to the MSHCP and/or any other adopted habitat conservation plan.

7) No more than 10 percent of the undeveloped private lands in each Conservation Area for each Covered Species will be subject to disturbance. Conservation of private lands within each Conservation Area will total no less than 90 percent of the modeled habitat for each Covered Species on the undeveloped private land as of November 1996. However, several factors, including acquisition, reduced development, and Like Exchanges to a Conservation Area boundary identified in Section 6.12.2 of the Plan may occur, resulting in potentially greater than 90 percent conservation. The maximum acreages of disturbance from Covered Activities, and the minimum acreages of conservation, will be as specified in Table 4-114 of the Plan.

8) Some public utilities and all school districts within the Plan Area are not identified as Permit Applicants under the MSHCP and are typically not subject to the local jurisdictions' discretion. Therefore, these utilities and districts do not receive coverage under the Permit as Permittees, but may receive incidental take authorization independently or under the MSHCP if they are willing to adhere to the MSHCP obligations through the Participating Special Entity provision (Section 7.4 of the Plan) and the execution of a Certificate of Inclusion.

9) Pursuant to Section 7.3.1 of the Plan, the Plan does not authorize take associated with development projects that have legal vested rights. However, a project with legal vested rights could obtain coverage, provided that the appropriate jurisdiction Permittee requires the execution of a Certificate of Inclusion and compliance with Plan requirements. In the rare event that a project within a Conservation Area on private land has incidental "take" exempted through section 7 of the Act or through a separate HCP, consistent with Section 14.8 of the Implementing Agreement, an equivalent acreage to the disturbance allowed/exempted would be deducted from the amount authorized for the Local Permittee jurisdiction within the respective Conservation Area. Ultimately, the decision to approve a project will be made by the applicable Permittee.

10) Language such as "may" or "could" might cause interpretation issues during implementation. Where the words "may" or "could" occur in the MSHCP associated with a potential obligation of Permittees, they will be changed or otherwise interpreted to mean "shall" or "will", indicating a clear obligation of the applicable Permittees, Participating Special Entities, or Third Parties Granted Take Authorization.

11) Conservation Area Goals throughout the MSHCP are interpreted to mean Goals, Objectives, and Required Measures.

12) Unless otherwise noted, all references to general plans throughout the MSHCP refer to general plan land use designations in effect at the time of MSHCP approval by the Permittees (October 2007).

13) In the general effects analysis (not species specific), we assume that despite mutable general plans of Local Permittees, future land uses and development patterns will reflect current land use trends (largely residential and tourist resort-commercial in the upper valley and agricultural and residential uses in the lower valley), thereby eliminating the probability of future land uses such as heavy industry and expansion of agriculture into native habitat (unregulated by County and therefore not a Covered Activity).

14) Operation and maintenance associated with existing uses are not considered Covered Activities, except where explicitly listed in Section 7.3.1.1 of the Plan.

15) In the general effects analysis (not species specific), we assume 99 percent conservation of the vegetation community types for all BLM lands administered within the Reserve System pursuant to the Coachella Valley Amendment to CDCA Plan (BLM 2002). Specifically, the CDCA Plan states "For the 8 vegetation community types (Figure 2-4, BLM 2002), the habitat conservation objectives outlined in Table 2-4 (BLM 2002) would be used to assess compatible uses and to develop appropriate mitigation measures within Conservation Areas on BLM-managed land." Those objectives state that BLM will conserve 99 percent of each vegetation community. BLM defines "conserve" as the use of "all methods and procedures which are necessary to bring any endangered species or threatened species to the points at which the measures provided pursuant to the Endangered Species Act are no longer necessary."

16) The BLM lands containing arroyo toad modeled habitat within the Whitewater Canyon Conservation Area are designated as Conservation Level 1 and 2 lands. It is assumed that habitat loss will occur on no more than one percent of these lands, and will only occur in conjunction with providing reasonable access across public lands to private inholdings within the Wilderness Areas, trails and trailheads, or as necessitated by an Adaptive Management action.

17) The past acquisition of livestock grazing rights will prevent the reintroduction of livestock grazing in the future on the Whitewater Canyon Allotment.

18) Covered Activities described in Section 7 of the MSHCP (in and outside of Conservation Areas) only pertain to the Permittees.

19) CVWD will conserve the 1,200 acres it owns in the CVFTL HCP Whitewater

Floodplain Preserve in perpetuity by recording an appropriate Legal Instrument prior to relinquishment of the CVFTL HCP permit.

20) Although project-specific information for some of the proposed Covered Activities is not available at this time, the activities will adhere to the Conservation Goals and Objectives and Required Measures, and Species Conservation Goals and Objectives identified in the MSHCP.

21) This Permit does not authorize the intentional pursuit or killing of Covered Species associated with hunting.

22) Lands within Conservation Areas that are not yet secured through a Legal Instrument nor authorized for disturbance will be maintained in their current natural state and not degraded.

23) An accounting of permitted, authorized, and unauthorized disturbance that has occurred on lands within the Conservation Areas compared to the baseline acreage to date will be prepared. The permitted and authorized disturbance that has occurred since 1996 will be deducted from the total authorized for disturbance within Conservation Areas.

24) The 3 acres of arroyo toad modeled habitat within the Upper Mission Creek/Big Morongo Conservation Area are designated as Conservation Level 2 lands. It is assumed that habitat loss will occur on no more than one percent of these lands and that any development will be consistent with the Conservation Goals and Objectives and Required Measures for this Conservation Area.

25) The Existing Conservation Lands controlled by the Permittees and those controlled by non-profit organizations (The Nature Conservancy, CNLM, etc.), that were set aside or designated for conservation associated with the CVFTL HCP, will be protected by an appropriate Legal Instrument in perpetuity prior to the relinquishment of that permit. The lands will be permanently protected and managed in a natural, ecologically-beneficial, open-space condition.

26) The Existing Conservation Lands controlled by CDFG and CDPR that were set aside or designated for conservation as a result of the CVFTL HCP, will be conserved in perpetuity by the respective agencies, or by any organization/agencies that are given control over these lands from these agencies. The Existing Conservation Lands controlled by BLM and the Service that were set aside or designated for conservation as a result of the CVFTL HCP and/or section 7 consultations or re-initiation of section 7 consultations on BLM actions, will be conserved based on the various agreements in place (i.e., biological opinions, The Coachella Valley Preserve System Management Plan and Decision Record, and Coachella Valley Amendment to the CDCA) by these respective agencies, or by any organization/agencies that are given control over these lands from these agencies. The Existing Conservation Lands will be protected and managed in their

entirety in a natural, ecologically-beneficial, open-space condition.

27) BLM will enter into an MOU with the CVCC, either prior to permit issuance and no later than 3 years post Permit issuance, that will ensure BLM's perpetual monitoring and management of the lands they control within the Plan Area is consistent with the Goals and Objectives of the MSHCP.

28) CVCC will execute a MOU (Joint Enforcement Agreement(s), Mutual Aid Agreement, or equivalent mechanism) with the applicable Permittees, BLM, USFS, CDFG, Service, and applicable Non-Profit Organizations which enables cross-jurisdictional capability to provide for enforcement in the cases of non-compliance with the requirements of the Plan. The MOU or equivalent mechanisms approved by the Service will specifically provide for enforcement of the relevant ordinances, resolutions, regulations, or other legal requirements necessary for effective management of the Reserve Lands. The MOUs will specify roles and responsibilities among the parties needed to effectively implement the pertinent requirements of the Plan including the Trails Plan (Section 7 of the MSHCP).

29) BLM will control OHV trespass across BLM lands through implementation of the CDCA Plan Amendment and any associated section 7 consultations, consistent with the Terms and Conditions in any associated Biological Opinions, and re-initiation of consultation on previous BLM actions where necessary.

30) Development activities on the Agua Caliente Indian Reservation within the blowsand Natural Communities will include substantial offsetting mitigation in the form of conservation of important blowsand ecosystem lands in the valley whether proposed projects are authorized through a section 10 permit for the draft Tribal HCP or section 7 of the Act. It is also assumed that the majority of currently undeveloped portion of Section 6, T4S, R5E, on the Agua Caliente Indian Reservation land will be conserved to maintain functional connectivity needed for Coachella Valley MSHCP Conservation Goals and Objectives.

31) Pursuant to the Conservation Objectives and Required Measures identified in the Plan, CVCC or other appropriate Permittees would maintain at least 376 acres of mesquite hummocks, with functional hydrology (groundwater and soil water) to support sustainable populations of mesquite (on the 376 acres) within Reserve Lands in perpetuity.

32) Any flood damage reduction facilities constructed in the future that are related to the planned Whitewater Flood Control Project, which consists of a series of levees to provide flood damage reduction for the Thousand Palms community and I-10 areas, would be developed consistent with the designs, potential impacts, and conservation analyzed in our Biological Opinion on the Whitewater River/Thousand Palms Flood Control Project (1-06-00-F-46). Any related project contracts, approvals, or funding by the Army Corps of Engineers, County of Riverside, and/or CVWD would be consistent with that Biological Opinion

(1-06-00-F-46).

33) It is expected that maintenance of fluvial sand transport capacity (Section 4.4 of the MSHCP, Fluvial Sand Transport) is equivalent in meaning to "no net loss" of this capacity compared to current conditions, to maintaining fluvial (and ultimately aeolian) erosion/transport/deposition processes important to the blowsand ecosystems of the action area. As such, fluvial processes within Conservation Areas that are important to the support of downstream/downwind CVFTL modeled habitat [within Conservation Areas and Section 6, T4S, R5E (adjacent to the Whitewater Floodplain Conservation Area)] are expected to be protected by the MSHCP from adverse changes that could otherwise result from Covered Activities.

34) General plan changes by Local Permittees would not result in an increase in the amount of take and habitat losses beyond those anticipated in our decision documents and contemplated in the MSHCP.

35) Trail closures will be enforced per Element 4 and Element 5 of the Trails Management Program for the Santa Rosa and San Jacinto Mountains Conservation Area to avoid and minimize recreational impacts to bighorn sheep during the summer water stress period and, as needed, to ensure that the research program can be conducted.

36) Upon the acquisition of private land within the Conservation Areas, invasive species are proposed to be removed. Although the wording varies between Section 8 (invasive species) and Section 5.2 in Appendix I (Saharan mustard), we assume that all invasive species will be removed and not a subset of species.

37) As described in Section 19.5 of the IA, it is understood that the lands that are conserved through the MSHCP are obligated in perpetuity and will not be withdrawn from the Reserve System after the 75-year permit term. Likewise, the duties and obligations of the Permittees for the protection, monitoring, management, adaptive management, and administration of the Reserve System will be in perpetuity.

38) With respect to Permittee-owned or controlled lands within the Reserve System, the applicable Permittees or CVCC will:

    a. Conserve, in perpetuity, the Local Permittee Existing Conservation Lands within the Reserve System, as identified below pursuant to Section 4.1.2 of the MSHCP. The parcels will be conserved through a recorded Legal Instrument acceptable to the Service. Conservation easements will be established in accordance with California Civil Code Section 815, *et seq*. CVCC will also enter into MOUs with the jurisdictions assuring management of these lands consistent with the Plan.

    b. Prior to relinquishment of the CVFTL HCP, the CVCC or appropriate

Permittees will conserve through a recorded Legal Instrument, as described above, at least 8,800 acres of the Local Permittee Existing Conservation Lands identified in Table 4-3 of the Plan.

c. The CVCC or appropriate Permittee will conserve through a recorded Legal Instrument, as described above, at least 7,500 acres of Non-Conserved Permittee Owned lands identified in Table 4-6 of the Plan. Of the 7,500 acres, 800 acres will be conserved through a recorded Legal Instrument within 3 years of Permit issuance and the remaining 6,700 acres owned by CVWD and IID will be conserved through a recorded Legal Instrument within 50 years of Permit issuance.

39) The CVFTL permit will be relinquished after the Permittees demonstrate that the following actions associated with Granite Construction Company's Garnet Mine within T3S R4E Section 26, on the Whitewater Floodplain Reserve mitigation lands have been accomplished: (a) removal of all existing debris piles and levees, and (b) restoration to original (pre-mining activities) elevations/contours of all lands that have been excavated or filled with spoil piles, berms, or levees, consistent with the *Interim Management Plan for the Garnet Mine, dated April 3, 2003*, adopted by the State Mining and Geology Board.

40) Section 4.2.2.2.2 of the Plan describes that undeveloped portions of parcels in Conservation Areas on which Development is approved will count toward meeting the Conservation Objectives when the undeveloped portion of the parcel is legally described and is permanently protected through an appropriate Legal Instrument and monitored and managed pursuant to the MSHCP's Monitoring and Management Programs. Parcels that are not appropriate to meet the Conservation Objective will count towards the allocated losses described under the Plan.

41) The total Peninsular bighorn sheep habitat authorized for disturbance/loss in relevant Conservation Areas includes the acreage of bighorn sheep habitat authorized for disturbance/loss in Special Provision areas under the Plan and the acreage of bighorn sheep habitat authorized for disturbance/loss under the HANS process.

42) Thousand Palms Site Planning Standard 2 requires that portions of parcels not developed shall be permanently conserved through conveyance of fee title or conservation easement, etc. To be consistent with Section 4.2.2.2.2 of the Plan, we understand that the lands referenced in Site Planning Standard 2 will be subject to the same criteria as described in Section 4.2.2.2.2 of the Plan. Thus, the portions of the lands not developed and appropriate for conservation will be permanently protected through a Legal Instrument and provisions made for the land to be monitored and managed pursuant to the Plan.

43) All new trails including perimeter trails on Reserve Lands in the Santa Rosa and San Jacinto Mountains Conservation Area, other than those identified in Element 5 of the Trails Plan (Section 7 of the Plan) will be subject to a Minor Amendment Requiring Wildlife Agencies' Concurrence.

44) Local Permittees will conserve at least 90 percent of the acreage within each/individual biological corridor designated in Section 4.3 of the Plan, in a configuration that provides functional connectivity for all applicable Covered Species within the Conservation Areas at issue. Any potential reduction in acreage below 90 percent of a given corridor will be prohibited unless it is possible to offset the adverse effect by acquiring equivalent functional acreage for that corridor to ensure no reduction in connectivity.

45) The projects listed in Tables 7-1 through 7-11 of the MSHCP are required to adhere to the Avoidance, Minimization, and Mitigation Measures described in Section 4.4 and also the Land Use Adjacency Guidelines described in Section 4.5 of the MSHCP.

46) Per the exchange of letters between the Service and the Coachella Valley Water District regarding activities in the Whitewater Floodplain Conservation Area, the CVWD will pursue the activities identified in the letters. The letters are attached and hereby incorporated by reference.

47) The CVWD and/or applicable Permittees will require that new wind energy development projects, the upgrading of any existing wind energy facilities, or renewal of any existing leases or other entitlements for wind energy projects within the Whitewater Floodplain Conservation Area require through any applicable permits or lease agreements that all such facilities be designed to provide 100-year flood protection and withstand any flow changes that may result from future measures implemented to re-establish more natural patterns of fluvial and aeolian sand transport.

48) Neither Palm Hills nor Shadowrock are vested projects.

49) Covered Activities will be under the direct control of the Permittees in conformance with approvals granted by the Permittees, or carried out in conformity with a Certificate of Inclusion or other written mechanism or instrument, and in compliance with the Implementing Agreement, the Permits and the MSHCP. As set forth in Section 11.1.1 of the Implementing Agreement, Permittees will include as a part of any discretionary or certain City ministerial approvals, a Certificate of Inclusion or other written mechanism, a condition requiring compliance with the Permits, the MSHCP and the Implementing Agreement, that describes the Take Authorization to be granted pursuant to the Permits and Section 17.2 of the Implementing Agreement. Such property owners, developers, and private and public entities will receive Take Authorization provided they are in full compliance with all requirements of the Permits, the Implementing Agreement, the MSHCP, the Implementation Mechanism adopted by Permittees, issued entitlements and all other applicable requirements.

50) The Implementation Manual will be submitted for Service review and concurrence prior to its finalization and distribution to the Permittees. The current draft version of the Implementation Manual is attached.

DEPARTMENT OF THE INTERIOR
U.S. FISH AND WILDLIFE SERVICE

3-201
(1/97)

FEDERAL FISH AND WILDLIFE PERMIT

2. AUTHORITY-STATUTES
16 USC 1539(a)
16 USC 1533(d)

REGULATIONS *(Attached)*
50 CFR 17.22
50 CFR 17.32

50 CFR 13

1. PERMITTEE

COACHELLA VALLEY MSHCP PERMITTEES
(SEE ATTACHMENT A)
SACRAMENTO, CA
U.S.A.

3. NUMBER
TE104604-0

4. RENEWABLE	5. MAY COPY
☒ YES	☒ YES
☐ NO	☐ NO

6. EFFECTIVE	7. EXPIRES
10/01/2008	10/01/2083

8. NAME AND TITLE OF PRINCIPAL OFFICER *(If #1 is a business)*

9. TYPE OF PERMIT
THREATENED AND ENDANGERED SPECIES

10. LOCATION WHERE AUTHORIZED ACTIVITY MAY BE CONDUCTED
Riverside County, California: within the MSHCP Plan Area as depicted on maps and described in the MSHCP.

11. CONDITIONS AND AUTHORIZATIONS:

A. GENERAL CONDITIONS SET OUT IN SUBPART D OF 50 CFR 13, AND SPECIFIC CONDITIONS CONTAINED IN FEDERAL REGULATIONS CITED IN BLOCK #2 ABOVE, ARE HEREBY MADE A PART OF THIS PERMIT. ALL ACTIVITIES AUTHORIZED HEREIN MUST BE CARRIED OUT IN ACCORD WITH AND FOR THE PURPOSES DESCRIBED IN THE APPLICATION SUBMITTED. CONTINUED VALIDITY, OR RENEWAL, OF THIS PERMIT IS SUBJECT TO COMPLETE AND TIMELY COMPLIANCE WITH ALL APPLICABLE CONDITIONS, INCLUDING THE FILING OF ALL REQUIRED INFORMATION AND REPORTS.

B. THE VALIDITY OF THIS PERMIT IS ALSO CONDITIONED UPON STRICT OBSERVANCE OF ALL APPLICABLE FOREIGN, STATE, LOCAL OR OTHER FEDERAL LAW.

C. VALID FOR USE BY PERMITTEE NAMED ABOVE.

C.1.
a. California Department of Parks and Recreation
b. Riverside County Flood Control
c. Riverside County Waste Resources Management District
d. Riverside County Regional Park & Open-Space District
e. Coachella Valley Mountains Conservancy
f. California Department of Transportation
g. Coachella Valley Association of Governments
h. Coachella Valley Water District
i. Imperial Irrigation District
j. City of Palm Springs
k. County of Riverside
l. City of Rancho Mirage
m. City of La Quinta
n. City of Indian Wells
o. City of Indio
p. City of Palm Desert
q. City of Cathedral City
r. City of Coachella
s. Coachella Valley Conservation Commission

D. Further conditions of authorization are contained in the attached Special Terms and Conditions.

☒ ADDITIONAL CONDITIONS AND AUTHORIZATIONS ALSO APPLY

12. REPORTING REQUIREMENTS

ISSUED BY	TITLE	DATE
	DEPUTY DIRECTOR, CALIFORNIA NEVADA REGION	10-1-08

Attachment A

A. Director
California Dept of Parks and Recreation
P.O. Box 942896
Sacramento, CA 94296-0001

B. Warren D. Williams, General Manager
Riverside County Flood Control
1995 Market Street
Riverside, CA 92501

C. Hans Kernkamp, General Manger
Riverside Co. Waste Resource Mgmt. Dist.
14310 Fredrick Street
Moreno Valley, CA 92553

D. Paul Frandsen, General Manager
Riverside Co. Reg. Park & Open-Space Dist.
4600 Crestmore Road
Riverside, CA 92509-6858

E. William D. Havert, Executive Director
Coachella Valley Mountains Conservancy
73-710 Fred Waring Drive, STE 205
Palm Desert, CA 92260

F. Michael Perovish, District Director
California Dept. of Transportation
464 West 4th Street
San Bernardino, CA 92401

G. John Wohlmuth, Executive Director
Coachella Valley Assn of Governments
73-710 Fred Waring Drive, STE 200
Palm Desert, CA 92260

H. Steve Robbins, General Manager
Coachella Valley Water District
85-995 Avenue 52
Coachella, CA 92236

I. Brian Brady, General Manager
Imperial Irrigation District
333 East Barioni Blvd.
Imperial, CA 92251

J. City of Indian Wells
44950 El Dorado Drive
Indian Wells, CA 92210-7497

K. Carolyn Syms Luna, Administrative Manager
County of Riverside
4080 Lemon Street
P.O. Box 1605
Riverside, CA 92502-1605

L. Patrick M. Pratt, City Manager
City of Rancho Mirage
69-825 Highway 111
Rancho Mirage, CA 92270

M. Thomas P. Genovese, City Manager
City of La Quinta
78-495 Calle Tampico
P.O. Box 1504
La Quinta, CA 92253

N. David H. Ready, City Manager
City of Palm Springs
3200 East Tahquitz Canyon Way
Palm Springs, CA 92262

O. Glenn Southard, City Manager
City of Indio
P.O. Drawer 1788
100 Civic Center Mall
Indio, CA 92201

P. Carlos Ortega, City Manager
City of Palm Desert
73-510 Fred Waring Drive
Palm Desert, CA 92260

Q. Don Bradley, City Manager
City of Cathedral City
68-700 Avenida Lalo Guerrero
Cathedral City, CA 92234

R. Tim Brown, City Manager
City of Coachella
1515 Sixth Street
Coachella, CA 92236

S. John Wohlmuth, Executive Director
Coachella Valley Conservation Commission
73710 Fred Waring Drive, STE 200
Palm Desert, CA 92260

COACHELLA VALLEY MULTIPLE SPECIES HABITAT CONSERVATION PLAN
SPECIAL TERMS AND CONDITIONS FOR TE-104604-0
U.S. FISH AND WILDLIFE SERVICE, CALIFORNIA

STANDARD CONDITIONS and ACCOUNTING

1. All sections of Title 50 C.F.R., parts 13, 17.22, and 17.32, and any future amendments thereto, 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 Recirculated Coachella Valley Multiple Species Habitat Conservation Plan/ Natural Community Conservation Plan (Plan/MSHCP), dated September 2007, and the executed Implementing Agreement (IA), all of which are hereby incorporated into this Permit. In the event of a discrepancy, the conditions and authorizations of this Permit are controlled by the Plan documents in the following order: (1) the Special Terms and Conditions of this Permit included herein; (2) the executed IA; and (3) the Plan, including its associated volumes (exclusive of the IA).

3. The Permittees, their authorized agents, Third Parties Granted Take Authorization under the direct control of the Permittees, and Participating Special Entities that have obtained a Certificate of Inclusion, are authorized to take the animal species in Attachment 2 to this Permit as Covered Species, subject to the conditions therein, to the extent that take of these species would otherwise be prohibited under section 9 of the Endangered Species Act of 1973, as amended (Act) and its implementing regulations, or pursuant to a special rule promulgated under section 4(d) of the Act. Take of Covered Species (animal) must be incidental to otherwise lawful Covered Activities within the Plan Area as defined in the IA and further described and depicted in the Plan. Per Attachment 2, twenty-seven (27) taxa are Covered Species subject to compliance with and implementation of the Permit Terms and Conditions described herein, the Plan, IA, and associated documents, and where appropriate, the species-specific Permit Terms and Conditions described herein.

4. Take authorization is effective at Permit issuance, subject to the other terms and conditions herein, for those animal species listed as "Covered" in Attachment 2 that are currently listed under the Act. For the 14 animal species in Attachment 2 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 their listing under the Act, subject to the conditions herein, should they be listed during the Permit term, to the extent that their take is prohibited by the Act. Take must be incidental to otherwise lawful Covered Activities within the Plan Area as defined in the IA and described in the Plan, and as further conditioned herein. The amount of the take for these species is summarized in Attachment 2 and for the natural communities in Attachment 3.

5. Because take of plants is not prohibited under the Act, incidental take for plants cannot be authorized under this Permit. No take is authorized for the federally listed Coachella

Valley milk-vetch (*Astragalus lentiginosus* var. *coachellae*) and triple-ribbed milk-vetch (*Astragalus tricarinatus*). Plant species included in 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 Plan and IA, and receive those assurances identified in the Plan and IA.

6. Fully Protected Species under California Fish and Game Code may not be taken (as that term is defined in the California Fish and Game Code) or possessed at any time except under limited circumstances, as provided in the Fish and Game Code. The following species are Fully Protected Species: California black rail (*Laterallus jamaicensis*), Yuma clapper rail (*Rallus longirostris yumanensis*), and Peninsular bighorn sheep (*Ovis canadensis cremnobates*).

7. This section 10(a)(1)(B) Permit shall constitute a Special Purpose Permit under 50 Code of Federal Regulations section 21.27, for the take of Covered Species listed under the Act and which are also listed under the Migratory Bird Treaty Act (MBTA; 16 U.S.C. §§ 703-712), in the amount and/or number specified in the Plan, subject to the terms and conditions specified in the Section 10(a) Permit. Any such Take will not be in violation of the MBTA. The MBTA Special Purpose Permit will extend to Covered Species listed under the Act and also under the MBTA after the Effective Date of the Section 10(a) Permit. This Special Purpose Permit shall be valid for a period of three (3) years from its effective date, provided the section 10(a) Permit remains in effect for such period. The Special Purpose Permit shall be renewed upon written request to the U.S. Fish and Wildlife Service (Service) or as otherwise applicable pursuant to the requirements of the MBTA, provided the Permittees remain in compliance with the terms of the Plan, the Implementing Agreement and the Section 10(a) Permit. Each such renewal shall be valid for a period of three (3) years, provided that the Section 10(a) Permit remains in effect for such period. Take, as defined by 50 C.F.R. 10.12, associated with habitat loss for bird species on the list of Covered Species is avoided or minimized within Conservation Areas by the restrictions provided in Section 4.4 of the Plan. For other birds protected by the Migratory Bird Treaty Act (MBTA) and not listed under the Act no take is authorized under the MBTA (including killing and wounding of any such birds, or take of eggs and active nests). Prior to authorized ground disturbing activities, Permittees shall provide information to affected landowners regarding their responsibilities under the Migratory Bird Treaty Act.

8. Permittees, as applicable, shall contact the Service's Carlsbad Fish and Wildlife Office (6010 Hidden Valley Road, Suite 101, Carlsbad, California 92011) within 1 business day after they become aware of any violations or potential violations of the Act or MBTA at (760) 431-9440.

9. Within one business day of finding dead, injured, or sick endangered or threatened wildlife species, the appropriate Permittee or its designated agent shall orally notify the Service's Carlsbad Fish and Wildlife Office at (760) 431-9440. Written notification to the Carlsbad Fish and Wildlife Office (6010 Hidden Valley Road Suite 101, Carlsbad, California 92011) and the Division of Law Enforcement (185 West F Street, Suite 440,

San Diego, California 92101-5063) shall be made within five business days and shall include the date, time, and location of the specimen and any other pertinent information.

10. Where Covered Activities result in the incidental take of Covered Species within the U.S. Army Corps of Engineers' (Corps) 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. Pursuant to and consistent with Section 14.8 of the IA, where Covered Activities require section 7 consultation under the Act, exemption for any associated incidental take by the applicable Federal agency shall be provided through future consultation, while authorization for any associated incidental take of Covered Species by the Permittees, Third Parties Granted Take Authorization, and/or Participating Species Entities shall be provided through this Permit.

11. A copy of this Permit must be on file with each of the Permittees. 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, Suite 101, Carlsbad, California 92011, telephone (760) 431-9440.

12. Notwithstanding anything to the contrary in the Plan and IA, the Service retains statutory authority, under both sections 7 and 10 of the Act, to revoke incidental take Permits that are found likely to jeopardize the continued existence of a listed species.

13. In order for Covered Activities carried out by third parties to receive take coverage under the Permit, the regulatory requirements for extending incidental take to third parties must be met (see 50 C.F.R. § 13.25(d) and (e)). Specifically, the third party must be under the direct control of a Permittee, such that the Permittee has the ability to enforce the terms and conditions of the Permit against the third party. A third party is under the direct control of a Permittee if 1) the third party is employed by or under contract to a Permittee for purposes authorized by the Permit; or 2) the third party Covered Activity is under the jurisdiction of a Permittee through an ordinance, or equivalent; or 3) the third party has been issued a permit by, or has executed a Certificate of Inclusion with, a Permittee. Vested projects within the Plan Area may receive take authorization under the Permit as follows: any proponent that has received all necessary approvals from a Permittee for a project within the Plan Area, such that the project is considered vested under appropriate California law, may request Third Party Take Authorization for its activities pursuant to the Permit as a Vested Project Developer. Such activities must comply with all applicable Plan, IA and Permit requirements. A project with legal vested rights (as of the date of Permit issuance) may obtain take coverage provided that the project applicant executes a Certificate of Inclusion with the applicable Permittee that requires compliance with all applicable Plan, IA, and Permit requirements, and that expressly confirms the consent of the third party to enforcement of the Plan, IA, and Permit against the Vested Project Developer by the Permittee.

14. New development that requires a discretionary permit from a Permittee which expands an Existing Use and results in new disturbance shall be subject to MSHCP requirements. Any authorized disturbance of Natural Communities and Covered Species modeled habitat shall count toward the amount of disturbance authorized under the Plan since the Covered Species habitat and Natural Communities on these lands were not addressed or included in the amount of anticipated disturbance authorized under the Plan.

15. CVCC shall conduct an accounting of authorized disturbance approved by the Permittees since November 1996. As may be determined by said accounting, any authorized disturbance acreage shall be deducted from the anticipated 10 percent disturbance allowed within the Conservation Areas as part of the Year 1 Annual Report under the Plan.

16. When a project is analyzed under the Joint Project Review Process, the authorized disturbance shall be calculated upon completion of the Joint Project Review Process and shall be deducted from the acreage of disturbance authorized for each Permittee at the time the Permittee issues a grading or building permit. Disturbance associated with public projects identified in Section 7 of the Plan shall not be counted against the disturbance authorization of the affected Permittee. Undeveloped portions of parcels in Conservation Areas on which development is approved shall count towards meeting the Conservation Objectives only when the undeveloped portion of the parcel is legally described and is permanently protected through an appropriate Legal Instrument that allows long-term monitoring and management in perpetuity. When these requirements are met, the conserved part of the parcel shall be counted in the rough-step calculations. Review of development projects and accounting shall occur in accordance with the Joint Project Review Process and the Implementation Manual and shall be included in the Annual Report.

17. If any Federal lands within the MSHCP Plan Area are transferred to private entities or Permittees otherwise covered under the MSHCP, any Covered Activities proposed on those lands shall be subject to all pertinent conservation requirements under the MSHCP. Within Conservation Areas there shall be no net loss of conservation.

18. CVCC and/or Coachella Valley Association of Governments shall ensure that a Final MSHCP document that incorporates the Special Permit Terms and Conditions and clerical changes consistent with Section 6.12.1 is printed within 12 months of Permit issuance.

19. Development proposed by non-profit organizations within Conservation Areas is subject to the take authorization and conservation requirements through the rough step calculation identified for each Conservation Area in the Plan.

20. A Conservation to Development ratio of 9:1 within the Willow Hole Conservation Area shall be maintained within each of the following areas: 1) the east half of the southwest quarter, and the east half of the east half of the west half of the southwest quarter, and east half of the west half of the southwest quarter, of Section 12, T3S R4E; 2) the east

half of the east half of the southeast quarter, and the west half of the west half of the southeast quarter, and the west half of the east half of the west half of the southeast quarter of Section12, T3S R4E as shown in Figure 4-13f of the Plan; 3) the northwest quarter of Section 19, T3S R5E; 4) the portion of the northeast quarter of Section 19, T3S R5E that is in the Conservation Area; 5) the portion of the northern half of Section 20, T3S R5E as depicted in Figure 4-13f of the Plan; 6) the portion of the north half of Section 24, T3S R4E that is in the Willow Hole Conservation Area; 7) the portion of the southern quarter of Section 28, T3S R5E as depicted in Figure 4-13f; and 8) the east half of the northwest quarter within the Willow Hole Conservation Area, and the west half of the west half of the northeast quarter, and the east half of the west half of the northeast quarter (except those portions north of Varner road) of Section 29, T3S R5E. (See Figure PC-1.)

21. Certain measures are identified in the Plan as obligations to be performed to the "maximum extent Feasible." If the applicable Permittee determines that performing an obligation to the fullest extent is not Feasible, the Permittee and the Wildlife Agencies shall meet and confer using the conflict resolution procedures and policies of the Agencies as appropriate.

CVCC MONITORING AND MANAGEMENT

22. Prioritization of the Monitoring Program shall include a focus on the development of scientifically valid, repeatable survey techniques that will support population estimation and determination of distribution for the Coachella Valley giant sand-treader cricket, Coachella Valley Jerusalem cricket, desert pupfish, Coachella Valley fringe-toed lizard, flat-tailed horned lizard, Coachella Valley round-tailed ground squirrel, and Palm Springs pocket mouse in the Plan Area (particularly in the Core Habitats) over the term of the Permit. These techniques shall be developed in coordination with the Wildlife Agencies prior to their implementation. The CVCC shall ensure that any monitoring and management of these species that are implemented through joint funding by multiple Permittees are coordinated to allow for comparison across the Plan Area and through time in support of the effectiveness monitoring and adaptive management requirements of the Plan.

23. Use of the Management Contingency Fund under Section 8 of the Plan shall include addressing the following sand-dependent species priorities: 1) funding of activities addressed in Special Permit Term and Condition #26; 2) development and implementation of an invasive species management plan that assesses the status of and threats from invasive species, identifies knowledge gaps, and addresses control of invasive plant species (e.g, Saharan mustard) in Snow Creek/Windy Point, Thousand Palms, Whitewater Floodplain, and Willow Hole Conservation Areas; and, 3) funding of other sand-dependent species/habitat related Special Permit Terms and Conditions. The invasive species management plan shall be developed within 3 years of Permit issuance in coordination with the Wildlife Agencies; this management plan shall be implemented beginning in year 4 post-Permit issuance. The Management Contingency Fund may supplement, but not replace, the Monitoring and Management Program budget.

24. For Coachella Valley Fringe-toed Lizard, Coachella Valley Round-tailed Ground Squirrel, Palm Springs Pocket Mouse, and Coachella Valley Milkvetch, to ensure that a minimum of three (3) viable populations (long-term persistence of self-sustaining populations) within Core Habitat for these species is maintained, or if necessary re-established and maintained, the following measures shall be implemented:

    a. The CVCC shall manage and enhance modeled Core Habitats for these species to provide for persistent and sustainable populations and essential ecological processes, including broader patterns of sand transport and deposition in the Whitewater Floodplain and maintenance of sand transport and deposition in all Core Habitats to the maximum extent practicable (e.g., sand fencing as appropriate in any of the Conservation Areas and restoring mesquite in Thousand Palms Conservation Area) to achieve the Conservation Objectives for these species in the Plan.

    b. The CVCC shall assess the animal species identified above to determine the presence of persistent and sustainable populations and essential ecological processes within the Core Habitats. This assessment shall be completed within three years of Permit issuance using methods developed jointly by the CVCC and Wildlife Agencies.

    c. Specific studies shall be conducted as part of the baseline monitoring for the Coachella Valley milkvetch to assess: viability of seed bank, substrate affinities, micro-habitat requirements, seed dispersal, pollination ecology, and impacts of invasive species within the Core Habitat areas to ensure that the appropriate measures to support long-term conservation of this species are identified. These studies shall be completed within 5 years of Permit issuance using methods developed jointly by the CVCC and Wildlife Agencies.

    d. The CVCC shall develop long-term management strategies for each of these species that identify specific monitoring approaches (e.g., the use of probabilistic population estimates, relativistic population indices, and/or assessments of effective population size) and management actions (including actions to address habitat as described in a) above) that will be implemented and a specific time line for implementation to ensure a minimum of 3 viable populations including adequate distribution to support long-term viability of the populations within Core Habitat areas. These management strategies shall be completed and provided to the Wildlife Agencies for their concurrence within 5 years of Permit issuance for the animal species and 7 years for the CV milkvetch.

    e. Within 6 months of their completion, implementation of the measures associated with the management strategies shall begin through incorporation into the applicable Reserve Management Unit Plan(s) and Adaptive Management Program. Any changes to the Covered Species and Natural Communities Conservation Goals and Objectives and Required Measures for the Conservation Areas that include Core Habitat for each of the species identified above shall be submitted to the Wildlife Agencies for review and approval within 8 years of permit issuance and incorporated into the Joint Project Review process as appropriate.

25. Within 3 years of permit issuance a translocation policy for sand dependent species shall be developed by the CVCC that complies with State and Federal laws, policies and regulations. This policy will address the potential need for translocation (e.g. to maintain genetic diversity). Known areas of high concentrations of species that are disturbed or developed could be targeted for possible salvage or for use in scientific studies.

26. CVCC and the Land Manager, through the land management program, shall identify and document implementation compliance with the Land Use Adjacency Guidelines and work with the landowners and appropriate jurisdictions to address these concerns. This information shall be included in the Annual Report to the Wildlife Agencies and the Permittees.

27. The CVCC shall ensure that the mesquite hummocks Natural Community will be subject to a "no net loss" requirement within Conservation Areas as described in Section 8.2.4.1 of the Plan. The CVCC shall ensure that all no net loss requirements are implemented within 10 years of impacts, including providing suitable or potential habitat for Covered Species if such habitat is affected or lost due to Covered Activities.

28. CVCC shall conduct a Joint Project Review for proposed single family homes in the 9:1 areas to identify applicable measures needed to meet Conservation Area and Covered Species Goals and Objectives of the Plan. If a Conservation Easement is offered over a parcel or a portion of a parcel in the 9:1 areas identified in Condition number 22, CVCC shall condition the acceptance of any easement to meet the Site Planning Standards described under Required Measure 3 in Section 4.3.11 of the Plan (with the exception of the first four sentences of Site Planning Standard 2).

29. The CVCC, after coordination with its Implementation Manual Subcommittee, shall provide the Implementation Manual for review and concurrence by the Wildlife Agencies prior to its finalization and distribution to the Permittees.

30. Should CDFG, Service, or BLM be unable to provide funds or personnel to the bighorn sheep monitoring program as described in the Plan, the CVCC shall ensure that the population level monitoring identified as necessary in Section 7.3.3.2.1 Element 3, including the hiring of qualified personnel, is conducted and is consistent with the budget as described in Section 8.8.3 of the Plan. Any changes in the scope, extent, or frequency of this monitoring shall be developed jointly among the CVCC and the Wildlife Agencies.

31. In coordination with the Wildlife Agencies, all capture and handling of bighorn sheep shall be conducted in accordance with State of California regulations and applicable Federal permit requirements. This Permit does not authorize the Permittees or their agents to capture or handle bighorn sheep.

32. Consistent with section 7.3.3.2, if a ewe group or subgroup of bighorn sheep (as identified in Tables 7-12 and 7-13 of the Plan), drops below 15, the CVCC shall convene a meeting of the Trails Management Subcommittee, RMUC, and appropriate researchers

within 30 days of notification by CDFG or Service of the population estimate. The group shall review data and develop management actions to address further declines in adult female abundance. The RMOC shall forward a recommendation within 30 days of the initial meeting to the CVCC for a decision so that implementation of appropriate management actions can commence within the following 30 days consistent with State and Federal regulations. If the population estimate indicates that a ewe group has 5 or fewer adult females, immediate management action (including but not limited to trail rerouting, adjustments in use levels, enforcement actions, and/or trail closures) to address the decline and/or reduce potential stress to the sheep population as described in Section 7.3.3.2 of the Plan shall be taken within 3 days. Concurrent with any action taken, CVCC shall initiate the process described above to identify long-term management action to address this condition.

33. Development of the Request for Proposals (RFP) for trails research and selection of contractors shall be by qualified representatives from the Wildlife Agencies, CVCC, BLM, and outside objective reviewers. The Service, CDFG, CVCC, and BLM shall be limited to one member each, and three outside reviewers shall be chosen by the consensus of the agency representatives. The seven-member group must reach agreement on the selection of the research design and contractor(s) to conduct research on the effects of recreational trail use on bighorn sheep. The above group shall (1) oversee implementation of the research program in coordination with the RMUC for the Santa Rosa and San Jacinto Mountains Conservation Area and the Trails Management Subcommittee, (2) provide advice and guidance on issues that arise during the field phase of the research, and (3) provide review of draft reports and articles. The selected researcher shall provide the review panel with semi-annual oral/written reports.

34. If the portion of the proposed Palm Desert to La Quinta Connector Trail between the Visitor Center and the Living Desert is pursued, it shall be reviewed jointly by the CVCC and Wildlife Agencies after the trails research program on the effects of recreational trail use on wild sheep and additional research evaluating the effects of the Connector Trail on captive sheep located at the Bighorn Institute are completed. Research evaluating the effects of the Connector Trail on captive sheep located at the Bighorn Institute is required for construction of the Connector Trail to be considered a Covered Activity. The research program evaluating the effects of the Connector Trail on captive bighorn sheep shall be conducted subsequent to the research program involving wild sheep. Research on the captive sheep is contingent upon obtaining the full cooperation of the Bighorn Institute.

35. Following completion of the trails research program, construction of the proposed perimeter trails listed under the Trails Plan could occur if research results demonstrate that expected future recreational use of these proposed trails is not likely to adversely impact the health, demography, population sustainability, and population connectivity of Peninsular bighorn sheep.

36. Any new trail within the perimeter trail corridor running along the east side of the Santa Rosa Wilderness from Coral Mountain Regional Park to Martinez Canyon shall be

limited to the identified trail corridor. Any new trail branching from this identified corridor that would enter bighorn sheep habitat would require a Minor Amendment requiring Wildlife Agency concurrence as described in Section 6.12.3 of the Plan.

37. The Trails Management Subcommittee shall evaluate and prioritize for decommissioning, all trails, paths, routes, or ways on Reserve Lands within the Santa Rosa and San Jacinto Mountains Conservation Area not specifically authorized in the Trails Plan within 5 years of Permit issuance. State and Federal regulatory processes must be completed and a final decision about trails to be decommissioned will be made by year 10 as part of the Trails Plan. Trails not currently authorized that are being considered for inclusion in the Trails Plan shall be treated the same as proposed new trails requiring the Minor Amendment process for authorization. All trails, paths, routes, or ways not given authorization under the Minor Amendment process shall be decommissioned and removed by the CVCC or appropriate Permittee in coordination with the land owner and the affected state and federal land management agencies no later than Plan Year 15. All unauthorized trails, routes, paths, or ways on lands acquired post Permit issuance shall be decommissioned within 3 years of parcel acquisition or detection of any unauthorized trails/paths/routes/ways. Should these timeframes not be met, the CVCC and the Wildlife Agencies shall meet to determine appropriate actions. Should any trails be illegally created between permit issuance and the decommissioning of trails, the CVCC shall coordinate with the Permittees and the appropriate state and federal land management agencies to assure removal of the trail.

38. Upon completion of the trails research program described in Element 2 of the proposed Trails Plan (Section 7.3.3.2), the Trails Management Subcommittee, RMUC, and RMOC shall develop a trails management plan to be implemented by Plan Year 10. Should these timeframes not be met, the CVCC and the Wildlife Agencies shall meet to determine appropriate actions. The revised public use and trails management plan shall be based on results from the research program (Element 2 of the Trails Plan), abundance levels of bighorn sheep, and the best available science, in addition to professional judgment and wildlife conservation principles where study results are less than definitive. Implementation of the public use and trails management plan for the portions of trails on non-federal land, shall be subject to the review and approval by the RMOC, of which the Wildlife Agencies are members. The resolution process related to the development and implementation of the Trails Plan through the RMOC shall not limit the Wildlife Agencies ability to ensure the Trails Management Plan is in compliance with the Plan, IA, and Permits.

39. For the parcels shown in Figure 4-26e (1, 2, 3, and 4) of the Plan, the HANS process shall be applied prior to Joint Project Review Process. Criteria for the HANS Process shall be developed by the Wildlife Agencies and CVCC in consultations with the affected Permittees within 6 months of Permit issuance incorporating an analysis regarding known core use areas, home ranges, water sources, escape terrain, lambing and rearing habitat, seasonally important foraging areas, or movement/dispersal zones that shall be completed to minimize adverse effects to these resources. These criteria shall be included in the

Implementation Manual. In the interim, prior to the adoption of these criteria, CVCC shall jointly analyze projects with the affected Permittees and the Wildlife Agencies.

40. In Peninsular bighorn sheep habitat, the CVCC shall assist Permittees to identify adopted policies or other options to locate and/or consolidate future development within Conservation Areas adjacent to existing development areas. Options identified shall be considered during the HANS and Joint Project Review Process. These options may include but are not limited to Transfers of Development Rights, Purchases of Development Rights, and Conservation Easements in order to provide for consolidation of development to ensure large intact blocks of bighorn sheep habitat. CVCC shall facilitate efforts across jurisdictions to maximize conservation of sheep habitat. This shall be an ongoing effort by the CVCC and the affected Permittees to meet the species conservation goals and objectives for bighorn sheep. Analysis to be used for these options shall include the following: bighorn sheep home ranges, core use areas, movement and dispersal zones, changing environmental conditions, and essential resources, including escape terrain, foraging areas, lambing and rearing habitat, habitat connectivity, water sources, and space for population expansion.

41. The Service shall participate fully in the RMUC for the Santa Rosa and San Jacinto Mountains, Snow Creek/Windy Point, and Cabazon Conservation Areas regarding discussions and recommendations that could affect bighorn sheep.

42. All monitoring and reporting for this Permit shall be in compliance with the Plan, IA, and the Special Permit Terms and Conditions. Annual reports are due no later than March 30, beginning in 2009 and ending in 2084. Copies of all reports shall be submitted to the Service's Field Supervisor, Carlsbad Fish and Wildlife Office, 6010 Hidden Valley Road, Suite 101, Carlsbad, California 92011, and to the Regional Director, Region 8, 2800 Cottage Way, Room W2606, Sacramento, California 95825-1846.

43. In T4S R6E Section 8 in the Thousand Palms Conservation Area, the Site Planning Standards described under Required Measure 3 of the Plan, also shall apply to lands with a Light Industrial general plan land use designation (with the exception of the first two sentences of Site Planning Standard 2).

44. Any future project that occurs in the Palm Hills Special Provisions area, including access from East Palm Canyon Drive and internal circulation, shall comply with the Plan, IA, Permit and Special Permit Terms and Conditions and will be considered a Covered Activity. All mitigation identified in the Plan regarding the Palm Hills project is retained as part of the conservation commitment in the Plan. The applicable Permittee shall ensure that all portions of the project, including any golf course or portions of the golf course will be located north of Eagle Canyon and no closer than one quarter mile to the water source located in Eagle Canyon (Section 31 T4S R4E). The extension of any road across or south of Eagle Canyon and any improvements to and/or the maintenance of the Dunn Road are not Covered Activities under the Plan and shall not be considered as a Minor Amendment.

45. For projects outside of the proposed Conservation Areas within the 50,272 acres of naturally occurring desert tortoise habitat anticipated to be impacted, the Permittee shall either: 1) notify the Service 45 days prior to the issuance of a grading permit to allow for the potential salvage of adult tortoises within this notification time period; or 2) condition such projects to conduct desert tortoise clearance surveys per the Service's protocol.

46. To be a Covered Activity under the Plan, development in Chino Canyon [Special Provision 2 (g)]) shall include the following measures:

a. The overall footprint of the Project shall not exceed 288 acres and shall conform to the "development area" depicted in Figure 4-26(e)(1)(A) including all on-site and off-site utility and street infrastructure improvements necessary to serve the Project.

b. Establish conservation easements in form substantially similar to the Model Conservation Easement, (as that form may be amended) over specific lands identified on Figure PBS-4 to create a PBS wildlife corridor across Chino Canyon. Corridor will include constructed escape terrain to facilitate PBS movement as described in [s] below. Easements must be implemented before grading permits may be issued for the Project. If easements not obtained in time, line demarcating take authorization will revert to original reasonable and prudent alternative location from the 1998 Conference Biological Opinion.

c. Prior to issuance of grading permits for the Project, all land in Sections 5, 8, and 9 owned by the City of Palm Springs and/or the City of Palm Springs' Parks, Open Space, and Trails (POST) fund as of October 22, 2005, including the land in the Mountain Falls area lease, must be permanently protected for PBS conservation purposes through a conservation easement to the CVCC, in a form substantially similar to the Model Conservation Easement, as that form may be amended, that guarantees conservation in perpetuity and precludes the possibility of constructing golf courses, new trails, or other facilities.

d. At the north and south ends of the wildlife corridor, the Permittee shall ensure that the Project Proponent installs artificial water sources for the PBS, with the design to be reviewed and approved by the Permittee who shall provide the Wildlife Agencies an opportunity to comment.

e. The Permittee shall ensure that the Project proponent works with the appropriate entities to design and implement a transportation plan that establishes a shuttle service for the Tramway. The transportation plan shall be reviewed and approved by the Permittee, who shall provide the Service an opportunity to comment. The Project shall have the ongoing obligation to minimize traffic on Tramway Road for the life of the Project.

f. The security gates for the proposed Project on Tramway Road shall be installed outside and downslope of the Wildlife Corridor. Currently, the Winter Park Authority closes the existing security gate to the Palm Springs Aerial Tramway facility (tram) near Highway 111 at 10 p.m. each night to prevent unauthorized use of Tramway Road. The Project proponent has agreed with the Winter Park Authority that the guard at the Project site entry gate shall move down to the tram

gate at 10 p.m. to control road access. The guard shall return to the Project gate when the Tramway Road reopens at 6 a.m. daily. The Project proponent shall build a gatehouse to provide shelter for the guard at that location. No other gates are contemplated.

g. A vegetation management plan for the riparian area in the wildlife movement corridor, depicted in Figure PBS-4 on project site land and on the land described in (1)c must be developed by the Project proponent, in cooperation with the City of Palm Springs, and approved by the Wildlife Agencies prior to issuance of grading permits. The vegetation management plan shall include the modification of riparian habitat necessary to facilitate the wildlife corridor, off-setting measures to ensure no-net loss as described in the Plan, and any modifications to the small cliff along the edge of the riparian area to facilitate sheep movement across the corridor.

h. The planting of toxic plants, such as oleander, nightshade species, and various Prunus sp., shall be prohibited within the proposed Project boundaries in perpetuity. Landscaping crews shall be trained in identifying these plants and shall remove them upon sighting.

i. Any artificial water features associated with the proposed Project shall be designed to preclude shallow, vegetated edges that provide breeding habitat for Culicoides midges, an invertebrate disease vector for the bluetongue virus, a disease of bighorn sheep. This requirement applies for the life of the Project.

j. The entire developed portion of the Project site shall be fenced and maintained in perpetuity to preclude PBS access to the development area. The fence shall be 8 feet high from its footings and shall not contain gaps larger than 4 inches to prevent entanglement of bighorn sheep. In addition, berms, vegetative hedges, or such other design features as the Permittee may require shall be established along the entire length of the Wildlife Corridor to preclude the visibility of activities on the project site to PBS and to encourage the PBS use of the wildlife corridor. The final fence plan, and any exceptions to the specified installation or location, shall be reviewed by the Service.

k. The Permittee shall ensure that the Project proponent deposits into a fund of a 501 (c)(3) as designated by the Service in the amount of $500,000 at the commencement of project vertical construction to be used for listed species conservation purposes to be determined by the Service.

l. The Permittee shall ensure that the Project proponent ensures that 1 percent of the gross proceeds from the sale of all retail goods within the hotel stores at the Project be deposited annually into an interest-bearing account, with an entity to be determined by the Service, for the life of the Project; these funds shall be used for listed species conservation purposes at the sole discretion of the Service. The Service will have sole discretion over these funds and a written legal instrument shall be provided to assure this. In the event a hotel is not built, one percent of the total building valuation (computed using the latest building valuation determined in the manner provided in PSMC Sec. 3.37.070(d) as may be amended from time to time) of the Project shall be deposited in an interest bearing account for the purposes described above prior to the issuance of occupancy for each phase of the Project as approved by the Permittee.

m. The Permittee shall ensure that the Project Proponent collects and deposits into an escrow fund of a 501 (c)(3) as designated by the Service and shall disperse at the direction of the Service all funds generated from all project-related sources from the Project for listed species conservation purposes. The contract shall require that the Project Proponent, and any successors and assigns, provide the specified services herein in perpetuity. The Permittee shall ensure that Project Proponent bears any of the administrative costs of this condition.

n. No mass grading shall occur within 100 feet of the Chino Creek riparian area from March 15 through September 15 within the Project site. For any construction work performed within the area specified in this paragraph during the period of March 15 through September 15 of a given year, the Project proponent shall install sound attenuation devices or implement measures, to minimize noise impacts on the LBV by reducing sound levels below 60 dBA.

o. Any Project fill material to be imported shall only come from off-site borrow areas permitted by local, State and Federal governmental agencies. The Permittee shall ensure that the Project proponent notify the Service as to where and when fill material will be obtained prior to importation, so that the Service can determine whether listed species could be adversely affected and any incidental take has been properly authorized.

p. If new water wells are developed by the Project proponent on the site, they shall comply with the restrictions established by the Permittee. The restrictions require that wells, if any, be located at least 5,000 feet downhill from the cienega west of the Project site.

q. No vertical construction activities or facilities shall occur within a minimum 100-foot setback from the Chino Creek riparian corridor within the Project site.

r. No rock crushing shall take place within 500 feet of the Chino Creek riparian area on the Project site.

s. A biological resources monitor shall be onsite during construction of the Project. The duties of the biological resources monitor shall include, but are not limited to: conducting desert tortoise clearance surveys per the Service's protocol; directing where to install temporary fencing that avoids sensitive areas such as the riparian habitat; and conducting an education program for the construction crew regarding sensitive habitat and listed species. The monitor shall have the authority to stop construction activities, if necessary, to ensure compliance with any of the conservation measures discussed herein.

t. A special lighting system shall be installed within the Project site to ensure to the extent feasible, that light does not "spill over" into the Chino Creek riparian area, PBS habitat, and other natural habitats surrounding the site. The lighting system shall include low-set lighting and shields that prevent artificial light sources from shining directly into natural habitat areas to minimize disturbance to and vulnerability of listed species to increased predation. Any golf driving range shall be limited to use during daytime hours only with no lights installed for night-time usage.

u. No construction-related activities, involving blasting and/or use of equipment that produces noises or sounds louder than 90 dbA at the source shall occur between

January 1 through June 30 of any year, to address, in part, the adverse impacts of construction during the PBS lambing season.

v. The Permittee shall work with the Mt. San Jacinto Winter Park Authority and the Service to reduce potential sheep mortality due to collisions with vehicles along Tramway Road and to enhance the currently reduced movement corridor for PBS across Chino Canyon, which is restricted due to current and Project-related traffic levels. To the extent that a hotel is constructed on site, the Project proponent shall establish a shuttle service that ferries people from the Project site to the tram for the life of the Project. The speed of the traffic on the road shall be limited to 25 miles per hour and signs shall be posted reminding drivers of the presence of PBS in the area for the life of the Project. Within the wildlife corridor, traffic speeds shall be limited to 5 mph for the life of the Project.

In addition, the area where people are picked up and dropped off shall be consolidated in the immediate vicinity of the tram. The Permittee shall ensure that the Project proponent enters into a legally enforceable agreement with the Desert Water Agency, Mount San Jacinto Winter Park Authority, Service, and any other necessary parties, which includes construction and operation of a gate system that effectively prohibits all human access along Tramway Road within the designated movement corridor, other than for operation and maintenance of the Palm Springs Aerial Tramway and Tramway Road, and for access to all landowners within and uphill of the designated movement corridor that require access to their properties, including the California Department of Parks and Recreation, California Department of Fish and Game, U.S. Forest Service, and BLM. The Project proponent shall also enter into an agreement with the Tram Authority, and any other affected parties to establish a coordinated shuttle system for all recreational visitors to the tramway that minimizes traffic through the wildlife corridor.

w. An education program, to be reviewed and approved by the Service, shall be developed and implemented for clients and residents of the Project for the life of the Project that provides information on the status, sensitivity, and conservation needs of the bighorn sheep.

x. The Permittee shall ensure that the Project proponent does not object to actions that the Permittee or CVCC may require to facilitate the use of the wildlife corridor. Such actions may include the construction of road improvements to avoid and minimize adverse effects on PBS caused by traffic, a crossing for sheep usage, or sheep augmentation within the San Jacinto Mountain range.

y. The need for escape terrain will be evaluated in conjunction with the environmental analysis to be conducted with any project entitlement. If improvements to facilitate escape terrain are identified as needed pursuant to the environmental analysis, the Project proponent shall be responsible for such improvements.

z. In the event the Permittee or CVCC determine that sheep do not use the designated wildlife corridor, the Permittee may require Project Proponent to implement additional measures to facilitate sheep movement through or around the project to ensure continued connectivity.

aa. The development of the Project shall be located solely within the Development Area depicted on Figure 4-26e(1)(A) (excluding required access and off-site infrastructure improvements) or such smaller area therein as the Permittee requires pursuant to the Permittee's adopted plans and policies or as the Permittee determines is necessary or appropriate to accommodate sheep movement as provided in Item z above. The construction of off-site utility and street infrastructure improvements below and east of the Project site necessary to serve the Project shall be consistent with the other requirements of this condition and of the CV MSHCP.

ATTACHMENT 1

50 C.F.R., parts 13, 17.22, and 17.32

Attachment 2. Covered Species and Take Authorized for Each Species Under the Coachella Valley MSHCP

Species Name (27 Species)	Listing Status Federal/State	Extent of Take Authorized
***LISTED PLANTS**		
Coachella Valley milk-vetch (*Astragalus lentiginosus* var. *coachellae*)	FE/-	15,706 acres
Triple-ribbed milkvetch (*Astragalus tricarinatus*)	FE/-	278 acres
***UNLISTED PLANTS**		
Mecca aster (*Xylorhiza cognata*)	-/-	6,459 acres
Orocopia sage (*Salvia greatae*)	-/-	6,960 acres
Little San Bernardino Mountains linanthus (*Linanthus maculates*) or (*Gilia maculata*)	-/-	695 acres
UNLISTED INVERTEBRATES		
Coachella Valley giant sand-treader cricket (*Macrobaenetes valgum*)	-/-	13,802 acres
Coachella Valley Jerusalem cricket (*Stenopelmatus cahuilaensis*)	-/-	10,236 acres
LISTED FISH		
Desert pupfish (*Cyprinodon macularius*)	FE/SE	Take of individuals from ongoing operations
LISTED AMPHIBIANS		
Arroyo toad (*Bufo californicus*)	FE/CSC	89 acres
LISTED REPTILES		
Desert tortoise (*Gopherus agassizii*)	FT/ST	68,453 acres
Coachella Valley fringe-toed lizard (*Uma inornata*)	FT/SE	13,801 acres
UNLISTED REPTILES		
Flat-tailed horned lizard (*Phrynosoma mcalli*)	-/CSC	19,520 acres
LISTED BIRDS		
Yuma clapper rail (*Rallus longirostris yumanensis*)	FE & MBTA/ ST & SFP	71 acres
Southwestern willow flycatcher (*Empidonax traillii extimus*)	FE & MBTA/SE	180 acres of breeding habitat 15,600 acres of migratory habitat
Least Bell's vireo (*Vireo bellii pusillus*)	FE & MBTA/SE	778 acres of breeding habitat 15,021 acres of migratory habitat
UNLISTED BIRDS		
California black rail (*Laterallus jamaicensis coturniculus*)	MBTA/ST & SFP	66 acres
Burrowing owl (*Athene cunicularia*)	MBTA/CSC	55 occurrences
Crissal thrasher (*Toxostoma crissale*)	MBTA/CSC	5,231 acres

Species Name (27 Species)	Listing Status Federal/State	Extent of Take Authorized
Le Conte's thrasher (*Toxostoma lecontei*)	MBTA/CSC	97,752 acres
Gray vireo (*Vireo vicinior*)	MBTA/CSC	3,945 acres
Yellow warbler (*Dendroica petechia brewsteri*)	MBTA/CSC	180 acres of breeding habitat 15,620 acres of migratory habitat
Yellow-breasted chat (*Icteria virens*)	MBTA/CSC	193 acres of breeding habitat 15,606 acres of migratory habitat
Summer tanager (*Piranga rubra*)	MBTA/-	180 acres of breeding habitat 15,620 acres of migratory habitat
LISTED MAMMALS		
Peninsular bighorn sheep (*Ovis canadensis*)	FE/ST & SFP	6,873 acres
UNLISTED MAMMALS		
Coachella Valley round-tailed ground squirrel (*Spermophilus tereticaudus chlorus*)	FC/CSC	62,366 acres
Western (Southern) yellow bat (*Lasiurus ega xanthinus*)	-/-	78 acres
Palm Springs pocket mouse (*Perognathus longimembris bangsi*)	-/CSC	76,889 acres

Status Codes:

FT - Federally Threatened
FE - Federally Endangered
FC - Federal Candidate for Listing
MBTA - Migratory Bird Treaty Act
ST - State Threatened
SE - State Endangered
SFP - State Fully Protected
CSC- State Species of Concern

*Plants are not subject to the take prohibitions of the Endangered Species Act and an incidental take permit is not required for impacts to plants. However, the Service uses the term "take" herein to refer to both take of covered animal species and loss of covered plant species.

Attachment 3. Extent of Take Authorized for the Coachella Valley MSHCP Natural Communities

Natural Community	Total Acres Subject to Impact
ACTIVE DESERT DUNES	25
STABILIZED & PARTIALLY STABILIZED DESERT SAND DUNES	79
ACTIVE DESERT SAND FIELDS	1,519
EPHEMERAL DESERT SAND FIELDS	860
STABILIZED & PARTIALLY STABILIZED DESERT SAND FIELDS	296
STABILIZED SHIELDED DESERT SAND FIELDS	10,928
MESQUITE HUMMOCKS	549
SONORAN CREOSOTE BUSH SCRUB	55,662
SONORAN MIXED WOODY & SUCCULENT SCRUB	24,837
MOJAVE MIXED WOODY SCRUB	5,902
DESERT SALTBUSH SCRUB	4,544
DESERT SINK SCRUB	1,682
CHAMISE CHAPARRAL	52
REDSHANK CHAPARRAL	979
SEMI-DESERT CHAPARRAL	305
INTERIOR LIVE OAK CHAPARRAL	3,858
CISMONTANE ALKALI MARSH	23
COASTAL & VALLEY FRESHWATER MARSH	27
SO. ARROYO WILLOW RIPARIAN FOREST	4
SONORAN COTTONWOOD-WILLOW RIPARIAN FOREST	65
SOUTHERN SYCAMORE-ALDER RIPARIAN WOODLAND	27
ARROWWEED SCRUB	14
DESERT FAN PALM OASIS WOODLAND	79
MESQUITE BOSQUE	36
DESERT DRY WASH WOODLAND	8,711
MOJAVEAN PINYON-JUNIPER WOODLAND	134
PENINSULAR JUNIPER WOODLAND AND SCRUB	1,108
SUBTOTAL	**122,305**
Agriculture – conversion to development of up to this amount	84,900
TOTAL	**207,205**