9.0 Species Accounts and Conservation Measures

This section begins with a general conservation approach that applies to all species. The application of this approach throughout the Plan Area varies depending on the species. Following the general conservation approach for all species, individual conservation strategies for each species together with background information on each species is presented. These species conservation strategies are arranged by taxonomic group, beginning with plants. These individual species accounts include all Species Conservation Goals and Objectives that relate to each of the Covered Species, such that a summary of the conservation approach for each species can be found here. There may be some information that is repeated elsewhere in other sections of the Plan that is included here to provide a complete description of the conservation approach for each species.

The following sections, beginning with Section 9.2, describe the general conservation approach, based in part on the species distribution models and known occurrences, for each species covered by the Plan. The species distribution models indicate the occurrence and distribution of known locations, occupied Habitat, and potential Habitat for each covered species. They do not provide data about the abundance of species within a given modeled area. Specific limitations of each individual species model are described in the relevant sections below. The known occurrences or known locations describe locations where a given covered species has been observed or collected. A given known location may represent a site where one or more individuals or a group of organisms of a given species were observed. The known location information is qualitative, not quantitative. These data do not represent a systematic survey of all areas within the Plan boundary where a given species could be expected to occur. The absence of a record for a species in a given location does not necessarily indicate that the species does not occur there. Additional information on development of these models, background on the known locations, and discussion of the limitations of both models and known locations is in Section 3.6 of Appendix I.

9.1 General Conservation Approach for Covered Species

This section contains a summary of the general conservation approach for all Covered Species. The implementation of this conservation approach is described in Section 4.0 for protection-related activities, including acquisition, and in Section 8.0, for monitoring, ongoing management, and Adaptive Management activities. The Conservation Area Conservation Objectives for the Covered Species are described for each Conservation Area in Section 4.3. Background information and the complete conservation strategy for each species are found in Section 9.2. The Conservation Area Conservation Objectives from Section 4.3 are repeated in Section 9.2 in summary form to describe all of the conservation measures proposed for each species.

9.1.1 Conservation: Acquisition and Related Protection

Actions

The following conservation approaches are those that involve acquisition and other protection actions that will be used to achieve Conservation of the Covered Species.

1. Conserve, restore, and manage sustainable populations in as many Core Habitat areas as feasible within the Plan Area. The maximum number of Core Habitat areas available is delineated for conservation. Tables 9-1a and 9-1b shows the Conservation Areas where each species is conserved and identifies Core Habitat areas.

    1a. Within Core Habitat areas, maintain the ecological integrity of large Habitat blocks, ecosystem function, and biological diversity.

2. Conserve Other Conserved Habitat, representative of the range of environmental conditions within which the species is known to occur. Incorporate a range of environmental gradients (e.g. slope, elevation, aspect) and high Habitat diversity to provide for shifting species distributions.

3. Provide for population fluctuation, which may include spatial shifts through time as a result of responses to local environmental conditions. Provide opportunities for dispersal and resultant genetic and demographic exchange among populations, which fosters genetic diversity.

4. Protect Essential Ecological Processes that sustain Core Habitat and Other Conserved Habitat areas. Essential Ecological Processes, including sand source areas and sand transport systems, hydrological systems, watershed features, and flooding regimes, will be protected.

5. Maintain Biological Corridors and Linkages among Core Habitat areas to sustain the effective movement and interchange of organisms between Habitat areas inside and outside the Plan Area to the Maximum Extent Feasible.

9.1.2 Conservation: Monitoring and Management Actions

1. Implement a Monitoring Program that identifies trends in species and community level resources protected under the Plan.

2. Implement a Management Program that includes species-specific actions to secure and enhance Habitat quality and provide for long-term population viability. This Management Program will incorporate Adaptive Management.

3. Identify activities, and any restrictions on those activities, allowed within Conservation Areas that are compatible with the Conservation of species, Habitats, natural communities, and their associated ecological functions.

4. Control threats, which may include Habitat fragmentation, invasive plant and animal species, OHV use, and edge effects.

9.1.3 Summary of Core Habitat for Covered Species Protected in Conservation Areas

Tables 9-1a and 9-1b provide a summary of the Habitat to be conserved according to the Conservation Objectives for each Covered Species within each Conservation Area. The number of acres of Core Habitat or Other Conserved Habitat with a specific Conservation Objective is also shown. The number shown is the total acres to be conserved within the MSHCP Reserve System; this also includes acres of Existing Conservation Lands which will be managed as part of the Reserve System. If there is not a specific Conservation Objective, the acres of Habitat are not shown. These tables are intended to provide an overview of the Habitat for each Covered Species to be conserved within each Conservation Area.

9.2 Plants

This section contains species accounts, including Habitat parameters and significant threats, and a conservation strategy, including Species Conservation Goals and Objectives, for each of the five plant species proposed for coverage in the Plan. The plants proposed for coverage include two federal Endangered Species, the Coachella Valley milkvetch and the triple-ribbed milkvetch, and three species with no official status, Little San Bernardino Mountains linanthus, Mecca aster, and Orocopia sage. Some of the features of the biology of plant species warrant special note with regard to these conservation strategies. General measures common to all of these plants are listed below and measures specific to a given species are described in the Species Conservation Goals and Objectives, and the species-specific Adaptive Management discussion for each plant.

1. Maintain Essential Ecological Processes for plants, including pollination, seed dispersal, soil characteristics, mycorrhizal relationships, and nitrogen fixation.
2. Restore and enhance degraded Habitat, using native vegetation only, as necessary according to monitoring results.
3. Evaluate whether establishment of a seed bank to guarantee against extinction is needed.

Section 9 of FESA does not prohibit Take of federally listed plants. In the following sections, the descriptions of Conservation actions for plants and the analysis of impacts refer to Habitat loss, impacts of disturbance, and direct effects on plant species rather than Take.

Table 9-1a: Summary of Core Habitat and Other Conserved Habitat to Be Conserved in Conservation Areas

Species	***Cabazon***	***Stubbe and Cottonwood Canyons***	***Snow Creek/ Windy Point***	***Whitewater Canyon***	***Hwy 111/ I-10***	***Whitewater Floodplain***	***Upper Mission Creek/ Big Morongo Canyon***	***Willow Hole***	***Long Canyon***	***Edom Hill***
	Acres shown are the number of acres to be conserved within each Conservation Area based on Species Conservation Objectives									
Coachella Valley milkvetch	◆	◆	2,385 CH	◆	335 OCH	5,325 CH	◆	2,884 CH	◆	1,639 OCH
Little San Bernardino Mountains linanthus	◇	◇	◇	540 OCH	◇	◇	2,186 CH	◆	◇	◇
Mecca aster	◇	◇	◇	◇	◇	◇	◇	◇	◇	◆
Orocopia sage	◇	◇	◇	◇	◇	◇	◇	◇	◇	◇
Triple-ribbed milkvetch	◇	◇	◇	1,254 CH	◆	◆	772 CH	◇	◇	◇
Coachella Valley giant sand-treader cricket	◇	◇	1,243 CH	◇	◇	5,309 CH	◇	◆	◇	98 OCH
Coachella Valley Jerusalem cricket	◆	◆	1,540 CH	◆	335 OCH	◆	661 OCH	◆	◆	◆
Desert pupfish	◇	◇	◇	◇	◇	◇	◇	◇	◇	◇
Arroyo toad	◇	◇	◇	2,004 CH	◇	◇	◆	◇	◇	◇
Coachella Valley fringe-toed lizard	◇	◇	1,244 CH	◇	◇	5,309 CH	◇	823 CH	◇	98 OCH
Desert tortoise	◆	5,482 CH	◆	4,374 CH	◆	◆	27,127 CH	◆	◆	◇
Flat-tailed horned lizard	◇	◇	◆	◇	◇	◆	◆	◆	◆	◆

Table 9-1a (cont.)

Species	***Cabazon***	***Stubbe and Cottonwood Canyons***	***Snow Creek/ Windy Point***	***Whitewater Canyon***	***Hwy 111/ I-10***	***Whitewater Floodplain***	***Upper Mission Creek/ Big Morongo Canyon***	***Willow Hole***	***Long Canyon***	***Edom Hill***
	Acres shown are the number of acres to be conserved within each Conservation Area based on Species Conservation Objectives									
Burrowing owl	◆	◆	◆	◇	◇	◆	◆	◆	◆	◆
California black rail	◇	◇	◇	◇	◇	◇	◇	◇	◇	◇
Crissal thrasher	◇	◇	◇	◇	◇	◇	◇	◆	◇	◇
Gray vireo	◆	◆	◆	◆	◇	◇	◆	◇	◇	◇
Le Conte's thrasher	◆	1,142 OCH	2,540 OCH	◆	350 OCH	6,867 OCH	3,549 OCH	4,928 OCH	◆	2,354 OCH
Least Bell's vireo	◆	◆	◇	◆	◇	◇	◆	◆	◇	◇
Southwestern willow flycatcher	◆	◆	◇	◆	◇	◇	◆	◆	◇	◇
Summer tanager	◆	◆	◇	◆	◇	◇	◆	◆	◇	◇
Yellow warbler	◆	◆	◇	◆	◇	◇	◆	◆	◇	◇
Yellow-breasted chat	◆	◆	◇	◆	◇	◇	◆	◆	◇	◇
Yuma clapper rail	◇	◇	◇	◇	◇	◇	◇	◇	◇	◇
, CV round- tailed ground squirrel	◆	◆	2,569 CH	◆	350 OCH	5,769 CH	2,512 OCH	3,296CH	◆	1,677 OCH
Palm Springs pocket mouse	◆	◆	2,503 CH	◆	350 OCH	6,574 CH	3,467/ 362 CH/OCH	4,205 CH	◆	1,227 OCH
Peninsular bighorn sheep	83 EH	◇	640 EH	◇	◇	◇	◇	◇	◇	◇
Southern yellow bat	◇	◇	◇	◆	◇	◇	◇	◆	◇	◇

Table 9-1b: Summary of Core Habitat and Other Conserved Habitat to Be Conserved in Conservation Areas

Species	*Thousand Palms*	*West Deception Canyon*	*Indio Hills/ Joshua Tree National Park Linkage*	*Indio Hills Palms*	*East Indio Hills*	*Joshua Tree National Park*	*Desert Tortoise and Linkage*	*Mecca Hills/ Orocopia Mountains*	*Dos Palmas*	*Coachella Valley Stormwater Channel and Delta*	*Santa Rosa and San Jacinto Mountains*
	Acres shown are the number of acres to be conserved within each Conservation Area based on Species Conservation Objectives										
Coachella Valley Milkvetch	4,292 CH	◆	◆	◇	◇	◆	◇	◇	◇	◇	◆
Little San Bernardino Mountains Linanthus	◇	◇	◇	◇	◇	◇	◇	◇	◇	◇	◇
Mecca aster	11,448 CH	◇	◆	5,836 CH	1,478 OCH	◇	4,525 CH	31,190 CH	◇	◇	◇
Orocopia sage	◇	◇	◇	◇	◇	◇	735 CH	64,377 CH	◆	◇	◇
Triple-ribbed milkvetch	◇	◇	◇	◇	◇	◇	◇	◇	◇	◇	◆
Coachella Valley giant sand-treader cricket	3,869 CH	◇	◇	◇	◆	◇	◇	◇	◇	◇	◆
Coachella Valley Jerusalem cricket	◆	◇	◇	◇	◇	◇	◇	◇	◇	◇	◆
Desert pupfish	$(15m)^2$ refugium	◇	◇	◇	◇	◇	◇	◇	$(30m)^2$ CH	25 CH	◇
Arroyo toad	◇	◇	◇	◇	◇	◇	◇	◇	◇	◇	◇
Coachella Valley fringe-toed lizard	3,869 CH	◇	◇	◇	◆	◇	◇	◇	◇	◇	◆
Desert tortoise	◇	◆	9,449 CH	◇	◆	125,453 CH	84,150 CH	109,951 CH	◆	◇	120,953 OCH

Species	*Thousand Palms*	*West Deception Canyon*	*Indio Hills/ Joshua Tree National Park Linkage*	*Indio Hills Palms*	*East Indio Hills*	*Joshua Tree National Park*	*Desert Tortoise and Linkage*	*Mecca Hills/ Orocopia Mountains*	*Dos Palmas*	*Coachella Valley Stormwater Channel and Delta*	*Santa Rosa and San Jacinto Mountains*
	Acres shown are the number of acres to be conserved within each Conservation Area based on Species Conservation Objectives										

Table 9-1b (cont.)

Species	*Thousand Palms*	*West Deception Canyon*	*Indio Hills/ Joshua Tree National Park Linkage*	*Indio Hills Palms*	*East Indio Hills*	*Joshua Tree National Park*	*Desert Tortoise and Linkage*	*Mecca Hills/ Orocopia Mtns.*	*Dos Palmas*	*Coachella Valley Stormwater Channel and Delta*	*Santa Rosa and San Jacinto Mtns.*
	Acres shown are the number of acres to be conserved within each Conservation Area based on Species Conservation Objectives										
Flat-tailed horned lizard	4,051 CH[1]	◇	◇	◇	587 OCH[1]	◇	◇	◇	5,134 OCH[1]	◇	◆
Burrowing owl	◆	◇	◇	◇	◇	◇	◇	◇	◇	◆	◆
California black rail	◇	◇	◇	◇	◇	◇	◇	◇	560 OCH	56 OCH	◇
Crissal thrasher	◆	◇	◇	◆	◆	◇	◇	◇	498 CH	809 CH	◇
Gray vireo	◇	◇	◇	◇	◇	30,519 OCH	◇	◇	◇	◇	66,089 OCH
Le Conte's thrasher	10,506 OCH	◆	5,790 OCH	105 OCH	1,985 OCH	4,305 OCH	46,571 OCH	16,815 OCH	14,139 OCH	706 CH	10,006 OCH
Least Bell's vireo	◆	◇	◇	◆	◆	◆	◆	◆	◆	◆	◆
Southwestern willow flycatcher	◆	◇	◇	◆	◆	◆	◆	◆	◆	◆	◆
Summer tanager	◆	◇	◇	◆	◆	◆	◆	◆	◆	◆	◆
Yellow warbler	◆	◇	◇	◆	◆	◆	◆	◆	◆	◆	◆
Yellow-breasted chat	◆	◇	◇	◆	◆	◆	◆	◆	◆	◆	◆

Species	*Thousand Palms*	*West Deception Canyon*	*Indio Hills/ Joshua Tree National Park Linkage*	*Indio Hills Palms*	*East Indio Hills*	*Joshua Tree National Park*	*Desert Tortoise and Linkage*	*Mecca Hills/ Orocopia Mountains*	*Dos Palmas*	*Coachella Valley Stormwater Channel and Delta*	*Santa Rosa and San Jacinto Mountains*
	Acres shown are the number of acres to be conserved within each Conservation Area based on Species Conservation Objectives										
Yuma clapper rail	◇	◇	◇	◇	◇	◇	◇	◇	560 OCH	56 OCH	◇

Table 9-1b (cont.)

Species	*Thousand Palms*	*West Deception Canyon*	*Indio Hills/ Joshua Tree National Park Linkage*	*Indio Hills Palms*	*East Indio Hills*	*Joshua Tree National Park*	*Desert Tortoise and Linkage*	*Mecca Hills/ Orocopia Mtns.*	*Dos Palmas*	*Coachella Valley Stormwater Channel and Delta*	*Santa Rosa and San Jacinto Mtns.*
	Acres shown are the number of acres to be conserved within each Conservation Area based on Species Conservation Objectives										
CV round- tailed ground squirrel	8,045 CH	◆	◆	◆	1,364 OCH	◆	◆	◆	◆	◆	◆
Palm Springs pocket mouse	11,189 CH	◆	◆	◆	1,534 OCH	◆	◆	◆	◆	◆	◆
Peninsular bighorn sheep	◇	◇	◇	◇	◇	◇	◇	◇	◇	◇	165,133 EH
Southern yellow bat	◆	◇	◇	◆	◇	◆	◇	◆	◆	◇	◆

◆ = Species present in this Conservation Area and conserved by virtue of Conservation Objectives for Essential Ecological Process areas, Biological Corridors, or Core Habitat for other Covered Species

◇ = Species not present or not known to occur in this Conservation Area

CH = Core Habitat; EH = Essential Habitat; OCH = Other Conserved Habitat covered by specific Conservation Objective

[1] This includes predicted Core Habitat or predicted Other Conserved Habitat. For an explanation of predicted Habitat see Section 9.6.3.3.

9.2.1 Mecca Aster
Xylorhiza cognata

Status Federal: **No official status**
State: **No official status**
CNPS: **List 1B**

9.2.1.1 Species Conservation Goals and Objectives

Conserve and manage populations within the MSHCP Reserve System according to the following criteria:

Goal 1: Protect Core Habitat areas that include occupied Habitat, and associated Essential Ecological Processes, allowing evolutionary processes and natural population fluctuations to occur. Minimize fragmentation, human-caused disturbance, and edge effects to Core Habitat by conserving contiguous Habitat patches and effective Linkages between patches of Core Habitat.

Objective 1. Ensure conservation of Core Habitat within the following Conservation Areas:

- Thousand Palms Conservation Area
- Indio Hills Palms Conservation Area
- East Indio Hills Conservation Area
- Desert Tortoise and Linkage Conservation Area
- Mecca Hills/Orocopia Mountains Conservation Area

Please refer to Section 4.3 and Table 9-2 for specific acreages to be protected by this Conservation Objective.

Goal 2: Protect Other Conserved Habitat to provide sufficient area and variety of Habitat types to accommodate population fluctuations, allow for genetic diversity, and to conserve the full range of environmental conditions within which this aster is known to occur.

Objective 2. Conserve Other Conserved Habitat for this aster through adherence to other Conservation Objectives (for another species, a natural community, Essential Ecological Process area, Biological Corridor, or Linkage area) in the following Conservation Areas:

- Edom Hill Conservation Area
- Indio Hills/Joshua Tree National Park Linkage Conservation Area

Please refer to Section 4.3 and Table 9-2 for specific acreages to be conserved by other Conservation Objectives.

Goal 3: Ensure conservation of Mecca aster 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. .

Objective 3. Implement biological monitoring and Adaptive Management actions to ensure self-sustaining populations within each Core Habitat.

Table 9-2: Summary of Habitat within Conservation Areas Mecca Aster

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*
Edom Hill	28	3	2	23	25	Other Cons. Habitat
Thousand Palms	11,745	297	8,772	2,676	11,448	Core Habitat
Indio Hills/ Joshua Tree NP Linkage	166	16	4	146	150	Other Cons. Habitat
Indio Hills Palms	6,091	255	3,546	2,290	5,836	Core Habitat
East Indio Hills	1,594	116	433	1,045	1,478	Core Habitat
Des. Tortoise & Linkage	4,731	206	2,670	1,855	4,525	Core Habitat
Mecca Hills/ Orocopia Mtns	31,655 / 17	465 / 2	27,009 / 0	4,181 / 15	31,190 / 15	Core / Other Cons. Habitat
Total – All Habitat	*56,027*	*1,360*	*42,436*	*12,231*	*54,667*	--
Total – Core Habitat	*55,816*	*1,339*	*42,430*	*12,047*	*54,477*	--
Total – Other Cons. Habitat	*211*	*21*	*6*	*184*	*190*	--

9.2.1.2 Threats, Limiting Factors, and Adaptive Management

Threats to this species include cumulative Habitat loss and degradation of the existing Habitat from OHV activity, illegal dumping, sand and gravel mining (J. Dice, pers. comm.), and edge effects. OHV activity that formerly threatened populations in the Mecca Hills has been eliminated with the designation of this area as Wilderness. OHV activity in the Indio Hills may threaten several populations and may increase as other areas become unavailable through Development or protection. For example, plants in the vicinity of Macomber Palms occur in a

wash where they are vulnerable to OHV. 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 two Habitat islands, the Indio Hills and the Mecca Hills. It has been suggested that this species is associated with soils of the Palm Springs and Canebrake formations (J. Stewart, pers. comm.), which are limited in distribution within the Plan Area. 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.

The following actions may be needed to ensure species persistence and long-term viability if biological monitoring indicates that such actions are warranted. This list is not comprehensive but identifies some of the known or likely threats to Mecca aster. More detailed information on the Management and Monitoring Programs can be found in Section 8.0. Some of the appropriate actions may include:

1. Control and manage activities that degrade Mecca aster Habitat. These activities are generally prohibited in the Mecca Hills Wilderness Area (OHV use). In the Indio Hills, edge effects and OHV activity could be a concern as areas outside the conservation boundaries develop. These impacts will be addressed through the Management and Monitoring Programs.
2. Identify and implement actions to reduce impacts from, and control where feasible, invasive species if it is determined from monitoring results that there are impacts to the Mecca aster or to its Habitat.
3. Develop and test models through the Management and Monitoring Programs to address the distribution, abundance, and ecological requirements of the Mecca aster.

9.2.1.3 Species Conservation Analysis

Conservation Area Reserve Design. The Conservation Areas include the entire known Habitat for this species as well as additional potential Habitat in both the Indio Hills and Mecca Hills. The conserved area includes continuous Habitat, which should provide for species persistence and support appropriate pollinators or dispersal agents. As information about the dispersal mechanisms and pollinators for this species is not known, the potential for exchange of genetic material between populations in the Indio Hills and those in the Mecca Hills cannot be evaluated. Conserved populations of this species are potentially subject to edge effects in the Indio Hills where Development could occur along the southern boundary of the East Indio Hills Conservation Area. Acquisition of private lands from willing sellers would be required to complete protection of the Habitat in the Indio Hills. The Habitat for Mecca aster in the Mecca Hills is within the BLM's Mecca Hills Wilderness Area, where acquisition of private inholdings would complete protection of the Habitat in the Mecca Hills/Orocopia Mountains Conservation Area.

The Planning Team did not attempt to estimate population densities for the Mecca aster, as data are limited on the number of individuals at known occurrences in the Indio Hills and in the Mecca Hills. The Planning Team selected Core Habitat from the Habitat model for this species using the following criteria: (1) the inclusion of the known Habitat areas, which currently support a population that continues to persist; (2) the absence of fragmentation and edge effects; and (3) an intact watershed. There is little known about the Essential Ecological Processes that may contribute to viable Habitat for this species. The Planning Team used watershed boundaries to

delineate a protected area surrounding the known locations, particularly in the Indio Hills. As depicted in Table 9-3, observations of this species have included more than 500 individuals in the Indio Hills and as many as 1,000 individuals in the Mecca Hills; additional data are needed to assess the population status and viability of Mecca aster. The Planning Team identified the Conservation Areas below as Core Habitats. For each area, see Table 9-2 for a breakdown of Existing Conservation Lands and remaining lands to be conserved.

Core Habitat Areas:

1. ***Thousand Palms.*** The Plan includes approximately 11,745 acres of Mecca aster Habitat modeled in this Conservation Area. Under the Plan, approximately 11,448 acres of this Habitat will be protected. At the present time, this species is only known from the southern slopes of the Indio Hills and adjacent foothills, east of Thousand Palms Canyon Road. Most of the plants that have been observed in this area occur in canyon bottoms and along the toe of the slope of the Indio Hills. This Conservation Area was considered as Core Habitat when included with the adjacent Indio Hills Palms Conservation Area.

2. ***Indio Hills Palms.*** This Conservation Area includes approximately 6,091 acres of modeled Mecca aster Habitat. Under the Plan, approximately 5,836 acres of this Habitat will be protected. This Conservation Area includes most of the significant Habitat known for this species in the Indio Hills. This Conservation Area was considered as Core Habitat when included with the adjacent Thousand Palms Conservation Area.

3. ***East Indio Hills*.** This Conservation Area includes approximately 1,594 acres of modeled Habitat for the Mecca aster. The Plan ensures conservation of approximately 1,478 of these acres. Known occurrences for this species are limited to the southwestern edge of the Conservation Area. Additional surveys would be necessary to better describe the presence and distribution of this species within this Conservation Area. The area is included as providing Core Habitat for this species when considered as functionally contiguous with Core Habitat in the Thousand Palms and Indio Hills Palms Conservation Areas.

4. ***Desert Tortoise and Linkage.*** This Conservation Area includes approximately 4,731 acres of modeled Habitat for the Mecca aster. The Plan ensures conservation of approximately 4,525 acres of this Habitat. The Habitat in this Conservation Area is contiguous with the Core Habitat for Mecca aster in the Mecca Hills/Orocopia Mountains Conservation Area. Therefore this Conservation Area was considered as providing Core Habitat, which is functionally part of the Core Habitat in the adjacent Conservation Area. However, it should be noted that Mecca aster has not been reported from this Conservation Area.

5. ***Mecca Hills/Orocopia Mountains.*** The Plan includes approximately 31,655 acres of modeled Habitat for the Mecca aster in this Conservation Area. The Plan ensures conservation of approximately 31,190 of these acres. This Conservation Area includes most of the significant Habitat known for this species in the Mecca Hills. Most if not all of this Habitat is within the Mecca Hills Wilderness Area. This Conservation Area was considered as Core Habitat.

Other Conserved Habitat Areas:

1. ***Edom Hill.*** This Conservation Area includes only 28 acres of modeled Habitat for the Mecca aster. The presence of this modeled Habitat is based on similarities in the soils and geology of this area compared to the Indio Hills portion of the adjacent Thousand Palms Conservation Area. The species has not been recorded in this Conservation Area, although no surveys have been conducted. The Plan ensures that at least 25 acres of modeled Mecca Aster Habitat will be conserved. With no known occurrences of Mecca aster, the Planning Team did not consider this Conservation Area as Core Habitat but rather as Other Conserved Habitat.
2. ***Indio Hills/Joshua Tree National Park Linkage.*** The Plan includes approximately 166 acres of modeled Habitat for the Mecca aster in this Conservation Area. The Plan will conserve 150 acres of this modeled Habitat. Known occurrences for this species have not been recorded in this Conservation Area so it is considered as Other Conserved Habitat and not Core Habitat.

9.2.1.4 Impacts Analysis

Significance of the Plan Area to Mecca Aster

Mecca aster is an endemic species found in the Indio Hills and the Mecca Hills. Its known range is entirely within the Plan Area. Mecca aster has no official state or federal status but is listed by the California Native Plant Society on List 1B (CNPS 2001). It typically occurs in fluvial mud hills in washes and along the lower slopes. It is known to occur from Macomber Palms and Biskra Palms on the Thousand Palms Preserve east 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, in Box Canyon along Highway 195, and in Hidden Spring Canyon as well as in other suitable Habitat in this area.

Direct Effects on Mecca Aster

The Plan Area includes 63,163 acres of modeled Habitat for Mecca aster, of which approximately 55,816 acres are identified as Core Habitat. The Plan would ensure Conservation of 54,477 acres (98%) of the Core Habitat and 190 acres (90%) of the Other Conserved Habitat for this endemic plant. Each of the conserved Core Habitat areas would be greater than 1,000 acres. Approximately 42,436 acres (67%) 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 12,231 acres (19%) of the modeled Habitat for Mecca aster in the Plan Area.

Potential adverse impacts could occur within the Conservation Areas, affecting 1,360 acres (2% of total) of modeled Mecca aster Habitat. Approximately 1,339 acres (2% of total) Core Habitat and 21 acres (10%) of Other Conserved Habitat would be subject to disturbance (See Table 9-2 and Table 4-114).

Outside of the Conservation Areas, there are 4,968 acres (8%) of modeled Mecca aster Habitat that could be subject to disturbance. The Habitat for this species that is not within the Conservation Areas is primarily at the margins of the modeled Habitat. In the Indio Hills it occurs on the north side of the Indio Hills where the Habitat was deemed potential but the species has not

been observed. A limited amount of potential Habitat occurs outside the East Indio Hills Conservation Area on the so-called Adams Ranch property. This Habitat does not include known occurrences of Mecca Aster. In the Mecca Hills potential Habitat outside the MSHCP Reserve System occurs along the margins of the Mecca Hills and in an area south of Box Canyon Road where the species has not been recorded. The areas subject to Development provide only marginal Habitat for Mecca Aster and the impacts to this species as a result of the Plan are insignificant.

The establishment of Conservation Areas where this species is protected is a significant improvement over the current situation where piecemeal and fragmenting nature of development patterns within this Habitat occurring now. The proposed Conservation Areas in the Plan include approximately 90% of the occupied and potential Habitat for Mecca aster as currently mapped. The actual reduction in Habitat value is expected to be considerably less than indicated by the raw acreage numbers because:

1. The Plan would conserve Habitat for both of the known populations within the Plan Area in the Indio Hills generally east of Washington Avenue and in the Mecca Hills. This includes areas considered as Core Habitat in the Thousand Palms Conservation Area, Indio Hills Palms Conservation Area, East Indio Hills Conservation Area, Desert Tortoise and Linkage Conservation Area, and Mecca Hills/Orocopia Mountains Conservation Area.
2. Habitat loss 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.
3. Habitat for Mecca aster would be protected as a result of implementing Conservation Objectives for Essential Ecological Processes. Some of the Habitat included in the current model, based on the distribution of the Palm Springs formation, is in the Indio Hills west of the Thousand Palms Preserve in an area where this species has never been observed; most, if not all, of this Habitat is conserved under the Plan as a sand source area for the preserve.
4. Lands in the MSHCP Reserve System would be managed and monitored to address significant edge effect problems, OHV impacts, invasive species, and other known and potential stressors to this species.

The issuance of Permits, therefore, will not likely jeopardize the continued existence of the Mecca aster and the implementation of the MSHCP will provide for the Conservation of the species.

<u>Measures to Avoid, Minimize, and Mitigate Impacts to Mecca Aster</u>

To mitigate the effects of disturbance on Mecca aster, the Permittees will protect and manage, in perpetuity, 12,231 acres of the modeled Habitat for this species, including 12,047 acres of Core Habitat. The 42,436 acres of modeled Habitat within Existing Conservation Lands will be monitored and managed to ensure that Conservation Objectives are met. The Plan will thus ensure Conservation, through protection and management, of 54,667 acres of Reserve Lands for this species.

The proposed Conservation Areas in the Plan include approximately 90% of the occupied

and potential Habitat for Mecca aster; as currently mapped. The Plan would conserve Habitat for both of the known populations within the Plan Area in the Indio Hills generally east of Washington Avenue and in the Mecca Hills. This includes areas considered as Core Habitat in the Thousand Palms Conservation Area, Indio Hills Palms Conservation Area, East Indio Hills Conservation Area, Desert Tortoise and Linkage Conservation Area, and Mecca Hills/Orocopia Mountains Conservation Area. Other Conserved Habitat from a range of environmental conditions within which this aster is known to or may occur will be protected in the Edom Hill and Indio Hills/Joshua Tree National Park Linkage Conservation Areas. Again, caution is advised in that some of the Habitat included in the current model, based on the distribution of the Palm Springs formation, is in the Indio Hills west of the Thousand Palms Preserve in an area where this species has never been observed; most, if not all, of this Habitat is conserved under the Plan as a sand source area for the preserve. There are 21 known locations for Mecca aster, 16 of which are within the Conservation Areas. Ten known locations occur on Existing Conservation Lands and five known locations occur outside the Conservation Areas and are subject to Take. Two of the locations outside the Conservation Area are east of the Granite Construction gravel mine in the Indio Hills and three are east of Box Canyon Road just outside the Conservation Areas boundary; two of the latter are on BLM land.

Additionally, the Plan calls for Management and Monitoring Programs to ensure the Conservation of this species, including control of activities that degrade Mecca aster, control of invasive species where necessary, and restoration and enhancement of 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 Mecca aster.

Overall Impacts to Mecca Aster under the Plan

Implementation of this Plan is expected to conserve and enhance population viability of the Mecca aster, as unprotected portions of its Habitat will be conserved. The potential for impacts from human uses, including OHV activity, appears to be low, although edge effects, particularly in the Indio Hills, should be monitored. Management and monitoring prescriptions will further enhance long-term Conservation of this species.

The Mecca aster will benefit from the establishment of the MSHCP Reserve System which will include Habitat in the Indio Hills and Mecca Hills where they occur. Implementation of the Plan is expected to provide for persistence of the Mecca aster 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 management to minimize impacts in aster Habitat, monitoring to better understand the distribution and ecology of this species, and long-term protection, management, and enhancement of Mecca aster Habitat is expected to effectively compensate for potential adverse effects to this plant species.

9.2.1.5 Species Account: Background

Distribution, Abundance, and Trends. Most of the known occurrences are along roads or well-traveled hiking routes; it is likely that the species has a scattered distribution throughout the Mecca Hills (Stewart 1991). Information on population size and density is not available. Table 9-3 summarizes the number of plants observed at 17 occurrences, as reported in the CNDDB (CDFG 1997).

Table 9-3: Summary of Observations of Mecca Aster [1]

LOCATION	NUMBER OF PLANTS					
	PRE-1976	1976	1984	1985	1986	1995-1997
INDIO HILLS – MACOMBER PALMS			660			
INDIO HILLS – BISKRA PALMS: several sites from 3.2 mi. to just SE of Biskra Palms			200/ 7/ 250	7 3.2 mi. SE		
MECCA HILLS – PAINTED CANYON	Collected in '38	25 1 mi. up				
MECCA HILLS – HIDDEN SPRING: from 1 mi. SE to 2.8 mi. SSE of Hidden Spring	Collected in '27, '30, '32, '46				<10/ <10/ 50	
MECCA HILLS – 1.4 mi. S of SHEEP HOLE OASIS					50-100	
MECCA HILLS – SOUTH OF SHAVERS WELL	Collected in '36			520/ 2.5 mi. SW 49 1.1 mi. S	100-1000+ 4.2 mi. SW	
MECCA HILLS – THERMAL MINE AREA 1 mi. S of Thermal Canyon						17/ 134 [1]

[1] Numbers of plants given are as reported to the CNDDB (CDFG 1997) by various observers, including J. Stewart, T. Bennett, A. Sanders, M.D. Clary, W. Follett, R. Ferris, and Lilburn Corp. (1995). In some areas (e.g. Hidden Spring area) more than one occurrence is reported, with numbers of plants separated by a slash.

Jon Stewart, a botanist familiar with the species, has suggested that occurrences of the Mecca aster may be associated with two intergraded geologic formations found in these hills, the Palm Springs formation and the Canebrake formation (Stewart 1991). 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. It should be noted that these two formations are not restricted to the Coachella Valley. The original model for this species incorporated the mapped distribution of the Palm Springs formation. This formation includes a significant 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. So in October 2002, the model was revised to more accurately reflect the known distribution of the Mecca aster.

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.

Associated Covered Species. Other species of concern which occur in the same general area as Mecca aster include Orocopia sage, desert tortoise, and Le Conte's thrasher.

9.2.2 Coachella Valley Milkvetch *Astragalus lentiginosus var. coachellae*

Status	**Federal:**	**Endangered**
	State:	**No official status**
	CNPS:	**List 1B**

9.2.2.1 Species Conservation Goals and Objectives

Conserve and manage populations within the MSHCP Reserve System according to the following criteria:

Goal 1: Protect Core Habitat areas that include occupied Habitat, and associated Essential Ecological Processes, allowing evolutionary processes and natural population fluctuations to occur. Minimize fragmentation, human-caused disturbance, and edge effects to Core Habitat by conserving contiguous Habitat patches and effective Linkages between patches of Core Habitat.

Objective 1. Ensure conservation of Core Habitat within the following Conservation Areas:

- Snow Creek/Windy Point Conservation Area
- Whitewater Floodplain Conservation Area
- Willow Hole Conservation Area
- Thousand Palms Conservation Area

Please refer to Section 4.3 and Table 9-4 for specific acreages to be protected by this Conservation Objective.

Goal 2: Protect Other Conserved Habitat to provide to provide sufficient area and variety of Habitat types to accommodate population fluctuations, allow for genetic diversity, and to conserve the full range of environmental conditions within which this milkvetch is known to occur.

Objective 2. Conserve Other Conserved Habitat for the Coachella Valley milkvetch through adherence to other Conservation Objectives (for another species, a natural community, Essential Ecological Process area, Biological Corridor, or Linkage area) in the following Conservation Areas:

- Cabazon Conservation Area
- Stubbe and Cottonwood Canyons Conservation Area
- Whitewater Canyon Conservation Area
- Highway 111/I-10 Conservation Area
- Upper Mission Creek/Big Morongo Canyon Conservation Area
- Edom Hill Conservation Area
- Indio Hills/Joshua Tree National Park Linkage Conservation Area
- Indio Hills Palms Conservation Area
- East Indio Hills Conservation Area
- Santa Rosa and San Jacinto Mountains Conservation Area

Please refer to Section 4.3 and Table 9-4 for specific acreages to be conserved by other Conservation Objectives.

Goal 3: Protect Essential Ecological Processes, including sand source/transport systems, necessary to maintain Core Habitat and Other Conserved Habitat for this species.

Objective 3. Ensure protection of Essential Ecological Process areas through Conservation Area Conservation Objectives for Essential Ecological Processes.

Goal 4: Maintain Biological Corridors and Linkages among all conserved populations to provide for seed dispersal and shifts in species distribution over time.

Objective 4. Protect Biological Corridors and Linkages through Conservation Area Conservation Objectives for Biological Corridors and Linkages.

Goal 5. Ensure conservation of Coachella Valley milkvetch 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.

Objective 5. Implement biological monitoring and Adaptive Management actions to ensure self-sustaining populations within each Core Habitat area.

Table 9-4: Summary of Habitat within Conservation Areas Coachella Valley Milkvetch

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	987	N/A	24	1 (962)[1]	25	Other Cons. Habitat
Stubbe and Cottonwood Canyons	232	15	84	133	217	Other Cons. Habitat
Snow Creek/ Windy Point	2,610 / 90	225 / 9	359 / 0	2,026 / 81	2,385 / 81	Core / Other Cons. Habitat
Whitewater Canyon	202	13	75	114	189	Other Cons. Habitat
Hwy 111/I-10	372	37	0	335	335	Other Cons. Habitat
Whitewater Floodplain	5,635 / 77	310 / 8	2,535 / 0	2,790 / 69	5,325 / 69	Core / Other Cons. Habitat
Upper Mission Creek/Big Morongo Canyon	829	57	256	516	772	Other Cons. Habitat
Willow Hole	3,166 / 168	282 / 13	351 / 37	2,533 / 118	2,884 / 155	Core / Other Cons. Habitat
Long Canyon	113	N/A	2	(111)[1]	2	Other Cons. Habitat
Edom Hill	1,788	149	298	1,341	1,639	Other Cons. Habitat
Thousand Palms	4,403 / 682	111 / 38	3,291 / 305	1,001 / 339	4,292 / 644	Core / Other Cons. Habitat
West Deception Canyon	115	6	15	50 (44)[1]	65	Other Cons. Habitat
Indio Hills/ Joshua Tree National Park Linkage	17	1	10	6	16	Other Cons. Habitat
Joshua Tree National Park	4	1	0	3	3	Other Cons. Habitat
Santa Rosa & San Jacinto Mountains	292	31	65	196	261	Other Cons. Habitat
Total – All Habitat	*21,782*	*1,306*	*7,707*	*11,652 (1,117)*[1]	*19,359*	--
Total – Core Habitat	*15,814*	*928*	*6,536*	*8,350*	*14,886*	--
Total – Other Cons. Habitat	*5,968*	*378*	*1,171*	*3,302 (1,117)*[1]	*4,473*	--

[1] Numbers within parentheses are acres of Habitat in fluvial sand transport areas. The only Conservation Objective in these areas is to maintain fluvial sand transport. Habitat conservation is not an objective.

9.2.2.2 Threats, Limiting Factors, and Adaptive Management

The primary threat to the Coachella Valley milkvetch is Habitat destruction due to continuing urban Development, including the direct effects of Habitat conversion. Many of the sand dune areas where this milkvetch occurs have now been developed, stabilized by adjacent Development, or fragmented by urbanization. Other impacts to the species are from increased human activity, including OHV use, trampling, and the introduction of non-native plants, including Russian thistle (*Salsola tragus*) and Saharan mustard (*Brassica tournefortii*). Development of wind energy parks appears to have a very limited impact; the plants can persist associated with wind parks as long as disturbance to the species' sandy Habitat is minimized. Each of the impacts described above relates to the sand dune ecosystem and the interference with the windblown sand transport system. These ecosystems require a source of new sand to be maintained over long periods of time and a wind corridor to maintain dune dynamics. Though Coachella Valley milkvetch does not necessarily occupy active blowsand Habitats, the species does appear to be dependent on sand dune ecosystems.

The following actions may be needed to ensure species persistence and long-term viability if biological monitoring indicates that such actions are warranted. This list is not comprehensive but identifies some of the known or likely threats to this species. More detailed information on the Monitoring and Management Programs can be found in Section 8.0. Some of these actions may include:

1. Control and manage activities that degrade Coachella Valley milkvetch Habitat. In particular, control and manage those activities that result in sand compaction and vegetation destruction, which may include OHV travel within Core or Other Conserved Habitat except on designated routes of travel, if any; vegetation manipulation or clearing; and other human disturbance.
2. Control invasive species if it is determined from monitoring results that there are impacts to the milkvetch or milkvetch Habitat.
3. Maintain the aeolian sand transport system through the Monitoring and Management Programs.
4. Develop and test models through the Management and Monitoring Programs to address the distribution, abundance, and ecological requirements of the Coachella Valley Milkvetch.

9.2.2.3 Species Conservation Analysis

Conservation Area Reserve Design. The proposed Conservation Areas in the MSHCP Reserve System include those areas judged by the Planning Team to be the most viable known Habitat for this species, from the Snow Creek area east to the Thousand Palms Preserve. The Planning Team selected Core Habitat from the Habitat model for this species using the following four criteria: (1) Core Habitat is sufficiently large that it can 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) Core Habitat is not fragmented by Development, including roads, in such a way to isolate populations. Although roads probably do

not create barriers to dispersal for this species, they can contribute to edge effects, including exotic plant species that colonize disturbed areas; (3) Core Habitat has intact Essential Ecological Processes, including sand source and sand delivery systems. While this species does not appear to require, or even prefer, active blowsand (K. Barrows 1987), natural disturbance from aeolian and fluvial processes (wind and flooding) may be necessary to promote establishment of new seedlings (Sanders 1996, R. Kobaly, pers. comm.) and was considered essential; and (4) Core Habitat has effective connections to other Core Habitat via Biological Corridors and/or Linkages, to allow gene flow among populations. For more detail on the process used to identify Conserved Habitat for this species, see Section 3.0. For each Conservation Area, see Table 9-4 for a breakdown of Existing Conservation Lands and remaining lands to be conserved.

Core Habitat Areas:

1. ***Snow Creek/Windy Point.*** There are approximately 2,610 acres of milkvetch Habitat Core Habitat here. The Plan will conserve approximately 2,385 acres of Core Habitat in this Conservation Area. Quantitative information on the occurrence of this species is very limited for all locations in the Plan Area. Sanders (1996) did estimate density for the areas where he surveyed on either side of Snow Creek Road; his estimates were 0.8 plants/acre (± 2/ha) on the west side of the road and 1.5 plants/acre (3.75/ha) on the east side of the road. Sanders (1996) reported that in some patchy areas in the dunes of the Snow Creek area, density for this species could reach 60 plants/ha. The Planning Team considered this area as Core Habitat for Coachella Valley milkvetch.

2. ***Whitewater Floodplain*.** The MSHCP Reserve System includes approximately 1,230 acres of modeled Habitat for the Coachella Valley milkvetch on the existing Whitewater Floodplain Preserve, and an additional approximately 4,374 acres of Habitat east of the Whitewater River between Highway 10 and Highway 111 (one occurrence here) in the area north of the CVWD recharge basins and adjacent to the southeastern corner of the preserve, to comprise a total of approximately 5,635 acres. The Plan will conserve approximately 5,325 acres of Core milkvetch Habitat. Indian Avenue and any other roads within this Conservation Area were not considered a fragmentation factor for this species; all of the Habitat within the Conservation Area was considered contiguous. Mark Fisher and Al Muth have reported the presence of the Coachella Valley milkvetch on their Coachella Valley fringe-toed lizard 2.5-acre study plot along the northern portion of the Whitewater Floodplain Preserve. In the years between 1993 and 2001, they observed a range from one plant in 1997 to 226 plants in 1995 (Muth and Fisher, pers. comm.). In surveys for the Plan in June 1995, Katie Barrows and Jennifer Purcell (K. Barrows 1995) reported 25 individuals of this milkvetch on four transects in the southern area of the preserve. The Planning Team considered this area as Core Habitat for Coachella Valley milkvetch.

3. ***Willow Hole.*** The Plan includes approximately 3,334 acres of milkvetch Habitat in this Conservation Area including 3,166 acres of Core Habitat. The Plan will conserve approximately 2,884 acres of the Core Habitat and 155 acres of Other Conserved Habitat in this Conservation Area. Habitat for the Coachella Valley milkvetch within the Willow Hole 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 either side of Varner Road east of Palm Drive, on Flat Top Mountain, particularly along the power line corridor, and on the Willow Hole-Edom Hill Preserve/ACEC. Surveys by the USFWS in 2001 (K. Corey, pers. comm.) revealed the

presence of this species at several locations along the Mission Creek and Big Morongo Wash sand transport channels, along the fault dunes west of Palm Drive, and on either side of Varner Road east of Palm Drive. The roads that bisect the southern portion of this Conservation Area, including Palm Drive, Mountain View Road, and Varner Road, were not considered as a barrier to dispersal for this species. For this reason, the Planning Team considered all of the Habitat within the Willow Hole Conservation Area as contiguous. Density information for this species is very limited at the Willow Hole-Edom Hill Preserve/ACEC, as elsewhere. Andy Sanders (1996) estimated the density in this area as 0.5 plants/acre (1.25 plants/ha). The density for this species could be higher in some areas of more favorable Habitat, as at the top of Flat Top Mountain, along the fault west of Palm Drive, and along the sandy flats on the existing preserve. The Planning Team did consider this area as Core Habitat.

4. ***Thousand Palms***. The Plan will protect approximately 4,292 acres of the approximately 4,403 acres of modeled Core Habitat for this species, including approximately 3,291 acres already protected on the existing preserve. An additional 644 acres of Other Conserved Habitat will also be protected. The Thousand Palms Preserve includes Habitat for the Coachella Valley milkvetch in the 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 Core Habitat areas described for this Conservation Area, a relatively small area in Thousand Palms Canyon and the much larger Core Habitat area mostly south of Ramon Road. These two areas are separated by approximately three miles. For a species with seeds probably dispersed by wind and water this intervening Habitat would probably not be a barrier to dispersal and genetic exchange. As with other parts of the Plan Area, roads were not considered as a barrier to dispersal for this species. The available information on the occurrence of this species within this preserve is primarily from surveys done for the Plan in 1995 (K. Barrows 1995) and from annual biological monitoring transects conducted by the preserve staff (C. Barrows 2001). Density estimates are not available. Generally, the density of this species within this Conservation Area is lower than at more western locations, such as Snow Creek. The Planning Team included this area as Core Habitat.

Other Conserved Habitat Areas:

1. ***Cabazon.*** This milkvetch has not been observed within this Conservation Area. This Conservation Area includes approximately 987 acres of modeled milkvetch Habitat; of this total acreage, the Plan will protect approximately 1 additional acre. An additional 24 acres of Habitat on existing BLM land will also be conserved. The remaining 962 acres of milkvetch Habitat are not protected by a Conservation Objective; these acres are within the fluvial sand transport area which has a Conservation Objective to maintain fluvial sand transport. The small parcel sizes within these sand transport areas would contribute to greater edge effects and make Habitat conservation in this area a challenge. The primary means for achieving Conservation in this Conservation Area is through compliance with Riverside County General Plan and Area Plan policies.

2. ***Stubbe and Cottonwood Canyons.*** This Conservation Area includes relatively low acreage of modeled milkvetch Habitat, approximately 232 acres. The Plan will conserve 217 acres of this Other Conserved Habitat. Surveys would need to be done to determine the extent to which this species occurs within this Conservation Areas.

3. ***Whitewater Canyon.*** This Conservation Area includes 202 acres of milkvetch Other Conserved Habitat. In this Conservation Area, the Plan will conserve 189 acres. Surveys would need to be done to determine the extent to which this species occurs within these Conservation Areas.

4. ***Highway 111/I-10 Conservation Area.*** This area was added to the MSHCP Reserve System primarily as Habitat for the Coachella Valley Jerusalem cricket. However, the area is probably suitable Habitat for Coachella Valley milkvetch; individuals have been observed along the south side of Tipton Road, adjacent to this Conservation Area (K. Barrows, pers. comm.). The Plan will ensure protection of approximately 335 of the 372 acres of modeled Habitat in this Conservation Area. The area is not large enough to be considered as a Core Habitat area.

5. ***Upper Mission Creek/Big Morongo Canyon.*** The modeled Habitat for the Coachella Valley milkvetch in this Conservation Area is limited. The Plan includes approximately 829 acres of modeled Habitat for this milkvetch in this Conservation Area. The Plan will protect approximately 772 acres of this Other Conserved Habitat. In Upper Mission Creek, one occurrence near the entrance gate to the Wildlands Conservancy property may be the result of sandy soil, containing seeds of this species, which was dumped there. Most of this area is much more gravelly or rocky than typical Habitat for this species. There are patches of suitable soil substrate east of Highway 62 in scattered fragments along both Mission Creek and Morongo Wash. Observations of this species were reported along Morongo Wash and Mission Creek, mostly around and south of Ramon Road, in May 2001 (K. Corey, pers. comm.). Surveys would need to be done to determine the extent to which this species occurs within these Conservation Areas.

76. ***Long Canyon.*** This Conservation Area does not have a specific Conservation Objective for species Habitat. There are approximately 113 acres of modeled milkvetch Habitat; 111 of these acres are within the Essential Ecological Process fluvial sand transport area, which has a Conservation Objective only to maintain sand transport. Because of existing land use patterns and associated edge effects in these sand transport areas, they would be unsuitable for Habitat protection through acquisition. The remaining 2 acres are within Existing Conservation Lands.

7. ***Edom Hill.*** This Conservation Area includes scattered sandy substrate Habitat between Willow Hole and the Thousand Palms Preserve in the Indio Hills. There are approximately 1,788 acres of modeled Habitat included in this Conservation Area. The Plan will conserve approximately 1,639 acres of this Habitat. The only records for the Coachella Valley milkvetch within this Conservation Area are from immediately north of Varner Road at the base of Edom Hill. This area was primarily envisioned as a connection between the Willow Hole Preserve and the Thousand Palms Preserve. With very few known occurrences of Coachella Valley milkvetch, the Planning Team did not consider this Conservation Area as Core Habitat.

8. ***West Deception Canyon.*** There are 115 acres of modeled milkvetch Habitat in this Conservation Area. The Plan calls for at least 65 acres of this Habitat to be conserved. Approximately 44 of these acres are within the Essential Ecological Process fluvial sand transport area, which is not covered by a Conservation Objective for Habitat. Because of existing land use patterns and associated edge effects in these areas, they would be unsuitable for Habitat protection through acquisition.

9. ***East Indio Hills*.** This Conservation Area was not considered as important Habitat for the Coachella Valley milkvetch as the species has never been recorded here. The Habitat at the most eastern end of the Indio Hills, particularly along the north-facing slope, appears suitable for this species; however, the Coachella Valley milkvetch has not been recorded east of the main dune area on the Thousand Palms Preserve, within the Plan Area. (There is an occurrence east of Desert Center as described previously.) Surveys in 1995 (K. Barrows 1995) and casual observations between 1987 and the present (K. Barrows, pers. comm.) did not locate any individuals of this species in this area. As this area is at the dry end of the moisture regime in the Coachella Valley, it may not provide suitable conditions, due to lower rainfall amounts, compared to areas to the west. This milkvetch has not actually been observed within this Conservation Area.

10. ***Santa Rosa and San Jacinto Mountains.*** There are 292 acres of modeled Habitat for this species within this Conservation Area. The Plan will conserve approximately 261 acres of this Habitat, most of which is located in the vicinity of Snow Creek.

11. ***Other Conservation Areas.*** There are two Conservation Areas with very limited Coachella Valley milkvetch Habitat: Indio Hills/Joshua Tree National Park Linkage with 17 acres and Joshua Tree National Park with 4 acres.

9.2.2.4 Impacts Analysis

Significance of the Plan Area to Coachella Valley Milkvetch

The Coachella Valley milkvetch is a variety of the more widely distributed species, *Astragalus lentiginosus;* other varieties of this species occur in Washington, Oregon, Idaho, Nevada, New Mexico, Arizona, northern Baja California, and Sonora.

The Coachella Valley milkvetch is restricted to the Plan Area between Cabazon and Indio, with the exception of six outlying occurrences within a 5-mile area along Rice Road in the Chuckwalla Valley north of Desert Center (BLM 2000, J. Dice, pers. comm.). The Coachella Valley milkvetch is a federal endangered species although it has no official status with the State of California. The current and apparently historical distribution is within a longitudinal, west to east range of approximately 33 miles. This species is known in locations from One Horse Spring near Cabazon to the sand dunes off Washington Avenue, north and west of Indio. Extensive dune systems at the base of the Santa Rosa Mountains in what are now the cities of Palm Springs, Cathedral City, Rancho Mirage, Palm Desert, Indian Wells, and La Quinta, now much reduced from what once occurred, provided suitable Habitat for the Coachella Valley milkvetch. 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, USFWS 1996).

Direct Effects on the Coachella Valley Milkvetch

The MSHCP Reserve System would provide for Habitat protection, management, and monitoring for currently unprotected Core Habitat and Other Conserved Habitat for the Coachella Valley milkvetch, from a range of environmental conditions within which it is known to occur. The important Essential Ecological Processes, including wind corridors and sand sources, would be protected under the Plan. Potential Linkages would also be protected.

There are 36,398 acres of modeled Coachella Valley milkvetch Habitat in the Plan area. The Plan would ensure Conservation of 14,886 acres (94%) of the total 15,814 acres of Core Habitat and 4,473acres (76%) of Other Conserved Habitat, or 89% of the significant Habitat for the Coachella Valley milkvetch. Each of the four Core Habitat areas conserved would be greater than 2,000 acres. Approximately 7,707 acres (21%) of the modeled Habitat are within Existing Conservation Lands and would be managed as part of the Reserve System. Overall, an additional 11,652acres (32%) of the modeled Habitat for Coachella Valley milkvetch in the Plan Area would be conserved.

Within the Conservation Areas potential adverse effects could occur to a maximum of 1,306 acres (4%) of modeled Coachella Valley milkvetch Habitat. There would be approximately 928 acres (6% of all Core Habitat) of Core Habitat and 378 acres of Other Conserved Habitat (6% of all Other Conserved Habitat) subject to disturbance (See Table 9-4 and Table 4-114). The Reserve System will effectively compensate for potential adverse impacts to this species because it will: 1) ensure Conservation of Core Habitat; 2) protect Essential Ecological Processes needed to maintain milkvetch Habitat; and 3) maintain Biological Corridors and Linkages among conserved populations to provide for population fluctuation and enhance genetic diversity. So, although some disturbance 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 species.

Outside of the Conservation Areas, there are 14,084 acres of modeled Habitat and 33 of the 122 known occurrences subject to Development and other proposed Covered Activities. The area where this species is known to occur south of Interstate 10, in the area known as the Big Dune, was not included in the Conservation Areas. This area was judged by the Planning Team to be too highly fragmented, with negative impacts of edge effects along the major roadways that now traverse this area. The Planning Team determined that Essential Ecological Processes, including sand transport, that are probably important to maintain Habitat for this species have been compromised. Some of the Habitat for Coachella Valley milkvetch within the Big Dune area south of Interstate 10 is on land owned by the Agua Caliente Band of Cahuilla Indians and will be addressed through their MSHCP. Other potential Habitat included within the species distribution model, particularly east of the Thousand Palms Preserve, is in areas where this species has never been observed. As part of the Biological Monitoring Program, this model will be revised to reflect occupancy. The Planning Team carefully considered all available and occupied Habitat for this species and determined that only those areas within the proposed Conservation Areas would provide long-term protection for self-sustaining populations of this species.

Although the percentage of Coachella Valley milkvetch modeled Habitat that could be lost to development within the next 75 years appears to be substantial, evaluation of the potential adverse effects requires an assessment of the quality of this Habitat. The establishment of

Conservation Areas where this species is protected is a significant improvement over the piecemeal and fragmenting nature of Development patterns within this Habitat occurring now. The actual reduction in Habitat value is expected to be considerably less than indicated by the raw acreage numbers because:

1. Conserved Habitat areas are large enough to contain self-sustaining populations of milkvetch and incorporate key Habitat elements.
2. Potential adverse effects 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.
3. 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.
4. 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 milkvetch.

Implementation of the Plan is expected to protect Habitat for this species and to maintain population viability of the Coachella Valley milkvetch, as significant Habitat that is currently unprotected will be conserved. The Plan will also secure the Essential Ecological Processes and Linkages necessary to maintain this Habitat.

Measures to Avoid, Minimize, and Mitigate Adverse Effects on Coachella Valley Milkvetch

To mitigate the impacts to Coachella Valley milkvetch, the Permittees will protect and manage, in perpetuity, 11,652 acres of the modeled Habitat for this species, including 89 of the 122 known occurrences. The 7,707 acres of modeled Habitat within Existing Conservation Lands will be monitored and managed to ensure that Conservation Objectives are met. The Plan will thus ensure Conservation, through protection and management, of 19,359 acres of Reserve Lands for this species.

The proposed Conservation Areas in the Plan would protect the Core Habitat areas from Cabazon to Windy Point, including Snow Creek; significant Habitat for this milkvetch in the Whitewater Floodplain area; the Willow Hole area, including additional Habitat west of Palm Drive and on Flat Top Mountain; and all of the occupied and potential Habitat on the Thousand Palms Preserve. Other Conserved Habitat from a range of environmental conditions within which this milkvetch is known to occur will be protected in the following Conservation Areas: Cabazon, Stubbe and Cottonwood Canyons, Whitewater Canyon, Highway 111/I-10, Upper Mission Creek/Big Morongo Canyon, Edom Hill, Indio Hills/Joshua Tree National Park Linkage, Indio Hills Palms, East Indio Hills, Joshua Tree National Park, Desert Tortoise and Linkage, Mecca Hills/Orocopia Mountains, Dos Palmas, Coachella Valley Stormwater Channel and Delta, and the Santa Rosa and San Jacinto Mountains. Reserve Design criteria used to establish the Conservation Areas require Conservation of Essential Ecological Processes. The MSHCP Reserve System will incorporate and protect additional sand source/sand transport areas for Snow Creek/Windy Point, the Whitewater Floodplain Conservation Area, Willow Hole and Flat Top Mountain, and the Thousand Palms Preserve.

Additionally, the Plan calls for Management and Monitoring Programs to ensure the Conservation of this milkvetch, including control of activities that degrade milkvetch Habitat, control of invasive species where necessary, and restoration and enhancement of degraded Habitat as necessary according to monitoring results.

Overall Impacts to Coachella Valley Milkvetch under the Plan

Implementation of this Plan is expected to conserve and enhance population viability of the Coachella Valley milkvetch, as unprotected portions of its Habitat will be conserved. The potential for impacts from human uses, including OHV activity, appears to be low, although edge effects should be monitored. Management and monitoring prescriptions will further enhance long-term Conservation of this species.

The Coachella Valley milkvetch will benefit from the establishment of the MSHCP Reserve System which will include conserved Habitat from Cabazon to the sand dunes of the Thousand Palms Conservation Area. Implementation of the Plan is expected to provide for persistence of this endangered milkvetch within the Plan Area, as currently unprotected portions of its Core Habitat and potential Habitat areas will be conserved. The combination of the overall Conservation measures; species-specific measures such as management to minimize impacts such as OHV trespass and invasive species, monitoring to better understand the ecology of this species and the potential impacts of invasive species, and long-term protection, management, and enhancement of Coachella Valley milkvetch Habitat is expected to effectively compensate for potential adverse effects to this endangered plant species.

9.2.2.5 Species Account: Background

Distribution, Abundance, and Trends

The Coachella Valley milkvetch occurs in dunes and sandy flats, along the disturbed margins of sandy washes, and in sandy soils along roadsides where they occur adjacent to existing sand dunes. Within the sand dunes and sand fields, this milkvetch tends to occur in the coarser sands at the margins of dunes, not in the most active blowsand areas. As this species is strongly affiliated with sandy substrates, it may occur in localized pockets where sand has been deposited by wind or by active washes. It may also occur in sandy substrates in creosote bush scrub, not directly associated with sand dune Habitats. In the Plan Area, populations are known from the Snow Creek area (in the sandy areas on either side of Snow Creek Road east toward Windy Point and scattered along Tipton Road, north of Highway 111), on the Whitewater Floodplain Preserve, the Willow Hole-Edom Hill Preserve/ACEC, and the Thousand Palms Preserve. Other concentrations of the species occur along Gene Autry Trail near the airport in Palm Springs, on and around Flat Top Mountain, along Varner Road at the base of Edom Hill, on remnants of the Big Dune south of Interstate 10, and in scattered locations in the southern parts of Desert Hot Springs (including at the wastewater treatment plant). In the area of the Big Dune, Habitat viability has been much reduced by roads, fragmentation, and disturbance (C. Barrows 1987, CNDDB/CDFG 1997). In one location within the Big Dune area, however, near DaVall Road and 30th Avenue, a significant population of more than 1,000 individuals (K. Nicol, pers. comm.) appears to be persisting. This population occurs on land owned by the Agua Caliente Band of Cahuilla Indians, which is not included in this Plan. The presence of large numbers of this species

at this location in the spring of 2000 may have been due to very localized conditions, such as a break in an underground water line (K. Barrows, pers. comm.). Though suitable Habitat appears to be present in the Indio and La Quinta areas, this species has not been recorded there. Within the Plan Area, the easternmost occurrence for the Coachella Valley milkvetch is on the Thousand Palms Preserve.

The Coachella Valley milkvetch was first described by Rupert Barneby in Shreve and Wiggins (1964) based on a collection made by Alice Eastwood in 1913 near Palm Springs, Riverside County. Barneby had previously identified this specimen as *Astragalus lentiginosus* var. *coulteri* in the description of that taxon in 1945. The Coachella Valley milkvetch is a variety of a much more widespread species, *Astragalus lentiginosus*. Varieties of this species occur in Washington, Oregon, Idaho, Nevada, New Mexico, Arizona, northern Baja California, and Sonora.

This federal listed, endangered Species is an erect winter annual or short-lived perennial, which blooms from February to May, producing pink to deep-magenta-colored flowers. It is distinguished in part from other members of the milkvetch genus by its strongly inflated, two-chambered, mottled pods. These pods, when dried, fall to the ground and are blown along the dunes. In good years, 100s to 1,000s of individuals have been described in a population, but often reports are of less than 20 plants. Specific data on population size and dynamics are not available for this species. The factors controlling population size through effects on seed germination, seedling establishment, and plant longevity have not been studied, but presumably involve moisture availability and soil and air temperatures (Sanders 1996).

Annual variation in population size has been observed in this species, associated with drought conditions and the occurrence of seasonal rainfall. The small size of populations in drought years could leave this milkvetch vulnerable to extinction from stochastic events. The number of individuals of this species at a given location can vary dramatically from year to year, depending on available soil moisture and other factors. For example, during the course of a biological survey for the COE at the Cabazon Windpark site in May 1979, 209 individuals were observed (Wright and La Pre 1979); a survey of this same area in May 1987 (K. Barrows 1987), a dry year, recorded only six Coachella Valley milkvetch. Results of various surveys for Coachella Valley milkvetch are given in Table 9-5.

Table 9-5: Results of Various Surveys for Coachella Valley Milkvetch[1]

LOCATION	Year of Observation	Number of CV Milkvetch Observed	Number of Transects
CABAZON WIND PARK	1979/1982[1] 1987[2]	209/2 6	-
SNOW CREEK ROAD	1982[1] 1987[2] 1995[3]	>100 8 (60/ha – dunes 3.8/ha –flats)	-
WINDY POINT	1987[2]	28	-
WHITEWATER FLOODPLAIN PRESERVE	1995[2]	25	4
MISSION CREEK & MORONGO WASH	2001[4]	> 2	-
WEST OF PALM DRIVE, FAULT DUNES	2001[4]	5	-
EAST OF PALM DRIVE, VARNER RD. N. OF FLAT TOP MOUNTAIN	2001[4]	>100	-
WILLOW HOLE PRESERVE	1987[2] 1995[2] 1995[3]	9 13 (1.25/ha)	10 10
FLAT TOP MOUNTAIN (ALONG POWERLINE ROAD	1982[1] 1987[2] 2001[4]	> 100 15/22 10/1	-
EAST OF DATE PALM DRIVE, S. OF VARNER ROAD	2001[4]	± 50	-
WEST OF BOB HOPE DRIVE, S. OF I-10 FWY (AGUA CALIENTE INDIAN RESERVATION)	2001[5]	20-1400	--
THOUSAND PALMS PRESERVE	1995[2]	309	36
EAST END INDIO HILLS (1999)	1995[2]	0	3

[1] Results are from the CNDDB (CDFG 1997) as reported by Robin Kobaly for 1979 and 1982. Record from Snow Creek Road was reported by Dan Pearson to CNDDB for April 1982 survey.

[2] 1987 results are from Katie Barrows (1987). Records from 1995 are from a report on biological surveys completed for this Plan by Katie Barrows (1995); in this survey, plants were counted along 10-meterwide transects of variable length.

[3] Density estimates are from Sanders and Thomas Olsen Associates (1996).

[4] Observations for 2001 were reported by Ken Corey (pers. comm.), USFWS, Carlsbad Field Office, from surveys conducted on May 23/24 and June 4, 2001. No specific number of individuals was reported for Mission Creek and Morongo Wash.

[5] Observations reported by Michael Brandman Associates (2001) were based on focused surveys along parallel transects on Agua Caliente Band of Cahuilla Indians Reservation land in March and April 2001. The highest concentrations of Coachella Valley milkvetch were found south of I-10 between Date Palm Drive and Bob Hope Drive in Sections 10, 14, 22, and 24 (T4S, R5E). In Section 14, 1,491 individuals were observed (2.3/acre).

Associated Covered Species. Within the Plan Area, other species of concern whose Core Habitat overlaps with that of the Coachella Valley milkvetch include flat-tailed horned lizard, Palm Springs pocket mouse, Coachella Valley fringe-toed lizard, Coachella Valley round-tailed ground squirrel, Coachella Valley giant sand-treader cricket, Coachella Valley Jerusalem cricket, and burrowing owl.

9.2.3 Triple-Ribbed Milkvetch *Astragalus tricarinatus*

Status	**Federal:**	**Endangered**
	State:	**No official status**
	CNPS:	**List 1B**

9.2.3.1 Species Conservation Goals and Objectives

Conserve and manage populations within the MSHCP Reserve System according to the following criteria:

Goal 1: Protect Core Habitat areas that include occupied Habitat, and associated Essential Ecological Processes, allowing evolutionary processes and natural population fluctuations to occur. Minimize fragmentation, human-caused disturbance, and edge effects to Core Habitat by conserving contiguous Habitat patches and effective Linkages between patches of Core Habitat.

Objective 1. Ensure conservation of Core Habitat within the following Conservation Areas:

- Whitewater Canyon Conservation Area
- Upper Mission Creek/Big Morongo Canyon Conservation Area

Please refer to Section 4.3 and Table 9-6 for specific acreages to be protected by this Conservation Objective.

Goal 2: Protect Other Conserved Habitat to provide sufficient area and variety of Habitat types to accommodate population fluctuations, allow for genetic diversity, and to conserve the range of environmental conditions within which this milkvetch is known to occur.

Objective 2. Conserve Other Conserved Habitat for this milkvetch through adherence to other Conservation Objectives (for another species, a natural community, Essential Ecological Process area, Biological Corridor, or Linkage area) in the following Conservation Areas

- Whitewater Floodplain Conservation Area
- Joshua Tree National Park Conservation Area
- Santa Rosa and San Jacinto Mountains Conservation Area

Please refer to Section 4.3 and Table 9-6 for specific acreages to be conserved by other Conservation Objectives.

Table 9–6: Summary of Habitat within Conservation Areas Triple-Ribbed Milkvetch

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*
Whitewater Canyon	1,295	41	886	368	1,254	Core Habitat
Hwy 111/I-10	5	1	0	4	4	Other Cons. Habitat
Whitewater Floodplain	866	59	272	535	807	Other Cons. Habitat
Upper Mission Creek/Big Morongo Canyon	819	47	346	426	772	Core Habitat
Santa Rosa & San Jacinto Mountains[1]	1	0	0	1	1	Other Cons. Habitat
Total – All Habitat	*2,986*	*148*	*1,504*	*1,334*	*2,838*	--
Total – Core Habitat	*2,114*	*88*	*1,232*	*794*	*2,026*	--
Total – Other Cons. Habitat	*872*	*60*	*272*	*540*	*812*	--

[1] There is one known occurrence for this species in Agua Alta Canyon within this Conservation Area.

Goal 3: Protect Essential Ecological Processes, including hydrological regimes, necessary to maintain Core Habitat and Other Conserved Habitat for this species.

Objective 3. Ensure protection of Essential Ecological Process areas through Conservation Area Conservation Objectives for Essential Ecological Processes.

Goal 4: Maintain Biological Corridors and Linkages among all conserved populations to provide for seed dispersal and shifts in species distribution over time.

Objective 4. Protect Biological Corridors and Linkages through Conservation Area Conservation Objectives for Biological Corridors and Linkages. Key Habitat connections and corridors include the following:

- ❖ Mission Creek undercrossings at Highway 62 in the Upper Mission Creek/Big Morongo Canyon Conservation Area.

Goal 5: Ensure conservation of triple-ribbed milkvetch 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.

Objective 5. Implement biological monitoring and Adaptive Management actions to ensure self-sustaining populations within each Core Habitat area.

9.2.3.2 Threats, Limiting Factors, and Adaptive Management

This species occurs in locations within the Plan Area where there are few, if any, human-caused threats. Most of the occurrences (85%) occur on Existing Conservation Lands in protected status, including those in Mission Creek on land owned by BLM or the Wildlands Conservancy, in Big Morongo Canyon on BLM land, or in Whitewater Canyon on BLM land. In the wash bottom Habitat and along roads, the species may be subject to trampling by vehicles, but most of the occurrences receive very limited vehicular traffic. Development pressures are a concern primarily in the Mission Creek drainage on private lands immediately west of Highway 62 and in the vicinity of Dry Morongo Wash near Highway 62 and Indian Avenue. One disturbance that may impact this species is flood control maintenance activities in the Whitewater Canyon and Mission Creek drainages. Sand and gravel mining is not a current threat, although there is some potential for mining in Whitewater Canyon. Road widening along Highway 62 could impact the Dry Morongo Canyon location in the future, although no widening is proposed. Grazing is not currently a threat in the locations where this species occurs. Illegal berming and drainage diversions are potential impacts that may, or might in the future, affect the structure and function of canyon Habitats. In the upper reaches of Big Morongo Canyon, outside the Plan boundary in San Bernardino County, Habitat for triple-ribbed milkvetch has been disturbed by pipeline construction and maintenance. This is a threat with mixed impacts, as, while individual plants may be destroyed, some plants may germinate in soil freshly disturbed by pipeline construction activities (G. Helmkamp, pers. comm.). In 1995, however, a pipeline realignment project in Big Morongo Canyon, outside the Plan Area, may have impacted this milkvetch.

With the low population numbers reported by most observers, a significant threat may be impacts to the species from stochastic natural events. Within the Plan Area, low population numbers for this species are a concern as is uncertainty about the preferred Habitat for triple-ribbed milkvetch. A natural event such as a large slide in the upland population or a major flood could impact the small groups of scattered plants that are the typical observation of this species. Climate change could also impact this species. An immediate need is for surveys throughout its range to better describe Habitat preferences, and to delimit extent and size of the populations.

The following actions may be needed to ensure species persistence and long-term viability if biological monitoring indicates that such actions are warranted. This list is not comprehensive but identifies some of the known or likely threats to this species. More detailed information on the Management and Monitoring Programs can be found in Section 8.0.

1. Control and manage activities that degrade triple-ribbed milkvetch Habitat. In particular, control and manage those activities that may involve vehicular travel within washes and flood control maintenance activities that could result in damage to plants and their Habitat outside of the flood control channel itself; activities within the flood control channel will be permitted by the Plan as Covered Activities (see Section 7.0).
2. Identify and implement actions to reduce impacts from, and control where feasible, invasive species if it is determined from monitoring results that there are impacts to the milkvetch or milkvetch Habitat.

3. Determine the conditions that favor germination and growth in this species and insure that these conditions persist (e.g. scouring by large floods).
4. In Mission Creek, coordinate with the Wildlands Conservancy to achieve Species Conservation Goals.

9.2.3.3 Species Conservation Analysis

Conservation Area Reserve Design. The occurrences for this species in the Mission Creek and Big Morongo Canyon areas are primarily on land conserved under BLM or Wildlands Conservancy ownership. These areas both provide contiguous Habitat of the wash and canyon bottoms where this species has been observed, adjacent to hill slopes above these washes where the species may occur. However, the small size of most known populations reduces the certainty that these Habitat areas are an appropriate configuration. Fortunately, most of the potential Habitat, which may include hill slopes above these washes, is also protected. The Whitewater Canyon area includes a small residential area and a public road, a trout fishing operation, and the Colorado River Aqueduct of the Metropolitan Water District. The Plan will not eliminate these Existing Uses such that some deleterious impacts to triple-ribbed milkvetch Habitat could occur. The risk of these impacts, primarily from foot traffic in the Habitat, is probably low. Acquisition of private land in Whitewater Canyon from willing sellers is a goal of the Plan.

As noted in the discussion in the Distribution, Abundance, and Trends section below, the population dynamics of this species are unknown. In the face of uncertainty about the preferred Habitat for this species, the Planning Team took the conservative approach and recommended inclusion of all known occurrences for this species and all occupied and potential Habitat. The proposed Conservation Areas in the MSHCP Reserve System include those areas judged by the Planning Team to be the most viable known Habitat for this species. The viability of this Habitat was based on the inclusion of the known occurrences, absence of fragmentation and edge effects, and an intact watershed and flood regime. The protection of the flooding regime may be the most significant feature for conservation of this species' Habitat. Additional research is needed to understand the distribution and population dynamics of this endangered plant. The Planning Team identified the Conservation Areas below as Core Habitats. For each area, see Table 9-6 for a breakdown of Existing Conservation Lands and remaining lands to be conserved.

Core Habitat Areas:

1. ***Whitewater Canyon.*** This canyon is one of the primary locations for known occurrences of this species and includes the type locality. The Conservation Area includes approximately 1,295 acres of modeled Habitat. The Plan will conserve approximately 1,254 acres of Core Habitat here. This milkvetch has been observed from near the fish hatchery to just north of Interstate 10. Several of the historic locations near the area where the Whitewater River passes under Interstate 10 may have been disturbed or eliminated by levee construction and activities related to the aqueduct. The Planning Team considered this area as Core Habitat for triple-ribbed milkvetch.

2. ***Upper Mission Creek and Big Morongo Canyon.*** The Plan includes approximately 819 acres of modeled Habitat for this milkvetch in this Conservation Area. Approximately 772 acres of Core Habitat will be protected by the Plan. This Conservation Area includes significant Habitat areas for this species in Upper Mission Creek, Big Morongo Canyon, and Dry Morongo Wash. Surveys for this species from 1991 to 1998, by George Helmkamp and Robin Kobaly (pers. comm.), and surveys for the Plan by a team of USFWS, BLM, and CVMC biologists (K. Barrows, pers. comm.) report from 13 to 120 individuals. In April 2004, a population of close to 200 triple-ribbed milkvetch plants on an upland site in the Mission Creek watershed west of Catclaw Flat was reported by Scott White and John Green (White et al. 2004). This discovery confirmed a suspicion that this species might occur on upland areas in addition to the sandy and gravelly washes where most known locations occur. Further discussion of this population is included below in Section 9.2.3.5.

This Conservation Area was designed in part to maximize Conservation of this species. All available Habitat was included in the Conservation Area. The Planning Team did consider the area as Core Habitat.

Other Conserved Habitat Areas:

1. ***Whitewater Floodplain***. There are approximately 866 acres of modeled Habitat for triple-ribbed milkvetch within this Conservation Area. The Plan will conserve 807 acres of this Habitat. Although suitable Habitat for this species certainly occurs within this Conservation Area, the Planning Team did not consider the area as Core Habitat in that not enough information on the extent to which the milkvetch occurs here was available.
2. ***Joshua Tree National Park Conservation Area.*** There is no Habitat for this species currently mapped and no known occurrences have been recorded within the Joshua Tree National Park Conservation Area. However, suitable Habitat appears to exist in Long Canyon and may occur in other canyons to the east. Additional surveys would be needed to determine whether triple-ribbed milkvetch does occur in these areas. The potential Habitat would be conserved within this Conservation Area.
3. ***Santa Rosa and San Jacinto Mountains.*** The Plan includes approximately 1 acre of modeled Habitat within this Conservation Area, all of this Habitat would be conserved under the Plan. The modeled Habitat in this Conservation Area is based on one observation of one individual in Agua Alta Canyon, a branch of Martinez Canyon. As the species has not been observed at this location since the original sighting in 1991, it was not considered as Core Habitat.

9.2.3.4 Impacts Analysis

Significance of the Plan Area to Triple-Ribbed Milkvetch

A significant portion of the total known range of triple-ribbed milkvetch is within the Plan Area. This endemic species is found in a narrow range primarily from the northwestern portion of the Coachella Valley, from the vicinity of Whitewater Canyon, the type locality, in Mission Creek Canyon (where one of the largest populations was recently discovered) across Highway 62 to Dry Morongo Wash and Big Morongo Canyon. The species is also known from several locations

outside the Plan boundary in San Bernardino County, including the upper reaches of Big Morongo Canyon, Dry Morongo Canyon just north of the county line, near Key's Ranch in Joshua Tree National Park (Sanders 1999). These locations in San Bernardino County are within the boundaries of BLM's West Mojave Planning Area. One individual of this species was collected in Agua Alta Canyon, a branch of Martinez Canyon in the Santa Rosa Mountains in the southern portion of the Plan Area. The species may be more widely distributed in the Plan Area (See Section 9.2.3.5)

Direct Effects on the Triple-Ribbed Milkvetch

The MSHCP Reserve System would provide for Habitat protection, management, and monitoring for currently unprotected Core Habitat and Other Conserved Habitat for the triple-ribbed milkvetch, from a range of environmental conditions within which it is known to occur. Potential Linkages would also be protected. Large areas in Joshua Tree National Park and the Santa Rosa Mountains that may provide Habitat for this species will be protected.

There are 3,007 acres of modeled triple-ribbed milkvetch Habitat in the Plan area. The Plan would ensure Conservation of 2,838 acres (94%) of the total modeled Habitat, including 2,026 acres of Core Habitat (96% of total) and 812 acres (93%) of Other Conserved Habitat. Each of the two Core Habitat areas conserved would be greater than 2,000 acres. Approximately 1,504 acres (50%) of the modeled Habitat are within Existing Conservation Lands and would be managed as part of the Reserve System. An additional 1,334 acres (44%) of the modeled Habitat for triple-ribbed milkvetch in the Plan Area would be conserved.

Within the Conservation Areas potential adverse effects could occur to a maximum of 148 acres (5%) of modeled triple-ribbed milkvetch Habitat. There would be approximately 88 acres (4% of all Core Habitat) of Core Habitat and 60 acres of Other Conserved Habitat (7% of all Other Conserved Habitat) subject to disturbance (See Table 9-6 and Table 4-114). The Reserve System will effectively compensate for potential adverse impacts to this species because it will: 1) ensure Conservation of Core Habitat; 2) protect Essential Ecological Processes needed to maintain milkvetch Habitat; and 3) maintain Biological Corridors and Linkages among conserved populations to provide for population fluctuation and enhance genetic diversity. So, although some disturbance 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 species.

Outside of the Conservation Areas, there are only 17 acres of modeled Habitat and 1 of the 34 known occurrences subject to Development and other proposed Covered Activities. 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. The one known location outside the Conservation Areas is near the Riverside County line in upper Mission Creek canyon in an area not likely to be threatened by Development. The Planning Team carefully considered all available and occupied Habitat for this species and determined that only those areas within the proposed Conservation Areas would provide long-term protection for self-sustaining populations of this species.

Implementation of the Plan is expected to protect Habitat and to maintain population viability of the triple-ribbed milkvetch, as significant Habitat on private land that is currently unprotected will be conserved. The Plan will also secure the Essential Ecological Processes and

Linkages necessary to maintain this Habitat.

Measures to Avoid, Minimize, and Mitigate Adverse Effects on Triple-Ribbed Milkvetch

To mitigate the impacts to triple-ribbed milkvetch, the Permittees will protect and manage, in perpetuity, 1,334 acres of the modeled Habitat for this species, including 33 of the 34 known locations. The 1,504 acres of modeled Habitat within Existing Conservation Lands will be monitored and managed to ensure that Conservation Objectives are met. The Plan will thus ensure Conservation, through protection and management, of 2,838 acres of Reserve Lands for this species.

As noted in the discussion in the Distribution, Abundance, and Trends section below, the population dynamics of this species are unknown. In the face of uncertainty about the preferred Habitat for this species, the Planning Team took the conservative approach and recommended inclusion of all known occurrences for this species and all occupied and potential Habitat. The proposed Conservation Areas in the MSHCP Reserve System include those areas judged by the Planning Team to be the most viable known Habitat for this species. The viability of this Habitat was based on the inclusion of the known occurrences, absence of fragmentation and edge effects, and an intact watershed and flood regime. The protection of the flooding regime may be the most significant feature for conservation of this species' Habitat. Additional research is needed to understand the distribution and population dynamics of this endangered plant. For each area, see Table 9-6 for a breakdown of Existing Conservation Lands and remaining lands to be conserved.

Additionally, the Plan calls for Management and Monitoring Programs to ensure the Conservation of this milkvetch, including control of activities that degrade milkvetch Habitat. The Monitoring and Management Programs also provide for determination of the conditions that favor germination and growth in this species to ensure that these conditions persist (e.g. scouring by large floods).

Overall Impacts to Triple-Ribbed Milkvetch under the Plan

Implementation of this Plan is expected to conserve and enhance population viability of the triple-ribbed milkvetch, as unprotected portions of its Habitat will be conserved. The potential for impacts from human uses at the present time appears to be very low, primarily related to occupied and potential Habitat in the lower reaches of the Whitewater River and Mission Creek which may be affected by flood control maintenance activities that alter the wash and could disturb triple-ribbed milkvetch populations. The Plan will also secure potential Habitat in each of the canyons where this species persists, including Whitewater, Mission Creek, Big Morongo, Dry Morongo, and Martinez/Agua Alta Canyons. It is possible that the species could occur in canyons east of Big Morongo Canyon, including Long Canyon; the portion of this canyon where this species could occur is within Existing Conservation Land in Joshua Tree National Park Conservation Area. Management and monitoring prescriptions will further enhance long-term Conservation of this species.

The Conservation Areas in Whitewater Canyon and Upper Mission Creek/Big Morongo Canyon include all of the Core Habitat for this species. The triple-ribbed milkvetch currently has 68% of the known occurrences on Existing public or private Conservation Lands in the Plan Area.

In addition, Other Conserved Habitat that did not meet the Core Habitat standard set by the Planning Team, and which provides significant Habitat for this milkvetch, will be conserved in the Whitewater Floodplain and the Santa Rosa and San Jacinto Mountains Conservation Areas. The Plan will conserve 33 of the 34 known occurrences. Conservation of 2,026 acres of Core Habitat and 812 acres of Other Conserved Habitat, or 95%, of the significant Habitat for the triple-ribbed milkvetch will ensure that this species can persist in the Plan Area.

9.2.3.5 Species Account: Background

Distribution, Abundance, and Trends. The triple-ribbed milkvetch is an endemic species found in a narrow range primarily from the northwestern portion of the Coachella Valley, from the vicinity of Whitewater Canyon, the type locality, in Mission Creek Canyon across Highway 62 to Dry Morongo Wash and Big Morongo Canyon. Another location where the species has been collected is Agua Alta Canyon, a branch of Martinez Canyon in the Santa Rosa Mountains in the southern portion of the Plan Area; this record is for one individual collected by Jon Stewart and identified by Andy Sanders of the U.C. Riverside herbarium. It is of interest that Barneby, in Munz and Keck (1959), Munz (1968, 1974), and Barneby (1964) described the range of the species from Whitewater to the Orocopia Mountains, east of the Martinez Canyon location. Apparently, Barneby reported the triple-ribbed milkvetch in the Orocopia Mountains. Gary Wallace of the USFWS reports that he has not been able to locate a specimen for this Barneby observation but considers it a good record based on Barneby's reputation (G. Wallace, pers. comm.). The Martinez Canyon known location has led some to suggest that this species could occur in the rugged canyons of the Santa Rosa and San Jacinto Mountains. The Deep Canyon area, which includes the University of California Boyd Deep Canyon Desert Research Center, has received a fair amount of attention from botanists, particularly in the Deep Canyon watershed near Palm Desert (Zabriskie 1979) where the triple-ribbed milkvetch has never been recorded. The species is also known from several locations outside the Plan boundary in San Bernardino County, including the upper reaches of Big Morongo Canyon, Dry Morongo Canyon just north of the county line, and a somewhat anomalous, relatively high elevation, location (Sanders 1999) near Key's Ranch in Joshua Tree National Park. These locations in San Bernardino County are within the boundaries of BLM's West Mojave Planning Area.

Most of the populations of this species appear to be in the eastern end of the San Bernardino Mountains and at the western end of the Little San Bernardino Mountains. Much of the suitable Habitat along the southern margin of these mountains is rugged and poorly explored, and so it is possible that additional populations occur in the upper reaches of Mission Creek, Dry Morongo, and Big Morongo Canyons, as well as in the westernmost portions of Joshua Tree National Park, including Long Canyon (Sanders 1999).

The preferred Habitat of the triple-ribbed milkvetch has been characterized as sandy and gravelly soils of dry washes or on decomposed granite or gravelly soils at the base of canyon slopes. Recent observations of the species have illustrated that its Habitat requirements are very poorly understood. Most, if not all, observations of the species are in disturbed areas, such that it may be require some disturbance, whether natural or man-made. In Big Morongo Canyon, it is found on decomposed granite "slides" at the base of canyon slopes. Other disturbed sites include along washes, on canyon bottoms where slides or flooding occurs. In Mission Creek Canyon, the species was observed in 1998 growing along the rocky edge of the stream, in the middle of roads, in a "rip-rap" barrier above the USGS gauging station, in open soils in a recently burned willow

thicket at the margins of the cienega, and on gravelly sandbars in the midst of the stream channel (K. Barrows, pers. comm.). In each of these locations, natural or man-made disturbance is a feature.

Andy Sanders (1999) has suggested that washes may not in fact be the typical Habitat for this species, which may be more common on the slopes above washes. Very limited surveys by Andy Sanders and Katie Barrows in Mission Creek Canyon between 1995 and 1998 have not located triple-ribbed milkvetch on these slopes. It also should be noted that Robin Kobaly and George Helmkamp described surveying hillsides in Big Morongo Canyon extensively without finding this species; they found the species to be mostly limited to the canyon bottoms in Big Morongo Canyon (R. Kobaly and G. Helmkamp, pers. comm.). It may be that the species requires a very specific set of environmental conditions for germination and growth. In this scenario, seeds only find these conditions infrequently in various years, such that plants are only seen in good numbers in certain years. In its wash Habitat, large-scale floods may be a necessary condition for the successful germination of many seeds of triple-ribbed milkvetch. These large, scouring flood events occur only infrequently in this arid desert climate. A question remains as to how this species can persist given the small size of most known populations and the relative level of disturbance that could, presumably, wipe out a substantial number of individuals. Consideration should be given to retaining an active and intact hydrological regime for this Listed Species.

In his summary of the species for the West Mojave Desert HCP (Sanders 1999), Andy Sanders nicely summarizes the questions about the Habitat requirements and population status of this species:

> "It is apparent that this species is most commonly collected along washes and on canyon bottoms, but whether this represents the preferred Habitat of the species or is simply the place that people collect, and hence find waifs, is yet to be determined. Given the small size of most populations and the instability of the Habitats occupied, it is difficult to see how this species could maintain itself if washes truly are its main Habitat. With every flood, seeds and plants will be destroyed or washed downstream out of the Habitat area. If there is not a substantial population, some of which will escape destruction, or a permanent population in areas not subject to scouring, it is difficult to see how a scarce fugitive can maintain itself at all. Seed longevity should be investigated to determine if seeds are able to survive prolonged burial in sand following a flood so that they might wait for many years until another flood again exposes them and makes open Habitat available. There is a great need for careful and thorough surveys of the slopes above the washes where this species is usually found. If there are no permanent populations found there, then it should be concluded that this species is in fact a wash inhabitant and that the plants are few in number and their status precarious indeed."

Where it does occur, triple-ribbed milkvetch is apparently not common. Surveys for the species in the Mission Creek area in 1998 detected only 13 plants, in spite of what would appear to have been favorable growth conditions with relatively high rainfall that year; the 13 plants were large and laden with fruits (K. Barrows, pers. comm.). Reported observations of the number of individuals of the triple-ribbed milkvetch in Whitewater Canyon, Dry Morongo Wash, and Big Morongo Canyon are mostly of one to 13 plants, with the exception of 120 plants reported in 1991 (in 1997, six to eight individuals were observed at this site), 35 plants reported in 1992 (both by

G. Helmkamp, pers. comm.), and 70 plants in 1993 (C. Jacobsen 1993). The known location in Martinez Canyon is a single observation of one plant, which has not been observed since it was reported in 1985; additional casual surveys of this location have been accomplished several times since 1985, but no plants have been found (W. Miller 1997; J. Dice, pers. comm.).

As mentioned above, in April 2004 a population of at least 300 plants was located by Scott White and John Green (White et al. 2004) just west of Wathier Landing in Mission Creek canyon west of Catclaw Flat. This location is near the Plan boundary. The plants were growing in a small outcrop of "unproductive-looking" gravelly soil and the species was not seen in the surround granitic slopes or alluvial fans and washes. The site of this population is on land owned by the Wildlands Conservancy and included within the Existing Conservation Lands for this Plan. Many more plants were found at this small outcrop than have been censused at other known occurrences. Additional triple-ribbed milkvetch plants were seen but not counted at similar outcrops in the vicinity (Scott White, pers. comm.). This discovery supports the view that other observations of this species may be "waifs" washed downstream or downslope from populations higher in the canyons.

As noted, the factors that control the distribution and size of populations of this species are not understood. During some years, the species is difficult to find, while in other years it may be relatively common at some sites. The occurrence in Big Morongo Canyon consists of approximately 50 plants, occupying a total area of about 36 acres; these plants occur in scattered locations along the canyon bottom, north of and within the Plan Area. As previously noted, George Helmkamp (pers. comm.) has seen this population vary from six to 120 plants. In the year when 120 plants were observed (ca. 1991), heavy rains resulting in floodwaters had scoured the bottom of the canyon; the plants appeared in the open canyon bottom. The Big Morongo Canyon has been monitored from 1983 and 1998, with changes in abundance apparently dependent on the amount of winter rainfall.

The triple-ribbed milkvetch may be a short-lived perennial, but more commonly behaves as an annual. It may best be described as a short-lived perennial, persisting for about 3 to 5 years (Sanders 1999). Healthy individuals appear as a somewhat bushy herb, which at maturity are usually 12-20 inches (30-50 cm) tall. The lower stem is somewhat woody, with a tap root. The white to pale cream-colored flowers appear from February through April, with fruits appearing as early as March and present until at least May. The fruits are distinctive, narrow pods, 2 to 4 cm long and three-ribbed in cross section. Most aspects of the biology of this species are unknown, including pollinators, germination requirements, longevity of seeds in the soil, and specific Habitat requirements.

Associated Covered Species. Within the Plan Area, other species of concern whose Core Habitat overlaps with that of the triple-ribbed milkvetch include the Little San Bernardino Mountains linanthus, desert tortoise, riparian birds, and burrowing owl.

9.2.4 Orocopia Sage *Salvia greatae*

Status **Federal:** **No official status**
State: **Special Plant, California Species of Special Concern**

CNPS: List 1B

9.2.4.1 Species Conservation Goals and Objectives

Conserve and manage populations within the MSHCP Reserve System according to the following criteria:

Goal 1: Protect Core Habitat areas that include occupied Habitat, and associated Essential Ecological Processes, allowing evolutionary processes and natural population fluctuations to occur. Minimize fragmentation, human-caused disturbance, and edge effects to Core Habitat by conserving contiguous Habitat patches and effective Linkages between patches of Core Habitat.

Objective 1. Ensure conservation of Core Habitat within the following Conservation Areas:

- Desert Tortoise and Linkage Conservation Area
- Mecca Hills/Orocopia Mountains Conservation Area

Please refer to Section 4.3 and Table 9-7 for specific acreages to be protected by this Conservation Objective.

Goal 2: Protect Other Conserved Habitat to provide sufficient area and variety of Habitat types to accommodate population fluctuations, allow for genetic diversity, and to conserve the range of environmental conditions within which this sage is known to occur.

Objective 2. Conserve Other Conserved Habitat for this sage through adherence to other Conservation Objectives (for another species, a natural community, Essential Ecological Process area, Biological Corridor, or Linkage area) in the following Conservation Areas:

- Dos Palmas Conservation Area

Please refer to Section 4.3 and Table 9-7 for specific acreages to be conserved by other Conservation Objectives.

Goal 3: Maintain Biological Corridors and Linkages among all conserved populations to provide for seed dispersal and shifts in species distribution over time.

Objective 3. Ensure conservation of Biological Corridors and Linkages through Conservation Area Conservation Objectives.

Table 9-7: Summary of Habitat within Conservation Areas Orocopia Sage

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*
Desert Tortoise and Linkage	779	44	337	398	735	Core Habitat
Mecca Hills/ Orocopia Mtns.	66,180	1,803	48,150	16,227	64,377	Core Habitat
Dos Palmas	4,022	185	2,177	1,661	3,838	Other Cons. Habitat
Total – All Habitat	*70,981*	*2,032*	*50,664*	*18,286*	*68,950*	--
Total – Core Habitat	*66,959*	*1,847*	*48,487*	*16,625*	*65,112*	--
Total – Other Cons. Habitat	*4,022*	*185*	*2,177*	*1,661*	*3,838*	--

Goal 4: Ensure conservation of Orocopia sage 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.

Objective 4. Implement biological monitoring and Adaptive Management actions to ensure self-sustaining populations within each Core Habitat area.

9.2.4.2 Threats, Limiting Factors, and Adaptive Management

Threats to this species are few in that its Habitat is largely protected within the Mecca Hills, Orocopia Mountains, and Chuckwalla Mountains Wilderness Areas, established by the 1994 Desert Protection Act. There may be some threat from illegal OHV activity, for example along the Bradshaw Trail, where lands on either side of this road were excluded from the Wilderness Areas. Fortunately, Orocopia sage populations are typically on rocky slopes or alluvial fans and are either inaccessible to vehicular traffic or are some distance from major roads. K. Barrows (1986) reported that no evidence of OHV impacts within Orocopia sage populations was observed along the Bradshaw Trail.

The following actions may be needed to ensure species persistence and long-term viability if biological monitoring indicates that such actions are warranted. This list is not comprehensive but identifies some of the known or likely threats to Orocopia sage. More detailed information on

the Monitoring and Management Programs can be found in Section 8.0.

1. Control and manage activities that degrade Orocopia sage Habitat. These activities are prohibited in the Mecca Hills and Orocopia Mountains Wilderness Areas (e.g. OHV use). Future increases in activity along the Bradshaw Trail, if they occur, could result in impacts to this species.
2. Identify and implement actions to reduce impacts from, and control where feasible, invasive species if it is determined from monitoring results that there are impacts to the Orocopia sage or impact to its Habitat.

9.2.4.3 Species Conservation Analysis

Conservation Area Reserve Design. The proposed Conservation Areas include nearly all of the known Habitat for this species as well as additional modeled Habitat in the Orocopia Mountains. This species has not been recorded along the north slopes of the Orocopia Mountains, but much of this area is not well explored by botanists. It is also protected within the BLM Wilderness Area. The dispersal mechanisms and pollinators for this species are not known. Conserved populations of this species are potentially subject to limited edge effects as a result of recreational use along the Bradshaw Trail, but these effects do not appear significant.

The Planning Team did not attempt to estimate population densities for the Orocopia sage, as data are limited on the number of individuals at known occurrences throughout its range in the Orocopia Mountains. This species occurs in only three Conservation Areas within the Plan Area, Desert Tortoise and Linkage, the Mecca Hills/Orocopia Mountains, and Dos Palmas. The proposed Conservation Areas include all known occurrences and modeled Habitat judged by the Planning Team to be the known Habitat suitable to support a self-sustaining population for this species. The viability of this Habitat was based on the inclusion of the known Habitat areas, which currently support an apparently successful population, absence of fragmentation and edge effects, and an intact watershed. There is little known about the ecosystem or large-scale processes that may contribute to viable Habitat for this species. Additional data are needed to assess the population status and viability of Orocopia sage. For each area, see Table 9-7 for a breakdown of Existing Conservation Lands and remaining lands to be conserved.

Core Habitat Areas:

1. ***Mecca Hills/Orocopia Mountains.*** The Plan includes approximately 66,180 acres of modeled Habitat for the Orocopia sage in this Conservation Area. The Plan will conserve approximately 64,377 of these acres. This Conservation Area includes most of the significant Habitat known for this species in the Orocopia Mountains. Most of this Habitat is within the Orocopia Mountains Wilderness Area. This Conservation Area was considered as Core Habitat.
2. ***Desert Tortoise and Linkage.*** This Conservation Area includes approximately 779 acres of modeled Habitat for the Orocopia sage. The Plan would ensure conservation of approximately 735 acres of this Habitat. The Habitat in this Conservation Area is contiguous with the Core Habitat for Orocopia sage in the Mecca Hills/Orocopia Mountains Conservation Area. Therefore this Conservation Area was considered as providing Core Habitat that is functionally part of the Core Habitat in the adjacent

Conservation Area.

Other Conserved Habitat Areas:

1. ***Dos Palmas.*** The Dos Palmas Conservation Area includes approximately 4,022 acres that have been delineated as modeled Habitat for the Orocopia sage, of which approximately 3,838 acres will be conserved under the Plan. More data would be necessary to confirm the potential for this area to constitute Core Habitat.

9.2.4.4 Impacts Analysis

Significance of the Plan Area to Orocopia Sage

The Orocopia sage is endemic to the Orocopia Mountains, Mecca Hills, and Chocolate Mountains in the eastern part of the Plan Area. Its known range is entirely within the Plan Area. Orocopia sage has no official state or federal status but is listed by the California Department of Fish and Game as a Species of Special Concern and by the California Native Plant Society on List 1B (CNPS 2001). Orocopia sage occurs in a longitudinal, west to east range of approximately 30 miles.

Direct Effects on Orocopia Sage

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. As a result of the Plan acquisitions 18,286 acres (23%) of the modeled Habitat for Orocopia sage in the Plan Area would be conserved. A total of 68,950 acres (87%) of modeled Orocopia sage Habitat would be conserved.

Potential adverse impacts could occur within the Conservation Areas, affecting 2,032 acres of modeled Orocopia sage Habitat. Approximately 1,847 acres (3% of total) Core Habitat and 185 acres (5%) of Other Conserved Habitat would be subject to disturbance (See Table 9-7 and Table 4-114).

Outside of the Conservation Areas, there are 4,901 acres of modeled Orocopia sage Habitat that could be subject to disturbance. The Habitat for this species that is not within the Conservation Areas is primarily at the margins of the modeled Habitat. It includes potential Habitat in the southeastern portion of the Mecca Hills. It is a mountainous area of the Mecca Hills where the Habitat was deemed potential but the Orocopia sage has not been observed. This area is part of the rugged badlands of the Mecca Hills that would not likely be subject to Development but could be subject to OHV use on designated routes, primarily in the canyon bottoms. The areas subject to disturbance outside the Conservation Areas provide only marginal Habitat for Orocopia sage and the impacts to this species as a result of the Plan are insignificant.

The proposed Conservation Areas in the Plan include approximately 87% of the occupied and potential Habitat for Orocopia sage as currently mapped. The actual reduction in Habitat value is expected to be considerably less than indicated by the raw acreage numbers because:

1. The Plan would conserve all of the known occurrences of Orocopia sage and Habitat for the known populations within the Plan Area in the Orocopia Mountains. This includes areas considered as Core Habitat in the Mecca Hills/Orocopia Mountains Conservation Area.
2. Take within the Conservation Areas would not eliminate or significantly impact any core populations. Conservation Objectives require any approved disturbance within Conservation Areas to ensure protection of Core Habitat.
3. Lands in the MSHCP Reserve System would be managed and monitored to address significant edge effect problems, OHV impacts, invasive species, and other known and potential stressors to this species,

The issuance of Take Permits, therefore, will not likely jeopardize the continued existence of Orocopia sage and the implementation of the MSHCP will provide for the Conservation of the species.

Measures to Avoid, Minimize, and Mitigate Impacts to Orocopia Sage

To mitigate the effects of disturbance on Orocopia sage, the Permittees will protect and manage, in perpetuity, 18,286 acres of the modeled Habitat for this species, including 16,625 acres of Core Habitat. The 50,664 acres of modeled Habitat within Existing Conservation Lands, including 48,487 acres of Core Habitat, will be monitored and managed to ensure that Conservation Objectives are met. The Plan will thus ensure Conservation, through protection and management, of 68,950 acres of Reserve Lands for this species

The proposed Conservation Areas include 87% of the known modeled Habitat for Orocopia sage. Most of the Conserved Habitat is on BLM land within the Mecca Hills and Orocopia Mountains Wilderness Areas. This includes areas considered as Core Habitat in the Desert Tortoise and Linkage Conservation Area and in the Mecca Hills/Orocopia Mountains Conservation Area. Other Conserved Habitat from a range of environmental conditions within which this sage is known to or may occur will also be protected in the Dos Palmas Conservation Area. This Plan includes 100% of the occurrences for this plant on 70,981 acres of Core and Other Conserved Habitat within the Conservation Areas. Consequently, the amount of modeled Habitat for Orocopia sage that could be subject to Take within the Conservation Areas would be 2,032 acres or 3% of all the modeled Habitat.

Additionally, the Plan calls for Management and Monitoring Programs to ensure the Conservation of this species, including control of activities that degrade Orocopia sage. This could include Adaptive Management of impacts as a result of future increases in OHV activity along the Bradshaw Trail, if they occur, and control of invasive species where necessary. The Management and Monitoring Programs include a provision to develop and test models to address the distribution, abundance, and ecological requirements of Orocopia sage.

Overall Impacts to Orocopia Sage under the Plan

Implementation of this Plan is expected to conserve and enhance population viability of the Orocopia sage, as unprotected portions of its Habitat will be conserved. The potential for impacts from human uses, including OHV activity, appears to be low. Management and monitoring prescriptions will further enhance long-term Conservation of this species.

The Orocopia sage will benefit from the establishment of the MSHCP Reserve System which will include Habitat in the Orocopia Mountains where they occur. Implementation of the Plan is expected to provide for persistence of this species within the Plan Area, as currently unprotected portions of its Habitat and potential Habitat in the Mecca Hills area will be conserved. The combination of the overall 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 effectively compensate for potential adverse effects to this plant species.

9.2.4.5 Species Account: Background

Distribution, Abundance, and Trends. The preferred Habitat of Orocopia sage is in gravelly or rocky soils on broad bajadas or fans, often adjacent to desert washes or on the rocky slopes of canyons. It may occur on alluvial terraces and sandy or rocky benches elevated above the flood plain of a wash, as in the Salt Creek Wash along the Bradshaw Trail. The species does not appear to occur within the immediate wash zone. This species has been recorded up to 2,800 feet in the Orocopia Mountains. It has only been observed on the south-facing slopes of the Orocopia Mountains, although thorough surveys have not yet been completed. Surveys completed several years ago in the Chocolate Mountains Aerial Gunnery Range (CMAGR) indicate it is fairly common in these mountains, which are outside the Plan boundary. This species has also been reported by BLM from the north side of the Chuckwalla Mountains, outside the Plan Area. This location, south of Desert Center, was visited in 1986 but the presence of Orocopia sage was not confirmed (K. Barrows 1986). 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). Information on population size and density of Orocopia sage is not available. 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. These initial efforts indicated the need for additional sampling. 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 2003).

Though Orocopia sage is patchy in its distribution, it is typically one of the dominant members of the vegetation where it occurs. Plants may be 3 to 4 feet tall and usually form dense, rounded clumps, sometimes as large as 4 or 5 feet in diameter. Multiple branching from near ground level results in a very bushy appearance. This species is associated with desert dry wash woodland and Sonoran creosote bush scrub.

Little is known of the life history and ecology of Orocopia sage. Its remarkable ability to withstand long periods of drought was noted by Jaeger (1941). During drought periods, it may lose nearly all its leaves. In dry years, this plant may be virtually dormant, forming only a few new shoots and perhaps no flowers (Clary, in Jepson 1943), whereas in wet years, plants may bloom by early April. Orocopia sage is reportedly pollinated by bees (Jones 1995).

Associated Covered Species. Other species of concern which occur in the same general

area as Orocopia sage include Mecca aster, desert tortoise, and Le Conte's thrasher.

9.2.5 Little San Bernardino Mountains Linanthus *Linanthus maculatus (also Gilia maculata)*

Status	**Federal:**	**Species of Concern**
	State:	**Species of Special Concern**
	CNPS:	**List 1B**

9.2.5.1 Species Conservation Goals and Objectives

Conserve and manage populations within the MSHCP Reserve System according to the following criteria:

Goal 1: Protect Core Habitat areas that include occupied Habitat, and associated Essential Ecological Processes, allowing evolutionary processes and natural population fluctuations to occur. Minimize fragmentation, human-caused disturbance, and edge effects to Core Habitat by conserving contiguous Habitat patches and effective Linkages between patches of Core Habitat.

.

Objective 1. Ensure conservation of Core Habitat within the following Conservation Areas

- Whitewater Canyon Conservation Area
- Upper Mission Creek/Big Morongo Canyon Conservation Area

Please refer to Section 4.3 and Table 9-8 for specific acreages to be protected by this Conservation Objective.

Goal 2: Protect Other Conserved Habitat to provide sufficient area and variety of Habitat types to accommodate for population fluctuations, allow for and genetic diversity, and to conserve the range of environmental conditions within which this small annual plant is known to occur.

Objective 2. Conserve Other Conserved Habitat for this small annual plant through adherence to other Conservation Objectives (for another species, a natural community, Essential Ecological Process area, Biological Corridor, or Linkage area) in the following Conservation Area:

- Willow Hole Conservation Area
- Upper Mission Creek/Big Morongo Canyon Conservation Area

Please refer to Section 4.3 and Table 9-8 for specific acreages to be conserved by other Conservation Objectives.

Table 9-8: Summary of Habitat within Conservation Areas
Little San Bernardino Mountains Linanthus

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***
Whitewater Canyon	579	39	192	348	540	Other Cons. Habitat
Upper Mission Creek/Big Morongo Canyon	2,410	224	168	2,018	2,186	Core Habitat
Willow Hole	200	20	3	177	180	Other Cons. Habitat
Total – All Habitat	*3,189*	*283*	*363*	*2,543*	*2,906*	--
Total – Core Habitat	*2,410*	*224*	*168*	*2,018*	*2,186*	--
Total – Other Cons. Habitat	*779*	*59*	*195*	*525*	*720*	--

Goal 3: Protect Essential Ecological Processes, including hydrological regimes, necessary to maintain Core Habitat and Other Conserved Habitat for this species.

Objective 3. Ensure protection of Essential Ecological Process areas through Conservation Area Conservation Objectives for Essential Ecological Processes.

Goal 4: Maintain Biological Corridors and Linkages among all conserved populations to provide for seed dispersal and shifts in species distribution over time.

Objective 4. Protect Biological Corridors and Linkages through Conservation Area Conservation Objectives for Biological Corridors and Linkages.

Goal 5: 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.

Objective 5. Implement biological monitoring and Adaptive Management actions to ensure self-sustaining populations within each Core Habitat area.

9.2.5.2 Threats, Limiting Factors, and Adaptive Management

The greatest threat to this species is growing urbanization in the vicinity of Desert Hot Springs and Highway 62 where the largest populations exist. Only 2% of the occurrences for Little San Bernardino Mountains linanthus are currently protected on public or private Existing Conservation Lands. Within the Plan Area, all populations not on public land must be considered

highly threatened as they occur on relatively flat sites and predominantly on private land. Urbanization spreading westward from Desert Hot Springs could eliminate the most significant populations in the long term. Development pressures are a concern primarily in the Mission Creek drainage east of Highway 62 and in the vicinity of Dry Morongo Wash near Highway 62 and Indian Avenue. One disturbance that could impact this species is flood control maintenance activities in the Whitewater Canyon and Mission Creek drainages. Another threat to this species is OHV activity in the wash Habitat where it occurs. The small size of the plants and their occurrence along the margins of washes, which may serve as routes of travel for OHV users, make them particularly vulnerable to vehicular damage.

The following actions may be needed to ensure species persistence and long-term viability if biological monitoring indicates that such actions are warranted. This list is not comprehensive but identifies some of the known or likely threats to this species. More detailed information on the Monitoring and Management Programs can be found in Section 8.0.

1. Control and manage activities that degrade Little San Bernardino Mountains linanthus Habitat. In particular, control those activities that may involve vehicular travel within washes and flood control maintenance activities that could result in damage to plants and their Habitat outside of the flood control channel itself. Operation and maintenance activities within the flood control channel itself are Covered Activities (see Section 7.0).
2. Identify and implement actions to reduce impacts from, and control where feasible, invasive species if it is determined from monitoring results that there are impacts to linanthus or impacts to its Habitat.
3. Develop and test models through the Management and Monitoring Program to address the distribution, abundance, and ecological requirements of the Little San Bernardino Mountains linanthus.
4. Determine the conditions that favor germination and growth in this species and insure that these conditions can continue to occur (e.g. scouring by large floods).
5. In Mission Creek, coordinate with the Wildlands Conservancy to achieve Species Conservation Goals.

9.2.5.3 Species Conservation Analysis

Conservation Area Reserve Design. The occurrences for this species in the Mission Creek and Big Morongo Canyon areas are primarily on private land. Those locations that are on public (BLM land in Whitewater Canyon) or private (Wildlands Conservancy land in Mission Creek) conservation lands are not of adequate size to constitute a secured population alone. Conservation of the occurrences on private lands will help to provide contiguous Habitat of adequate size to secure the persistence of this species within the Plan Area, provided appropriate management actions can also be insured. The small areal extent of this species' Habitat and the linear Habitat corridor increases the potential for deleterious edge effects. The Whitewater Canyon area includes a small residential area and a public road, a trout fishing operation, and the Colorado River Aqueduct of the Metropolitan Water District. The Plan will not eliminate these Existing Uses; therefore, some deleterious impacts to Little San Bernardino Mountains linanthus populations could occur. Similar concerns apply in the lower Mission Creek and Big Morongo Canyon drainages where a public road (Worsley Road) and low-density residential areas could result in impacts to this species.

The Planning Team did not attempt to identify Core Habitat for this species using density estimates. The Planning Team attempted to include as much of the known Habitat for this species as feasible, incorporating all known occurrences and all available and occupied Habitat for populations in Whitewater Canyon Conservation Area and Upper Mission Creek/Big Morongo Canyon Conservation Area. Known Habitat was based on the species distribution model, developed with considerable assistance from Robin Kobaly and George Helmkamp who both have a great deal of familiarity with this species. As part of the Habitat model development for this species, the network of drainages and interlaced washes that occur in the Mission Creek and Morongo Wash area, mostly east of Highway 62 on either side of Indian Avenue were mapped. George Helmkamp (pers. comm.) has observed more than 10,000 individuals of this linanthus at the mouth of Big Morongo Canyon. The Planning Team focused on ensuring that Essential Ecological Processes that maintain this species' Habitat, including flooding events, could continue to occur. The Planning Team also worked with County Flood to ensure that the Core Habitat and Other Conserved Habitat for this species would be kept free of flood control channels and other disturbance that could alter the Habitat character. For each area, see Table 9-8 for a breakdown of Existing Conservation Lands and remaining lands to be conserved.

Core Habitat Areas:

1. ***Whitewater Canyon.*** This canyon is one of the primary locations for known occurrences of this species. The Conservation Area includes approximately 579 acres of modeled Habitat, of which approximately 540 acres will be conserved under the Plan. The Little San Bernardino Mountains linanthus has been observed from the fish hatchery to below Interstate 10. A survey by Will Miller and others of the USFWS in 1997 detected two populations. The first population of 300 to 500 plants was approximately 1 mile north of Bonnie Bell. The second population, 0.4 miles south of the gauging station, was described in 1997 as more than 1,000 individuals. The Planning Team considered the area as Core Habitat.
2. ***Upper Mission Creek/Big Morongo Canyon.*** The Plan includes approximately 2,410 acres of modeled Core Habitat for this linanthus in this Conservation Area. The Plan will conserve approximately 2,186 acres of this Habitat. This Conservation Area includes

significant Habitat areas for this species in the outwash fans of Mission Creek, Big Morongo Canyon, Dry Morongo Wash, Little Morongo Wash, and Morongo Wash south of Indian Ave. Surveys in 1997 (USFWS 1997) described 42 populations or subpopulations in this area. These subpopulations were described as containing 50 to 1,000s of individuals; in one case, a subpopulation was estimated at over 10,000 plants. This Conservation Area was designed in part to maximize Conservation of this species. Braided washes associated with the above named drainages were included to provide for the fluvial terraces this species occurs on. The Planning Team did consider the area as Core Habitat.

Other Conserved Habitat Areas:

1. ***Willow Hole.*** The Plan includes approximately 200 total acres of Other Conserved Habitat within this Conservation Area, of which approximately 180 acres will be conserved under the Plan. There is an historical record downstream from Willow Hole, last observed in 1952, that has not been confirmed in the recent past. George Helmkamp and Robin Kobaly suggested potential Habitat in this area, which was included in the model. As the species has not been confirmed at this location, it was not considered as Core Habitat.

2. ***Long Canyon, Indio Hills/Joshua Tree National Park Linkage, and Joshua Tree National Park.*** Habitat for this species was not modeled in the vicinity of the mouth of Long Canyon, or in other canyons in Joshua Tree National Park to the east of Long Canyon. Several botanists have suggested that the species could occur in these areas. This potential Habitat includes the canyon mouths that occur within the Indio Hills/Joshua Tree National Park Linkage Conservation Area. Little San Bernardino Mountains linanthus is known from locations on the north slopes of the Little San Bernardino Mountains, north and east of Long Canyon. Surveys would need to be done to determine whether this species occurs within these Conservation Areas. The areas of potential Habitat are fully within these Conservation Areas and as such are conserved.

9.2.5.4 Impacts Analysis

Significance of the Plan Area to Little San Bernardino Mountains Linanthus

The Little San Bernardino Mountains linanthus is a tiny endemic plant species found in a restricted range in the northwestern part of the Plan Area. Although extensive populations occur outside the Plan Area, the portion of its range within the Plan Area is significant. This tiny annual plant has no official state or federal status although it is considered a Species of Concern by USFWS and is on CNPS List 1B (CNPS 2001). It occurs in the vicinity of the Little San Bernardino Mountains near Desert Hot Springs, in Mission Creek Canyon across Highway 62 to Dry Morongo Wash and Big Morongo Canyon and near the mouth of Dry Morongo Canyon in the northwestern portion of the Coachella Valley, in Whitewater Canyon in the eastern San Bernardino Mountains, and from Whitewater to Palm Springs, the type locality. The most extensive populations of this species are outside the Plan boundary, along washes at the northern edge of Joshua Tree National Park, in the vicinity of Joshua Tree, Yucca Valley, and Twentynine Palms. It seems likely that additional populations of this species may occur in the area of approximately 22 miles between Rattlesnake Canyon and Yucca Valley. There is one very recently described location in Rattlesnake Canyon on the north side of the San Bernardino Mountains.

Direct Effects on the Little San Bernardino Mountains Linanthus

The MSHCP Reserve System would provide for Habitat protection, management, and monitoring for currently unprotected Core Habitat and Other Conserved Habitat for the Little San Bernardino Mountains Linanthus, from a range of environmental conditions within which it is known to occur. Potential Linkages would also be protected. Large areas in Joshua Tree National Park and the Santa Rosa Mountains that may provide Habitat for this species will be protected.

There are 3,389 acres of modeled Little San Bernardino Mountains Linanthus Habitat in the Plan area. The Plan would ensure Conservation of 2,906 acres (86%) of the total modeled Habitat, including 2,186 acres of Core Habitat (93% of total) and 720 acres (92%) of Other Conserved Habitat. The primary Core Habitat area for this species in Upper Mission Creek/Big Morongo Canyon Conservation Area would be greater than 1,500 acres. Approximately 363 acres (11%) of the modeled Habitat are within Existing Conservation Lands and would be managed as part of the Reserve System. An additional 2,543 acres (81%) of the modeled Habitat for Little San Bernardino Mountains Linanthus in the Plan Area would be conserved. Overall, 2,906 acres (93%) of modeled linanthus Habitat would be conserved and managed as a result of the Plan.

Within the Conservation Areas, potential adverse effects could occur on a maximum of 283 acres (7%) of modeled Little San Bernardino Mountains Linanthus Habitat. There would be approximately 224 acres (7% of all Core Habitat) of Core Habitat and 59 acres of Other Conserved Habitat (8% of all Other Conserved Habitat) subject to disturbance (See Table 9-8 and Table 4-114). The Reserve System will effectively compensate for potential adverse impacts to this species because it will: 1) ensure Conservation of Core Habitat; 2) protect Essential Ecological Processes needed to maintain Little San Bernardino Mountains Linanthus Habitat; and 3) maintain Biological Corridors and Linkages among conserved populations to provide for population fluctuation and enhance genetic diversity. So, although some disturbance 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 species. The Planning Team, in consultation with local botanists, carefully considered all available and occupied Habitat for this species and determined that only those areas within the proposed Conservation Areas would provide long-term protection for self-sustaining populations of this species.

Outside of the Conservation Areas, there are only 195 acres (6%) of modeled Habitat subject to Development and other proposed Covered Activities. The modeled Habitat outside the MSHCP Reserve System occurs at the margins of the Upper Mission Creek/Big Morongo Canyon Conservation Area, east of Indian Avenue in an area where the hydrological regime has been compromised by surrounding development. At present, only one known occurrence, located east of Mission Lakes Country Club, is identified as subject to potential Habitat loss. Habitat loss could occur primarily in the lower reaches of Mission Creek and Big Morongo Canyons, south of Indian Avenue. Other populations of this species that occur outside the Plan Area in Joshua Tree National Park are not affected by this Plan. The protection of Habitat and known occurrences of this species will require acquisition of private lands. Public lands in Whitewater Canyon will require management actions to conserve the Habitat for this linanthus and other target species.

Implementation of the Plan is expected to protect Habitat and to maintain population viability of the Little San Bernardino Mountains Linanthus, as significant Habitat on private land that is currently unprotected will be conserved. The Plan will also secure the Essential Ecological

Processes and Linkages necessary to maintain this Habitat.

Measures to Avoid, Minimize, and Mitigate Adverse Effects on Little San Bernardino Mountains Linanthus

To mitigate the impacts to Little San Bernardino Mountains Linanthus, the Permittees will protect and manage, in perpetuity, 3,189 acres of the modeled Habitat for this species, including 58 of the 60 known occurrences. At the time the permit was issued, 57 of the known occurrences for this tiny plant were on private or public non-conservation land (e.g. utility land). As of 2012 66% of the acres of modeled Habitat for this species are currently conserved; the conserved lands include 40 of the 60 known occurrences for linanthus. The Plan will ultimately conserve 86% of all Habitat and 91% of all Core Habitat for this species. The 363 acres of modeled Habitat within Existing Conservation Lands will be monitored and managed to ensure that Conservation Objectives are met. The Plan will thus ensure Conservation, through protection and management, of 2,906 acres of Reserve Lands for this species.

The proposed Conservation Areas in the MSHCP Reserve System include those areas judged by the Planning Team to be the most viable known Habitat for this species. The viability of this Habitat was based on the inclusion of the known occurrences, absence of fragmentation and edge effects, and an intact watershed and flood regime. The protection of the flooding regime may be the most significant feature for conservation of this species' Habitat. Additional research is needed to understand the distribution and population dynamics of Little San Bernardino Mountains Linanthus. See Table 9-8 for a breakdown of Existing Conservation Lands and remaining lands to be conserved.

Additionally, the Plan calls for Management and Monitoring Programs to ensure the Conservation of this species, including control of activities that degrade little San Bernardino Mountains linanthus Habitat. The Monitoring and Management Programs also provide for determination of the conditions that favor germination and growth in this species to ensure that these conditions persist (e.g. scouring by large floods). It will also develop and test models through the Management and Monitoring Programs to address the distribution, abundance, and ecological requirements of the Little San Bernardino Mountains linanthus.

Overall Impacts to Little San Bernardino Mountains Linanthus under the Plan

The Little San Bernardino Mountains linanthus currently has only 2% of the known occurrences on public or private Existing Conservation Lands in the Plan Area. This includes portions of the occurrences in Whitewater Canyon and in Mission Creek. The MSHCP Reserve System would provide protection for two Core Habitat areas identified by the SAC and the Planning Team: Whitewater Canyon and Upper Mission Creek/Big Morongo Canyon. Other Conserved Habitat from a range of environmental conditions within which this linanthus is known to or may occur will be protected in the following Conservation Areas: Willow Hole, Indio Hills/Joshua Tree National Park Linkage, and Joshua Tree National Park. The Conservation Area boundaries were delineated to include almost all of the available and occupied Habitat for this species. The Plan will conserve 97%, or 58 of the 60 known occurrences for this species. The Little San Bernardino Mountains Linanthus currently has only one of the known occurrences on Existing public or private Conservation Lands in the Plan Area. Conservation of 2,410 acres of Core Habitat and 779 acres of Other Conserved Habitat, or 100% of the significant Habitat for the Little

San Bernardino Mountains linanthus, will ensure that this species can persist within the Plan Area.

Implementation of the Plan will maintain and enhance population viability of the Little San Bernardino Mountains Linanthus, as the significant populations and occurrences will be conserved. Equally important, the Plan will ensure that the hydrological regimes that maintain this Habitat, including meandering or braided washes, are maintained. The Plan will also secure potential Habitat in each of the canyons and washes where this species persists, including Whitewater Canyon, Mission Creek, Big Morongo wash, and Dry Morongo Canyon. It is possible that the species could occur in canyons east of Big Morongo Canyon, including Long Canyon; the portion of this canyon where this species could occur is within Existing Conservation Land in Joshua Tree National Park Conservation Area.

9.2.5.5 Species Account: Background

Distribution, Abundance, and Trends. The size and ephemeral habit of the Little San Bernardino Mountains linanthus have made it difficult to find, and hence, it is little collected and studied. This tiny desert annual was first described by Parish in 1892 from a collection at "Agua Caliente" (at a location that is now in downtown Palm Springs) in 1889; the location of this collection was described as just west of the hot springs in Palm Springs. The next collection was at Joshua Tree in 1924. It was little known until Patterson (1989) described more exactly its preferred Habitat. More records have been reported in the last five to ten years. Recently, the nomenclature for this species has been revised and it is included in the genus Linanthus (Porter and Johnson 2000). There is, however, still discussion about its taxonomy, as some authors prefer to retain this species in the genus Gilia (Patterson 1989).

The preferred Habitat of Little San Bernardino Mountains linanthus is in loose soft sandy soils on low benches along washes, generally where the substrate shows some evidence of water flow. It seems to occur in areas where few or no competing species are found, with little shrub or tree cover in the immediate vicinity. The sand is loose and well-aerated, soft and unconsolidated (Sanders 1999). The occurrences within the Plan Area are on the margins of washes on shallow sandy benches, not on areas where a hard surface layer occurs, and not on loose blowsand away from washes. It 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.

Little is known of the life history of this species. Its pollinators, germination requirements, seed longevity, and population parameters have not been described. The flower form and color are indicative of insect pollination but no information on pollination ecology is available. The plants are very small, generally reaching a height of only 0.8 to 1.2 inches. They have a slender, little-branched tap root that may extend over 3 inches into the sand, probably allowing the plants to tap subsurface supplies of moisture and thus avoid atmospheric drying. They are nevertheless very ephemeral.

No comprehensive population estimates have been made, but records for the species give an idea of the size of the known populations. In Dry Morongo Canyon, Helmkamp (in Sanders 1999) reported a few hundred plants in 1995 but only six in 1996. At the mouth of Big Morongo Canyon north of Indian Avenue, more than 10,000 plants were reported in the spring of 1996. Populations in the Whitewater River area have been reported in the range of 200 individuals. In Mission Creek wash east of old Highway 62, Helmkamp reported a single population of more than

2,000 plants in 1992. Clearly, populations vary with environmental conditions in a given year.

Associated Covered Species. Within the Plan Area, other species of concern whose Core Habitat overlaps with that of the Little San Bernardino Mountains linanthus include triple-ribbed milkvetch, Palm Springs pocket mouse, desert tortoise, and burrowing owl.

9.3 Insects

This section contains species accounts, including Species Conservation Goals and Objectives, Habitat parameters and significant threats, for each of the two insect species proposed for coverage under this Plan. Neither of the target insect species has any state or federal status. These insects, the Coachella Valley giant sand-treader cricket and the Coachella Valley Jerusalem cricket, are endemic to the Coachella Valley and the Plan Area. Some of the features of the biology of insect species warrant special note with regard to these conservation strategies. General measures common to both of these insects are listed below, and measures specific to either species are considered in the individual species description.

1. Maintain Habitat features and ecological processes essential to insects, including availability of food plants and suitable local environmental conditions such as vegetation and soil microclimates.
2. Restore and enhance degraded Habitat as necessary according to monitoring results.

9.3.1 Coachella Valley Giant Sand-Treader Cricket *Macrobaenetes valgum*

Status **Federal:** **Species of Concern (No official status)**
State: **No official status**

9.3.1.1 Species Conservation Goals and Objectives

Conserve and manage populations within the MSHCP Reserve System according to the following criteria:

Goal 1: Protect Core Habitat areas that include occupied Habitat, and associated Essential Ecological Processes, allowing evolutionary processes and natural population fluctuations to occur. Minimize fragmentation, human-caused disturbance, and edge effects to Core Habitat by conserving contiguous Habitat patches and effective Linkages between patches of Core Habitat.

.

Objective 1. Ensure conservation of Core Habitat within the following Conservation Areas:

- Snow Creek/Windy Point Conservation Area
- Whitewater Floodplain Conservation Area
- Thousand Palms Conservation Area

Please refer to Section 4.3 and Table 9-9 for specific acreages to be protected by this Conservation Objective.

Goal 2: Protect Other Conserved Habitat to provide sufficient area and variety of Habitat types to accommodate population fluctuations, allow for genetic diversity, and to conserve the range of environmental conditions within which this sand-treader cricket is known to occur.

Objective 2. Conserve Other Conserved Habitat for this cricket through adherence to other Conservation Objectives (for another species, a natural community, an Essential Ecological Process area, a Biological Corridor, or Linkage area) in the following Conservation Areas:

- Willow Hole Conservation Area
- Edom Hill Conservation Area
- East Indio Hills Conservation Area
- Santa Rosa and San Jacinto Mountains Conservation Area

Please refer to Section 4.3 and Table 9-9 for specific acreages to be conserved by other Conservation Objectives.

Table 9-9: Summary of Habitat within Conservation Areas Coachella Valley Giant Sand-Treader Cricket

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*
Snow Creek/ Windy Point	1,374	131	70	1,173	1,243	Core Habitat
Whitewater Floodplain	5,617	309	2,532	2,777	5,309	Core Habitat
Willow Hole	1,754	160	157	1,437	1,594	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*	*779*	*5,999*	*6,998*	*12,997*	--
Total – Core Habitat	*10,953*	*533*	*5,637*	*4,784*	*10,421*	--
Total – Other Cons. Habitat	*2,823*	*246*	*362*	*2,215*	*2,577*	--

Goal 3: Protect Essential Ecological Processes, including hydrological regimes, necessary to maintain Core Habitat and Other Conserved Habitat for this species.

Objective 3. Ensure protection of Essential Ecological Process areas through Conservation Area Conservation Objectives for Essential Ecological Processes.

Goal 4: Maintain Biological Corridors and Linkages among all conserved populations to provide for dispersal and shifts in species distribution over time.

Objective 4. Protect Biological Corridors and Linkages through Conservation Area Conservation Objectives for Biological Corridors and Linkages.

Goal 5: Ensure conservation of Coachella Valley giant sand-treader cricket 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.

Objective 5. Implement biological monitoring and Adaptive Management actions to ensure self-sustaining populations within each Core Habitat area.

9.3.1.2 Threats, Limiting Factors, and Adaptive Management

The most significant limiting factor for this species is the availability of the aeolian sand ecosystem and the sand sources and corridors that maintain it. Threats to this species include cumulative Habitat loss and degradation of the existing Habitat as a result of Development, in particular where sand transport processes are disturbed. OHV activity is a threat to the Habitat of 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. 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 significantly stabilize active sand Habitats and may decrease Habitat quality for these crickets.

The following actions may be needed to ensure species persistence and long-term viability if biological monitoring indicates that such actions are warranted. This list is not comprehensive but identifies some of the known or likely threats to this species. More detailed information on the Monitoring and Management Programs can be found in Section 8.0. Actions may include:

1. Control and manage activities that degrade Coachella Valley giant sand-treader cricket Habitat. In particular, control and manage those activities that result in sand compaction or may crush burrows, which may include OHV travel within Core Habitat except on designated routes of travel, if any; vegetation manipulation or clearing, and other human disturbance.
2. Restrict human access to occupied Habitat during the emergence period in the winter months and during the breeding season in the spring.
3. Identify actions to reduce impacts from, and control where feasible, invasive species if it is determined from monitoring results that there are impacts such as stabilization of sand dunes and sand fields or other impacts to sand-treader cricket Habitat.
4. Refine and test models on habitat associations and estimate the distribution of this species in the Plan Area.

9.3.1.3 Species Conservation Analysis

Conservation Area Reserve Design. The Planning Team selected Core Habitat from the Habitat model for this cricket using the following four criteria: (1) Core Habitat is sufficiently large that it can 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) Core Habitat is not fragmented by Development, including roads, in such a way as to isolate populations. The extent to which roads create barriers to dispersal for this species is not well known, but they can contribute to edge effects, including exotic plant species that colonize disturbed areas. Although lightly traveled two-lane roads that have limited potential for expansion (e.g. Snow Creek Road) are not barriers to this species, two-lane roads with heavy traffic (e.g. Indian Ave.) create significant barriers. Where roads are considered to have a potential

fragmenting effect on Core Habitat, the Plan calls for wildlife underpasses to be constructed when the roads become wide enough to cause potential fragmentation; (3) Core Habitat has intact Essential Ecological Processes, including sand source and sand delivery systems. This species appears to require active blowsand such that natural disturbance from aeolian and fluvial processes (wind and flooding) is considered essential; and (4) Core Habitat has effective connections to other Biological Corridors and/or Linkages to allow gene flow among populations.

The Conservation Areas benefit this species by securing the long-term sand source/transport systems for the active sand dune and sand fields upon which this species depends. At the present time, the sand transport corridors for the Snow Creek area and for the Thousand Palms Preserve are unprotected; these areas would be protected under the Plan. The Planning Team identified the Conservation Areas below as Core Habitats. For each area, see Table 9-9 for a breakdown of Existing Conservation Lands and remaining lands to be conserved.

Core Habitat Areas:

1. ***Snow Creek/Windy Point.*** There are approximately 1,374 acres of Habitat for the Coachella Valley giant sand-treader cricket within this Conservation Area. The Plan will protect approximately 1,243 acres of this Core Habitat. As noted by Cameron Barrows (1998) the distinctive excavations of this species were common on the more active portions of the aeolian sands within the Snow Creek/Windy Point area. Some preliminary density estimates can be made for this area. Conversion of the trapping results from this area to number of individuals per acre gives a density for two different trap dates of 58 to 76 individuals per acre (73 and 95 individuals in a 0.50 ha (1.25 acre) pitfall grid) (C. Barrows 2001). Another trapping effort in 1998 resulted in an average 3.4 individuals per acre (4.25 individuals in a 0.5 ha (1.25 acre) pitfall grid) over a four-month period from January to April (C. Barrows 1998). The two-lane Snow Creek Road was not considered a barrier to movement for this insect because traffic volumes are low. As all of the land surrounding Snow Creek Road is slated for conservation, no large increase in traffic is expected. In that this area is the location with what appears to be the largest number of individuals of this species reported for the Plan Area and the sand transport system will be conserved, the Planning Team considered this area as Core Habitat for the Coachella Valley giant sand-treader cricket.

2 ***Whitewater Floodplain*.** The Plan includes approximately 1,230 acres of modeled Habitat on the existing Whitewater Floodplain Preserve, and an additional approximately 4,520 acres of Habitat adjacent to the southeastern corner of the preserve and west of Indian Avenue, north and northeast of the existing recharge ponds, to comprise a total of approximately 5,617 acres. The Plan will conserve approximately 5,309 acres of this sand-treader cricket Habitat. Trap results from Cameron Barrows (1998) were from the active dune area west of Gene Autry Trail at the Whitewater Wash. He reported that an average of 6.4 individuals per acre (average of eight individuals for the 0.5 ha pitfall grid) were trapped during a four-month period (see Table 9-10). The Planning Team considered this area as Core Habitat for the Coachella Valley giant sand-treader cricket.

3. ***Thousand Palms.*** The existing Thousand Palms Preserve and additional Habitat within the Conservation Area includes a total of approximately 3,962 acres of Core Habitat for the Coachella Valley giant 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. The Plan will conserve approximately 3,869 acres of this Habitat. 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. Information on the occurrence of the Coachella Valley giant sand-treader cricket population on the Thousand Palms Preserve is primarily from the trapping data of Cameron Barrows (C. Barrows 1998, CNLM 2000). From a site near Varner Road, an average of 0.8 individuals per acre (one individual for a 0.5 ha pitfall grid) were trapped over a four-month period; these data are collected from the equivalent of 100 trap nights. This species may be restricted to the more active dune areas on the preserve. The large areas of contiguous occupied Habitat within the preserve were the basis for the Planning Team including this area as Core Habitat.

Other Conserved Habitat Areas:

1. ***Willow Hole.*** There are approximately 1,754 acres of modeled Habitat for this sand-treader cricket in the Willow Hole Conservation Area, of which approximately 1,594 acres will be conserved under the Plan. The Willow Hole-Edom Hill Preserve/ACEC area includes Habitat primarily on 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 for the sand-treader cricket. There is some fragmentation in this area as a result of roads, including Palm Drive, Mountain View Drive, and Varner Road. Data for the presence of this species in the Willow Hole vicinity comes from the trapping results of Cameron Barrows (1998). This trapping was done near the junction of Varner Road and Mountain View Drive. The average number of individuals trapped for the same four-month period was 0.6 individuals per acre (0.75 individuals for a 0.5 ha pitfall grid). Cameron Barrows (1998) did note that the cone-shaped excavations of this species were less common at Willow Hole than at areas to the west (Snow Creek and Whitewater Floodplain). The largest patch of contiguous Habitat for this species is 800 acres west of Palm Drive. The other Habitat patch east of Palm Drive is 954 acres for a total of 1,754 acres of modeled Habitat. Future data gathering and analysis may indicate that Willow Hole could be considered Core Habitat for the sand-treader cricket.

Table 9-10: Results of Pit-Trapping for Coachella Valley Giant Sand-Treader Cricket[1]

LOCATION	NUMBER OF CRICKETS					
	JAN 1998	FEB 1998	MAR 1998	APRIL 1998	JAN 1999	FEB 1999
SNOW CREEK (West valley)	5	2	2	8	95/73[2]	28
WHITEWATER FLOODPLAIN PRESERVE (west valley)	28	1	2	1	N/A	N/A
WILLOW HOLE PRESERVE	0	1	0	2	N/A	N/A
THOUSAND PALMS PRESERVE - Main Dunes (central valley)	2	0	2	0	1	N/A
THOUSAND PALMS PRESERVE - Simone Dunes (central valley)	3	0	0	0	N/A	N/A
LA QUINTA, W. OF WASHINGTON AVE. – near St. Francis of Assisi Church	0	0	0	0	N/A	N/A
EAST END OF THE INDIO HILLS (east valley)	0	0	0	0	0	0

[1] Results are from Cameron Barrows (pers. comm., C. Barrows 1998, and CNLM 2000); except as noted (see [2]). Data represent one sample of 20 pit traps (500 ml cups) placed within 0.50 to 0.25 ha area of active aeolian sand hummocks at each location. The 1998 survey used 25 unbaited, dry pitfall traps, one night per month for the 4 months noted.

[2] Two different samples are reported.

2. ***Edom Hill.*** This Conservation Area includes scattered sandy substrate Habitat between Willow Hole and the Thousand Palms Preserve in the Indio Hills. There are approximately 120 acres of modeled Habitat, not enough to constitute Core Habitat for this species. The Plan ensures that 114 acres of this Habitat will be conserved. In 1994, 17 Coachella Valley giant sand-treader crickets were trapped in surveys to evaluate the expansion of the Edom Hill Landfill (Tierra Madre 1994). This area does provide slightly higher elevation Habitat and a Linkage between Willow Hole and the Thousand Palms Preserve. The Planning Team did not consider this area as Core Habitat.

3. ***East Indio Hills*.** The East Indio Hills appears to provide suitable Habitat for the Coachella Valley giant sand-treader cricket; there are approximately 824 acres of modeled Habitat here, of which approximately 754 acres will be conserved under the Plan. Trap results from Cameron Barrows (1998) report no captures of this species at this location. The typical cone-shaped excavations that reveal this species presence were not observed at all in what appeared to be suitable Habitat at the East Indio Hills. The viability of the sand transport system was a particular concern here; the system, which carried sand from Whitewater River, Mission Creek and Morongo Wash, and others, has been blocked by Development upwind. The remaining sand sources in the Indio Hills and Little San Bernardino Mountains are at least partially compromised by roads. These uncertainties, in particular the absence of confirmed locations, led the Planning Team not to consider this area as Core Habitat for the Coachella Valley giant sand-treader cricket.

4. ***Santa Rosa and San Jacinto Mountains.*** The Santa Rosa and San Jacinto Mountains Conservation Area has very limited Coachella Valley giant sand-treader cricket Habitat, primarily in the Snow Creek/Windy Point Conservation Area where sandy substrate

Habitat occurs along the toe of the San Jacinto Mountains. Of the approximately 122 acres of modeled Habitat, approximately 112 acres will be conserved under the Plan.

9.3.1.4 Take Analysis

Significance of the Plan Area to Coachella Valley Giant Sand-Treader Cricket

The Coachella Valley giant sand-treader cricket occurs exclusively in the active sand hummocks and dunes in the Coachella Valley. 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. This insect has no official state or federal status although it is considered a Species of Concern by USFWS. The Coachella Valley giant 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. It's distribution has been described by Tinkham (1962) as extending to two miles west of Indio.

Effects of Take on the Coachella Valley Giant Sand-Treader Cricket

The primary importance of the proposed MSHCP to Coachella Valley giant sand-treader cricket is that it provides Conservation (including Habitat protection, management and monitoring) of the species across its entire range. The Plan ensures the long-term conservation of Core Habitat, the associated Essential Ecological Processes, and connectivity between these Habitat areas. In addition, the Conservation Areas provide protection across an array of Habitat variables, including moisture, soil character, elevation, and vegetation, within the entire range of this subspecies.

There are 27,070 acres of modeled Habitat for this species within the Plan Area of which approximately 10,953 acres are identified as Core Habitat. The Plan would ensure Conservation of 10,421 acres (95%) of the Core Habitat and 2,577 (91%) of the Other Conserved Habitat for this cricket. The conserved Core Habitat areas range from 1,200 to over 5,000 acres. Approximately 5,999 acres (22%) of the modeled Habitat are within Existing Conservation Lands and would be managed as part of the Reserve System. The Plan would ensure that 6,998 acres (26%) of additional modeled Habitat would be protected. Overall, the Plan would conserve 12,997 acres (48%) of the modeled Habitat for Coachella Valley giant sand-treader cricket in the Plan Area.

Within the Conservation Areas under the worst case scenario, 779 acres of Take of modeled Habitat (3%) could occur. There would be approximately 533 acres (5% of all Core Habitat) of Core Habitat and 246 acres of Other Conserved Habitat (9% of all Other Conserved Habitat) subject to Take Authorization (See Table 9-9 and Table 4-114). Take of sand-treader cricket Habitat within the Conservation Areas must be consistent with the Conservation Objectives for this species to: 1) ensure Conservation of Core Habitat; 2) protect Essential Ecological Processes, including the sand source/sand transport system, needed to maintain sand-treader cricket Habitat; and 3) maintain Biological Corridors and Linkages among conserved populations to provide for population fluctuation and enhance genetic diversity. 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 species.

Outside of the Conservation Areas, there are 12,903 acres (48%) of modeled Habitat authorized for Take. The Habitat outside the Conservation Areas is already highly fragmented, surrounded by existing Development, and has a compromised sand source/transport system. The potential for these Habitat areas to provide for the long-term persistence of sand-treader cricket populations is low. These areas are primarily 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 area no longer has a viable sand transport/wind corridor and is highly fragmented by major roads. These fragmented blocks are more susceptible to edge effects, including mortality on roads. The Planning Team carefully considered all available and occupied Habitat for this species and determined that only those areas within the proposed Conservation Areas would provide long-term protection for self-sustaining populations of this cricket. Core Habitat was not delineated in the Big Dune area, as active blowsand areas have been disturbed, and Essential Ecological Processes are already altered and degraded by the Interstate 10 freeway and roads that fragment the dune. The close association of this species with active sand dunes and active sand fields makes the long-term conservation of sand transport systems essential. It was determined that these sand transport systems were irrevocably altered or compromised in the Big Dune area south of Interstate 10.

Although the percentage of sand-treader cricket modeled Habitat that could be lost to development within the next 75 years appears to be substantial, evaluation of the impacts of Take requires an assessment of the quality of this Habitat. The establishment of Conservation Areas where this species is protected is a significant improvement over the piecemeal and fragmenting nature of development patterns within this Habitat occurring now. The actual reduction in Habitat value is expected to be considerably less than indicated by the raw acreage numbers because:

1. Conserved Habitat areas are large enough, 1,200 to over 5,000 acres, to contain self-sustaining populations of sand-treader crickets and incorporate key Habitat elements, including active sand dunes and fields.
2. 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.
3. 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.
4. 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.
5. Lands in the MSHCP Reserve System would be managed and monitored to address significant edge effect problems, impacts from OHV trespass, potential stabilization of Habitat from introduction of invasive species, and other stressors to this species,

The issuance of Take Permits, therefore, will not likely jeopardize the continued existence of Coachella Valley sand-treader cricket and the implementation of the MSHCP will provide for the Conservation of the species.

Measures to Avoid, Minimize, and Mitigate Take of Coachella Valley Sand-Treader Cricket

To mitigate the Take of Coachella Valley Sand-treader Cricket, the Permittees will protect and manage, in perpetuity, 12,997 acres of the modeled Habitat for this species. The 5,999 acres of modeled Habitat within Existing Conservation Lands will be monitored and managed to ensure that Conservation Objectives are met. The Plan will thus ensure Conservation, through protection and management, of 6,998 acres of Additional Conservation Lands for this species.

The proposed Conservation Areas in the Plan would protect the Core Habitat areas from Snow Creek to the Thousand Palms Preserve. Core Habitat was designated for this species in the Snow Creek area, the Whitewater Floodplain Preserve, and at the Thousand Palms Preserve, based primarily on the distribution of active blowsand areas. Other Conserved Habitat from a range of environmental conditions within which this cricket is known to occur will be protected in the following Conservation Areas: Willow Hole, Edom Hill, East Indio Hills, and sandy areas around Snow Creek that are within the Santa Rosa and San Jacinto Mountains Conservation Area. Reserve Design criteria used to establish the Conservation Areas require Conservation of Essential Ecological Processes. The MSHCP Reserve System will incorporate and protect additional sand source/sand transport areas for Snow Creek/Windy Point, the Whitewater Floodplain Conservation Area, Willow Hole and Flat Top Mountain, and the Thousand Palms Preserve.

Additionally, the Plan calls for Management and Monitoring Programs to ensure the Conservation of this species, including control of activities that degrade sand-treader cricket Habitat, control of OHV trespass, limits on disturbance during the emergence and breeding seasons, control of invasive species where necessary, and restoration and enhancement of degraded Habitat as necessary according to monitoring results. The Plan also calls for baseline monitoring to better describe the distribution, abundance, and Habitat parameters of the Coachella Valley sand-treader cricket throughout the MSHCP Reserve System.

Overall Impacts to Coachella Valley Giant Sand-Treader Cricket under the Plan

The Planning Team carefully considered all available and occupied Habitat for this species and determined that only those areas within the proposed Conservation Areas would provide long-term protection for self-sustaining populations of this cricket. Core Habitat was not delineated in the Big Dune area, as active blowsand areas have been disturbed, and Essential Ecological Processes are already altered and degraded by the Interstate 10 freeway and roads that fragment the dune. The close association of this species with active sand dunes and active sand fields makes the long-term conservation of sand transport systems essential. It was determined that these sand transport systems were irrevocably altered or compromised in the Big Dune area south of Interstate 10.

The Coachella Valley sand-treader cricket will benefit from the establishment of the MSHCP Reserve System which will include Core Habitat from Snow Creek to the Thousand Palms Preserve and Other Conserved Habitat from Willow Hole to the East Indio Hills. Implementation of the Plan is expected to provide for persistence of the Coachella Valley sand-treader cricket within the Plan Area, where only 22% of the modeled Habitat is currently protected. The Plan will ensure the Conservation an additional 26% of Habitat and potential Habitat areas. The combination of the overall Conservation measures: species-specific measures such as management to minimize impacts such as OHV trespass and disturbance during the emergence

and breeding seasons, fragmentation and edge effects, monitoring to better understand the effects of these impacts on the species, and long-term protection, management, and enhancement of sand-treader cricket Habitat is expected to effectively compensate for potential adverse effects to this species.

9.3.1.5 Species Account: Background

Distribution, Abundance, and Trends. As previously noted, the Coachella Valley giant sand-treader cricket depends on the active dunes and ephemeral sand fields at the west end of the Coachella Valley. They can 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. 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 (C. Barrows 1998). 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 (C. Barrows 1998); 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. Perennial shrubs, including creosote bush, burrobush, honey mesquite, Mormon tea, desert willow, and sandpaper bush, 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 Cameron Barrows (1998). 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.

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; however, the active blowsand areas preferred by the Coachella Valley giant sand-treader cricket will not persist in the absence of an intact sand transport corridor system. The occupied range for this species has been greatly reduced as a result of Development and sand stabilization.

The Coachella Valley giant 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 life history of these insects is not well known. 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 have disappeared.

Other Associated Covered Species. Within the Plan Area, other species of concern whose Habitat overlaps with that of the Coachella Valley giant sand-treader cricket include Coachella Valley milkvetch, Coachella Valley fringe-toed lizard, flat-tailed horned lizard, Palm Springs pocket mouse, Coachella Valley round-tailed ground squirrel, Coachella Valley Jerusalem cricket, and burrowing owl.

9.3.2 Coachella Valley Jerusalem Cricket *Stenopelmatus cahuilaensis*

Status **Federal:** **No official status**
State: **No official status**

9.3.2.1 Species Conservation Goals and Objectives

Conserve and manage populations within the MSHCP Reserve System according to the following criteria:

Goal 1: Protect Core Habitat areas that include occupied Habitat, and associated Essential Ecological Processes, allowing evolutionary processes and natural population fluctuations to occur. Minimize fragmentation, human-caused disturbance, and edge effects to Core Habitat by conserving contiguous Habitat patches and effective Linkages between patches of Core Habitat.

.

Objective 1. Ensure conservation of Core Habitat within the following Conservation Areas:

- Snow Creek/Windy Point Conservation Area

Please refer to Section 4.3 and Table 9-11 for specific acreages to be protected by this Conservation Objective.

Table 9-11: Summary of Habitat within Conservation Areas Coachella Valley Jerusalem Cricket

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	356	N/A	0	(356) [1]	0	Other Cons. Habitat
Stubbe & Cottonwood Cyns	12	1	8	3	11	Other Cons. Habitat
Snow Creek/ Windy Point	1,690 / 283	150 / 28	187 / 0	1,353 / 255	1,540 / 255	Core / Other Cons. Habitat
Whitewater Canyon	2	1	1	0	1	Other Cons. Habitat
Highway 111/ I-10	372	37	0	335	335	Other Cons. Habitat
Whitewater Floodplain	5,646	311	2,532	2,803	5,335	Other Cons. Habitat
Upper Mission Creek/Big Morongo Canyon	717	56	154	507	661	Other Cons. Habitat
Willow Hole	2,632	239	245	2,148	2,393	Other Cons. Habitat
Long Canyon	110	N/A	0	(110) [1]	0	Other Cons. Habitat
Edom Hill	1,256	104	219	933	1,152	Other Cons. Habitat
Thousand Palms	197	15	51	131	182	Other Cons. Habitat
Santa Rosa & San Jacinto Mtns	199	17	32	150	182	Other Cons. Habitat
Total – All Habitat	*13,472*	*959*	*3,429*	*8,618 (466)* [1]	*12,047*	--
Total – Core Habitat	*1,690*	*150*	*187*	*1,353*	*1,540*	--
Total – Other Cons. Habitat	*11,782*	*809*	*3,242*	*7,265 (466)* [1]	*10,507*	--

[1] All Habitat within fluvial sand transport area; no Habitat Conservation Objective.

Goal 2: Protect Other Conserved Habitat to provide sufficient area and variety of Habitat types to accommodate population fluctuations, allow for genetic diversity, and to conserve the range of environmental conditions within which this Jerusalem cricket is known to occur.

Objective 2. Conserve Other Conserved Habitat for this cricket through adherence to other Conservation Objectives (for another species, a natural community, Essential Ecological Process area, Biological Corridor, or Linkage area) in the following Conservation Areas:

- Cabazon Conservation Area
- Highway 111/I-10 Conservation Area
- Whitewater Floodplain Conservation Area
- Upper Mission Creek/Big Morongo Canyon Conservation Area
- Willow Hole Conservation Area
- Edom Hill Conservation Area

Please refer to Section 4.3 and Table 9-11 for specific acreages to be conserved by other Conservation Objectives.

Goal 3: Protect Essential Ecological Processes, including sand source/transport systems, necessary to maintain Core Habitat and Other Conserved Habitat for this species.

Objective 3. Ensure protection of Essential Ecological Process areas through Conservation Area Conservation Objectives for Essential Ecological Processes.

Goal 4: Maintain Biological Corridors and Linkages among all conserved populations to provide for dispersal and shifts in species distribution over time.

Objective 4. Protect Biological Corridors and Linkages through Conservation Area Conservation Objectives for Biological Corridors and Linkages.

Goal 5: Ensure conservation of the Coachella Valley Jerusalem cricket by maintaining the long-term persistence of self-sustaining populations and conserving Habitat quality through biological monitoring and Adaptive Management in the Plan Area.

Objective 5a. Implement biological monitoring and Adaptive Management actions to ensure self-sustaining populations within each Core Habitat area.

Objective 5b. Establish at least two additional self-sustaining populations of Coachella Valley Jerusalem cricket, if Feasible, in previously occupied habitat.

9.3.2.2 Threats, Limiting Factors, and Adaptive Management

The most significant threats to the Coachella Valley Jerusalem cricket are Habitat fragmentation and OHV use within their Habitat. OHVs damage their Habitat by crushing underground burrows and eliminating native vegetation. Conversely, clean up and removal of surface debris may not benefit this species, as they use debris piles. 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. Greg Ballmer, in his report on a trapping survey for the Coachella Valley Jerusalem cricket (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. He 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.

The following actions may be needed to ensure species persistence and long-term viability if biological monitoring indicates that such actions are warranted. This list is not comprehensive but identifies some of the known or likely threats to this species. More detailed information on the Management and Monitoring Programs can be found in Section 8.0. Actions may include:

1. Control and manage activities that degrade Coachella Valley Jerusalem cricket Habitat. In particular, these activities include alteration of the natural vegetation, fragmentation, and OHV impacts.
2. Restrict human access to occupied Habitat during the emergence and breeding season from January through March.
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 Jerusalem cricket Habitat.
4. As part of the Management and Monitoring Programs, better describe the distribution and Habitat characteristics for this species. This will be accomplished in part by collecting field data to evaluate and update models.

9.3.2.3 Species Conservation Analysis

Conservation Area Reserve Design. Habitat for this cricket from Fingal's Finger area east to Edom Hill will be conserved in the proposed Conservation Areas. While not all of these conserved acres provide suitable Habitat for the Jerusalem cricket, they are configured to provide a large, contiguous block of occupied and potential Habitat for this species. A species distribution model was developed with significant help from Greg Ballmer of the Department of Entomology at UC Riverside. The proposed Conservation Areas were delineated to incorporate all known occurrences and the location of populations in Cabazon, Snow Creek/Windy Point, and a recently discovered location on the bluffs on the east side of Whitewater Canyon, within the Upper Mission Creek/Big Morongo Canyon Conservation Area. The Planning Team evaluated Core Habitat areas for this species using the following three criteria: (1) Core Habitat is sufficiently large that it can support a self-sustaining population independent of other Core Habitat areas. In the case of this species, not enough information is available to estimate a viable population, so larger areas were favored; (2) Core Habitat is not fragmented by Development, including roads. Although lightly traveled two-lane roads that have limited potential for expansion (e.g. Snow Creek Road) are not barriers to this species, two-lane roads with heavy traffic (e.g. Indian Ave) could create significant barriers. Where roads are considered to have a potential fragmenting effect on Core Habitat, the Plan calls for wildlife underpasses when the roads become wide enough to cause potential fragmentation;(3) Core Habitat has intact Essential Ecological Processes, including sand source

and sand delivery systems. While this species may not depend on active blowsand areas, long-term maintenance of the sand dunes and sand fields where it occurs was considered essential; and (4) Core Habitat has effective connections to other Biological Corridors and/or Linkages, to allow gene flow among populations.

The Conservation Areas benefit this species by securing the long-term sand source/transport systems for the sand dune and sand fields where it occurs. Collections of this species from vacant lots in Palm Springs (Ballmer 1993) indicate that this species can occur in small parcels of sand Habitat if the natural vegetation exists. However, protection of any individual lots as Habitat for this species would be problematic, as edge effects and unauthorized access would continue to reduce the long-term viability of these sites. The summary of Habitat protection for this species within each of the Conservation Areas evaluated is shown in Table 9-11. The Planning Team evaluated the following Conservation Areas:

Core Habitat Areas:

1. ***Snow Creek/Windy Point.*** According to Greg Ballmer (pers. comm.), the area around Fingal's Finger within this Conservation Area appears to have the highest density for this species within its known distribution. The Plan will protect approximately 1,540 acres of Core Habitat. The two-lane Snow Creek Road was not considered a barrier to movement for this insect because traffic volumes are low; as all of the land surrounding Snow Creek is slated for conservation, no large increase in traffic is expected. Density estimates are not available for this species. Given that this area is the location with the largest number of individuals reported for the Plan Area, and the sand transport system will be conserved, the Planning Team considered this area as significant Core Habitat for the Coachella Valley Jerusalem cricket.

Other Conserved Habitat Areas:

1. ***Highway 111/I-10.*** This area was added to the MSHCP Reserve System primarily as Habitat for the Coachella Valley Jerusalem cricket. There are approximately 372 acres of modeled Habitat here, of which the Plan ensures conservation of approximately 335 acres. Members of the Planning Team met with Greg Ballmer at UC Riverside to request his recommendations for Conservation for this species. The discussion focused on whether this Conservation Area was significant to the Coachella Valley Jerusalem cricket. There are three occurrences within this Conservation Area. The area probably provides both Habitat and an important Linkage to Habitat at Snow Creek to the south and near Whitewater Canyon to the north. An area east of Tipton Road and the freeway rest stop was added as Other Conserved Habitat to this Conservation Area and the MSHCP Reserve System to provide additional protection for this species.
2. ***Whitewater Floodplain.*** The Coachella Valley Jerusalem cricket has not been observed in the vicinity of the Whitewater Floodplain Preserve, and Hawks (1995) suggests that suitable Habitat does not exist in this area. The MSHCP Reserve System includes approximately 5,646 acres of modeled Habitat within this Conservation Area. The Plan will conserve approximately 5,335 acres of this Habitat. Indian Avenue and any other roads within this Conservation Area were not considered a fragmentation factor for this species so that all of the Habitat within this Conservation Area was considered contiguous. More information is needed about the extent to which this cricket may occur in this area.

3. ***Upper Mission Creek/Big Morongo Canyon***. One known occurrence is located in this Conservation Area from a relatively recent observation of scattered patches of aeolian sand on the bluffs east of Whitewater Canyon within a wind farm area. There is potential for additional locations for this species along this bluff area where scattered sand patches occur. There are approximately 717 acres of this Other Conserved Habitat, of which the Plan will conserve approximately 661 acres.

4. ***Willow Hole.*** There are no known occurrences for this cricket within the Willow Hole Conservation Area. Greg Ballmer (pers. comm.) has done some searching for this species in the dunes along the fault west of Palm Drive. He has not found *S. cahuilaensis.* He suggested that this area is comparatively drier than the Snow Creek area, which reduces the viability of the Habitat for *S. cahuilaensis.* More information is needed about the extent to which this cricket may occur in this area. Nevertheless, the Plan will conserve approximately 2,393 acres of Other Conserved Habitat here.

5. ***Edom Hill.*** There are no known occurrences for this cricket within the Edom Hill Conservation Area. Like Willow Hole, this area is comparatively drier than the Snow Creek area, which reduces the viability of the Habitat for *S. cahuilaensis.* It is included in the Habitat model 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. More information is needed about the extent to which this cricket may occur in this area. The Plan will conserve approximately 1,152 acres of Other Conserved Habitat here**.**

6. ***Other Conservation Areas.*** There are five Conservation Areas with very limited Coachella Valley Jerusalem cricket Habitat: Cabazon with approximately 356 acres, Stubbe and Cottonwood Canyons with approximately 12 acres, Long Canyon with approximately 110 acres, Thousand Palms with approximately 197 acres, and the Santa Rosa and San Jacinto Mountains Conservation Area with approximately 199 acres. The Upper Mission Creek/Big Morongo Canyon Conservation Area would preserve approximately 89 acres of Coachella Valley Jerusalem Cricket habitat. The Plan does not set specific Conservation Objectives for the Jerusalem cricket in these areas, but will conserve portions of these Habitat patches incidental to achieving other Conservation Objectives, except in Long Canyon Conservation Area. The sole Conservation Objective for the Long Canyon Conservation Area is to maintain fluvial sand transport.

9.3.2.4 Take Analysis

Significance of the Plan Area to Coachella Valley Jerusalem Cricket

The known range for the Coachella Valley Jerusalem cricket is entirely within the Plan Area. The Coachella Valley Jerusalem cricket has no official state or federal status. It is known from near the Plan boundary in the Cabazon area west of Fingal's Finger to 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 sandy soils on the ridgeline along the eastern side of Whitewater Canyon. The easternmost known occurrence is a record from the Thousand Palms area in the vicinity of Bob Hope Drive and Interstate 10. Recent surveys by University of California Riverside biologists (University of California Riverside 2004) within the potential Habitat area east of Windy Point have not yielded any crickets. They occur in sandy to somewhat gravelly sandy soils and have

been called an obligate sand species (G. Ballmer, pers. comm.). Their abundance at the western edge of the Coachella Valley and their affiliation with cool, moist conditions, has led some to suggest their distribution is limited by temperature and moisture regimes (Tinkham 1968, Hawks 1995).

Effects of Take on the Coachella Valley Jerusalem Cricket

Implementation of the Plan will maintain and increase long-term persistence of the Coachella Valley Jerusalem cricket because unprotected portions of its Habitat, potential Habitat, Essential Ecological Processes for the sand dunes, and Biological Corridors and Linkages will be conserved. The Reserve System would provide protection across an array of Habitat variables, including moisture, soil character, elevation, and vegetation, within the entire range of this subspecies. The extent to which additional populations exist and could be conserved will need to be evaluated on a continuing basis as the Plan progresses. Occurrences not within the proposed Conservation Areas are generally in small, highly fragmented locations, including the Palm Springs Airport (may no longer be extant) and an undeveloped lot in Palm Springs. The Plan also provides for management and monitoring of the species across its entire range.

There are 22,811 acres of modeled Habitat for this species within the Plan Area of which approximately 1,690 acres are identified as Core Habitat. The Plan would ensure Conservation of 1,540 acres (91% of total) of the Core Habitat and 10,507 acres (89%) of the Other Conserved Habitat for this cricket. The conserved Core Habitat area at Snow Creek would be greater than 1,500 acres. Approximately 3,429 acres (15%) of the modeled Habitat are within Existing Conservation Lands and would be managed as part of the Reserve System. The Plan would also require the long-term protection of 8,618 acres of Habitat for this species. There are 466 acres that fall within the fluvial sand transport areas. Overall, the Plan would conserve a total of 12,047 acres (53%) of the modeled Habitat for Coachella Valley Jerusalem cricket in the Plan Area.

Within the Conservation Areas under the worst case scenario, 959 acres (7%) of Take of modeled Habitat could occur. There would be approximately 150 acres (9% of total) of Core Habitat and 809 acres of Other Conserved Habitat (7% of total) subject to Take Authorization (See Table 9-11 and Table 4-114). Take of Jerusalem cricket Habitat within the Conservation Areas must be consistent with the Conservation Objectives for this species to: 1) ensure Conservation of Core Habitat; 2) protect Essential Ecological Processes needed to maintain Jerusalem cricket Habitat; and 3) maintain Biological Corridors and Linkages among conserved populations to provide for population fluctuation and enhance genetic diversity. 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 species.

Outside of the Conservation Areas, there are 9,032 acres (40%) of modeled Habitat authorized for Take. The Habitat outside the Conservation Areas is already highly fragmented, surrounded by existing Development, and has a compromised sand source/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 recharge 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. These fragmented blocks would make the Jerusalem cricket more susceptible to edge effects, including mortality on roads and predation by feral animals. This fragmentation results in impacts to the Habitat that

would reduce the potential for long-term Conservation of Jerusalem cricket populations.

Although the percentage of Jerusalem cricket modeled Habitat that could be lost to development within the next 75 years appears to be substantial, evaluation of the impacts of Take requires an assessment of the quality of this Habitat. The model for this species was developed to describe all potential Habitat to ensure comprehensive reserve design. Surveys by the UC Riverside Center for Conservation Biology in 2003 and 2004 (UC Riverside, Center for Conservation Biology 2005) have reinforced the idea that this species occurs primarily west of Windy Point. The actual reduction in Habitat value is expected to be considerably less than indicated by the raw acreage numbers because:

1. Conserved Habitat areas are large enough to contain self-sustaining populations of Jerusalem crickets and incorporate key Habitat elements, including sandy substrates moisture regimes.
2. 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.
3. 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 Whitewater Canyon and Windy Point.
4. 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.
5. 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,

The issuance of Take Permits, therefore, will not likely jeopardize the continued existence of this species and the implementation of the MSHCP will provide for the Conservation of the Coachella Valley Jerusalem cricket.

<u>Measures to Avoid, Minimize, and Mitigate Take of Coachella Valley Jerusalem Cricket.</u>

To mitigate the Take of Coachella Valley Jerusalem cricket, the Permittees will protect and manage, in perpetuity, 8,618 acres of modeled Habitat for this species. The 3,429 acres of modeled Habitat within Existing Conservation Lands will be monitored and managed to ensure that Conservation Objectives are met. The Plan will thus ensure Conservation, through protection and management, of 12,047 acres of Additional Conservation Lands for this species

The proposed Conservation Areas in the Plan would protect the Core Habitat area from Cabazon to Windy Point within the Snow Creek/Windy Point Conservation Area. Other Conserved Habitat from a range of environmental conditions within which this cricket is known to occur but has not been recently observed will be protected in the following Conservation Areas: Cabazon, Stubbe and Cottonwood Canyons, Whitewater Canyon, Highway 111/I-10, Whitewater

Floodplain, Upper Mission Creek/Big Morongo Canyon, Willow Hole, Edom Hill, Thousand Palms, and sandy substrates in the Snow Creek area of the Santa Rosa and San Jacinto Mountains Conservation Area. Reserve Design criteria used to establish the Conservation Areas require Conservation of Essential Ecological Processes. The MSHCP Reserve System will incorporate and protect additional sand source/sand transport areas for Snow Creek/Windy Point.

Additionally, the Plan calls for Management and Monitoring Programs to ensure the Conservation of this species, including control of activities that degrade Jerusalem cricket Habitat, control of invasive species where necessary, and restoration and enhancement of degraded Habitat as necessary according to monitoring results. The Monitoring Program also calls for data gathering to better describe the distribution, abundance, and Habitat parameters of the Coachella Valley Jerusalem cricket within the Plan Area, including update and refinement of the species model.

Overall Impacts to Coachella Valley Jerusalem Cricket under the Plan

The MSHCP Reserve System includes 13 of the 18 (72%) known occurrences, for the Coachella Valley Jerusalem cricket within Conserved Habitat. The Plan would ensure the conservation of a minimum of 1,540 acres of Core Habitat for this species, including Habitat from the vicinity of Fingal's Finger east to Windy Point, including the Snow Creek dune system. Other Conserved Habitat from a range of environmental conditions within which this cricket is known to occur will be protected in the following Conservation Areas: Cabazon, Highway 111/I-10, Whitewater Floodplain, Upper Mission Creek/Big Morongo Canyon, Willow Hole, Edom Hill C, and Santa Rosa and San Jacinto Mountains.

The Coachella Valley Jerusalem cricket will benefit from the establishment of the MSHCP Reserve System which will conserve essential Core Habitat for this species in the Snow Creek/Windy Point area which appears to be the center of their distribution. Implementation of the Plan is expected to provide for Conservation of this rare cricket within the Plan Area, as currently unprotected portions of its Habitat and potential Habitat areas will be conserved. Currently, only 15% of this Habitat is conserved. The combination of the overall Conservation measures; species-specific measures such as management to minimize impacts in Core Habitat, monitoring and niche modeling to better describe the distribution and ecology of this species, and long-term protection, management, and enhancement of Jerusalem cricket Habitat is expected to effectively compensate for potential adverse effects to this species.

9.3.2.5 Species Account: Background

Distribution, Abundance, and Trends. The Coachella Valley Jerusalem cricket is known from the Snow Creek area from Fingal's Finger east to Windy Point, and from remnants of sand dune Habitat around the Palm Springs Airport. The easternmost known occurrence is a record from the Thousand Palms area in the vicinity of Bob Hope Drive and Interstate 10. In spring 2003 surveys by the University of California found this cricket west from Fingal's Finger to nearly the Plan boundary. They 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 blowsand Habitat but have been found in loose wind blown drift sands, dunes, and sand in vacant lots if native vegetation exists. They have 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).

The Coachella Valley 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.

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. Occurrences where this species has been observed are 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. In a 1995 survey for this Plan, Dave Hawks (1995) reported finding these crickets only in the vicinity of Fingal's Finger. Cameron Barrows (pers. comm.) has also 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.). They have not been found in the vicinity of the Whitewater Floodplain Preserve and Hawks (1995) suggests that suitable Habitat does not exist in this area. 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. Greg Ballmer suggests this record is probably an outlier. 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 ISA 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 Coachella Valley Jerusalem cricket by revisiting previously known locations and new areas. They placed transects along which they surveyed for Jerusalem crickets using several techniques, including shallow pitfall traps (see Table 9-12) and square "ceiling tiles" placed to provide a shelter for these crickets; the latter technique was quite successful according to Tom Prentice (2003), especially when the area under the tile was kept moist. 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.

Table 9-12: Results of Pitfall Trapping for Coachella Valley Jerusalem Cricket

LOCATION	NUMBER OF CRICKETS				
	OCT.	NOV./ DEC.	JAN./ FEB.	MAR./ APRIL	MAY/ JUNE
DUNES W. OF SNOW CREEK/FINGAL – to near Cabazon[2]	0	0	4	7	3
SAN GORGONIO RIVER WASH - from 1 to 3.7 miles W of Snow Creek Road[1]	3 (89/90)	9 (89/90)	12 (90/91)	3 (90)	3 (90)
DUNES W. OF WINDY POINT - N and S of Highway 111 at Tipton Road[1]	1 (89)	0	1 (90)	1 (89)	0
PALM SPRINGS – San Rafael Road, 0.25 mi. W of Indian Avenue [1]	0	0	1 (90)	0	0
THOUSAND PALMS - 2 mi. E of I-10, S of Ramon Road[1]	0	0	0	0	0
WASHINGTON STREET – 1 mi. N of I-10, near Thousand Palms Preserve[1]	0	0	0	0	0
INDIAN WELLS/LA QUINTA AREA - Miles Avenue[1]	0	0	0	0	-

[1] Results are from Ballmer (1993) and are based on a total or 41 survey dates at 17 trapping sites from 4 February 1989 to 16 March 1991, using from one to five traps at each location. Numbers in parentheses are years that crickets were trapped.

[2] Results are from surveys conducted by Tom Prentice at UC Riverside as part of initial monitoring surveys for the Plan (Center for Conservation Biology, UCR 2004, Prentice 2003).

Other Associated Covered Species. Within the Plan Area, other species of concern whose Habitat overlaps with that of the Coachella Valley Jerusalem cricket include Coachella Valley milkvetch, Coachella Valley fringe-toed lizard, flat-tailed horned lizard, Palm Springs pocket mouse, Coachella Valley round-tailed ground squirrel, Coachella Valley giant sand-treader cricket, and burrowing owl.

9.4 Fish

This section contains a species account and conservation approach, including Habitat parameters and significant threats, for the one fish species proposed for coverage under this Plan, the desert pupfish. Conservation measures specific to the desert pupfish are also included here.

9.4.1 Desert Pupfish *Cyprinodon macularius macularius*

Status **Federal:** **Endangered**
State: **Endangered**

9.4.1.1 Species Conservation Goals and Objectives

Conserve and manage populations within the MSHCP Reserve System according to the following criteria:

Goal 1: Protect occupied Habitat, and associated Essential Ecological Processes, allowing evolutionary processes and natural population fluctuations to occur. Minimize fragmentation, human-caused disturbance, and edge effects to Habitat by conserving contiguous Habitat areas and effective Linkages between Habitat areas.

Objective 1a. Ensure conservation of occupied Habitat within the following Conservation Areas:

- Coachella Valley Stormwater Channel and Delta Conservation Area by maintaining a self-sustaining desert pupfish population in the agricultural drains within the Coachella Valley Stormwater Channel and Delta Conservation Area.
- Dos Palmas Conservation Area, including conservation of known locations.

Please refer to Section 4.3 and Table 9-13 for specific acreages to be protected by this Conservation Objective.

Objective 1b. Ensure maintenance of self-sustaining refugia populations in the following Conservation Areas, consistent with the Desert Pupfish Recovery Plan:

- Thousand Palms Conservation Area
- Dos Palmas Conservation Area

Please refer to Section 4.3 and Table 9-13 for specific acreages to be conserved in refugia populations.

Goal 2: Protect Essential Ecological Processes, which may include hydrological process areas, necessary to maintain Core Habitat, refugia, and agricultural drain Habitat for this species.

Goal 3: Ensure conservation of desert pupfish 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.

Objective 3. Implement biological monitoring and Adaptive Management actions. These actions will include Monitoring and Management Programs to be developed by CVWD within one year of Plan approval, to ensure persistence of pupfish populations in the agricultural drains.

Table 9-13: Summary of Habitat within Conservation Areas
Desert Pupfish

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***
Thousand Palms	($15m^2$)	N/A	($15m^2$)	0	($15m^2$)	Refugium
Dos Palmas	($30m^2$)	N/A	($30m^2$)	0	($30m^2$)	Core Habitat
CV Stormwater Channel & Delta	25	N/A	0	25	25	Core Habitat
Total – All Habitat	*25.05*	*N/A*	*($45m^2$)*	*25*	*25.05*	--
Total – Core Habitat	*25.05*	*N/A*	*($30m^2$)*	*25*	*25.05*	--
Total – Other Conserved Habitat (Refugium)	*($15m^2$)*	*N/A*	*($15m^2$)*	*0*	*($15m^2$)*	--

9.4.1.2 Threats, Limiting Factors, and Adaptive Management

Currently, the major threat is the presence of exotic fish species, particularly tilapia (*Tilapia* spp.), sailfin molly (*Poecilia latipinna*), and mosquitofish (*Gambusia affinis*) in Habitats occupied by pupfish. These and other introduced fish species affect pupfish populations through predation, competition, and behavioral interference. Introduced mosquitofish are known to contribute to decline of pupfish in the Salton Sea (USFWS 1993, Jennings 1985). Other non-native species that impact pupfish populations include other tilapia (*Sarotherdon* spp.), carp, sailfin molly, and largemouth bass (BLM 1996, USFWS 1993, Schoenherr 1988, Black 1980). In addition, the non-native bullfrog (*Rana catesbeiana*) is a serious predator of pupfish. Introduced plant species, such as salt cedar (*Tamarisk*), also pose a threat to pupfish populations. Evapotranspiration by salt cedar may result in a lack of water at critical times, especially in smaller Habitats where water supply is limited. Salt Creek is particularly vulnerable to the effects of salt cedar. Other threats within the Plan Area include groundwater pumping, dewatering, water diversion, drain maintenance

activities, OHV use, contaminants, the lining of the Coachella Canal, and fluctuations of the Salton Sea. The pupfish requires shallow, slow-moving clear water with a moderate amount of aquatic vegetation and soft substrate. The viable population size is considered to be a minimum of 500 overwintering adults (Ryman and Utter 1987, Soule 1987, Templeton 1990).

If biological monitoring indicates that such actions are warranted, the following actions may be needed to ensure species persistence and long-term viability. This list is not comprehensive but identifies some of the known or likely threats to this species. More detailed information on the Management and Monitoring Programs can be found in Section 8.0. Actions will include:

1. Complete hydrologic studies for the Salt Creek area to determine if the water sources for Salt Creek are adequately protected or if additional water sources may be needed and are available.
2. Ensure agricultural drain maintenance and water supply. This program will include Monitoring and Management Programs, including Adaptive Management, to be developed by CVWD within one year of Plan approval, to ensure persistence of pupfish populations in the agricultural drains (See Section 8.4.5.2). Monitoring will include surveys for pupfish presence in the agricultural drains along with regular sampling of flow, water depth, and selenium concentrations as called for in CVWD's Final Program Environmental Impact Report for Coachella Valley Water Management Plan (Montgomery, Watson and Harza 2002). Upon determination of effects from selenium on desert pupfish reproduction and survival, CVWD will work with the Wildlife Agencies to develop and implement appropriate measures to minimize impacts to pupfish.
3. Control and manage, in cooperation with implementation of the recovery plan, exotic or invasive species in pupfish Habitat, if monitoring identifies this as a threat. At Dos Palmas, non-native fish populations in man-made fishponds that continue to contaminate the Salt Creek drainage should be controlled. Control efforts should also address non-native fish, bullfrogs, and other invasive species that threaten refugia populations. Where non-native fish populations are established in pupfish habitat in the Dos Palmas Conservation Area, CVCC shall develop and submit for review and approval by the Wildlife Agencies, an interim plan within 6 months of Permit issuance that includes measures to control the non-native fish species in these areas present in the ponds at Dos Palmas and/or the surface waters of the Salt Creek watershed. Within 5 years of Permit issuance, CVCC shall develop and submit for the review and approval of the Wildlife Agencies a management strategy for the permanent control of non-native fish within this Conservation Area. Control efforts shall address all non-native fish species. The presence and potential impacts of Asian tapeworm, a potential pupfish parasite, shall be addressed in the Monitoring and Management Programs. Within 5 years of Permit issuance, CVCC shall develop, submit for review and approval by the Wildlife Agencies, and implement a management strategy with the goal of sustaining healthy populations of desert pupfish in the Plan Area in perpetuity.
    a. Remove tamarisk (salt cedar) where it is affecting the amount of water available to pupfish.
4. To the extent possible without restricting CVWD's ability to meet the water related needs of the people at reasonable cost, maintain water levels, water quality, and proper functioning condition of ponds, springs, and drains, to the extent these activities are under

Plan authority. CVWD will monitor available technologies to reduce selenium concentrations and re-evaluate the feasibility of such measures if promising methods that could work in the Coachella Valley are identified and warranted by the conditions in the drains.

5. Restore and enhance degraded Habitat as necessary according to monitoring results.
6. Conduct experiments on the timing and mechanics of drain cleaning that would minimize impacts to desert pupfish.
7. Estimate distribution and/or population size of desert pupfish.
8. Survey contaminant levels in the water and in pupfish.

9.4.1.3 Species Conservation Analysis

Conservation Area Reserve Design. The Planning Team did not attempt to delineate Core Habitat for desert pupfish but rather attempted to include all known locations and refugia populations within Conservation Areas. The occupied Habitat in Salt Creek is all within the Dos Palmas ACEC, which is entirely within the Dos Palmas Conservation Area. Most of the land within the ACEC is owned by BLM, the CNLM, or TNC. Some private inholdings remain to be acquired, and would be acquired pursuant to the Plan. Protection of the Salton Sea population will be achieved through a Monitoring and Adaptive Management Program regarding drain maintenance to be developed and implemented by CVWD, with Wildlife Agencies' concurrence.

BLM and TNC prepared a Dos Palmas Ecosystem Management Plan in 1994. BLM and the CNLM now manage the ACEC lands. A primary objective of the Dos Palmas plan is to provide for the protection and enhancement of desert pupfish and rail Habitat. The MSHCP will coordinate with BLM and CNLM regarding implementation.

The amount of Habitat proposed for conservation under the Plan for this species within each of the Conservation Areas is shown in Table 9-13. The Planning Team identified the significant pupfish populations in the following Conservation Areas:

1. ***Coachella Valley Stormwater Channel and Delta.*** The Whitewater River and the agricultural drains as they enter the Salton Sea include approximately 25 acres that have been delineated as Habitat for the desert pupfish (Harza 2002). This is considered as Core Habitat.
2. ***Dos Palmas.*** Native Habitat for desert pupfish within the Dos Palmas Conservation Area occurs at the mouth of Salt Creek as it enters the Salton Sea. There is also a refugium population of pupfish in the man-made ponds east of the preserve residence and in the re-contoured wetlands ponds. The Habitat in this Conservation Area is considered to be Core Habitat.
3. ***Thousand Palms.*** There is a refugium population of desert pupfish in the larger pools around the Thousand Palms oasis area, including the largest pool near the so-called Simone Grove palm oasis. The pupfish in this refugium population were captured in Salt Creek and transplanted to the Coachella Valley Preserve beginning in 1987. The population is well established and apparently thriving.

9.4.1.4 Take Analysis

Significance of the Plan Area to Desert Pupfish

Although the Plan Area does not include all of the known range for the desert pupfish, it includes a significant portion, including the known locations in upper and lower Salt Creek, the mouth of Salt Creek, shoreline pools and irrigation drains at the north end of the Salton Sea, and various artificial refugia. According to the Desert Pupfish Recovery Plan (USFWS 1993), naturally occurring populations of desert pupfish are now restricted in California to two streams tributary to, and a few shoreline pools and irrigation drains of, the Salton Sea. These naturally occurring populations are within the Plan Area.

This historical distribution of desert pupfish is much reduced from the lower Colorado River in Arizona and California south to Baja and Sonora. Today, outside the Plan Area, desert pupfish occur in San Felipe Creek, San Sebastian Marsh, and southern parts of the Salton Sea. Native populations are gone from Arizona. The desert pupfish is listed as endangered by both the state and federal government. Although it is remarkable tolerant of extremes of temperature, salinity, and dissolved oxygen the species is threatened with extinction throughout its range primarily because of Habitat loss or modification, pollution, and introduced exotic fishes (USFWS 1986).

Effects of Take on the Desert Pupfish

Within the MSHCP Reserve System, significant known Habitat would be protected under Conservation ownership, including the Salt Creek population. The numerical evaluation of the acres of Habitat conserved for this species is a challenge in that the locations where pupfish occur are small pools and agricultural drains, usually much less than one acre in size. The actual number of acres of Habitat for this species has been estimated based on interpretation of aerial images of the conserved locations and refugia. Many of the known locations for desert pupfish are in agricultural drains that release agricultural runoff into the Salton Sea. Within the Plan Area there are 31 known occurrences mapped for desert pupfish. Only 7 of the desert pupfish locations occur within Existing Conservation Lands, primarily at the Dos Palmas Conservation Area. The remaining 24 mapped pupfish locations occur in agricultural drains which empty into the Salton Sea and are included within the Conservation Areas. The Plan requires that the agricultural drain population be conserved through a Management Program that ensures maintenance of agricultural drains in a manner that maintains viable Habitat. Disturbance of the Habitat and potential Take would be permitted in the Salton Sea agricultural drains only as a result of operations and maintenance activities so long as the pupfish population is maintained.

Implementation of the Plan is expected to maintain and enhance population viability of the desert pupfish by helping to implement the Desert Pupfish Recovery Plan (USFWS 1993). The primary objective of the recovery plan is to eliminate threats to extant populations and successfully establish additional populations in secure Habitat, such that the species can be downlisted from endangered to threatened.

The establishment of Conservation Areas where this species is protected is a significant improvement over the current situation where only 23% of desert pupfish known locations are

conserved. The actual impacts of Take to this species are expected to be low because:

1. Conserved Habitat areas are large enough to contain self-sustaining populations of desert pupfish and incorporate key Habitat elements, including shoreline pools, vegetation cover, and water quality.
2. Take within the Conservation Areas would not eliminate or significantly impact any desert pupfish populations. Conservation Objectives require any approved disturbance within Conservation Areas to ensure protection of desert pupfish known locations, conservation of newly found locations, and maintenance of refugium populations of the desert pupfish in accordance with the Desert Pupfish Recovery Plan.
3. 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 from the agricultural drains and shoreline pools around the Salton Sea to Salt Creek are adequately connected to each other to allow genetic exchange.
4. Habitat for desert pupfish would be managed and monitored to address significant stressors for this species, including changes in water quality and potential impacts from introduction of exotic species. Water quality, flow, depth, and selenium concentration will be monitored and managed through Adaptive Management.

The issuance of Take Permits, therefore, will not likely jeopardize the continued existence of desert pupfish and the implementation of the MSHCP will provide for the Conservation of this species.

Measures to Avoid, Minimize, and Mitigate Take of Desert Pupfish

To mitigate the Take of desert pupfish, the Permittees will protect and manage, in perpetuity, 25.05 acres of the modeled Habitat for this species. There is a very small acreage of modeled Habitat, occurring at two refugia populations, within Existing Conservation Lands. In addition, there are approximately 25 acres of desert pupfish Habitat in the agricultural drains (Harza 2002). These locations will continue to be monitored and managed to ensure that Conservation Objectives are met. The Plan will thus ensure Conservation, through protection, restoration, and management, of at least 25 acres of desert pupfish Habitat. In addition, agricultural drains will be managed to enhance the Habitat potential for desert pupfish.

Additionally, the Plan calls for Management and Monitoring Programs to ensure the Conservation of desert pupfish. The Management Program will include control of activities that degrade their Habitat, control of invasive species where necessary, and restoration and enhancement of degraded Habitat as necessary according to monitoring results. The Plan also provides that the Monitoring Program would address the distribution, abundance, and Habitat parameters of the desert pupfish throughout the MSHCP Reserve System.

1. Complete hydrologic studies for the Salt Creek area to determine if the water sources for Salt Creek are adequately protected or if additional water sources may be needed and are available.
2. Ensure agricultural drain maintenance and water supply. CVWD will develop a study to include surveys for pupfish presence in the agricultural drains along with regular sampling of flow, water depth, and selenium concentrations as called for in CVWD's Water Management Plan Programmatic Environmental Impact Report (See Section 4.3.20 and Section 8.4.5.2).
3. Control and manage, in cooperation with implementation of the recovery plan, exotic or invasive species in pupfish Habitat, including tamarisk and other species, if monitoring identifies them as a threat.
4. Maintain water levels, water quality, and proper functioning condition of ponds, springs, and drains, to the extent these activities are under Plan authority.
5. Restore and enhance degraded Habitat as necessary according to monitoring results.
6. Conduct experiments on the timing and mechanics of drain cleaning that would minimize impacts to desert pupfish.
7. Estimate and describe the distribution, abundance, and Habitat parameters of desert pupfish within the Plan Area and survey contaminant levels in the water and in pupfish. Methods for surveying and handling the desert pupfish are described in Section 8.4.5.3.3.

To mitigate impacts from drain maintenance and other operations and maintenance activities, CVWD will establish at least 25 acres of managed replacement Habitat for desert pupfish, on a 1:1 ratio at a site or sites to be determined with input from the Wildlife Agencies. Ongoing maintenance and adjustments will be required, including vegetation control and dike and bank maintenance, to achieve desired Habitat characteristics. Water quality, including selenium concentrations will be maintained at acceptable levels (See Section 4.3.20).

Overall Impacts to Desert Pupfish

Within the Conservation Areas, significant known Habitat would be protected under Conservation ownership, including the Salt Creek population. Habitat for this species within the Plan Area includes most of the known locations, which are in agricultural drains that release agricultural runoff into the Salton Sea. The Plan requires that the agricultural drain population be conserved through a Management Program that ensures maintenance of agricultural drains in a manner that maintains viable Habitat. Disturbance of the Habitat and potential Take would be permitted in the Salton Sea agricultural drains as a result of operations and maintenance activities so long as the pupfish population is maintained.

Implementation of the Plan is expected to maintain and enhance population viability of the desert pupfish by helping to implement the Desert Pupfish Recovery Plan (USFWS 1993). The primary objective of the recovery plan is to eliminate threats to extant populations and successfully establish additional populations in secure Habitat, such that the species can be downlisted from endangered to threatened.

9.4.1.5 Species Account: Background

Distribution, Abundance, and Trends. Historically, desert pupfish occurred in the lower Colorado River in Arizona and California, from about Needles downstream to the Gulf of Mexico and onto its delta in Sonora and Baja. In California, pupfish inhabited springs, seeps, and slow-moving streams in the Salton Sink basin, and backwaters and sloughs along the Colorado River. Desert pupfish also occurred in the Gila River Basin in Arizona and Sonora, including the Gila, Santa Cruz, San Pedro, and Salt Rivers; the Rio Sonoyta of Arizona and Sonora; Puerto Penasco, Sonora; and Laguna Salada basin of Baja California. The Quitobaquito pupfish, found only in Quitobaquito Spring, Arizona, was recognized as a subspecies of desert pupfish; however, a recent phylogenetic study supports the recognition of this pupfish, as well as pupfish from the Rio Sonoyta, as the species *Cyprinodon eremus (*Miller and Fuiman 1987).

In the Salton Sink, desert pupfish populations were remnants of those that inhabited ancient Lake Cahuilla. About 400-500 years ago, the Colorado River was diverted away from the lake and into the Gulf of California, leaving the pupfish isolated in certain springs. After the Salton Sink was flooded in the early 1900s by diversion of the Colorado River, desert pupfish colonized the Salton Sea. The Salton Sea, its tributary streams, irrigation drains, and shoreline pools, supported large pupfish populations until sharp declines began in the mid- to late-1960s. However, a 1991 CDFG survey (Nicol et al. 1991) found pupfish in a majority of irrigation drains, some shoreline pools and several tributaries of the Salton Sea. Currently, California desert pupfish populations are restricted to portions of San Felipe Creek and its associated wetland, San Sebastian Marsh (Imperial County), portions of Salt Creek (Riverside County), some shoreline pools and irrigation drains along the Salton Sea (Imperial and Riverside Counties), and various artificial refugia (Riverside and San Diego Counties).

Naturally occurring populations of desert pupfish have been extirpated from Arizona. However, pupfish have been transplanted to a number of locations within the state. A large population of another desert pupfish subspecies is endemic to Quitobaquito Springs, Organ Pipe National Monument. In Mexico, desert pupfish are found at various localities along Rio Sonoyta, on the Colorado River Delta, and in the Laguna Salada Basin. In Sonoran portion of the Rio Sonoyta, pupfish inhabit several spring-fed marshes. In Baja California, pupfish occur on the Colorado Delta, in Laguna Salada, in a wetland associated with a geothermal power plant, and in a ditch downstream of this marshland.

In the Plan Area, pupfish are found in upper and lower Salt Creek, the mouth of Salt Creek (Sutton 2000), several irrigation drains emptying into the Salton Sea, some shoreline pools, and several refugia: Dos Palmas; the Thousand Palms Preserve; Oasis Springs Ecological Reserve; The Living Desert; and Salton Sea State Recreation Area. The Plan Area contains a substantial portion of remaining pupfish Habitat, including one of only two natural tributary streams, most of the refugia, and some of the shoreline pools and irrigation drains.

A small, but stable, population exists in Salt Creek. The majority of fish inhabit an upstream portion of the creek, but a few pupfish were found at the mouth as recently as 1995 and again in 1999 (Sutton 1999). During 1997 surveys conducted by CDFG, 100 pupfish and 700 mosquitofish were captured in the upstream section of Salt Creek. In recent surveys conducted by CDFG, pupfish were found in approximately 30% of the irrigation drains emptying into the Salton Sea, significantly fewer than in 1991, probably as a result of a substantial increase in tilapia

numbers during the past few years. Pupfish seem to be doing better along the west end of the sea, where Habitat is more suitable. Along the east end of the sea, the substrate in many of the drains consists almost entirely of tilapia nests, and very little aquatic vegetation remains in these drains.

The refugium population of pupfish at Dos Palmas was established in the early 1990s (C. Barrows, pers. comm., 6/30/03) from Thousand Palms fish, which originally came from Salt Creek. All fish transfers were conducted by CDFG (Kim Nicol, pers. comm.). Currently there are three separate locations for pupfish refugia at Dos Palmas -- one is a cement holding tank near the storage shed, one is a pond near the residential/operations facility, and one is one of the enhanced fish ponds.

Adequate water quantity and quality must be maintained in desert streams, springs, irrigation drains, and shoreline pools. Surface and groundwater from upper Salt Creek Canyon and other canyons in the Orocopia and Chocolate Mountains may contribute to the groundwater system. Seepage from the Coachella Canal also contributes to the groundwater in the Salt Creek drainage system. Groundwater pumping, channel erosion, water diversion, contaminants, and other threats must be reduced.

Associated Covered Species. Other species of concern whose Core Habitat overlaps that of the desert pupfish within the Plan Area include California black rail, Yuma clapper rail, and the riparian birds.

9.5 Amphibians

This section contains a species account, including Habitat parameters and significant threats, for the only amphibian proposed for coverage under this Plan, the federal endangered arroyo toad. Conservation measures specific to the arroyo toad are also described below.

9.5.1 Arroyo Toad *Bufo microscaphus californicus*

Status **Federal:** **Endangered**
State: **Species of Special Concern**

9.5.1.1 Species Conservation Goals and Objectives

Conserve and manage populations within the MSHCP Reserve System according to the following criteria:

Goal 1: Ensure species persistence in the Plan Area by conserving significant populations, consistent with the Arroyo Toad Recovery Plan, and associated Essential Ecological Processes, allowing evolutionary processes and natural population fluctuations to occur. Minimize fragmentation, human-caused disturbance, and edge effects by conserving contiguous Habitat patches and effective Linkages between Habitat.

Objective 1. Conserve significant populations and modeled Habitat including at least 2,004 acres within the following Conservation Area:
- ❖ Whitewater Canyon Conservation Area

Please refer to Section 4.3 and Table 9-14 for specific acreages to be conserved by other Conservation Objectives.

Goal 2: Protect other potential Habitat to provide sufficient area and variety of Habitat types to accommodate population fluctuations, allow for genetic diversity, and to conserve the range of environmental conditions, within which this toad is known to occur.

Objective 2. Conserve potential Habitat for this toad through adherence to other Conservation Objectives (for another species, a natural community, Essential Ecological Process area, Biological Corridor, or Linkage area) in the following Conservation Areas:
- ❖ Snow Creek/Windy Point Conservation Area
- ❖ Upper Mission Creek/Big Morongo Canyon Conservation Area

Please refer to Section 4.3 and Table 9-14 for specific acreages to be conserved by other Conservation Objectives.

Table 9-14: Summary of Habitat within Conservation Areas Arroyo Toad

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 Conserved in MSHCP Reserve System***	***Designation***
Whitewater Canyon	2,082	78	1,298	706	2,004	Core Habitat
Upper Mission Creek/ Big Morongo Canyon	3	0	3	0	3	Other Cons. Habitat
Total – All Habitat	*2,085*	*78*	*1,301*	*706*	*2,007*	--
Total – Core Habitat	*2,082*	*78*	*1,298*	*706*	*2,004*	--
Total – Other Cons. Habitat	*3*	*0*	*3*	*0*	*3*	--

Goal 3: Protect Essential Ecological Processes, which may include hydrological regimes, necessary to maintain significant populations and Other Conserved Habitat.

Objective 3. Ensure protection of Essential Ecological Process areas through Conservation Area Conservation Objectives for Essential Ecological Processes.

Goal 4: Ensure conservation of arroyo toad 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.

Objective 4. Implement biological monitoring and Adaptive Management actions to ensure self-sustaining populations within each Core Habitat area.

9.5.1.2 Threats, Limiting Factors, and Adaptive Management

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 the 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 many threats to this species throughout its range, all of which could potentially be a problem to the Whitewater Canyon population. Human activities that affect water quality influence the timing and amount of non-flood flows or frequency and intensity of floods, affect riparian plant communities, or alter sedimentation dynamics can reduce or eliminate the suitability of stream channels for arroyo toad breeding Habitat (USFWS 1998). Mining, especially when it involves dredging, alternation of the hydrological regime, and surface disturbance, is also a threat (Jennings and Hayes 1994); sand and gravel mining is a significant threat (USFWS 1998). The development and alteration of streamside gravel bars and terraces is probably the main factor in the loss of Habitat (Jennings and Hayes 1994). Degradation or loss of surrounding uplands reduces and eliminates foraging and overwintering Habitat. This species is especially vulnerable to predation by exotic fishes and bullfrogs. Exotic plants can also adversely impact the Habitat. The streamside bank and terrace Habitat is popular for human uses such as camping, wading, and OHV use. Arroyo toads crossing or foraging on roads in the Habitat area are also subject to mortality. Cattle grazing is an identified threat to all known remaining populations (Jennings and Hayes 1994, Sweet 1993). Grazing livestock can trample egg clutches, juvenile, and adult toads; alteration of sand bars and stream terraces, siltation, and other impacts to water quality are other problems caused by grazing (USFWS 1998).

The following actions may be needed to ensure species persistence and long-term viability if biological monitoring indicates that such actions are warranted. This list is not comprehensive but identifies some of the known or likely threats to this species. More detailed information on the Management and Monitoring Programs can be found in Section 8.0. Actions may include:

1. Control and manage activities that adversely impact water quality and the hydrological regime in arroyo toad Habitat.
2. Control and manage activities on public conservation lands, such as removal of boulders, OHV use, picnicking or camping in sensitive areas, and livestock grazing that are impacting arroyo toad Habitat. Also control and manage alteration or disturbance of streamside gravel bars and terraces to protect arroyo toad Habitat.

3. Schedule activities, except emergency response activities, which may cause disturbance to arroyo toad Habitat, to avoid the March 1 to June 30 breeding season.
4. Conduct an educational program about the arroyo toad and its Conservation needs for residents of Whitewater Canyon and the operators of the fish hatchery/trout fishing facility.
5. Coordinate with the private owners of the fish hatchery/trout fishing facility to evaluate stream flow and water quality issues associated with arroyo toad Habitat.
6. Restore degraded Habitat as deemed necessary from the results of the Monitoring Program.
7. 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 arroyo toad and its Habitat

9.5.1.3 Species Conservation Analysis

Conservation Area Reserve Design. The Whitewater Canyon is the only known Habitat of the arroyo toad in the Plan Area where its presence has been verified. This population was last observed in 1992. The Whitewater Canyon is open to the public and contains a small residential area, a public trout fishing operation, and Whitewater Canyon Road. These Existing Uses will not be eliminated by the Plan (except to the extent that the trout farm might be acquired from a willing seller) and have the potential to impact the arroyo toad's Habitat in the Whitewater Canyon. The Plan includes acquisition of private land from willing sellers in the Whitewater Canyon and development of management prescriptions for land in public ownership in the canyon to minimize activities deleterious to the arroyo toad and its Habitat.

For each area, see Table 9-14 for a breakdown of Existing Conservation Lands and remaining lands to be conserved.

9.5.1.4 Take Analysis

Significance of the Plan Area to Arroyo Toad

The arroyo toad is a federal Endangered Species and a state Species of Special Concern. It is also a California and Baja endemic. Historically, it occurred from the upper Salinas River in San Luis Obispo County south along the coast to the Rio Santo Domingo system in Baja California, Mexico. Within the Plan Area, there are records for this species in the Whitewater River in Whitewater Canyon, and potential Habitat in Mission Creek and Stubbe Canyon. The Whitewater River population is one of the 15 self-sustaining populations identified in the Arroyo Toad Recovery Plan (USFWS 1999) as necessary for consideration of delisting the species. There are records from six desert side drainages. The species has disappeared from 76% of its historic range as of 1994 (Jennings and Hayes 1994). The northern, central, and eastern portions of the range have lost all of their populations. It is currently known from only a few scattered localities within its historic range. About 90% of the known extant populations occur in areas owned or managed by the USFS (1993a).

Effects of Take on the Arroyo Toad

Implementation of the Plan will conserve and maintain Habitat for arroyo toad in the Whitewater River and benefit this species as unprotected portions of its Habitat, potential Habitat, Essential Ecological Processes including hydrological regimes, and Biological Corridors and Linkages will be conserved. The extent to which the Whitewater River population exists and additional populations exist and could be conserved will need to be evaluated on a continuing basis as the Plan progresses. The Plan also provides for management and monitoring of arroyo toad across its entire range.

There are 2,095 acres of modeled Habitat for this species within the Plan Area of which approximately 2,085 acres are within the Conservation Areas. Of the modeled Habitat within the Conservation Areas, 2,082 acres are identified as Core Habitat. The Plan would ensure Conservation of 2004 acres (96% of total) of the Core Habitat and 3 acres (100%) of the Other Conserved Habitat for this toad. The conserved Core Habitat area in Whitewater Canyon is more than 2,000 acres. Approximately 1,301 acres (62%) of the modeled Habitat are within Existing Conservation Lands and would be managed as part of the Reserve System. The Plan would also require the long-term protection of an additional 706 acres of Habitat for this species. Overall, the Plan would conserve a total of 2,007 acres (96%) of the modeled Habitat for arroyo toad in the Plan Area.

Within the Conservation Areas under the worst case scenario, 78 acres of Take of modeled Habitat (4%) could occur. (See Table 9-14 and Table 4-114). Take of arroyo toad Habitat within the Conservation Areas must be consistent with the Conservation Objectives for this species to: 1) ensure Conservation of Core Habitat and existing populations as well as potential Habitat; 2) protect Essential Ecological Processes needed to maintain toad Habitat, including hydrological regimes; and 3) maintain Biological Corridors and Linkages among conserved populations to provide for population fluctuation and enhance genetic diversity. 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 arroyo toad.

Outside of the Conservation Areas, there are 10 acres of modeled Habitat authorized for Take. The Habitat outside the Conservation Areas is modeled Habitat only that is on the periphery of suitable Habitat for this species.

Although the status of arroyo toad in the Plan Area is uncertain as the species has not been confirmed since 1992, the establishment of Conservation Areas where this species is protected is a significant improvement over the current situation where only 64% of modeled Habitat is conserved. The actual impacts of Take to this species are expected to be very limited because:

1. Conserved Habitat areas are large enough to contain self-sustaining populations of arroyo toad and incorporate key Habitat elements, including breeding pools and foraging areas.
2. Take within the Conservation Areas would not eliminate or significantly impact any known populations. Conservation Objectives require any approved disturbance within Conservation Areas to ensure protection of Core Habitat.
3. As a result of implementing the Conservation Objectives to protect Habitat for this arroyo toad, the Plan would ensure Conservation of existing Habitat, limiting disturbance in Core

Habitat areas according to results of the Monitoring Program. The Plan would also ensure Conservation of potential Habitat areas for this species.

4. Potential Development would not adversely impact the Essential Ecological Processes needed to maintain currently viable Habitat. Conservation Areas were carefully designed to incorporate the watershed and hydrological regimes.

5. 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 the arroyo toad,

The issuance of Take Permits, therefore, will not likely jeopardize the continued existence of the arroyo toad and the implementation of the MSHCP will provide for the Conservation of the species.

Measures to Avoid, Minimize, and Mitigate Take of Arroyo Toad

To mitigate the Take of arroyo toad, the Permittees will protect and manage, in perpetuity, 706 acres of the modeled Habitat for this species. The 1,301 acres of modeled Habitat within Existing Conservation Lands will be monitored and managed to ensure that Conservation Objectives are met. The Plan will thus ensure Conservation, through protection and management, of 2,007 acres of Habitat for arroyo toad.

The proposed Conservation Areas in the Plan would protect the Core Habitat areas in Whitewater Canyon as well as locations where the species could occur in Mission Creek and Snow Creek.

Additionally, the Plan calls for Management and Monitoring Programs to ensure the Conservation of this species, including control of activities that adversely impact water quality and the hydrological regime, disturbance from recreational activity in sensitive areas, control of invasive species where necessary, and restoration and enhancement of degraded Habitat as necessary according to monitoring results. The Plan also calls for an educational program for residents and visitors in Whitewater Canyon to inform them about the arroyo toad and its Conservation needs.

Overall Impacts to Arroyo Toad

Under the Plan, 96 % of the modeled Habitat of arroyo toad within the Plan Area will be conserved. In addition, potential Habitat in Snow Creek and Mission Creek will be conserved. Potential Habitat in the Palm Canyon area is located on the Agua Caliente Indian Reservation, which is not included in this Plan.

The Arroyo Toad Recovery Plan (USFWS 1999) identifies conserving 15 self-sustaining populations in addition to 19 primary populations in seven areas to secure genetic and phenotypic variation. The Whitewater River population is one of the 15 self-sustaining populations necessary for consideration of delisting the species. Implementation of the Plan is thus expected to maintain and enhance population viability of the arroyo toad by conserving and managing Habitat in the Whitewater Canyon and protecting a Snow Creek and/or a Mission Creek population should one be located in these areas.

9.5.1.5 Species Account: Background

Distribution, Abundance, and Trends. The arroyo toad has highly specialized Habitat requirements. Arroyo toad breeding sites are known to be streams of second to sixth order with overflow pools, depending somewhat on latitude (Sweet 1992, Griffin 1999). The streams and pools should be free of predatory fish. The adults breed in pools that have little woody vegetation along the margins and are shallow, sand or gravel based. The current velocity is generally low. The breeding pools occur near juvenile and adult Habitat. This Habitat is a shoreline or central bar and stable sandy terraces. The juveniles prefer areas that provide shelter either through drying algal mats or small damp refuges or depressions. The sandy terraces have an overstory of scattered shrubs and trees such as mulefat, California sycamore, Fremont cottonwood, or coast live oak. There is an absence of vegetation at ground level (USFS 1993a, Jennings and Hayes 1994). Arroyo toads have been found up to 1.08 km from water (Griffin 1999).

There is a 1992 record for this species from Whitewater Canyon. It is unknown if it is still extant, although the Habitat is intact. Surveys in Whitewater Canyon in the vicinity of the trout farm by biologists from USGS (USGS 2003) did not locate any arroyo toads. However, it is considered likely that arroyo toads still occur in Whitewater Canyon (A. Backlin, pers. comm.). Mark Jennings (pers. comm.) suggests that the only other likely sites in the Plan Area would be Palm Canyon and Mission Creek. The Habitat in Mission Creek will be conserved as a result of Conservation Objectives for other Covered Species. USFWS has suggested that Snow Creek could also provide appropriate Habitat. This Habitat will be conserved as a result of Conservation Objectives for other species. The Whitewater population represents one of six desert localities of this more typically coastal area species. The current status and viability of the Habitat locations for this species within the Plan Area are unknown at this time. Surveys are needed to determine if the arroyo toad still occurs in Whitewater Canyon and if the species occurs at Snow Creek or Mission Creek. Potential Habitat in Palm Canyon is on land owned by the Agua Caliente Band of Cahuilla Indians, which is not part of this Plan.

Associated Covered Species. Within the Plan Area, other species of concern whose Habitat overlaps with that of the arroyo toad include least Bell's vireo, yellow warbler, yellow-breasted chat, southwestern willow flycatcher, and summer tanager.

9.6 Reptiles

This section contains species accounts, including Species Conservation Goals and Objectives, significant threats, and life history information, for each of the three species of reptile proposed for coverage under this Plan. These species include the desert tortoise, listed as threatened by the federal and state governments, the Coachella Valley fringe-toed lizard, listed as a state Endangered and a federal Threatened Species, and the flat-tailed horned lizard, a species proposed for federal listing. General measures common to all of these reptiles are listed below, and measures specific to a given species are considered in the conservation strategy for each of the species.

1. As part of the Monitoring Program, evaluate the impact of "artificial" perches for predators,

including power poles and landscape trees, along the edges or adjacent to Conservation Areas. Some evidence from the Thousand Palms Preserve suggests that predation rates may be increased due to these artificial perches.

9.6.1 Desert Tortoise *Xerobates agassizii* (or *Gopherus agassizii*)

Status **Federal:** **Threatened**
State: **Threatened**

9.6.1.1 Species Conservation Goals and Objectives

Conserve and manage populations within the MSHCP Reserve System according to the following criteria:

Goal 1: Ensure species persistence in the Plan Area by conserving Core Habitat, consistent with the Desert Tortoise Recovery Plan, and associated Essential Ecological Processes, allowing evolutionary processes and natural population fluctuations to occur. Minimize fragmentation, human-caused disturbance, and edge effects to Core Habitat by conserving contiguous Habitat patches and effective Linkages between patches of Core Habitat.

Objective 1. Ensure Conservation of Core Habitat within the following Conservation Areas:

- Stubbe and Cottonwood Canyons Conservation Area
- Whitewater Canyon Conservation Area
- Upper Mission Creek/Big Morongo Canyon Conservation Area
- Indio Hills/Joshua Tree National Park Linkage Conservation Area
- Joshua Tree National Park Conservation Area
- Desert Tortoise and Linkage Conservation Area
- Mecca Hills/Orocopia Mountains Conservation Area

Please refer to Section 4.3 and Table 9-15 for specific acreages to be protected by this Conservation Objective.

Goal 2: Protect Other Conserved Habitat to provide sufficient area and variety of Habitat types to accommodate population fluctuations, allow for genetic diversity, and to conserve the range of environmental conditions within which the desert tortoise is known to occur.

Objective 2. Through adherence to other Conservation Objectives (for another species, a natural community, Essential Ecological Process area, Biological Corridor, or Linkage area) conserve 126,431 acres of Other Conserved Habitat for this tortoise in the following Conservation Areas:

- Snow Creek/Windy Point Conservation Area
- Hwy 111/I-10 Conservation Area
- Upper Mission Creek/Big Morongo Canyon Conservation Area
- Whitewater Floodplain Conservation Area

- Thousand Palms Conservation Area
- East Indio Hills Conservation Area
- Dos Palmas Conservation Area
- Santa Rosa and San Jacinto Mountains Conservation Area

Please refer to Section 4.3 and Table 9-15 for specific acreages to be protected by this Conservation Objective.

Table 9-15: 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	28,447	1,320	17,106	10,021	27,127	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
Mecca Hills/Orocopia Mountains	112,575	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

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*
Total – All Habitat	*513,304*	*17,120*	*345,899*	*146,519 (3,766)* [1]	*492,418*	--
Total – Core Habitat	*377,898*	*11,911*	*260,639*	*105,348*	*365,987*	--
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.

Goal 3: Maintain Biological Corridors and Linkages among all conserved populations.

Objective 3. Note: Additional details on these Biological Corridors and Linkages, and requirements for the installation of wildlife underpasses, are found in the Conservation Area descriptions in Section 4. Key Habitat Linkages and Biological Corridors include the following:

- Stubbe Canyon Wash Biological Corridor
- Whitewater River Biological Corridor
- Highway 62 Biological Corridor
- Interstate 10 Biological Corridors, including:
  a. Corridor 1 centered on Thermal Canyon
  b. Corridor 2 centered on the E. Cactus City Wash and Hazy Gulch culverts
  c. Corridor 3 centered on the Happy Gulch culvert
  d. Corridor 4 centered on the Desperation Arroyo culvert
  e. Corridor 5 centered on the Desperation Arroyo, West Buried Mountain Wash, Buried Mountain Wash, Resurrection Wash, West Saddle Gulch, Saddle Gulch, West Cotton Gulch, Cotton Gulch, East Cotton Gulch, and Paul Gulch culverts
- Possible future wildlife undercrossings along Dillon Road within the Indio Hills/Joshua Tree National Park Linkage Conservation Area if this road is widened to four or more lanes
- Maintain the ability for desert tortoise to cross Indian Avenue and Pierson Boulevard in the Upper Mission Creek/Big Morongo Canyon Conservation Area if these roads are widened

Goal 4: Ensure conservation of the desert tortoise 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.

Objective 4. Implement monitoring and Adaptive Management actions to ensure self-sustaining populations within each Core Habitat area.

9.6.1.2 Threats, Limiting Factors, and Adaptive Management

Coyotes (*Canis latrans*), bobcats (*Lynx rufus*), ravens (*Corvus corax*), golden eagles (*Aquila chrysaetos*), and Gila monsters (*Heloderma suspectum*) (which do not occur in the Plan Area) are known predators of either eggs, juveniles, or adults (J. Barrow 1979, Luckenbach 1982, Barrett and Humphrey 1986), and ring-tailed cats (*Bassariscus*), badgers (*Taxidea*), skunks (*Mephitis, Spilogale*), kit foxes (*Vulpes*), domestic dogs (*Canis familiaris*), large hawks (*Buteo*), owls (*Athene*), roadrunners (*Geococcyx*), bullsnakes (*Pituophis*), and coachwhip snakes (*Masticophis*) are suspected predators (Ernst, Lovich, and Barbour 1972, Luckenbach 1982). The presence of a high density of local ravens (*Corvus corax*) has a detrimental affect on populations of *X. agassizii* through predation on young desert tortoises (Boarman 1999).

Desert tortoise Habitat can be lost to urbanization and other human-related activities, including OHV use, overgrazing of domestic livestock, and construction of roads and utility corridors. Secondary contributions to degradation include the proliferation of exotic plant species and a higher frequency of anthropogenic fire. Effects of these impacts include alteration or destruction of macro- and micro-vegetation elements, establishment of disclimax plant communities, destruction of soil stabilizers, soil compaction, erosion, and pollution (Lovich 1992). OHV use may contribute to declines of desert tortoise populations directly by crushing individuals (above or below ground), or by collapsing burrows. Vehicular activity may also destroy vegetation used by desert tortoises for food or cover, making Habitat unsuitable for sustaining their populations.

Certain key desert tortoise food plants may comprise over 40% of the cattle diet, and, since cattle are larger and more mobile than tortoises, these plants may be severely depleted with heavy grazing (Berry 1978, Coombs 1979). The Whitewater Grazing Allotment managed by the BLM overlaps significant desert tortoise Habitat in the Whitewater and Painted Hills. Cattle have been observed to step on burrows and cause their collapse in the area, including burrows occupied by desert tortoises or used as nest sites. Recent research by Hal Avery (1998) of the USGS demonstrates conclusively, for the first time, that cattle can out-compete desert tortoises for key forage species. Cattle grazing in the Whitewater Hills desert tortoise Habitat has also lead to visible increases in soil destruction and increased erosion in some areas.

Disease has contributed to the decline of some desert tortoise populations. Wild and captive desert tortoises are afflicted with Upper Respiratory Tract Disease (URTD) in many areas within the geographic range. Jacobson et al. (1991, 1995) isolated a species of *Mycoplasma*, a small bacterium lacking a cell wall, as a potential pathogen causing URTD. Introductions of infected captive tortoises into the desert may have caused the spread of this potentially lethal disease in wild desert tortoise populations. No visible evidence of URTD or shell disease has been observed in desert tortoises in the Whitewater Hills or the Painted Hills (J. Lovich, pers. comm.). A new disease, called shell disease, has recently been reported in tortoises.

Jeff Lovich believes that fire is the biggest threat to the continued survival of desert tortoises in the western Coachella Valley. He reports that the proliferation of exotic annual grasses and forbs, especially Saharan mustard (*Brassica tournefortii*) in the region has dramatically increased the frequency and extent of wildland fires in an ecosystem poorly adapted to perturbations of such periodicity or magnitude (Brooks and Esque 2002). Other than direct

mortality, Habitat conversion of desert scrub and semi-desert chaparral to exotic grasslands will diminish the prospects for long-term survival of viable desert tortoise populations.

The following actions may be needed to ensure species persistence and long-term viability if biological monitoring indicates that such actions are warranted. This list is not comprehensive but identifies some of the known or likely threats to this species. More detailed information on the Management and Monitoring Programs can be found in Section 8.0. Actions may include:

1. Control raven predation on desert tortoises in the area if monitoring determines it to be a problem to the growth and maintenance of the tortoise population.
2. Avoid impacts due to overgrazing by domestic animals, soil compaction, and erosion that affect desert tortoise forage.
3. Control activities that may result in crushing of or disturbance to tortoise burrows.
4. Control and manage poaching, illegal collection, and crushing of desert tortoise to minimize impacts.
5. Identify actions to reduce impacts from, and control where feasible, invasive species if it is determined from monitoring results that there are impacts to desert tortoise Habitat or populations. Invasive plant species of concern include Saharan mustard, Mediterranean grass, and other exotic annual grasses and forbs.
6. Develop and implement 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.
7. Determine the need for tortoise fencing along the Interstate 10 corridor in Critical Habitat and install tortoise fencing where deemed necessary in conjunction with new projects.
8. Implement required avoidance, mitigation, and minimization measures.

9.6.1.3 Species Conservation Analysis

Conservation Area Reserve Design. Desert tortoise Habitat is broadly distributed over the Plan Area, but generally the density of desert tortoises is low. The high-density population in the Whitewater Hills occurs in a wind-farm area. Access is limited to maintenance personnel, who have been educated about the importance of avoiding impacts to the desert tortoise. Much of the remainder of the desert tortoise Habitat, however, is in rugged terrain that few people are likely to access. The largest threat may be from Interstate 10 in the Habitat between the Mecca Hills and the Orocopia Mountains and Joshua Tree National Park. Conservation Area management will include monitoring to evaluate edge effects. Such monitoring should be coordinated with monitoring activities proposed by the NECO Plan.

The Planning Team did not attempt to evaluate Core Habitat. Instead, input from individuals with expertise on this species was used to delineate the Core Habitat areas. In particular, Jeff Lovich of the USGS provided review of the map, proposed Conservation Areas, and desert tortoise data on numerous occasions during the process. His recommendations assisted the Planning Team in delineating important Habitat areas and evaluating potential Linkages in the vicinity of the Whitewater Hills, Stubbe and Cottonwood Canyons, Mission Creek, and the Little San Bernardino Mountains. Areas proposed for conservation to benefit desert tortoise in the

eastern part of the Plan Area were based on the NECO Plan recommendations for this area. For each area, see Table 9-15 for a breakdown of Existing Conservation Lands and remaining lands to be conserved.

9.6.1.4 Take Analysis

Significance of the Plan Area to Desert Tortoise

The desert tortoise ranges from southern Nevada and extreme southwestern Utah south through southeastern California and southwestern Arizona into northern Mexico. In California, desert tortoises occur in northeastern Los Angeles, eastern Kern, and southeastern Inyo counties, and over most of San Bernardino, Riverside, and Imperial counties. They inhabit a diverse array of desert Habitats including river washes, rocky hillsides and mountains, and flat expanses of creosote bush scrub. The desert tortoise is listed by the State of California and by the USFWS as a threatened species, and it is the official state reptile.

The Plan Area represents a small, but biologically significant portion of the desert tortoise's overall range. Desert tortoises in the foothills of the southeastern San Bernardino Mountains (especially in the Whitewater Hills) represent the western-most reproductively active population of desert tortoises in the Colorado Desert ecosystem (Lovich et al. 1999). Desert tortoise are known in the Plan Area in the foothills of the San Bernardino and Little San Bernardino Mountains, the Painted and Whitewater Hills (in the latter they are common), the San Jacinto and northern Santa Rosa Mountains, and in the eastern part of the Plan Area in the Desert Tortoise and Linkage, Mecca Hills/Orocopia Mountains, and Dos Palmas Conservation Areas.

The Desert Tortoise Recovery Plan (USFWS 1994) was completed in 1994 and the USFWS has designated about six million acres as critical Habitat, most of which is in California, particularly in the Mojave Desert and the Northern and Eastern Colorado Desert. The Desert Tortoise and Linkage Conservation Area includes all the federally designated critical Habitat for desert tortoise within the Plan Area. According to the Desert Tortoise Recovery Plan, maintenance of viable populations within each recovery unit, including the Eastern Colorado Recovery Unit which is partially within the Plan Area, is essential to this species.

Effects of Take on the Desert Tortoise

The primary importance of the proposed MSHCP to desert tortoise is that it provides Conservation for this species at the western limits of its range. The Desert Tortoise and Linkage Conservation Area includes all the federally designated critical Habitat for desert tortoise within the Plan Area. The Plan ensures the long-term conservation of currently unprotected desert tortoise Habitat and provides for connectivity between Habitat areas throughout the Plan Area. In addition, the Conservation Areas provide protection across an array of Habitat variables, including moisture gradients, soil character, elevation, and vegetation.

There are 571,098 acres of modeled Habitat for this species within the Plan Area of which approximately 377,898 acres are identified as Core Habitat. The Plan would ensure Conservation of 365,987 acres (97% of total) of the Core Habitat and 126,431 acres (93%) of the Other Conserved Habitat for the desert tortoise. The conserved Core Habitat areas range in size from 89,178 to over 125,000 acres. Approximately 345,899 acres (67%) 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 146,519 acres (28%) of the modeled Habitat for desert tortoise in the Plan Area.

Within the Conservation Areas under the worst case scenario, 17,120 acres of Take of modeled Habitat (3%) could occur. There would be approximately 11,911 acres (3% of total) of Core Habitat and 5,209 acres of Other Conserved Habitat (4% of total) subject to Take Authorization (See Table 9-15 and Table 4-114). Take of desert tortoise Habitat within the Conservation Areas must be consistent with the Conservation Objectives for this species to: 1) ensure Conservation of Core Habitat consistent with the Desert Tortoise Recovery Plan (USFWS 1994); 2) protect Other Conserved Habitat within a range of environmental conditions and conserve Essential Ecological Processes needed to maintain this Habitat; and 3) maintain Biological Corridors and Linkages among conserved populations to provide for population fluctuation and enhance genetic diversity. 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 species.

Outside of the Conservation Areas, there are 49,501 acres (9%) of modeled Habitat authorized for Take. None of this modeled Habitat outside the Conservation Areas is designated critical Habitat for the desert tortoise. The density of desert tortoises in much of the Coachella Valley is very low. Modeled Habitat outside the Conservation Areas is primarily in two areas: 1) in the area east of Highway 62 and south of Desert Hot Springs, and 2) in the area around Dillon Road where it intersects with the Interstate 10 freeway.

The establishment of Conservation Areas where this species is protected is a significant improvement over the piecemeal and fragmenting nature of development patterns that are occurring now within this Habitat. The actual reduction in Habitat value is expected to be considerably less than indicated by the raw acreage numbers because:

1. Conserved Habitat areas are large enough to sustain individuals or populations of desert tortoise and incorporate key Habitat elements.
2. 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.
3. As a result of implementing the Conservation Objectives to protect Habitat for desert tortoise 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 Stubbe Canyon under the freeway to Snow Creek, from Mission Creek under Highway 62, and at numerous locations under Interstate 10 to allow tortoise to move from Joshua Tree National Park into the Orocopia Mountains and Chuckwalla Bench area.
4. Desert tortoise Habitat in the MSHCP Reserve System would be managed and monitored to address impacts to desert tortoise (see Section 9.6.1.2), including fragmentation by roads, potential loss of Habitat from introduction of exotic species, and other potential stressors to this species,

The issuance of Take Permits, therefore, will not likely jeopardize the continued existence of this species and the implementation of the MSHCP will provide for the Conservation of desert tortoise.

Measures to Avoid, Minimize, and Mitigate Take of Desert Tortoise

To mitigate the Take of desert tortoise, the Permittees will protect and manage, in perpetuity, 146,519 acres of the modeled Habitat for this species. The 345,899 acres of modeled Habitat within Existing Conservation Lands will be monitored and managed to ensure that Conservation Objectives are met. The Plan will thus ensure Conservation, through protection and management, of 492,418 acres of Reserve Lands for this species.

Under the Plan, 86% of the Habitat for desert tortoise in the Plan Area will be conserved. The conserved areas include 97% of the significant population in the Whitewater Hills, and 97% of the Critical Habitat designated in the area between the Mecca Hills and the Orocopia Mountains and Joshua Tree National Park; this Desert Tortoise and Linkage Conservation Area is consistent with the Critical Habitat designation and with the NECO Plan. Habitat would also be conserved in a range of environmental conditions and would be distributed throughout the Plan Area.

Both inside and outside Conservation Areas, avoidance, minimization, and mitigation measures require relocation of individual tortoises if required surveys locate individuals on the site of Covered Activities. For more information about avoidance, minimization, and mitigation measures see Section 4.4. Under the Plan, Take would be permitted on 49,501 acres of the naturally occurring Habitat outside the Conservation Areas.

The Plan provides for protection of Biological Corridors and Linkages that will maintain connectivity for desert tortoise from the western limits to the eastern part of the Plan Area. This connectivity will be maintained by existing Biological Corridors including Stubbe Canyon Wash, the Whitewater River, Highway 62, and Interstate 10 between Joshua Tree National Park to the north and the Orocopia Mountains to the south.

Additionally, the Plan provides for Management and Monitoring Programs to ensure the Conservation of this species, including control of activities that degrade desert tortoise Habitat, control of invasive species where necessary, and restoration and enhancement of degraded Habitat as necessary according to monitoring results. The Plan also calls for various monitoring and management actions, including:

1. Control of invasive plant species or impacts from domestic animals if monitoring determines indicates such control is appropriate.
2. Control of raven predation on desert tortoises in the area if monitoring determines it to be a problem to the growth and maintenance of the tortoise population.
3. Control activities that may result in poaching, illegal collection, crushing of or disturbance to tortoises and tortoise burrows.
4. Develop and implement 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.

5. Determine the need for tortoise fencing along the Interstate 10 corridor in Critical Habitat and install tortoise fencing where deemed necessary in conjunction with new projects.

Overall Impacts to Desert Tortoise under the Plan

Implementation of the Plan is expected to maintain and enhance population viability of the desert tortoise in the Plan Area by protecting the populations and additional Habitat within a range of environmental conditions, and by providing connectivity with populations outside the Plan Area. Implementation of the Plan should coordinate with implementation of the NECO Plan.

The desert tortoise will benefit from the establishment of the MSHCP Reserve System wherein 86% of the Habitat for desert tortoise in the Plan Area will be conserved. The conserved areas include 97% of the significant population in the Whitewater Hills, and 97% of the Critical Habitat designated in the area between the Mecca Hills and the Orocopia Mountains and Joshua Tree National Park; this Conservation Area is consistent with the Critical Habitat designation and with the NECO Plan. Plan implementation is expected to provide for Conservation of the desert tortoise 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 in tortoise Habitat, monitoring to evaluate potential stressors to desert tortoise, and long-term protection, management, and enhancement of desert tortoise Habitat is expected to effectively compensate for potential adverse effects to this threatened species.

9.6.1.5 Species Account: Background

Distribution, Abundance, and Trends. The desert tortoise is widely distributed through an exceptionally broad array of Habitats that span 1,100 kilometers from northern Sinaloa State, Mexico where it occupies deciduous forest, across the Sonoran (including the Colorado Desert Subdivision in California) and Mojave Deserts, to the edge of the Colorado Plateau in arid southwestern Utah (Ernst et al. 1994, Germano 1994). Populations north and west of the Colorado River were listed as federal threatened in April 1990. The species is listed by California as a Threatened Species, and it is the official state reptile. In California, the desert tortoise is naturally absent from most areas west of the Salton Sea (Luckenbach 1982). Thus the Imperial Valley and portions of the southern Coachella Valley may not support native populations of desert tortoises. Desert tortoises, however, are found naturally along the northern, eastern, and western rim of the Coachella Valley in the foothills of the Little San Bernardino Mountains, the Painted and Whitewater Hills (in the latter they are common), and the San Jacinto and northern Santa Rosa Mountains.

The Plan Area represents a small, but perhaps biologically significant portion of the desert tortoise's overall range. Desert tortoises in the foothills of the southeastern San Bernardino Mountains (especially in the Whitewater Hills) represent the western-most reproductively active population of desert tortoises in the Colorado Desert ecosystem (Lovich et al. 1999). The western-most records of live tortoises in the San Gorgonio Pass are from T2S, R3E, Sec. 31 near the north end of Verbenia Avenue (J. Lovich, pers. comm.). Significant geographic variation in ecology, morphology, allozymes, plasma proteins markers, gene sequences and mitochondrial DNA has been noted among populations of tortoise rangewide (Weinstein and Berry 1987, Rainboth et al. 1989, Lamb et al. 1989, Glenn et al. 1990, Lamb and Lydeard 1994, Morafka et al. 1994), but no

published comparisons have included tortoises from the Coachella Valley.

Range wide, occupied Habitats include desert alluvial fans, washes, canyon bottoms, hillsides, and other steep terrain. In the Whitewater Hills and environs, desert tortoise burrows were found on slopes averaging 17.7^{o} and ranging from 0-45^{o} (Lovich and Daniels 2000). Areas with gravelly or coarse sandy soil are preferred, but desert tortoises can be found in boulder piles in some areas near the Coachella Valley. Desert tortoises have been recorded at elevations of at least 3,510 feet (1,070 m) in some portions of their range. Elevational records for desert tortoises in the Whitewater Hills and Painted Hills average 2,411 feet (735 m) and range from 2,168 to 2,680 feet (661-817 m), based on 150 records of 27 specimens in 1997. In the Santa Rosa Mountains, desert tortoises have been observed at elevations above 3,000 feet (C. Barrows, pers. comm.) The particular Habitat types utilized vary geographically with a preference for rocky slopes in the eastern part of the range (Schamberger and Turner 1986, Barrett 1990). However, it is important to emphasize that desert tortoises can occupy a surprising range of Habitat types.

The spatial distribution of desert tortoises in relation to plant communities is not random (Baxter 1988). High diversity plant ecotones and communities, and possibly soil characteristics, are important features in determining tortoise densities (Wilson and Stager 1992). This may explain the relatively high density of desert tortoises in the Whitewater Hills, as the area is situated in a transition zone between plant communities from the San Bernardino Mountains, the Mojave and Colorado Deserts, and coastal assemblages. The clustered nature of desert tortoise burrows in the western Coachella Valley environs is consistent with the observations of others throughout the range of the tortoise; desert tortoises frequently exhibit a contagious distribution, with clusters of individuals in some areas and large intervening areas of what appears to be suitable Habitat without desert tortoises. Home ranges of desert tortoises vary from about 1 to 642 acres with males typically having larger home ranges than females. In southern Nevada, males had an average home range of 80 acres, while females used 37 acres (data summarized by Luckenbach 1982).

In the western Coachella Valley, the nesting season extends from April through at least July. Of 10 females radio-tracked and x-rayed at weekly intervals from early April through July 1997 in the Whitewater Hills, nine produced 72 eggs in 16 clutches. Seven produced second clutches and one desert tortoise produced a third clutch. Clutch sizes ranged from one to eight (including a single female with one egg in the Painted Hills) with the first clutch averaging 4.33 eggs and the second clutch averaging 5.0 eggs (Lovich et al. 1999). In contrast, during the same time period, only one of eight females tracked and x-rayed in Joshua Tree National Park produced eggs; a single clutch of 5.0. The difference is attributed to the fact that winter rain produced high biomass of annuals in the Whitewater Hills, whereas desert tortoises in the Park are in the second year of drought conditions.

Associated Covered Species. Other Covered Species with Core Habitat overlapping the modeled Habitat for the desert tortoise include Peninsular bighorn sheep, Palm Springs pocket mouse, burrowing owl, triple-ribbed milkvetch, Little San Bernardino Mountains linanthus, and gray vireo.

9.6.2 Coachella Valley Fringe-Toed Lizard *Uma inornata*

Status **Federal:** **Threatened**
State: **Endangered**

9.6.2.1 Species Conservation Goals and Objectives

Conserve and manage populations within the MSHCP Reserve System according to the following criteria:

Goal 1: Protect at least four Core Habitat areas that include occupied Habitat, and associated Essential Ecological Processes, allowing evolutionary processes and natural population fluctuations to occur. Minimize fragmentation, human-caused disturbance, and edge effects to Core Habitat by conserving contiguous Habitat patches and effective Linkages between patches of Core Habitat.

Objective 1. Ensure conservation of Core Habitat areas including at least 11,245 acres within the following Conservation Areas:

- Snow Creek/Windy Point Conservation Area
- Whitewater Floodplain Conservation Area
- Willow Hole Conservation Area
- Thousand Palms Conservation Area

Please refer to Section 4.3 and Table 9-16 for specific acreages to be protected by this Conservation Objective.

Goal 2: Protect Other Conserved Habitat, to provide sufficient area and variety of Habitat types to accommodate population fluctuations, allow for genetic diversity, and to conserve the range of environmental conditions within which this lizard is known to occur.

Objective 2. Through adherence to other Conservation Objectives (for another species, a natural community, Essential Ecological Process area, Biological Corridor, or Linkage area) conserve Other Conserved Habitat for this lizard in the following Conservation Areas:

- Edom Hill Conservation Area
- East Indio Hills Conservation Area
- Santa Rosa and San Jacinto Mountains Conservation Area

Please refer to Section 4.3 and Table 9-16 for specific acreages to be protected by this Conservation Objective.

Goal 3: Protect Essential Ecological Processes, including sand source/transport systems, necessary to maintain Core Habitat and Other Conserved Habitat for this species.

Objective 3. Ensure protection of Essential Ecological Process areas through Conservation Area Conservation Objectives for Essential Ecological Processes.

Goal 4: Maintain Biological Corridors and Linkages among all conserved populations.

Objective 4. Note: Specific additional details on these Biological Corridors and Linkages, and requirements for the installation of wildlife underpasses, are found in the Conservation Area descriptions in Section 4.0. Key Habitat Linkages and Biological Corridors include the following:

- Whitewater River Biological Corridor
- Mission Creek Biological Corridor
- Willow Wash Biological Corridor
- Possible future wildlife undercrossings at Indian Avenue and Gene Autry Trail in the Whitewater Floodplain Conservation Area
- Possible future widened culverts or undercrossings at Palm Drive
- Possible future widened culverts or undercrossings at Mountain View Road, and Varner Road in the Willow Hole Conservation Area
- Possible future wildlife undercrossings along Ramon Road, Washington Street, and Thousand Palms Canyon Road in the Thousand Palms Conservation Area

Goal 5: Ensure conservation of the Coachella Valley fringe-toed lizard 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.

Objective 5. Implement monitoring and Adaptive Management actions to ensure self-sustaining populations within each Core Habitat area.

Table 9-16: Summary of Habitat within Conservation Areas Coachella Valley Fringe-Toed Lizard

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*
Snow Creek/ Windy Point	1,374	130	70	1,174	1,244	Core Habitat
Whitewater 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*	--

9.6.2.2 Threats, Limiting Factors, and Adaptive Management

Primary threats are loss or degradation of Habitat and the Essential Ecological Processes that sustain that Habitat. Habitat is lost when urban, agricultural, and other types of Development replace suitable with unsuitable Habitat. Habitat is degraded by OHV abuse, illegal dumping, invasion by exotic weeds, and other impacts. The processes that drive the aeolian sand system cannot be disrupted. Floodwaters transport sediment downstream from its source to where it is gradually sorted and the sand is then transported by wind to form dunes. To maintain the Habitat, floodwaters must not be blocked or redirected from the sorting area. There also must be no barriers blocking the movement of wind and its sand load between the sorting area and the Habitat. These barriers impound sand and cause shielding effects, which, eventually, will "extend to the downwind end of the region because of the unidirectional sand movement pattern" (The Nature Conservancy 1985).

Edge effects are related to urban Development adjacent to Habitat. Roads, feral animals,

collecting, and other disturbances, increase mortality of Coachella Valley fringe-toed lizards, especially around the perimeter of a Habitat patch. The larger the perimeter is, relative to the total area (perimeter to area ratio), the greater the potential for negative edge effects from adjacent Development.

The following actions may be needed to ensure species persistence and long-term viability if biological monitoring indicates that such actions are warranted. This list is not comprehensive but identifies some of the known or likely threats to this species. More detailed information on the Management and Monitoring Programs can be found in Section 8.0. Actions may include:

1. Control and manage impacts that degrade Coachella Valley fringe-toed lizard Habitat, including fragmentation by roads, OHV use in protected Habitat (except on designated routes of travel, if any), and other human disturbance.
2. Control human access to occupied Habitat as necessary.
3. Evaluate the need as determined by monitoring for perimeter fencing to keep lizards inside Conservation Areas and away from roadways.
4. Identify actions to reduce impacts from, and control where feasible, invasive species if it is determined from monitoring results that there are impacts to fringe-toed lizard Habitat or populations.
5. Include measures to reduce the impacts to the lizards' food source, harvester ants, including aerial pesticide spraying (in coordination with the California Department of Food and Agriculture) or introduction of exotic species (e.g. fire ants).

9.6.2.3 Species Conservation Analysis

Conservation Area Reserve Design. To ensure long-term viability of the species, multiple Core Habitats were delineated that contained the best-known Habitat and were of the appropriate size and shape. The Planning Team selected Core Habitat from the Habitat model for this species using the following four criteria: (1) Core Habitat is sufficiently large that it can support a viable population independent of other Core Habitat areas; (2) Core Habitat is not fragmented by Development, including roads. Lightly traveled two-lane roads that have limited potential for expansion (e.g. Snow Creek Road) were not considered barriers to this species. Where roads have the potential to fragment Core Habitat, the Plan provides for wildlife underpasses to be constructed when road widening could cause potential fragmentation; (3) Core Habitat has intact Essential Ecological Processes, including sand source and sand delivery systems. This species depends on active blowsand areas, such that long-term maintenance of the sand dunes and sand fields where it occurs was considered essential; and (4) Core Habitat provides suitable areas to act as refugia in the event of large-scale flood events or other extreme conditions (climate change, extended drought).

The Conservation Areas benefit this lizard by securing the long-term sand transport-delivery systems for the Core Habitat and Other Conserved Habitat. At the present time, the sand transport corridors for the Snow Creek area, the Willow Hole area, and for the Thousand Palms Preserve are unprotected; the MSHCP Reserve System will protect these areas. In addition to preserving Core Habitat, Other Conserved Habitat supporting smaller populations is protected in sand source areas. The patchy distribution and relatively small area of the Habitat in the sand

source areas may preclude the presence of long-term viable populations. The MSHCP Reserve System also provides Linkages between Core Habitat areas.

For each area, see Table 9-16 for a breakdown of Existing Conservation Lands and remaining lands to be conserved. The Planning Team identified and assessed the sufficiency of the following Conservation Areas as Core Habitats:

Core Habitat Areas:

1. ***Snow Creek/Windy Point.*** There are approximately 1,374 acres of fringe-toed lizard Habitat modeled here, of which the Plan will conserve approximately 1,244 acres. 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 Planning Team considered this area as Core Habitat for this lizard.

2. ***Whitewater Floodplain.*** This Conservation Area contains 5,617 acres of fringe-toed lizard Habitat, of which the Plan will conserve 5,309 acres. This Conservation Area includes the existing Whitewater Floodplain Preserve, located in Palm Springs between Indian Avenue and Gene Autry Trail, south of the Southern Pacific railroad and north of the flood control dike that forms the southern edge of the Whitewater River channel. The Conservation Area also includes Habitat west of Indian Avenue and additional Habitat south and east of the existing preserve boundary. Sand for the Conservation Area is supplied primarily by the Whitewater River and its major tributary, the San Gorgonio River, which deposit sand in the floodplain west of the preserve. From there the sand is transported onto and across the Conservation Area by wind. A secondary source is Mission Creek, which enters the floodplain at about the midpoint of the northern border. It augments the sand stock in the eastern half of the Conservation Area. Sand is also supplied to this area from Garnet Wash.

The Whitewater Floodplain Preserve contains the population of *U. inornata* studied most intensively in the Coachella Valley. Allan Muth and Mark Fisher (Muth and Fisher, unpub. data 1985-2003) initiated a long-term demographic study of the species in 1985. They constructed a 2.25-hectare (5.56-acre) plot that lies approximately midway along the east-west axis of the preserve. They enumerated all *U. inornata* on the site, revealing the annual population size from 1985 through 2000. From these data, the geometric mean (= logarithmic mean) density was calculated as 57.6 *U. inornata* per hectare (approximately 23 per acre). Given that the total area of the preserve is 498 hectares (1,230 acres; The Nature Conservancy 1985), then the geometric mean population size of the Whitewater Floodplain Preserve is 28,684 *U. inornata*.

The Muth and Fisher study (Muth and Fisher, unpub. data 1985-2003) encompassed a severe drought from 1985 to 1990 of a magnitude experienced only once before in the 102-year history of climatological data from Palm Springs (U.S. Climatological Records 1898-2000). The population size at the study site dropped to 38 individuals (16.9/ha) in 1990.

Assumptions: Calculating the geometric mean population size of the Whitewater Floodplain Preserve involved the following assumptions:

1. The aeolian sand Habitat at the Whitewater Floodplain Preserve is homogeneous so lizard densities at the study plot will be identical to those throughout the preserve. This is not actually true, as the eastern portions of the preserve have more blowsand than do western portions; hence, lizard densities are probably greater in those eastern portions. However, placing the study plot midway along the east-west axis of the Whitewater Floodplain Preserve should average these differences in the long-term.

2. All individual *U. inornata* seen on the site in a year occupied only the 2.25-hectare study plot, so the density estimates are accurate. The study site population was not closed; individuals immigrated and emigrated. Thus, the densities may represent an overestimate of true densities. They are, however, the best available data for this species. But to err on the side of caution, a very conservative estimate is that the actual density is one-half the density of individuals seen each year on the study plot (M. Fisher, pers. comm.). This more conservative method gives a geometric mean density of 28.8 per hectare and 14,342 *U. inornata* at the Whitewater Floodplain Preserve (95% C.I. = 9,636-21,364 *U. inornata*).

   Immediately west of the existing Whitewater Floodplain Preserve on the west side of Indian Avenue there are about 3,035 acres (1,214 hectares) modeled as fringe-toed lizard Habitat which the Plan will conserve. Wind velocities are greater here than farther east, and following a depositional event, sand is transported away from here faster than it can be replaced by the next event (Turner et al. 1981). Because of this ephemeral nature, there is normally less actual Habitat than is modeled for most of this area. There are, however, some patches of perennial Habitat particularly in the northern portion of this area. These patches extend to the west where they connect with Habitat at Snow Creek/ Windy Point. They are isolated from the preserve for this and the other target animals by Indian Avenue, which is currently under consideration for widening because of high traffic volume. A bridge or very large culverts, installed at the point where the Whitewater River normally flows across Indian Avenue, will allow animal and sand movement below the road while keeping the road open to traffic during flood events. A relatively small patch of Habitat (150 hectares; 371 acres) lies east of Gene Autry Trail and was historically connected with Habitat at the Whitewater Floodplain Preserve. The two-lane road supports heavy traffic and is already scheduled for widening. The Habitat can be connected to the preserve via a bridge or large culverts. The Planning Team did consider this Conservation Area as Core Habitat for the Coachella Valley fringe-toed lizard.

3. ***Willow Hole*.** The Conservation Area includes approximately 1,754 total acres of Habitat within this Conservation Area for the fringe-toed lizard. The Plan will conserve approximately 823 acres of Core Habitat and 771 acres of Other Conserved Habitat in this Conservation Area. There is some fragmentation in this area as a result of roads, including Palm Drive, Mountain View Drive, and Varner Road. These roads likely reduce the unimpeded movement of lizards from one Habitat patch to another. Other fringe-toed lizard Habitat within the Willow Hole Conservation Area is at Flattop Mountain/Stebbins Dune (239 acres) and along the fault line immediately west of Willow Hole (330 acres).

   West of Palm Drive, the Habitat occurs primarily south of the San Andreas Fault where sandy deposits from Mission Creek and Big Morongo Wash provide suitable Habitat for the fringe-toed lizard. The mesquite hummocks within the fault line dunes area are

perennial Habitat but are only a small portion of the Habitat modeled for that area. The remainder is made up of sand fields that appear more ephemeral than the active sand fields that occur on Flattop Mountain/Stebbins Dune. Additional surveys would be necessary to confirm the status of this lizard in the fault line dunes so this area was considered as Other Conserved Habitat.

On the east side of Palm Drive there are 823 acres of Core Habitat and 51 acres of Other Conserved Habitat to be conserved. This includes the known Habitat north of Varner Road and active sand Habitat south of Varner Road, particularly in the Flattop Mountain/Stebbins Dune area. The Planning Team considered Willow Hole as Core Habitat for fringe-toed lizards for the same reasons it was designated a reserve by the Coachella Valley Fringe-toed Lizard Habitat Conservation Plan (The Nature Conservancy 1985). First, it "exists basically as an independent system replete with its own source and dune system." "The long-term self-perpetuation of the…blowsand ecosystem appears probable." (The Nature Conservancy 1985). Second, this sand source is discrete from other sources, making it unlikely that a catastrophic weather event will destroy all these. And third, as insurance against the loss of Habitat in other reserves from the effects of global climate change, Willow Hole's geographic placement in the Coachella Valley makes it intermediate climatically to the Whitewater Floodplain Conservation Area and the Thousand Palms Conservation Area.

Three sand source areas were identified for the Willow Hole-Edom Hill Preserve/ACEC area. 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 availability of multiple Habitat patches within the Willow Hole Conservation Area has benefits such that in the event of a population crash from stochastic or climatic events, they may not all be affected at the same magnitude. Thus, the likelihood of the species surviving in at least one Habitat patch is increased. For the long term, connecting these patches is desirable. The Plan proposes possible future widened culverts or undercrossings at Mountain View Road and Varner Road in the Willow Hole Conservation Area, if these roads are widened to four lanes or more. This would involve installing a bridge or wide culvert (≥ 3m wide) under the existing roadway to be used as a corridor by fringe-toed lizards as well as other species. The SAC or other scientists with similar expertise should be involved in the design process.

4. ***Thousand Palms.*** The existing Thousand Palms Preserve and additional Habitat within the Conservation Area includes approximately 3,962 acres of Habitat for the Coachella Valley fringe-toed lizard 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. The Plan will conserve approximately 3,869 acres of this Habitat. Floodwaters carry sand-containing sediment from sources in the Indio Hills and in the Little San Bernardino Mountains (via Thousand Palms Canyon) and deposit the sediment on the alluvial fans upwind from the dunes. Strong winds sort and transport sand, forming

the active dune fields of the Thousand Palms Preserve. In the CVFTL HCP, Weaver (TNC 1985), refined estimates from Turner et al. (1980) of sand contribution to the aeolian system by flood events. He determined that the majority of aeolian sand within the Thousand Palms Preserve area originated from floodwaters that flowed through Thousand Palms Canyon. More recent studies (Lancaster et al. 1993, Meek and Wasklewicz 1993, Wasklewicz and Meek 1995, Barrows 1996) reexamined these sources and determined that portions of the Indio Hills west of Thousand Palms Canyon contribute the majority of the sand. The Plan will protect both sources. The Indio Hills source is also aided by a flood control project designed to deliver sediment-laden water to the sorting region upwind from the Thousand Palms Preserve. There are no long-term demographic studies for this species for the Thousand Palms Conservation Area, but there are a series of strip transects that give relative abundance of *U. inornata* (Cameron Barrows, pers. comm.). Data from these transects allowed for Habitat quality distinctions with the best Habitat labeled herein as primary, lower quality Habitat as secondary, and all other as non-Habitat. Fringe-toed lizard abundance in secondary Habitat is approximately 1/5 to 1/2 that of primary Habitat (Cameron Barrows, pers. comm.). Measurements from satellite photographs (2000) show approximately 283 to 364 hectares (700 to 900 acres) are primary Habitat, and an additional 405 hectares (1,000 acres) are secondary Habitat. Transects are poor estimators of actual density because they are essentially two-dimensional, and lizards are not marked individually to allow the use of mark-recapture techniques. But the density estimate of Turner et al. (1981) of 45.5 fringe-toed lizards per hectare on primary Habitat here is nearly identical to their estimate (45.0) for a site at the Whitewater Floodplain Preserve. This site is the same as that used by Muth and Fisher. The Planning Team did consider this Conservation Area as Core Habitat for the Coachella Valley fringe-toed lizard.

Other Conserved Habitat Areas:

1. ***Edom Hill.*** This Conservation Area includes scattered sandy substrate Habitat between Willow Hole and the Thousand Palms Preserve in the Indio Hills. There are approximately 120 acres of modeled Habitat, not enough to constitute Core Habitat for this species, of which the Plan will conserve approximately 114 acres. This area does provide slightly higher elevation Habitat and a Linkage between Willow Hole and the Thousand Palms Conservation Area. In addition, the entire Conservation Area is covered by a Conservation Objective to protect either the sand source or sand transport areas. The Planning Team did not consider this area as Core Habitat, but as Other Conserved Habitat for the fringe-toed lizard.

2. ***East Indio Hills.*** There are approximately 824 acres of Habitat modeled at the east end of the Indio Hills, of which approximately 754 acres are conserved under the Plan. Of primary concern here is the health of the sand source system. The "formerly robust" sand source and delivery system from the west (Whitewater River, Mission and Morongo Creeks, etc.) is no longer intact, having been blocked by Development upwind. This leaves sand sources in the adjacent Indio Hills and the Little San Bernardino Mountains to supply all the sand for this area (see ISA report in Appendix I). Because of uncertainty about the sand source and sand transport system, and because the fringe-toed lizards here do not differ genetically from those elsewhere in the Coachella Valley (Trepanier and Murphy 2001), the Planning Team designated this area as Other Conserved Habitat.

3. ***Santa Rosa and San Jacinto Mountains.*** The Santa Rosa and San Jacinto Mountains Conservation Area has very limited Coachella Valley fringe-toed lizard Habitat, primarily adjacent to the Snow Creek/Windy Point Conservation Area where sandy substrate Habitat occurs along the toe of the San Jacinto Mountains. Of the approximately 122 acres of modeled Habitat, the Plan will conserve approximately 112 acres.

9.6.2.4 Take Analysis

Significance of the Plan Area to Coachella Valley Fringe-Toed Lizard

The Coachella Valley fringe-toed lizard is restricted to the Coachella Valley and was found historically from near Cabazon at the northwestern extreme to near Thermal at the southeastern extreme. This species is endemic to and does not occur outside the Plan Area. The Coachella Valley fringe-toed lizard is listed as a threatened species under FESA and is listed as endangered by the State of California. It is strongly associated with active blowsand Habitats on the floor of the Coachella Valley and once occurred from Cabazon to Indio in what was once an extensive sand dune system. Today less than 5% of the original Habitat for this species remains (Barrows 1996).

Effects of Take on the Coachella Valley Fringe-Toed lizard

The primary importance of the proposed MSHCP to Coachella Valley fringe-toed lizard is that it provides Conservation (including Habitat protection, management and monitoring) of the species across its entire range. The Plan ensures the long-term conservation of Core Habitat and the associated Essential Ecological Processes including the sand transport and delivery system. The Plan also ensures that connectivity between these Habitat areas will be maintained. In addition, the Conservation Areas provide protection across an array of Habitat variables, including moisture, soil character, elevation, and vegetation, within the entire range of this subspecies.

There are 27,070 acres of modeled Habitat for this lizard within the Plan Area of which approximately 11,850 acres are identified as Core Habitat. The Plan would ensure Conservation of 11,245 acres (95% of total) of the Core Habitat and 1,754 acres (91% of total) of the Other Conserved Habitat for the fringe-toed lizard. Each of the four conserved Core Habitat areas would be greater than 1,200 acres. Approximately 5,999 acres (22%) 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 6,999 acres (26%) of the modeled Habitat for Coachella Valley fringe-toed lizard in the Plan Area.

Within the Conservation Areas under the worst case scenario, 778 acres of Take of modeled Habitat (6%) could occur. There would be approximately 606 acres (5% of total) of Core Habitat and 172 acres of Other Conserved Habitat (9% of all Other Conserved Habitat) subject to Take Authorization (See Table 9-16 and Table 4-114). Take of fringe-toed lizard Habitat within the Conservation Areas must be consistent with the Conservation Objectives for this species to: 1) ensure Conservation of Core Habitat; 2) protect Essential Ecological Processes needed to maintain fringe-toed lizard Habitat; and 3) maintain Biological Corridors and Linkages among conserved populations to provide for population fluctuation and enhance genetic diversity. 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 species.

Outside of the Conservation Areas, there are 12,903 acres (48%) of modeled Habitat authorized for Take. The Habitat outside the Conservation Areas is already highly fragmented, surrounded by existing Development, and has a compromised sand source/transport system. The potential for this Habitat to provide for the long-term persistence of Coachella Valley fringe-toed lizard populations is low. These areas are primarily in the remnants of the Big Dune south of Interstate 10 east to La Quinta and Indio. There are scattered areas in the vicinity of the Whitewater Floodplain Preserve, including south of the levee that is the preserve's southern boundary. These fragmented blocks are more susceptible to edge effects, including mortality on roads and predation by feral animals.

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 of Take requires an assessment of the quality of this Habitat. The actual reduction in Habitat value is expected to be considerably less than indicated by the raw acreage numbers because:

1. 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.
2. 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.
3. 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.
4. 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.
5. 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,

The issuance of Take Permits, therefore, will not likely jeopardize the continued existence of the Coachella Valley fringe-toed lizard and the implementation of the MSHCP will provide for the Conservation of the species.

<u>Measures to Avoid, Minimize, and Mitigate Take of Coachella Valley Fringe-Toed Lizard</u>

To mitigate the Take of Coachella Valley fringe-toed lizard, the Permittees will protect and manage in perpetuity 6,999 acres of the modeled Habitat for this species. The 5,999 acres of modeled Habitat within Existing Conservation Lands will be monitored and managed to ensure that Conservation Objectives are met. The Plan will thus ensure Conservation, through protection and management, of 12,998 acres of Additional Conservation Lands for this species.

The proposed Conservation Areas will ensure that a minimum of 48%, of the occupied and potential Habitat in the entire Plan area will be conserved for the Coachella Valley fringe-toed lizard. Core Habitat was designated for this species in the Snow Creek/Windy Point, Whitewater Floodplain, Willow Hole, and Thousand Palms Conservation Areas, based primarily on the distribution of active blowsand areas. In the area from Fingal's Finger, at the west end of Snow Creek, to Windy Point, 1,374 acres of contiguous Core Habitat have been mapped; at least 1,244 of these acres will be conserved. In the Whitewater Floodplain Conservation Area, 5,617 acres of Core Habitat have been mapped; a minimum of 5,309 of these acres will be conserved. In the Willow Hole Conservation Area, 897 acres of Core Habitat are present with a Conservation Objective to ensure conservation of at least 823 acres of this Habitat. On the Thousand Palms Preserve, 3,869 of the total 3,962 acres of Core Habitat will be conserved, for a total in the Plan Area of 11,850 acres of Core Habitat for this lizard species. Those areas where Take could be permitted for this species, including approximately 778 acres, are primarily in the remnants of the Big Dune south of Interstate 10. The Big Dune area no longer has a viable sand transport/wind corridor. Active blowsand areas have been disturbed, and Essential Ecological Processes are already altered and degraded primarily by the Interstate 10 freeway and four-lane roads that fragment the dune. This Big Dune area is also highly fragmented by major roads. These fragmented blocks are more susceptible to edge effects, including mortality on roads and predation by feral animals.

Additionally, the Plan calls for Management and Monitoring Programs to ensure the Conservation of this species, including control of activities that degrade fringe-toed lizard Habitat such as fragmentation and OHV trespass, control of invasive species where necessary, and evaluation of lizard population parameters according to monitoring results. The Plan also calls for refinement and updating of the model that addresses the distribution and Habitat parameters of the Coachella Valley fringe-toed lizard throughout the Reserve System.

<u>Overall Impacts to Coachella Valley Fringe-toed Lizard under the Plan</u>

Implementation of the Plan will maintain and enhance population viability of the Coachella Valley fringe-toed lizard, as unprotected portions of its Habitat, potential Habitat, and Essential Ecological Processes for the aeolian sand system will be preserved. This Plan builds on the protection established by the Coachella Valley Fringe-toed Lizard HCP (The Nature Conservancy 1985) by protecting significant additional Core Habitat and associated Essential Ecological Processes.

The fringe-toed lizard will benefit from the establishment of the MSHCP Reserve System which will include Core Habitat form Snow Creek to the Thousand Palms Preserve and Other Conserved Habitat from Willow Hole to the East Indio Hills. Implementation of the Plan is expected to provide for persistence of the Coachella Valley fringe-toed lizard within the Plan Area, where only 22% of the modeled Habitat is currently protected. The Plan will ensure the Conservation an additional 26% of Habitat and potential Habitat areas. The combination of the overall Conservation measures; species-specific measures such as management to minimize impacts such as OHV trespass, fragmentation, and edge effects, monitoring to better understand the effects of these impacts on the species, and long-term protection, management, and enhancement of fringe-toed lizard Habitat is expected to effectively compensate for potential adverse effects to this threatened and endangered species.

9.6.2.5 Species Account: Background

Distribution, Abundance, and Trends. The Coachella Valley fringe-toed lizard is restricted to the Coachella Valley and was found historically from near Cabazon at the northwestern extreme to near Thermal at the southeastern extreme. It is associated with a substrate of aeolian (wind-blown) sand to which it has developed morphological and behavioral adaptations (Heifetz 1941, Stebbins 1944, Norris 1958), and it occurs wherever there are large patches of the appropriate substrate (England and Nelson 1976, LaPre and Cornett 1981, Turner et al. 1981, England 1983, C. Barrows 1997). As Development of the Coachella Valley progressed, fringe-toed lizard Habitat declined from roughly 171,000 acres, historically (The Nature Conservancy 1985) to 63,360 acres in 1980 (Federal Register 1980) to 27,206 acres estimated by the model in 2000.

Coachella Valley fringe-toed lizard abundance, calculated as density, was estimated at several sites considered representative of Habitat in the Coachella Valley by Turner et al. (1981, 1984). These estimates, made from surveys in only one year, ranged from 11 to 45 per hectare (four to 18 per acre) in unstabilized Habitat. However, a long-term demographic study by Muth and Fisher (unpublished data, 1985-2003; pers. comm.) revealed density variations among years from 17 to 149 per hectare (seven to 60 per acre) at one site. Availability of food resources appears causal to these fluctuations in density, as reproduction and mortality are correlated with annual rainfall.

The Coachella Valley fringe-toed lizard is omnivorous, and diet changes as a function of food availability. During normal to wet years, it eats primarily flowers and plant dwelling arthropods. During dry periods, the diet shifts to primarily leaves and ants (Durtsche 1987, 1995). The dietary content differs also between breeding and non-breeding seasons for males, but does not differ significantly for females. During late summer, the diets of the two sexes are indistinguishable (Durtsche 1992).

Coachella Valley fringe-toed lizards differ sexually in their spatial use of the Habitat. Males have a significantly larger home range size than do females. The average sizes are 1,070m² (11,518 ft²) for males and 437m² (4,704 ft²) for females (Horchar 1992). A home range is the area within which an animal conducts its normal daily and seasonal activity. A territory, on the other hand, is a portion of a home range that is defended. Muth and Fisher (pers. comm.) saw no evidence of territoriality in 16 years, contrary to Carpenter's (1963) observations of captive lizards.

Coachella Valley fringe-toed lizards are active from March to mid-November (and sometimes into December when the weather is accommodating), although adults are primarily active from April to October with a peak in May-June (Mayhew 1965, Muth and Fisher, pers. comm.). Springtime activity is triggered when subsurface temperatures exceed the minimum voluntary temperature at -5 cm (-2 inches) where the lizards hibernate, and end when these temperatures drop below minimum voluntary in the fall (Cowles 1941, Brattstrom 1965, Muth and Fisher 1991). Daily activity is also associated with temperature: Mayhew (1964) found them active when their body temperatures ranged from 25.8-44.0° C (78-111° F); the mean is 38.0° C (100° F). They must have access to cool temperatures to survive midday temperatures during the hottest months. Muth and Fisher (1991) found that surface temperatures in the shade and subsurface temperatures at -5 cm in the sun exceed the critical thermal maximum for the species (Brattstrom 1965). They must burrow 5 cm in the shade or much deeper in the sun to escape these extremes.

Not all individuals are active any given day, despite appropriate temperatures. Muth (1987) and Muth and Fisher (1991 and unpubl. data) found that, on average, only 20% of their marked population was active daily, with much individual variation. Inactive individuals must be buried in the shade or at 10 cm or deeper if in the sun. Although Fisher and Muth (pers. comm.) watched them excavate relatively deep burrows in the sun on the hottest days, Pough (1970) states that they do not bury deeper than 3 to 4 cm "even under near-fatal heat stress."

Breeding occurs from late April into August, and eggs are laid from May into September (Mayhew 1965). This prolonged breeding season, along with distinct size classes among hatchlings, the simultaneous presence of enlarged eggs in both oviduct and ovary, and the recurrence of breeding color in individual females suggest they lay multiple clutches per year when food resources are ample (Mayhew 1965, Muth and Fisher, unpubl. data). Young of the year hatch the first week of August at Whitewater Floodplain Reserve, on average (Muth and Fisher, unpubl. data), but a week or two earlier at the Thousand Palms Preserve (Cameron Barrows, pers. comm.) where average temperatures are higher. Growth rate is positively correlated with annual rainfall, and young reach adult size one to two (sometimes three) years after hatching. Fewer females breed during dry years, and they lay fewer egg clutches those years (Muth and Fisher, unpubl. data).

Coachella Valley fringe-toed lizards are known to live eight years in the wild, but annual survivorship is about 35%. Size, sex, or age-related differences in mortality have not been detected (Muth and Fisher 1991). Known predators include larger conspecifics, leopard lizards (*Gambelia wislizenii*), coachwhip snakes (*Masticophis flagellum*), sidewinders (*Crotalus cerastes*), loggerhead shrikes (*Lanius ludovicianus*), and American kestrels (*Falco sparverius*). Coyotes (*Canis latrans*), kit foxes (*Vulpes macrotis*), Coachella Valley round-tailed ground squirrels (*Spermophilus tereticaudus* ssp. *chlorus*), red-tailed hawks (*Buteo jamaicensis*), prairie falcons (*Falco mexicanus*), greater roadrunners (*Geococcyx californianus*), and burrowing owls (*Speotyto cunicularia*) utilize Coachella Valley fringe-toed lizard Habitat and are known to eat lizards.

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, confirming earlier analyses of anatomical characters (Norris 1958, de Querioz 1989) and display behavior (Carpenter 1963). But genetic differences among the nine populations are considerably less than genetic differences among populations of the Colorado Desert fringe-toed lizard, indicating a relatively recent genetic isolation.

Associated Covered Species. Other target species whose Habitat overlaps with that of the Coachella Valley fringe-toed lizard include the flat-tailed horned lizard, Coachella Valley milkvetch, Palm Springs pocket mouse, Coachella Valley round-tailed ground squirrel, Coachella Valley giant sand-treader cricket, Coachella Valley Jerusalem cricket, and the burrowing owl.

9.6.3 Flat-Tailed Horned Lizard *Phrynosoma mcallii*

Status Federal: No official status

State: California Species of Special Concern

9.6.3.1 Species Conservation Goals and Objectives

Conserve and manage populations within the MSHCP Reserve System according to the following criteria:

Goal 1: Protect Core Habitat areas that include occupied Habitat, and associated Essential Ecological Processes, allowing evolutionary processes and natural population fluctuations to occur. Minimize fragmentation, human-caused disturbance, and edge effects to Core Habitat by conserving contiguous Habitat patches and effective Linkages between patches of Core Habitat.

Objective 1. Ensure conservation of Core Habitat areas including at least 4,051 acres within the following Conservation Area:

- Thousand Palms Conservation Area

Please refer to Section 4.3 and Table 9-17 for specific acreages to be protected by this Conservation Objective.

Goal 2: Protect Other Conserved Habitat, to provide sufficient area and variety of Habitat types to accommodate population fluctuations, allow for genetic diversity, and to conserve the range of environmental conditions within which this lizard is known to occur.

Objective 2. Through adherence to other Conservation Objectives (for another species, a natural community, Essential Ecological Process area, Biological Corridor, or Linkage area) conserve 13,025 acres of Other Conserved Habitat for this lizard in the following Conservation Areas:

- Whitewater Floodplain Conservation Area
- Willow Hole Conservation Area
- East Indio Hills Conservation Area
- Dos Palmas Conservation Area
- Santa Rosa and San Jacinto Mountains Conservation Area

Please refer to Section 4.3 and Table 9-17 for specific acreages to be protected by this Conservation Objective.

Table 9-17: Summary of Habitat within Conservation Areas Flat-Tailed Horned Lizard

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*[1]
Snow Creek/ Windy Point	20	2	4	14	18	Potential Other Cons. Habitat
Whitewater Floodplain	3,369 / 2,120	177 / 121	1,598 / 909	1,594 / 1,090	3,192 / 1,999	Pred. / Pot. Other Cons. Habitat
Upper Mission Creek/ Big Morongo Cyn.	96	10	0	86	86	Potential Other Cons. Habitat
Willow Hole	880 / 842	75 / 84	126 / 5	679 / 753	805 / 758	Pred. / Pot. Other Cons. Habitat
Long Canyon	110	N/A	0	(110)[2]	0	Potential Other Cons. Habitat
Edom Hill	276	28	0	248	248	Potential Other Cons. Habitat
Thousand Palms	4,148	97	3,174	877	4,051	Pred. Core Habitat
Thousand Palms	98 / 81	10 / 1	61 / 21	27 / 59	88 / 80	Pred. / Pot. Other Cons. Habitat
East Indio Hills	645	58	67	520	587	Predicted Other Cons. Habitat
Dos Palmas	5,537	403	1,503	3,631	5,134	Predicted Other Cons. Habitat
Santa Rosa / San Jacinto Mtns.	61 / 15	10 / 1	45 / 1	6 / 13	51 / 14	Pred. / Pot. Other Cons. Habitat
Total – All Habitat	*14,738 / 3,560*	*830 / 247*	*6,574 / 940*	*7,334 / 2,263 (110)*[2]	*13,908 / 3,203*	*Predicted / Potential*
Total – Core Habitat	*4,148*	*97*	*3,174*	*877*	*4,051*	*Predicted*
Total – Other Cons. Habitat	*10,590 / 3,560*	*733 / 247*	*3,400 / 940*	*6,457/ 2,263 (110)*[2]	*9,857/ 3,203*	*Predicted / Potential*

[1] The species distribution model for the flat-tailed horned lizard includes predicted ("pred.") Habitat and also potential (Pot.) Habitat. Predicted Habitat includes areas where presence of this species is known or expected based on recent observations. Potential Habitat includes areas where there are historical observations of this species but no recent observations are recorded. See Section 9.6.3.3 for additional information.

[2] 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.

Goal 3: Protect Essential Ecological Processes, including sand source/transport systems, necessary to maintain Core Habitat and Other Conserved Habitat for this species.

Objective 3. Ensure protection of Essential Ecological Process areas through Conservation Area Conservation Objectives for Essential Ecological Processes.

Goal 4: Maintain Biological Corridors and Linkages among all conserved populations.

Objective 4. Protect Biological Corridors and Linkages through Conservation Area Conservation Objectives for Biological Corridors and Linkages. Key Habitat Linkages and Biological Corridors include the following:

- Whitewater River Biological Corridor
- Mission Creek Biological Corridor
- Morongo Wash Flood Control Corridor
- Willow Wash Biological Corridor
- Possible future wildlife undercrossings at Indian Avenue and Gene Autry Trail in the Whitewater Floodplain Conservation Area
- Possible future widened culverts or undercrossings at Palm Drive
- Possible future widened culverts or undercrossings at Mountain View Road, and Varner Road in the Willow Hole Conservation Area
- Possible future wildlife undercrossings along Ramon Road, Washington Street, and Thousand Palms Canyon Road in the Thousand Palms Conservation Area

Goal 5: Ensure conservation of the flat-tailed horned lizard 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.

Objective 5a. Implement monitoring and Adaptive Management actions to ensure self-sustaining populations within each Core Habitat area.

Objective 5b. Establish at least two additional self-sustaining populations of the flat-tailed horned lizard, if feasible, in previously occupied habitat.

9.6.3.2 Threats, Limiting Factors, and Adaptive Management

Threats to the flat-tailed horned lizard include increased mortality and loss of Habitat. Population viability analysis indicates that populations are particularly sensitive to changes in mortality rate and fecundity. A slight change in mortality or fecundity can lead to extinction (Rorabaugh et al., unpubl. data). Threats to Habitat within the Plan Area include agricultural Development, urban Development, expansion of utility corridors, and OHV use. Here, 84% of the historic Habitat has been lost to urban and agricultural Development (K. Nicol, pers. comm.). This estimate is conservative because much of the remaining Habitat is now discontinuous and fragmented. Roads are known to dramatically increase mortality of desert reptiles, including flat-tailed horned lizards, and may deplete the population for as much as 1 mile from the road edge. Another serious edge effect is predation. This predation could occur from household pets that are allowed to wander into Habitat from surrounding urban Development. Recent evidence from the

Thousand Palms Preserve suggests that predation rates by native predators such as kestrels may be increased due to artificial perches associated with Development (palm trees, power poles). Non-native species, including Saharan mustard (*Brassica tournefortii*) and Russian thistle (*Salsola tragus*) may impact this species as well.

The following actions may be needed to ensure species persistence and long-term viability if biological monitoring indicates that such actions are warranted. This list is not comprehensive but identifies some of the known or likely threats to this species. More detailed information on the Management and Monitoring Programs can be found in Section 8.0. Actions may include:

1. Control and manage impacts that degrade flat-tailed horned lizard Habitat, including fragmentation by roads, OHV use in protected Habitat (except on designated routes of travel, if any), and other human disturbance.
2. Control human access to occupied Habitat as necessary.
3. Consider the need for perimeter fencing to keep lizards in Conservation Areas and away from roadways.
4. Identify actions to reduce impacts from, and control where feasible, invasive species if it is determined from monitoring results that there are impacts to flat-tailed horned lizards.
5. Include measures to reduce the impacts to the lizards' food source, harvester ants, including aerial pesticide spraying (in coordination with the California Department of Food and Agriculture) or introduction of exotic species (e.g. fire ants).

9.6.3.3 Species Conservation Analysis

Conservation Area Reserve Design. The MSHCP Reserve System includes the most viable known Habitat in the Plan Area for the flat-tailed horned lizard. No other unfragmented, occupied Habitat of sufficient size remains in the Plan Area. In addition, potential Habitat across the range of the species is included. Ideally, three or more sites with discrete sand sources and of sufficient size to maintain a viable population should be preserved. Realistically, there are not three such sites remaining that are not already fragmented or otherwise compromised by Development. Thus, the most appropriate measure to meet the Conservation needs of the species is to acquire unprotected Habitat that is still intact and of sufficient size and to ensure that existing Biological Corridors are maintained between local populations. The Conservation Areas benefit this species by securing the long-term sand source–sand transport systems for their preferred Habitat in the dune areas of the western and central Coachella Valley and by securing the unprotected Habitat described above throughout the Plan Area.

The species distribution model for the flat-tailed horned lizard includes predicted Habitat and also potential Habitat. The development of the flat-tailed horned lizard model occurred through a coordinated effort involving members of the SAC, wildlife agency biologists, and other biologists with expertise on flat-tailed horned lizards. The team labeled Habitat where presence of the flat-tailed horned lizard was expected based on recent observations as predicted Habitat. All of the Core Habitat is in this category. Some outlying Habitat, generally above 800 feet in elevation, where historical observations of this lizard are in the database but no recent observations are recorded, was labeled potential Habitat. Statistics for this species presented in this section and elsewhere include both predicted and potential Habitat.

The Planning Team selected Core Habitat from the Habitat model for this species using the following four criteria: (1) Core Habitat is sufficiently large that it can support a self-sustaining population independent of other Core Habitat areas; (2) Core Habitat is not fragmented by Development, including roads. Although lightly traveled two-lane roads that have limited potential for expansion (e.g. Snow Creek Road) were not considered barriers to this species. Where roads have the potential to fragment Core Habitat, the Plan provides for wildlife underpasses to be constructed when road widening could cause potential fragmentation; (3) Core Habitat has intact processes, including sand source and sand delivery systems; while this species may not depend on active blowsand areas, long-term maintenance of the sand dunes and sand fields where it occurs was considered essential; and (4) Core Habitat provides suitable areas to act as refugia in the event of large-scale flood events or other extreme conditions (climate change, extended drought). For each area, see Table 9-17 for a breakdown of Existing Conservation Lands and remaining lands to be conserved. The Planning Team identified and assessed the sufficiency of the following Conservation Area as Core Habitat:

Core Habitat Areas:

1. ***Thousand Palms.*** The Thousand Palms Preserve includes approximately 3,660 acres of Habitat for flat-tailed horned lizards in the main dune system, in the area south of Ramon Road and west of Washington Avenue, and an additional approximately 610 acres of Habitat elsewhere in the Conservation Area for a total of approximately 4,310 acres. The Plan will conserve approximately 4,051 acres of the Core Habitat. Because Ramon Road and Washington Ave. receive moderate traffic volumes, the main dune system is somewhat isolated from the remaining flat-tailed horned lizard Habitat on the preserve. This lizard has been observed throughout the dune area south of Ramon. Sampling of specific density plots has not been conducted at this preserve. Using the population density estimates for this lizard noted above for the Coachella Valley would suggest that 2,089 individuals per acre (at 0.5/acre per Muth and Fisher (1992)) to 10,027 individuals per acre (at 2.4/acre per Turner and Medica (1982)) could occur within this part of the preserve. The Planning Team included this area as Core Habitat.

   There are no known locations for flat-tailed horned lizards on the Thousand Palms Preserve north of Ramon Road and west of Thousand Palms Canyon Road. The Habitat patch delineated in this area includes approximately 536 acres of potential flat-tailed horned lizard Habitat. Additional surveys would be necessary to determine whether these lizards are present on this part of the preserve.

Other Conserved Habitat:

1. ***Dos Palmas.*** The Dos Palmas area includes approximately 5,537 of occupied and potential Habitat that appears to be of high quality for this species. The Plan will conserve approximately 5,134 acres of this Other Conserved Habitat. Two different records exist for this species at Dos Palmas within the existing Dos Palmas ACEC. Systematic surveys for this lizard have not been completed at Dos Palmas. Distribution and abundance data would be necessary to confirm the significance of this area as Core Habitat. The amount of suitable Habitat and the lack of disturbance would suggest that this could be an important area for flat-tailed horned lizards. However, without sufficient data on the occurrence of this species at Dos Palmas, the Planning Team considered this area as Other Conserved Habitat, not Core Habitat, for the flat-tailed horned lizard.

2. ***Snow Creek/Windy Point.*** 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. However, no records for the occurrence of the flat-tailed horned lizard are known from the Snow Creek area. This lizard tends to occur at elevations below approximately 800 feet (Mark Fisher, pers. comm.). They are not expected to occur in numbers that would approach a viable population in the Snow Creek area west of Windy Point. There are historical records for this species on the east side of Windy Point in the Whitewater Floodplain Conservation Area (see below).

3. ***Whitewater Floodplain*.** This Conservation Area includes approximately 3,369 acres of predicted and 2,120 acres of potential Other Conserved Habitat for this species, from the area slightly west of Indian Avenue to the eastern boundary of the existing preserve. The Plan will conserve approximately 3,192 acres of predicted Other Conserved Habitat and 1,999 acres of potential Other Conserved Habitat. Both Indian Avenue and Gene Autry Trail were not, in their current condition as two lane roads, considered as significant barriers for this species. There is some additional Habitat on Garnet Hill and in the area east of the CVWD recharge ponds and west of Indian Avenue. The only confirmed record for this species on the Whitewater Floodplain Preserve is from incidental sightings on the fringe-toed lizard study plot by Mark Fisher and Al Muth (pers. comm.) in the years from 1985 to 1994; this lizard has not been observed by Fisher and Muth since 1994. Density estimates for this species have not been made at this location. According to Mark Fisher, a reasonable average density is one individual per acre (pers. comm.). A relatively small patch of Habitat occurs east of Gene Autry Trail, east of the existing preserve, including potential flat-tailed horned lizard Habitat. No known locations for flat-tailed horned lizards have been recorded here. Gene Autry Trail, a two-lane road, has heavy traffic and is already scheduled for widening. The Plan recommends that an undercrossing would be constructed on Gene Autry Trail when it is widened to six lanes. Surveys would need to be done to determine the extent to which this species occurs within this area. The Planning Team considered the modeled Habitat within this Conservation Area as moderate quality Habitat for this lizard; it was not considered as Core Habitat.

4. ***Willow Hole.*** The Willow Hole Conservation Area includes approximately 880 acres of predicted and 842 acres of potential Other Conserved Habitat for this lizard. The Plan will conserve approximately 805 and 758 acres, respectively, of this modeled Habitat. The only known location for this species within the Conservation Area is an observation by Mark Fisher (pers. comm.) of a few individuals along the power line road on Flat Top Mountain

in 1978. Cameron Barrows (pers. comm.) has reported that since 1986 he has not observed any flat-tailed horned lizards during annual monitoring transects for the fringe-toed lizard on the Willow Hole-Edom Hill Preserve. This area provides potential Habitat but was not considered Core Habitat by the Planning Team.

5. ***East Indio Hills.*** There are approximately 645 acres of occupied and potential Habitat for this lizard within this Conservation Area, mostly at the easternmost end of the Indio Hills. A portion of the Habitat on the south side of the Indio Hills has been compromised by recent Development activity. The viability of the sand transport system is also a concern here; the system, which carried sand from Whitewater River, Mission and Morongo Creeks, and others, has been blocked by Development upwind. The remaining sand sources in the Indio Hills and Little San Bernardino Mountains are at least partially compromised by roads. These uncertainties led the Planning Team to be concerned about whether this area provides Core Habitat for flat-tailed horned lizards. The Plan will conserve approximately 587 acres of Other Conserved Habitat for this lizard in this Conservation Area

6. ***Santa Rosa and San Jacinto Mountains.*** The Santa Rosa and San Jacinto Mountains Conservation Area has very limited flat-tailed horned lizard Habitat primarily in the area east of Windy Point where sandy substrate Habitat occurs along the toe of the San Jacinto Mountains. The Windy Point area is at the western limits of this species' known distribution. Of the 76 acres of modeled Habitat, all but 11 acres of Conservation Level 4 private lands are covered by a Conservation Objective for another purpose.

9.6.3.4 Take Analysis

Significance of the Plan Area to the Flat-Tailed Horned Lizard

The Plan Area represents the northernmost and westernmost limits of flat-tailed horned lizard geographic range. The populations in the Coachella Valley are isolated from all other flat-tailed horned lizard populations by agriculture, urban Development, and by the Salton Sea. As a group, the Coachella Valley population can be viewed as a distinct vertebrate population pursuant to FESA. To date, no analyses have been completed to determine if this distinct population differs genetically from the more southeastern populations.

The historic range of this species included suitable Habitat in southeastern California, southwestern Arizona, northwestern Sonora, Mexico, and northeastern Baja California, Mexico. In California, they occurred in the Lower Colorado River Basin and the Salton Basin (Coachella and Imperial Valleys) from Palm Springs south-southeast to the Mexican border - an area of about 3,462 square miles. Historically there were about 694 square miles in the Coachella Valley Plan Area of Riverside County. Currently, less than 50% of the historic Habitat in California remains (Turner et al. 1980).

Effects of Take on the Flat-Tailed Horned Lizard

The primary importance of the proposed MSHCP to the flat-tailed horned lizard is that it provides for long-term Conservation (including Habitat protection, management and monitoring) of Core Habitat, the associated Essential Ecological Processes, and connectivity between these

Habitat areas. In addition, the Conservation Areas provide protection across an array of Habitat variables, including moisture, soil character, elevation, and vegetation.

There are 32,426 acres of predicted modeled Habitat for this species within the Plan Area of which approximately 4,148 acres are identified as Core Habitat. For predicted Habitat, the Plan would ensure Conservation of 4,051 acres (98% of total) of the Core Habitat and 9,857 acres (93% of total) of the Other Conserved Habitat for the flat-tailed horned lizard. The conserved Core Habitat area in the Thousand Palms Conservation Area would be greater than 4,000 acres. Approximately 6,574 acres (20%) 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 7,334 acres (23%) of predicted modeled Habitat for the flat-tailed horned lizard in the Plan Area.

For potential Habitat, there are 5,161 acres of modeled Habitat for this species within the Plan Area. The Plan would ensure Conservation of 3,203 acres (90% of total) of the potential Other Conserved Habitat for the flat-tailed horned lizard. Approximately 940 acres (26%) of the modeled potential Habitat are within Existing Conservation Lands and would be managed as part of the Reserve System. The Plan would conserve an additional 2,263 acres (64%) of potential modeled Habitat for the flat-tailed horned lizard in the Plan Area.

Within the Conservation Areas under the worst case scenario, Take could occur within 830 acres (6%) of predicted Habitat and 247 acres of potential modeled Habitat (7%). There could be Take on approximately 97 acres (2%) of all Core Habitat. Take could also occur within 733 acres of predicted Other Conserved Habitat (7% of total) and 247 acres (7%) of potential Other Conserved Habitat (See Table 9-17 and Table 4-114). Take of flat-tailed horned lizard Habitat within the Conservation Areas must be consistent with the Conservation Objectives for this species to: 1) ensure Conservation of Core Habitat; 2) protect Essential Ecological Processes needed to maintain horned lizard Habitat; and 3) maintain Biological Corridors and Linkages among conserved populations to provide for population fluctuation and enhance genetic diversity. 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 species.

Outside of the Conservation Areas, there are 16,735 acres (52%) of predicted modeled Habitat authorized for Take. There are an additional 1,483 acres (29%) of potential Habitat authorized for Take. This potential Habitat is not known to be occupied by flat-tailed horned lizards. The Habitat outside the Conservation Areas is already highly fragmented, surrounded by existing Development, and has a compromised sand source/transport system. The potential for these areas to provide for the long-term persistence of flat-tailed horned lizard populations is low. These areas are primarily in the remnants of the Big Dune south of Interstate 10. The Big Dune area no longer has a viable sand transport/wind corridor and is highly fragmented by major roads. These fragmented blocks are more susceptible to edge effects, including mortality on roads and predation by feral animals. The patches of Habitat outside the Conservation Areas occur primarily at the margins of potential Habitat, including south of the Whitewater Floodplain Preserve, east and west of the Thousand Palms Preserve, east of the Salton Sea, and southeast of Box Canyon Road.

Although the percentage of horned lizard modeled Habitat that could be lost to development within the next 75 years appears to be substantial, evaluation of the impacts of Take

requires an assessment of the quality of this Habitat. The actual reduction in Habitat value is expected to be considerably less than indicated by the raw acreage numbers because:

1. Conserved Habitat areas are large enough to contain self-sustaining populations of horned lizards and incorporate key Habitat elements, including sandy substrates and foraging areas.
2. 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.
3. 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 Willow Hole and Thousand Palms to the east end of the Indio Hills.
4. 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.
5. Lands in the MSHCP Reserve System would be managed and monitored to address significant edge effects, potential loss of Habitat from introduction of exotic species, and other stressors to this species,

The issuance of Take Permits, therefore, will not likely jeopardize the continued existence of the flat-tailed horned lizard and the implementation of the MSHCP will provide for the Conservation of this species.

Measures to Avoid, Minimize, and Mitigate Take of Flat-Tailed Horned Lizard

To mitigate the Take of flat-tailed horned lizard, the Permittees will protect and manage, in perpetuity, 7,334 acres of the predicted modeled Habitat for this species. The 6,574 acres of modeled Habitat within Existing Conservation Lands will be monitored and managed to ensure that Conservation Objectives are met. The Plan will thus ensure Conservation, through protection and management, of 13,908 acres of Additional Conservation Lands for this species.

The Plan includes a total of 37,587 acres of the predicted and potential Habitat for the flat-tailed horned lizard. Only one area was delineated as Core Habitat for this species, at the Thousand Palms Preserve. On the Thousand Palms Preserve, Foreman (1997) estimated approximately 6,000 acres as suitable Habitat for the flat-tailed horned lizard. The Planning Team for this Plan delineated approximately 4,148 acres as Core Habitat. Conservation Objectives ensure the conservation of at least 4,051 acres in the Thousand Palms Conservation Area.

The Plan also includes protection of Other Conserved Habitat at the Whitewater Floodplain Preserve and on Flat Top Mountain as part of the Willow Hole Conservation Area. Additional potential Habitat west of Indian Avenue, potential Habitat at Willow Hole, and potential Habitat between Willow Hole, Edom Hill, and the Thousand Palms Preserve would also be conserved. Other Conserved Habitat will also be conserved within the East Indio Hills Conservation Area where this lizard is known to occur. Some Development has occurred in this area in the last two

years within flat-tailed horned lizard Habitat, eliminating several known locations on the south side of the Indio Hills. The Habitat for this species that is not within the MSHCP Reserve System is generally highly fragmented in the remnants of the Big Dune, from Palm Springs east to La Quinta and Indio. These are areas where Essential Ecological Processes are already altered and degraded. Take could occur on 51% of the total Habitat, whether confirmed as occupied or not, for this species under the Plan.

Additionally, the Plan calls for Management and Monitoring Programs to ensure the Conservation of this species, including control of activities that degrade horned lizard Habitat, evaluation and management of edge effects and other impacts through Adaptive Management, control of invasive species where necessary, and restoration and enhancement of degraded Habitat as necessary according to monitoring results.

Overall Impacts to Flat-Tailed Horned Lizard under the Plan

Implementation of the Plan is expected to maintain and enhance population viability of the flat-tailed horned lizard as unprotected portions of its Habitat, potential Habitat areas, and Essential Ecological Processes for the sand dunes and fields will be conserved.

The flat-tailed horned lizard will benefit from the establishment of the MSHCP Reserve System which will build on the existing Conservation of 20% of this species Habitat. Plan implementation will ensure Conservation of currently unprotected Core Habitat areas for this lizard. The combination of the overall Conservation measures; species-specific measures such as management to minimize edge effects, fragmentation, and other impacts in flat-tailed horned lizard Habitat, monitoring to better understand the distribution and ecology of this species and the impacts of stressors on this species, and long-term protection, management, and enhancement of its Habitat is expected to effectively compensate for potential adverse effects to the flat-tailed horned lizard.

9.6.3.5 Species Account: Background

Distribution, Abundance, and Trends. The flat-tailed horned lizard is often associated with sand flats and sand dunes, although it is rare on more active dunes. It also occurs far from blowsand on concreted silt and gravel substrates (Beauchamp et al. 1998, Cameron Barrows, pers. comm., Muth and Fisher 1992). In their comparisons of Habitat types, Turner et al. (1980) determined the "best" Habitat consisted of hard packed sand or desert pavement overlain with fine blowsand. The most common perennial plants associated with Habitat for this lizard are creosote bush (*Larrea tridentata*) and white bursage (*Ambrosia dumosa*) (Turner et al. 1980, Muth and Fisher 1992).

Within the Plan Area, the flat-tailed horned lizard occurs at low elevations in the valley. Nearly all sightings in California and Arizona were below 800 feet (250 m) elevation (Mayhew and Carlson 1986, Turner et al. 1980, M. Fisher, pers. comm.). This lizard is found in two protected areas created by the HCP: the Thousand Palms Preserve and the Whitewater Floodplain Preserve. Another population is known from an unprotected area at the east end of the Indio Hills on the north side of the Coachella Canal. A potential Habitat corridor was identified between the east end of the Indio Hills and the Thousand Palms Preserve. In a survey conducted to evaluate the suitability of this corridor in 1999 it was concluded that the corridor is not presently suitable for

flat-tailed horned lizards (Hays, LaPointe, and Wright 1999).

The Plan Area represents the northernmost and westernmost limits of flat-tailed horned lizard geographic range. The populations in the Coachella Valley are isolated from all other flat-tailed horned lizard populations by agriculture, urban Development, and by the Salton Sea. As a group, the Coachella Valley population can be viewed as a distinct vertebrate population pursuant to FESA. To date, no analyses have been completed to determine if this distinct population differs genetically from the more southeastern populations. The historic range of this species included suitable Habitat in southeastern California, southwestern Arizona, northwestern Sonora, Mexico, and northeastern Baja California, Mexico. In California, they occurred in the Lower Colorado River Basin and the Salton Basin (Coachella and Imperial Valleys) from Palm Springs south-southeast to the Mexican border - an area of about 3,462 square miles. Historically there were about 694 square miles in the Coachella Valley Plan Area of Riverside County. Currently, less than 50% of the historic Habitat in California remains (Turner et al. 1980).

The flat-tailed horned lizard lives in low elevation desert characterized by extremely high temperatures and low rainfall and humidity. The flat-tailed horned lizard has a higher preferred body temperature than its congener, the desert horned lizard (*Phrynosoma platyrhinos*) (Brattstrom 1965). This enables the flat-tailed horned lizard to exploit a hotter environment, but at the same time may restrict it to that environment. Thus, there is little overlap in the geographic ranges of the two horned lizards found in the Coachella Valley (flat-tailed horned lizards, *P. mcallii,* and desert horned lizard, *P. platyrhinos*).

Like related species, flat-tailed horned lizards are myrmecophageous; they eat ants. Ants, especially harvester ants, comprise about 98% of their diet. The proportion of ants in the diet is substantially higher in the flat-tailed horned lizard than in any other horned lizard (Pianka and Parker 1975, Turner and Medica 1982).

The flat-tailed horned lizard is relatively active for a desert lizard. More than half (54%) of the day is spent in some kind of activity, including feeding, digging burrows, and running (Muth and Fisher 1992). They eat ants they encounter while moving. They dig burrows to escape hot midday temperatures, and for winter hibernation. Most of the remaining activity involves running to locate food, suitable burrow sites, and mates. The mean home range size is nearly 300,000 sq. ft. (over 6½ acres), a large portion of which is covered daily. When approached by a potential predator, a flat-tailed horned lizard usually stops running and flattens its body against the ground. It relies on cryptic coloration to avoid predation and will usually remain immobile until after the threat has passed. This behavior makes the species difficult to locate in the field; in blowsand Habitats, they may be located by following tracks left in freshly deposited sand (Cameron Barrows, pers. comm.).

Adult flat-tailed horned lizards are obligatory hibernators (Mayhew 1965). They hibernate from mid-November to mid-February in shallow burrows, although at least some juveniles are active on warm days during the winter (Cameron Barrows, pers. comm.). Reproductive activity begins in the spring and the first clutch of eggs hatches in late July. A second cohort may hatch in September. One or both of these cohorts may not be produced or may not survive if environmental conditions are severe. Females lay about five eggs per clutch, on average. Young grow quickly and reach sexual maturity by one year of age.

About 50% of all individuals survive from one year to the next, with most mortality in mid-summer. Population density estimates range from 0.5 (Muth and Fisher 1992) to 2.4 (Turner and Medica 1982) flat-tailed horned lizards per acre. The lower value may underestimate the true density, and the higher value may overestimate it. In addition, density may vary annually with changes in environmental conditions.

Associated Covered Species. Within the Plan Area, other species of concern whose Habitat overlaps with that of the flat-tailed horned lizard include the Coachella Valley milkvetch, Palm Springs pocket mouse, Coachella Valley fringe-toed lizard, Coachella Valley round-tailed ground squirrel, Coachella Valley giant sand-treader cricket, Coachella Valley Jerusalem cricket, and burrowing owl.

9.7 Birds

This section contains species accounts, including Species Conservation Goals and Objectives, Habitat parameters and significant threats, for each of the eleven bird species proposed for coverage under this Plan. The birds include species that are resident in the Coachella Valley, including the burrowing owl, California black rail, crissal thrasher, and Le Conte's thrasher. A number of the species are migratory, occurring in the Coachella Valley primarily during migration, or during the nesting season. The migratory species include the gray vireo, Yuma clapper rail, and five riparian bird species, including the least Bell's vireo, southwestern willow flycatcher, summer tanager, yellow warbler, and yellow-breasted chat. For the riparian bird species, consideration was given in the Plan to Habitat used for breeding and Habitat used during migration. General measures common to all of these birds are listed below and measures specific to a given species that are not addressed in the general conservation measures are listed as species-specific conservation measures.

1. Avoid impacts to Habitat during nesting season, generally from February through July, for all bird species.

9.7.1 Yuma Clapper Rail *Rallus longirostris yumanensis*

Status **Federal:** **Endangered**
State: **Threatened**

9.7.1.1 Species Conservation Goals and Objectives

Conserve and manage populations within the MSHCP Reserve System according to the following criteria:

Goal 1: Ensure species persistence in the Plan Area by conserving existing populations, restoring degraded Habitat, and establishing additional Habitat as feasible. Conserve Habitat, and associated Essential Ecological Processes, allowing evolutionary processes and natural population fluctuations to occur. Minimize fragmentation, human-caused disturbance, and edge effects to Core Habitat by conserving contiguous Habitat patches and effective Linkages between patches of Core Habitat.

Objective 1a. Ensure conservation of Other Conserved Habitat, which consists of known Habitat areas and additional potential Habitat, including at least 744 acres in the following Conservation Areas:

- Dos Palmas Conservation Area
- Coachella Valley Stormwater Channel and Delta Conservation Area

Please refer to Section 4.3 and Table 9-18 for specific acreages to be protected by this Conservation Objective.

Objective 1b. Establish 66 acres of permanent Habitat for Yuma clapper rail in the Coachella Valley Stormwater Channel and Delta Conservation Area to replace the Habitat that is periodically altered by flood control and drain maintenance activities.

Goal 2: Protect Essential Ecological Processes, which may include hydrological regimes, necessary to maintain Core Habitat and Other Conserved Habitat for this species.

Objective 2. Ensure protection of Essential Ecological Process areas through Conservation Area Conservation Objectives for Essential Ecological Processes.

Goal 3: Ensure conservation of Yuma clapper rail 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.

Objective 3. Implement biological monitoring and Adaptive Management to ensure self-sustaining populations within each Core Habitat area.

Table 9-18: Summary of Habitat within Conservation Areas Yuma Clapper Rail

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*
Dos Palmas	682	42	267	374	641	Other Cons. Habitat
CV Stormwater Channel & Delta	62	6	4	52	56	Other Cons. Habitat
Total – All Habitat	*744*	*47*	*271*	*426*	*697*	--
Total – Other Cons. Habitat	*744*	*47*	*271*	*426*	*697*	--

9.7.1.2 Threats, Limiting Factors, and Adaptive Management

Water diversions, salt cedar infestations, Habitat manipulation for flood control and chemical contamination (the last two pertain primarily to the Whitewater delta) are the primary threats to Yuma clapper rails within the Plan Area. Another potential threat is the lining of the Coachella Canal; leakage from the Coachella Canal currently provides a portion of the water supply to rail Habitat at the Dos Palmas Preserve/ACEC. There are small amounts of Yuma clapper rail Habitat in the Plan Area, and it is unknown whether the Habitat areas are large enough to sustain a viable population. However, while the amount of Habitat in the Plan Area is relatively small, it is part of a larger network of Habitat in the Salton Sea basin. Even if the Habitat in the Plan Area is not able to support a viable population, it contributes to the larger population within the Salton Sea basin. The Habitat in the Plan Area may also provide important support as other parts of the Salton Sea basin change or undergo active management. Additional surveys are needed as part of Plan implementation to determine patch sizes and whether they are adequate for a self-sustaining population. There are opportunities for Habitat restoration and enhancement in the Plan Area.

The following actions may be needed to ensure species persistence and long-term viability if biological monitoring indicates that such actions are warranted. This list is not comprehensive but identifies some of the known or likely threats to clapper rails. More detailed information on the Management and Monitoring Programs can be found in Section 8.0. Actions may include:

1. Control invasive species, including plant species such as tamarisk and animal species such as non-native ants, brown-headed cowbirds, bullfrogs, and other species that threaten rail Habitat. Crayfish are an exotic species that has become an important component of the diet for Yuma clapper rail in the Salton Sea basin (C. Roberts, pers. comm.); if monitoring indicates that control of crayfish is necessary, the need to establish other suitable prey for

the Yuma clapper rail should be evaluated by the CVCC, Permittees, and the Wildlife Agencies. If the evaluation concludes that a new or enhanced prey base for the Yuma clapper rail is necessary to achieve the goals and objectives of the Plan, a management strategy that includes an implementation schedule will be developed by the CVCC within 12 months of that determination and submitted to the Wildlife Agencies for review and approval.

2. As part of the Monitoring Program, complete hydrologic studies for the Salt Creek area to determine if the water sources for the clapper rail's Habitat are adequately protected or if additional water sources may be needed.
3. To the extent activities are under Plan authority, maintain water levels, water quality, and proper functioning condition of seeps, springs, marshes, and wetlands. Conduct research on the potential impacts of these activities on Yuma clapper rails.
4. Estimate population size or patch occupancy of the Yuma clapper rails in the Plan Area.
5. Restore and enhance Habitat for Yuma clapper rails. This may include enhancing specific features in marshes, such as nesting sites.
6. Evaluate management actions for black rails as to affects on Yuma clapper rails.
7. Research methods of drain maintenance that minimize impacts to Yuma clapper rails.

9.7.1.3 Species Conservation Analysis

Conservation Area Reserve Design. The occupied Habitat in the Dos Palmas area is within the Dos Palmas Preserve/ACEC. Most of the land within the ACEC is owned by either the BLM or TNC/CNLM. Some private inholdings remain to be acquired, and would be acquired pursuant to the Plan as willing sellers and funds are available. The Habitat at the Salton Sea State Recreation Area is managed by State Parks to conserve the species; efforts will be made to coordinate with the recreation area for management of Yuma clapper rail at this location.

The Planning Team did not attempt to estimate population densities or identify acres of Core Habitat for the Yuma clapper rail. The intent was to conserve all known locations and contiguous Habitat. The distribution of clapper rail Habitat by Conservation Area is shown in Table 9-18.

9.7.1.4 Analysis: Impacts of Disturbance

Significance of the Plan Area to Yuma Clapper Rail

The Plan Area is at the northern edge of the Yuma clapper rail distribution. There are records of occurrences from the Whitewater River delta and upstream, in scattered locations, for approximately 10 miles along the Coachella Valley Stormwater Channel, two agricultural drains on the west side of the Salton Sea, at the mouth of Salt Creek, and in the Dos Palmas area. The Yuma clapper rail is a federally listed endangered species and is state listed as threatened. Yuma clapper rails are now and have historically been restricted to the region of the lower Colorado River, the Colorado River delta, and appropriate Habitats surrounding the Salton Sea and in the Whitewater River north of the sea. There are rare records for this species in marshland Habitat along the eastern shore of the Sea of Cortez. Within this historic range, appropriate Habitat along

the lower Colorado River and delta areas has been severely reduced through water diversions and tamarisk/salt cedar infestations.

Effects of Disturbance on the Yuma Clapper Rail

The primary importance of the proposed MSHCP to the Yuma clapper rail is that currently unprotected Habitat will be conserved, additional Habitat will be created, and existing Habitat will be enhanced as a result of the Monitoring and Management Programs.

There are 762 acres of modeled Habitat for this species within the Plan Area of Core Habitat was not designated for this species although all known Habitat was considered as core. The Plan would ensure Conservation of 697 acres (91%) of the Habitat for this rail. Approximately 271 acres (36%) of the modeled Habitat are within Existing Conservation Lands and would be managed as part of the Reserve System. There are 6 known locations for Yuma clapper rail within the Dos Palmas Conservation Area 5 of which are within Existing Conservation Lands. The Plan would conserve a total of 697 acres (94%) of the modeled Habitat for Yuma clapper rail in the Plan Area.

Within the Conservation Areas under the worst case scenario, 47 acres of Disturbance of modeled Habitat (6%) could occur. Disturbance of Yuma clapper rail Habitat within the Conservation Areas must be consistent with the Conservation Objectives for this species to: 1) ensure Conservation of Core Habitat; 2) protect Essential Ecological Processes including the hydrological regime needed to maintain rail Habitat; and 3) maintain Biological Corridors and Linkages among conserved populations to provide for population fluctuation and enhance genetic diversity. So, although some Disturbance 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 species.

Outside of the Conservation Areas, there are 16 acres of modeled Habitat authorized for Disturbance. There are 14 known locations for this rail, 8 of which are outside the Conservation Areas. The Habitat outside the Conservation Areas occurs along the Coachella Valley Stormwater Channel, north of the Stormwater Channel and Delta Conservation Area boundary. This Habitat is impacted by periodic flood control channel maintenance by CVWD. The impacts to this Habitat will be mitigated by the creation of replacement permanent rail Habitat by CVWD (see below).

The establishment of Conservation Areas where this species is protected is a significant improvement over the current situation where only 33% of the clapper rail's Habitat is protected. The actual impacts of Disturbance to this species are expected to be low because:

1. Conserved Habitat areas are large enough to support part of a self-sustaining metapopulations of Yuma clapper rails and incorporate key Habitat elements, including cattail/bulrush vegetation and foraging areas.
2. Disturbance within the Conservation Areas would not eliminate or significantly impact any core populations. Conservation Objectives require any approved Development or disturbance within Conservation Areas to ensure protection of existing populations.
3. As a result of implementing the Conservation Objectives to protect this species existing populations would be conserved, degraded Habitat would be restored, and additional

Habitat would be established. Habitat areas are adequately connected to each other to allow genetic exchange. Biological Corridors and Linkages would be conserved to provide Habitat connectivity.

4. Potential Development would not adversely impact the Essential Ecological Processes needed to maintain currently viable Habitat, including maintenance of water quality, water quantity, and associated hydrological regime that supports the wetland Habitat for clapper rails.

5. Habitat for Yuma clapper rail 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,

The issuance of Permits, therefore, will not likely jeopardize the continued existence of the Yuma clapper rail and the implementation of the MSHCP will provide for the Conservation of the species.

Measures to Avoid, Minimize, and Mitigate Disturbance of Yuma Clapper Rail

To mitigate impacts to Yuma clapper rail, the Permittees will protect and manage, in perpetuity, 426 acres of the modeled Habitat for this species. The 271 acres of modeled Habitat within Existing Conservation Lands will be monitored and managed to ensure that Conservation Objectives are met. The Plan will thus ensure Conservation, through protection and management, of 697 acres, or 91%, of the clapper rail Habitat in the Plan Area.

Some temporary impacts to Yuma clapper rail Habitat will be permitted in the course of O&M activities by CVWD. The Coachella Valley Water District (CVWD) will establish 66 acres of permanent Habitat for the California black rail and Yuma clapper rail in this Conservation Area to replace the 41 acres of Habitat in the Coachella Valley Stormwater Channel and the 25 acres of Habitat in the drains that is periodically altered by flood control and drain maintenance activities (See Section 4.3.20). As part of this restoration a plan detailing the location, water supply, and monitoring and management responsibilities, including funding will be developed within two years of permit issuance.

Additionally, the Plan calls for Management and Monitoring Programs to ensure the Conservation of this species, including control of activities that degrade rail Habitat, control of invasive species where necessary, and restoration and enhancement of degraded Habitat as necessary according to monitoring results.

1. If monitoring indicates that control of crayfish is necessary, the need to establish other suitable prey for the Yuma clapper rail should be evaluated. Crayfish, an exotic species, has become an important component of the diet for Yuma clapper rail in the Salton Sea basin (C. Roberts, pers. comm.).

2. As part of the Monitoring Program, complete hydrologic studies for the Salt Creek area to determine if the water sources for the clapper rail's Habitat are adequately protected or if additional water sources may be needed.

3. To the extent activities are under Plan authority, maintain water levels, water quality, and proper functioning condition of seeps, springs, marshes, and wetlands.

The Yuma clapper rail is a Fully Protected Species. Surveys will be required in potential Habitat for this rail before any activity that would impact the Habitat. If rails are found, the Habitat must be avoided or measures approved by The Wildlife Agencies taken to ensure that no take of an individual occurs, other than projects where Fish and Game Code Section 2081.7 is applicable.

Overall Impacts to Yuma Clapper Rail under the Plan

Implementation of the Plan is expected to maintain and enhance population viability of the Yuma clapper rail by protecting its existing Habitat in the Plan Area and restoring and enhancing additional Habitat. The BLM and TNC prepared a Dos Palmas Ecosystem Management Plan in 1994. BLM and the CNLM now manage the ACEC lands. A primary objective of the Dos Palmas plan is to provide for the protection and enhancement of desert pupfish and rail Habitat. Plan implementation will coordinate with BLM and CNLM.

The Yuma clapper rail will benefit from the establishment of the MSHCP Reserve System which will include Habitat in the Dos Palmas and Coachella Valley Stormwater Channel and Delta Conservation Areas. Only 33% of the modeled Habitat for this species is currently conserved. Implementation of the Plan is expected to provide for persistence of this threatened and endangered rail 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 rails 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 Yuma clapper rail Habitat is expected to effectively compensate for potential adverse effects to this bird species.

9.7.1.5 Species Account: Background

Distribution, Abundance, and Trends. Yuma clapper rails are found in marsh Habitats of cattails (*Typha domingensis*) and bullwhip/California bulrush (*Scirpus californicus*). In Habitats found along and adjacent to the lower Colorado River, these rails selected some combination of cattails and bulrush for breeding. There was a post-breeding shift at some sites concurrent with a rise in water level, to higher elevation willows, arrowweed and salt cedar dominated Habitats. Common reed (*Phragmites communis*) was also used as Habitat, but usually occurred in areas too dry for breeding and foraging. Water depth appears to be an important Habitat characteristic, with average preferred depths varying from 6.5 cm to 20 cm, depending on the study site. In deeper water, a residual mat of decaying vegetation was important to allow the rails to have access and use throughout their home range. The rails also preferred Habitat edges and generally less dense Habitat to facilitate mobility and access. Home ranges for male birds were found to average 7.7 +/- 5.9 ha, and for females 9.9 +/- 9.6 ha.

The Salton Sea and Whitewater River Habitats are potentially impacted by chemical contaminants, salt cedar infestations, and flood control channel maintenance. The Yuma clapper rail occurs at the Salton Sea State Recreation Area at the mouth of Salt Creek. Yuma clapper rails occur within the Dos Palmas marshland complex in unknown numbers. The Dos Palmas area may have particular importance in that it may be one of the few occupied sites throughout this bird's entire range that is relatively free of chemical contaminants. Both Dos Palmas and the Whitewater River delta/Salton Sea could, if managed appropriately, provide additional Habitat to what already exists there. The population size of Yuma clapper rails within this area is not known, nor is the

trend in its population numbers, but it is likely that this population will require immigration from occupied Habitat to the south to maintain long term viability.

Associated Covered Species. California black rails are often found in association with Yuma clapper rail Habitat. Conservation measures for one species will benefit the other. Desert pupfish and riparian birds may be found in associated wetland Habitat.

9.7.2 California Black Rail *Laterallus jamaicensis*

Status **Federal:** **No official status**
State: **Threatened**

9.7.2.1 Species Conservation Goals and Objectives

Conserve and manage populations within the MSHCP Reserve System according to the following criteria:

Goal 1: Ensure species persistence in the Plan Area by conserving existing populations, restoring degraded Habitat, and establishing additional Habitat. Conserve Habitat, and associated Essential Ecological Processes, allowing evolutionary processes and natural population fluctuations to occur. Minimize fragmentation, human-caused disturbance, and edge effects to Core Habitat by conserving contiguous Habitat patches and effective Linkages between patches of Core Habitat.

Objective 1a. Ensure conservation of Other Conserved Habitat, which consists of known Habitat areas and additional potential Habitat, including at least 616 acres in the following Conservation Areas:

- Dos Palmas Conservation Area
- Coachella Valley Stormwater Channel and Delta Conservation Area

Please refer to Section 4.3 and Table 9-19 for specific acreages to be protected by this Conservation Objective.

Objective 1b. Establish 66 acres of permanent Habitat for California black rail in the Coachella Valley Stormwater Channel and Delta Conservation Area to replace the Habitat that is periodically altered by flood control and drain maintenance activities.

Table 9-19: Summary of Habitat within Conservation Areas California Black Rail

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 of Habitat to be Conserved in MSHCP Reserve System*	*Designation*
Dos Palmas	597	37	226	334	560	Other Cons. Habitat
CV Stormwater Channel & Delta	62	6	4	52	56	Other Cons. Habitat
Total – All Habitat	*659*	*43*	*230*	*386*	*616*	--
Total - Other Cons. Habitat	*659*	*43*	*230*	*386*	*616*	--

Goal 2. Protect Essential Ecological Processes, which may include hydrological regimes, necessary to maintain Core Habitat and Other Conserved Habitat for this species.

Objective 2. Ensure protection of Essential Ecological Process areas through Conservation Area Conservation Objectives for Essential Ecological Processes.

Goal 3. Ensure conservation of California black rail 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.

Objective 3. Implement biological monitoring and Adaptive Management to ensure self-sustaining populations within each Habitat area.

9.7.2.2 Threats, Limiting Factors, and Adaptive Management

Threats to the California black rails' continued occurrence within the Plan Area include water diversions that reduce marsh Habitat, including the lining of the earthen Coachella canal above Dos Palmas; Habitat modification for flood control at the Whitewater River delta; tamarisk infestations which degrade and dry up marsh Habitat; and predation from exotic bullfrogs. Even with appropriate Habitat management practices, the California black rail population within the Plan Area is small and will probably require immigration from Habitats outside the area being addressed in this Plan to maintain long-term viability.

Based on limited knowledge about the status of this species in the Plan Area and known threats, the following actions may be needed to ensure species persistence and long-term viability if biological monitoring indicates that such actions are warranted. This list is not comprehensive but identifies some of the known or likely threats to black rails. More detailed information on the Management and Monitoring Programs can be found in Section 8.0. Actions may include:

1. Control invasive species, including plant species such as tamarisk and animal species such as non-native ants, brown-headed cowbirds, bullfrogs, crayfish, and other species that threaten black rail Habitat.
2. As part of the Monitoring Program, complete hydrologic studies for the Salt Creek area to determine if the water sources for the black rail's Habitat are adequately protected or if additional water sources may be needed.
3. To the extent activities are under Plan authority, maintain water levels, water quality, and proper functioning condition of seeps, springs, marshes, and wetlands.

BLM and TNC prepared a Dos Palmas Ecosystem Management Plan in 1994. BLM and CNLM now manage the ACEC lands. A primary objective of the Dos Palmas plan is to provide for the protection and enhancement of desert pupfish and rail Habitat. Plan implementation will involve coordination with BLM and CNLM.

9.7.2.3 Species Conservation Analysis

Conservation Area Reserve Design. The occupied Habitat in the Dos Palmas area is within the Dos Palmas ACEC. Most of the land within the ACEC is owned by either the BLM or TNC/CNLM. Some private inholdings remain to be acquired, and would be acquired pursuant to the Plan as willing sellers and funds are available. Two of the three known locations in the Dos Palmas Conservation Area are on private land; the third is on BLM land. Habitat at the Salton Sea State Recreation Area is managed for the Conservation of the species by State Parks. Protection and enhancement of the Coachella Valley Stormwater Channel and Delta population depends on achieving an agreement with CVWD regarding flood control channel maintenance. One black rail known occurrence is within the Coachella Valley Stormwater Channel and Delta on IID land. Additional information on dispersal distances is needed to evaluate configuration issues and whether the Conservation Areas for this species are currently too far apart to provide any connection.

The BLM and TNC prepared a Dos Palmas Ecosystem Management Plan in 1994. BLM and CNLM now manage the ACEC lands. A primary objective of the Dos Palmas plan is to provide for the protection and enhancement of desert pupfish and rail Habitat. The Plan will coordinate with BLM and CNLM in its implementation. Coordination with State Parks with regard to management of rail Habitat at the Salton Sea State Recreation Area will also be a part of Plan implementation.

The Planning Team did not attempt to estimate population densities or identify acres of Core Habitat for the California black rail. The intent was to conserve all known locations and contiguous Habitat. The distribution of California black rail Habitat by Conservation Area is shown in Table 9-19.

9.7.2.4 Disturbance Analysis

Significance of the Plan Area to California Black Rail

Historically, California black rails occurred along the Pacific coast from Bahia San Quintin in Baja California to San Diego, Los Angeles and north to San Francisco. Inland, these rails occurred from the delta of the Colorado River north to the central valley of California and on to eastern Oregon marshlands. Today, the coastal and inland wetlands are greatly reduced from their historic range.

A desert stronghold for this species appears to be along the lower Colorado River where over a hundred birds have been observed repeatedly during censuses in recent years. California black rails are known to occur within the Salt Creek watershed of the Dos Palmas region, both in the wetlands in the Dos Palmas Springs area and at the mouth of Salt Creek. No accurate numbers are available. There is also a record from the Whitewater delta area at the north end of the Salton Sea. Appropriate management of both Dos Palmas and the Whitewater delta could expand existing Habitat for this species.

Effects of Disturbance on the California Black Rail

The primary importance of the proposed MSHCP to the California black rail is that currently unprotected Habitat will be conserved, additional Habitat will be created, and existing Habitat will be enhanced as a result of the Monitoring and Management Programs.

There are 675 acres of modeled Habitat for this species within the Plan Area of Core Habitat was not designated for this species although all known Habitat was considered as core. The Plan would ensure Conservation of 616 acres (91%) of the Habitat for this rail. Approximately 230 acres (34%) of the modeled Habitat are within Existing Conservation Lands and would be managed as part of the Reserve System. Overall, the Plan would conserve a total of 616 acres (91%) of the modeled Habitat for California black rail in the Plan Area.

Within the Conservation Areas under the worst case scenario, 43 acres of Disturbance of modeled Habitat (7%) could occur. Disturbance of California black rail Habitat within the Conservation Areas must be consistent with the Conservation Objectives for this species to: 1) ensure Conservation of Core Habitat; 2) protect Essential Ecological Processes including the hydrological regime needed to maintain rail Habitat; and 3) maintain Biological Corridors and Linkages among conserved populations to provide for population fluctuation and enhance genetic diversity. So, although some Disturbance 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 black rails.

Outside of the Conservation Areas, there are 16 acres of modeled Habitat authorized for Disturbance. The Habitat outside the Conservation Areas is located along the Coachella Valley Stormwater Channel in an area of potential Habitat where the occurrence of black rails has not been confirmed. As with the Yuma clapper rail, the impacts to this Habitat as a result of flood control channel maintenance will be mitigated by the establishment of replacement permanent rail Habitat by CVWD (see below).

The establishment of Conservation Areas where this species is protected is a significant improvement over the current situation where only 33% of the black rail's Habitat is protected. The actual impacts of Disturbance to this species are expected to be low because:

1. Conserved Habitat areas are large enough to support, to the extent they occur, self-sustaining metapopulations of California black rails and incorporate key Habitat elements, including bulrush-dominated vegetation and foraging areas.
2. Disturbance within the Conservation Areas would not eliminate or significantly impact any core populations. Conservation Objectives require any approved Development or disturbance within Conservation Areas to ensure protection of existing populations.
3. As a result of implementing the Conservation Objectives to protect this species existing populations would be conserved, degraded Habitat would be restored, and additional Habitat would be established. Habitat areas are adequately connected to each other to allow genetic exchange. Biological Corridors and Linkages would be conserved to provide Habitat connectivity.
4. Potential Development would not adversely impact the Essential Ecological Processes needed to maintain currently viable Habitat, including maintenance of water quality, water quantity, and associated hydrological regime that supports the wetland Habitat for black rails.
5. Habitat for California black rail 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.

The issuance of Permits, therefore, will not likely jeopardize the continued existence of the California black rail and the implementation of the MSHCP will provide for the Conservation of the species.

Measures to Avoid, Minimize, and Mitigate Disturbance of California Black Rail

To mitigate the Disturbance of California black rail, the Permittees will protect and manage, in perpetuity, 659 acres of the modeled Habitat for this species. The 230 acres of modeled Habitat within Existing Conservation Lands will be monitored and managed to ensure that Conservation Objectives are met. The Plan will thus ensure Conservation, through protection and management, of 616 acres of Additional Conservation Lands for this species

Under the Plan, approximately 616 acres, or 91%, of the Habitat for this rail in the Plan Area will be conserved. All of the four known locations within the Plan Area are within the Coachella Valley Stormwater Channel and Delta or Dos Palmas Conservation Areas. Some temporary impacts to California black rail Habitat will be permitted in the course of O&M activities by CVWD. CVWD will establish and maintain 66 acres of Habitat for rails in the Coachella Valley Stormwater Channel and Delta Conservation Area (See Section 4.3.20 and Section 9.7.1.4 above for Yuma clapper rail).

Additionally, the Plan calls for Management and Monitoring Programs to ensure the Conservation of this species, including control of activities that degrade rail Habitat, control of

invasive species where necessary, and restoration and enhancement of degraded Habitat as necessary according to monitoring results.

1. As part of the Monitoring Program, complete hydrologic studies for the Salt Creek area to determine if the water sources for the black rail's Habitat are adequately protected or if additional water sources may be needed.
2. To the extent activities are under Plan authority, maintain water levels, water quality, and proper functioning condition of seeps, springs, marshes, and wetlands.

The California black rail is a Fully Protected Species. Surveys will be required in potential Habitat for this rail before any activity that would impact the Habitat. If rails are found, the Habitat must be avoided or measures approved by The Wildlife Agencies taken to ensure that no take of an individual occurs, other than projects where Fish and Game Code Section 2081.7 is applicable.

Overall Impacts to California Black Rail under the Plan

Implementation of the Plan is expected to maintain and enhance population viability of the California black rail by protecting its existing Habitat in the Plan Area and restoring and enhancing additional Habitat.

The California black rail will benefit from the establishment of the MSHCP Reserve System which will include Habitat in the Dos Palmas and Coachella Valley Stormwater Channel and Delta Conservation Areas. Only 33% of the modeled Habitat for this species is currently conserved. Implementation of the Plan is expected to provide for persistence of this threatened and endangered rail 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 rails 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 California black rail Habitat is expected to effectively compensate for potential adverse effects to this bird species.

9.7.2.5 Species Account: Background

Distribution, Abundance, and Trends. California black rails are birds of dense coastal and inland marsh Habitat. Based on radio telemetry data gathered on the lower Colorado River, California black rails selected Habitat dominated by California bulrush (*Scirpus californicus*) and three square bulrush (*S. americanus*). They either avoided cattails (*Typha domingensis*) or utilized cattail Habitat in proportion to its availability. However, nests were often constructed of cattail leaf blades, even though cattails were rarely the dominant vegetation type surrounding the nest. Preferred Habitat sites had a shallow water depth of <2.5 cm, with 25% of the substrate covered in water. They preferred areas closer to the shoreline than would have been expected in random distribution.

Depending on sex and time of year, home range size in appropriate Habitat along the lower Colorado River varied from 0.43 to 0.55 hectares, which are three to four times smaller than those described for the eastern black rail and may result from more stable water levels than found in tidal Habitats. The rails were found to be entirely diurnal in their activity and resident year-round.

California black rails are omnivorous, eating both invertebrates and bulrush seeds. Predators include house cats, short-eared owls, northern harriers, great blue herons, great egrets, and exotic bullfrogs.

Associated Covered Species. California black rails are often found in association with Yuma clapper rail Habitat. Conservation measures for one species will benefit the other species; however, additional information is needed on how these two species partition the Habitat. Other associated species may include riparian birds and desert pupfish.

9.7.3 Burrowing Owl *Athene cunicularia*

Status **Federal:** **Species of Concern (No official status)**
State: **Species of Special Concern**

9.7.3.1 Species Conservation Goals and Objectives

Conserve and manage populations within the MSHCP Reserve System according to the following criteria:

Goal 1: Ensure species persistence throughout its current range in the Plan Area by conserving burrowing owl Habitat, across the range of this species, and associated Essential Ecological Processes, allowing evolutionary processes and natural population fluctuations to occur. Minimize fragmentation, human-caused disturbance, and edge effects to Core Habitat by conserving contiguous Habitat patches and effective Linkages between patches of Core Habitat.

Objective 1. Ensure conservation of occupied burrowing owl burrows within the following Conservation Areas:

- Stubbe and Cottonwood Canyons Conservation Area
- Snow Creek/Windy Point Conservation Area
- Whitewater Floodplain Conservation Area
- Upper Mission Creek/Big Morongo Canyon Conservation Area
- Willow Hole Conservation Area
- Edom Hill Conservation Area
- Thousand Palms Conservation Area
- Coachella Valley Stormwater Channel and Delta Conservation Area
- Santa Rosa and San Jacinto Mountains Conservation Area

A summary of known occurrences of the burrowing owl within Conservation Areas is given in Table 9-20.

Table 9-20: Summary of Known Occurrences within Conservation Areas Burrowing Owl

Conservation Area	*Total in Plan Area*	*Disturbance Authorized (outside Conserv. Area)*	*Total Within Existing Conservation Lands*	*Remaining to be Conserved*	*Total Conserved in MSHCP Reserve System*
Burrowing Owl known occurrences[1]	74	33	23	18	41

[1] These are observations of this species at a given location. Each occurrence may represent one or more individual burrowing owls.

Goal 2: Protect Other Conserved Habitat, to provide sufficient area and variety of Habitat types to accommodate population fluctuations, allow for genetic diversity, and to conserve the range of environmental conditions within which this owl is known to occur.

Objective 2a. Through adherence to other Conservation Objectives (for another species, a natural community, Essential Ecological Process Area, Biological Corridor, or Linkage area) conserve Other Conserved Habitat for this owl in the following Conservation Areas:

- Cabazon Conservation Area
- Stubbe and Cottonwood Canyons Conservation Area
- Snow Creek/Windy Point Conservation Area
- Whitewater Floodplain Conservation Area
- Willow Hole Conservation Area
- Edom Hill Conservation Area
- Thousand Palms Conservation Area
- Indio Hills Palms Conservation Area
- Coachella Valley Stormwater Channel and Delta Conservation Area
- Santa Rosa and San Jacinto Mountains Conservation Area

Objective 2b. Implement avoidance, minimization, and mitigation measures as described in Section 4.4.

Goal 3: Ensure conservation of burrowing owl by maintaining the long-term persistence of self-sustaining populations or metapopulations and conserving Habitat quality through biological monitoring and Adaptive Management actions in the Plan Area.

Objective 3. Implement Management and Monitoring Programs to ensure self-sustaining populations within each Core Habitat area.

9.7.3.2 Threats, Limiting Factors, and Adaptive Management

The most significant threat to the continued persistence of the burrowing owl is destruction of Habitat. Their ground nesting habit also leaves them susceptible to predation by domestic cats and dogs. Individuals may be killed on roadways while foraging at night. Other studies indicated that road mortality can be a significant factor for this species; vehicle collisions caused three of five known deaths in one study (Konrad and Gilmer 1984) and 37% of known mortality in another (Haug and Oliphant 1987). 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 and by poisoning from pesticide use or rodent poisoning campaigns. OHV activity is a threat to the Habitat of this species, as their burrows can be crushed and their nest sites disturbed. Illegal trash dumping has also been observed to impact burrowing owls (K. Corey, pers. comm.).

The open burrows on the ground occupied by burrowing owls make them particularly exposed and vulnerable to predation by domestic pets and to disturbance from human activities. Coordination with the agricultural community could provide an opportunity to enhance burrowing owl populations; this coordination might include the installation of artificial nest burrows. Burrowing owl populations are also being addressed in other regional planning efforts, including planning for the Salton Sea, now in progress. Coordination with these plans, including the monitoring programs, will facilitate Conservation planning for this species in the vicinity of the Salton Sea.

The following actions may be needed to ensure species persistence and long-term viability if biological monitoring indicates that such actions are warranted. This list is not comprehensive but identifies some of the known or likely threats to this species. More detailed information on the Management and Monitoring Programs can be found in Section 8.0. Actions may include:

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, from 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.

5. Evaluate the need and potential for, and impacts of, establishment of artificial burrows in Conservation Areas after more information on current population status is obtained.

9.7.3.3 Species Conservation Analysis

Conservation Area Reserve Design. The determination of available Habitat for burrowing owls within the proposed Conservation Areas is limited in that the Planning Team determined that development of a model for this species would be of limited value. While Habitat for this species has not been modeled, burrowing owls have been observed in sandy substrate areas that are also occupied by other Covered Species, including the Coachella Valley round-tailed ground squirrel, Coachella Valley milkvetch, and Palm Springs pocket mouse. The Conservation Areas benefit this species by securing the occupied and potential Habitat and foraging areas surrounding burrow sites to allow burrowing owls to persist, away from the impacts of roads and human activity.

The Planning Team did not attempt to estimate population density for burrowing owls. As previously noted, data on the number of individuals that could occur in the Coachella Valley is limited. Additional information on home range size and Habitat requirements for burrowing owls in desert environments is needed. Burrowing owls occupy a broad array of Habitats and have been observed in areas from the sand dunes at Willow Hole, adjacent to urban areas in open creosote bush, in the wash in Mission Creek, in Bear Creek Canyon in La Quinta and Magnesia Canyon in Rancho Mirage, and in agricultural areas around the Salton Sea. The focus in this Plan was to include areas of contiguous Habitat in areas where burrowing owls are known to occur.

9.7.3.4 Take Analysis

Significance of the Plan Area to Burrowing Owl

The burrowing owl has a broad distribution that includes open country in eastern Washington and Oregon, southern, central and eastern California, central and eastern Montana, southern Idaho, Utah, Nevada, Arizona, Wyoming, Colorado, New Mexico, North Dakota, South Dakota, Nebraska, western and central Kansas, western and central Oklahoma, western Minnesota, northwestern Iowa and western Texas (Klute et al. 2003), parts of central Canada, and into Mexico and the drier regions of Central and South America. In Southern California, it is known from lowlands over much of the region, particularly in agricultural areas. The burrowing owl is a federal Species of Concern and a California Species of Special Concern.

According to a USFWS Status Report and Conservation Plan for Burrowing Owls (USFWS 2002), "California supports one of the largest resident and winter populations of burrowing owls within the United States. The distribution of burrowing owls has changed considerably since introduction of industrial agriculture and increased urbanization, reflecting both losses and gains in local populations. Surveys conducted during 1991 to 1993 reported greater than 9,000 breeding pairs. Most of the burrowing owls occurred in the Imperial and Central Valleys, primarily in agricultural areas." Research and surveys indicate that in California burrowing owl populations are declining in areas with the greatest urban growth while larger populations occur in areas of intensive agriculture (e.g., Gervais et al. 2003, Rosenberg and Haley 2003), or designated open space. DeSante and Ruhlen (1995) determined that throughout their survey area

within California that nearly 60% of the breeding groups of owls mapped in the 1980s had disappeared by the early 1990s.

Within the Plan Area, burrowing owls are scattered in low numbers on natural desert terrain throughout the lowlands. However, this species is greatly reduced in numbers throughout its range (DeSante et al. 1991, 1992), including the Coachella Valley. In a 2003 evaluation by CDFG the 74 known locations for this Plan were noted and an observation that "an estimated 10 to 20 breeding pairs are scattered over the lower end of the valley and on some of the preserves . . . " is reported (C. Barrows, pers. comm., in CDFG 2003). As a subset of the 9,000 breeding pairs reported by USFWS (2002), the Coachella Valley population is low. The known locations in the database developed for this Plan do not include any locations in the agricultural areas of the Coachella Valley. Breeding burrowing owls are known to occur in the Snow Creek/Windy Point Conservation Area, Whitewater Floodplain Conservation Area, the Upper Mission Creek/Big Morongo Canyon Conservation Area, the Willow Hole and Edom Hill Conservation Areas, and the Thousand Palms Conservation Area.

Effects of Take on the Burrowing Owl

The primary importance of the proposed MSHCP to burrowing owl is that it provides Conservation (including Habitat protection, management and monitoring) of the 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.

A species Habitat distribution model was not developed for the burrowing owl. The effects of Take can be evaluated in part by analysis of the known occurrences within the Plan Area. There are 74 known locations for this species within the Plan Area. There are 23 known locations (31%) 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%). Overall, the Plan would ensure Conservation of 41 of these known locations (55%) within the Reserve System.

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, the Mission Creek area west of Highway 62, the Willow Hole-Edom Hill Preserve/ACEC area, and the Thousand Palms Preserve. 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 authorized for Take. 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 on roads and predation by feral animals. Roads and low-density residential Development generally fragment the area near Desert Hot Springs.

Although the percentage of burrowing owl locations that could be lost to development within the next 75 years appears to be substantial, evaluation of the impacts of Take requires an assessment of the quality of this Habitat. The establishment of Conservation Areas where this species is protected is a significant improvement over the current situation of unprotected Habitat. The actual reduction in Habitat value is expected to be considerably less than indicated by the known location numbers because:

1. Conserved Habitat areas are large enough to contain a self-sustaining metapopulation of burrowing owls and incorporate key Habitat elements, including burrows and foraging areas.
2. Take within the Conservation Areas would not eliminate or significantly impact any individual burrowing owls. Objectives require any approved development within Conservation Areas to conserve occupied burrows according to measures described in Section 4.4.
3. 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.
4. 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.

The issuance of Take Permits, therefore, will not likely jeopardize the continued existence of the burrowing owl in the Plan Area and the implementation of the MSHCP will provide for the Conservation of the species.

Measures to Avoid, Minimize, and Mitigate Take of Burrowing Owl

To mitigate the Take of burrowing owl, the Permittees will protect and manage, in perpetuity, 41 of the 74 known locations within the MSHCP Reserve System. Although modeled Habitat was not described for the burrowing owl, the reserve design process focused on inclusion of areas of contiguous Habitat in areas where burrowing owls are known to occur. This contiguous Habitat would also provide adequate foraging 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 Snow Creek area, the Whitewater Floodplain Preserve, the Mission Creek area west of Highway 62, the Willow Hole-Edom Hill Preserve/ACEC area, the Thousand Palms Preserve, including the sand source area, and significant portions of the Indio Hills, the Mecca Hills, and Dos Palmas. Conserved populations would be protected from edge effects, from OHV impacts, and from any activities that may result in disturbance to owl burrows.

The Plan requires avoidance, minimization, and mitigation measures for burrowing owls (see Section 4.4). For projects subject to CEQA, surveys for the presence of burrowing owls in the Conservation Areas, using an accepted protocol, are required. Occupied burrows would have to be avoided until the young owls are no longer dependent on the burrow. These measures also require County Flood, CVWD, and IID to inventory burrowing owls along levees, berms, and dikes and

to develop measures to minimize impacts to any burrowing owls on their respective lands within the Plan Area.

Additionally, the Plan calls for Management and Monitoring Programs to ensure the Conservation of this species, including control of activities that degrade burrowing owl Habitat, control of invasive species where necessary, and potential for establishment of artificial burrows in Conservation Areas, based on analysis of impacts and current population status.

Overall Impacts to Burrowing Owl under the Plan

The Plan would ensure Conservation of known burrow sites for burrowing owls. Throughout the Plan Area, the protected known locations include those in the Snow Creek area, the Whitewater Floodplain Preserve, the Mission Creek area west of Highway 62, the Willow Hole-Edom Hill Preserve/ACEC area, the Thousand Palms Preserve, including the sand source area, and significant portions of the Indio Hills and the Mecca Hills. Other potential Habitat areas would be conserved in the Dos Palmas area, the Coachella Valley Stormwater Channel and Delta, and the Desert Tortoise and Linkage Conservation Areas. Burrowing owls would be protected from edge effects, from OHV impacts, and from any activities that may result in disturbance to owl burrows.

The burrowing owl will benefit from the establishment of the MSHCP Reserve System including valley floor Habitats where they occur. Implementation of the Plan is expected to provide for persistence of the burrowing owl within the Plan Area, as currently unprotected portions of its Habitat, burrow sites, foraging areas, and potential Habitat areas will be conserved. The combination of the overall Conservation measures; species-specific measures such as avoidance of active burrows during the breeding season; efforts by flood control and water districts to inventory and minimize impacts to burrowing owls; and long-term protection, management, and enhancement of burrowing owl Habitat is expected to effectively compensate for potential adverse effects to burrowing owls.

9.7.3.5 Species Account: Background

Distribution, Abundance, and Trends. The burrowing owl has a broad distribution that includes open country throughout the Midwest and western United States, Texas and southern Florida, parts of central Canada, and into Mexico and the drier regions of Central and South America. In Southern California, it is known from lowlands over much of the region, particularly in agricultural areas. This species is greatly reduced in numbers throughout its range (DeSante et al. 1991, 1992).

Within the Plan Area, burrowing owls are scattered in low numbers on open terrain throughout the lowlands. They occur in open desert areas, in fallow fields, along irrigation dikes and levees, wherever burrows (generally dug by ground squirrels) are available away from intense human activity. They can occur adjacent to residential Development, as evidenced by regular observations of these owls in sandy substrates along Washington Avenue in Bermuda Dunes (prior to development of empty lots) (Cameron Barrows, pers. comm.), and around the Palm Springs Airport (J. Cornett, pers. comm.).

Burrowing owls are notably common in Imperial County, along roads and levees in the agricultural areas. They may occur along roads and levees in agricultural areas at the eastern end

of the Coachella Valley, within the Plan Area. However, efforts to locate reliable records for burrowing owls in these agricultural areas met with limited success. Biologists from CDFG and CVWD who routinely visit the agricultural drains and associated levees around the Salton Sea reported only one burrowing owl observation (S. Keeney (CDFG) and R. Thiery (CVWD, pers. comm.).

An influx of wintering burrowing owls may occur in the Coachella Valley. The known location information for this species does not allow a determination of wintering birds, as the month of observation is not consistently reported. For the 40 known locations, four report only the year of observation, four are listed as observations during the winter months (December to February), and the remaining are from observations in the spring and summer months, which probably indicate resident birds, potentially on breeding territories.

Burrowing owls occupy burrows dug by others, primarily ground squirrels. If left undisturbed, they will use the same burrow year after year for nesting. A clutch of seven to nine eggs is laid between March and July. Both parents take part in incubation for about 28 days. The young emerge from the nest and spend daylight hours at the burrow entrance with one or both adults. Their distress call is a low rattle, said to be a mimic of a rattlesnake. The burrows selected by these owls are typically abandoned rodent burrows, however, they also commonly use old pipes, culverts or other debris that simulates a hole in the ground.

Though their occurrence, distribution, and Habitat preferences in the Coachella Valley are not well documented, burrowing owls are well studied elsewhere. Aspects of their biology that have been well documented include their food habits (Maser et al. 1971, Brown et al. 1986, Green et al. 1993) and their nesting requirements (Gleason and Johnson 1985, MacCracken et al. 1985, Rich 1986).

Burrowing owls follow a crepuscular habit, being most active during the early morning and evening hours. They are often observed perched on fence posts or utility wires. They typically live 8 years or more. Their diet is predominantly large insects and small rodents, but they will also take small birds, reptiles, amphibians, fish, scorpions, and other available prey. One study found that during the breeding season they feed on both vertebrates (mainly rodents) and invertebrates (mainly beetles) (Belthoff et al 1995). This study also noted that factors that provide for recruitment of young into the breeding population are important to reversing population declines in this species. These factors include post-fledging behavior, dispersal, and survival of young burrowing owls.

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. In a summary of the relative distribution and abundance of burrowing owls in California, DeSante et al. (1996) report that burrowing owls often move their breeding locations over short (less than two to three km) distances from year to year, but do not appear to move over large distances. They designated “breeding groups” according to the following standard, “any location of known or presumed breeding burrowing owls found to lie within 3.0 km of any other location in continuous breeding Habitat, or within 2.0 km of any other location from which it was separated by non-breeding Habitat, was considered to be part of the same breeding group . . . most owl pairs were found to lie either well within 2 km or well over 3

km of each other." Further research would be necessary to determine if this standard applies to burrowing owls in the Coachella Valley.

9.7.4 Southwestern Willow Flycatcher *Empidonax traillii extimus*

Status **Federal:** **Endangered**
State: **Endangered**

9.7.4.1 Species Conservation Goals and Objectives

Conserve and manage populations within the MSHCP Reserve System according to the following criteria:

Goal 1: Ensure species persistence in the Plan Area by conserving existing breeding Habitat and an assemblage of native Habitats that are likely important for migration. Conserve Habitat, and associated Essential Ecological Processes, allowing evolutionary processes and natural population fluctuations to occur. Minimize fragmentation, human-caused disturbance, and edge effects to Core Habitat by conserving contiguous Habitat patches and effective Linkages between patches of Core Habitat.

Objective 1a. Ensure conservation of the riparian natural communities that this flycatcher depends on, Sonoran cottonwood-willow riparian forest, southern arroyo willow riparian forest, southern sycamore-alder riparian woodland, mesquite hummocks (migration), desert dry wash woodland (migration), desert saltbush scrub (migration), desert sink scrub (migration), mesquite bosque (migration), coastal and valley freshwater marsh (migration), arrowweed scrub (migration), and cismontane alkali marsh (migration), in the following Conservation Areas

- Cabazon Conservation Area
- Stubbe and Cottonwood Canyons Conservation Area
- Whitewater Canyon Conservation Area
- Upper Mission Creek/Big Morongo Canyon Conservation Area
- Willow Hole Conservation Area
- Thousand Palms Conservation Area
- Indio Hills Palms Conservation Area
- Joshua Tree National Park Conservation Area
- Desert Tortoise and Linkage Conservation Area
- Mecca Hills/Orocopia Mountains Conservation Area
- Dos Palmas Conservation Area
- Coachella Valley Stormwater Channel and Delta Conservation Area
- Santa Rosa and San Jacinto Mountains Conservation Area

Please refer to Section 4.3 and Tables 9-21a and 9-21b for specific acreages to be protected by this Conservation Objective.

Objective 1b. Ensure that CVWD will establish permanent riparian Habitat, including at least 44 acres of Sonoran cottonwood-willow riparian forest in the Coachella Valley Stormwater Channel and Delta Conservation Area, to replace the Habitat that is periodically altered by flood control maintenance activities. This Habitat will provide for the conservation of this natural community and the riparian birds covered by the Plan.

Goal 2: Protect Essential Ecological Processes, including hydrological regimes, necessary to maintain Habitat for this species.

Objective 2. Ensure protection of Essential Ecological Process areas through Conservation Area Conservation Objectives for Essential Ecological Processes.

Goal 3: Ensure conservation of the southwestern willow flycatcher by maintaining the long-term persistence of self-sustaining populations or metapopulations and conserving Habitat quality through biological monitoring and Adaptive Management actions in the Plan Area.

Objective 3. Implement biological monitoring and Adaptive Management to ensure persistence of this flycatcher in the Plan area.

Table 9-21a: Summary of Habitat within Conservation Areas Southwestern Willow Flycatcher – Breeding Habitat

Conservation Area	*Total Acres of Habitat in Conserv. Areas*	*Acres of Disturbance Authorized*	*Acres of Existing Conservation Lands*	*Remaining Acres to be Conserved*	*Total Acres to be Conserved in MSHCP Reserve System*
Cabazon	87	1	78	8	86
Stubbe & Cottonwood Canyons	266	2	241	23	264
Whitewater Canyon	167	11	60	96	156
Upper Mission Ck./ Big Morongo Canyon	204	14	62	128	190
Willow Hole	1	0	1	0	1
Thousand Palms	141	0	141	0	141
Indio Hills Palms	93	5	46	42	88
East Indio Hills	0	0	0	0	0
Joshua Tree	5	0	5	0	5

Conservation Area	***Total Acres of Habitat in Conserv. Areas***	***Acres of Disturbance Authorized***	***Acres of Existing Conservation Lands***	***Remaining Acres to be Conserved***	***Total Acres to be Conserved in MSHCP Reserve System***
Nat'l Park					
Desert Tortoise & Linkage	0	0	0	0	0
Mecca Hills/ Orocopia Mtns.	1	0	1	0	1
Dos Palmas	125	6	69	50	119
CV Storm-water Channel & Delta	8	1	0	7	7
Santa Rosa & San Jacinto Mountains	1,574	69	822	683	1,505
Total – Breeding Habitat	*2,672*	*109*	*1,526*	*1,037*	*2,563*

Table 9-21b: Summary of Habitat within Conservation Areas Southwestern Willow Flycatcher – Migratory Habitat

Conservation Area	*Total Acres of Habitat in Conserv Areas*	*Acres of Disturbance Authorized*	*Acres of Existing Conservation Lands*	*Remaining Acres to be Conserved*	*Total Acres to be Conserved in MSHCP Reserve System*
Cabazon	13	1	0	12	12
Stubbe & Cottonwood Canyons	289	26	34	229	263
Whitewater Canyon	0	0	0	0	0
Upper Mission Creek/ Big Morongo Canyon	258	15	112	131	243
Willow Hole	294	28	16	250	266
Thousand Palms	805	4	767	34	801
Indio Hills Palms	83	4	43	36	79
East Indio Hills	47	5	0	42	42
Joshua Tree National Park	2,195	13	2,063	119	2,182
Desert Tortoise & Linkage	13,564	764	5,920	6,880	12,800
Mecca Hills/ Orocopia Mountains	9,435	319	6,241	2,875	9,116
Dos Palmas	10,184	644	3,745	5,795	9,540
CV Stormwater Channel & Delta	2,047	183	214	1,650	1,864
Santa Rosa & San Jacinto Mountains	3,963	325	2,157	1,481	3,638
Total – Migratory Habitat	*43,177*	*2,331*	*21,312*	*19,534*	*40,846*

9.7.4.2 Threats, Limiting Factors, and Adaptive Management

The most significant threats to the southwestern willow flycatcher in the Plan Area are extensive loss and modification of riparian Habitats upon which they depend and nest parasitism by the brown-headed cowbird. Other factors that have contributed to their decline include disturbance of riparian Habitat by cattle, fragmentation of breeding areas, flood control activities, invasion of non-native plants in riparian Habitats, degradation of Habitat as a result of edge effects related to urbanization and other human activities, and sand/gravel mining. Other localized threats may include changes in fire frequency and concentrated human access within some of the riparian areas. For example, the Whitewater River area near Bonnie Bell appears to be heavily used by

people. Brown-headed cowbird parasitism rates of southwestern willow flycatcher nests has been reported as ranging from 50% to 80% in California, to 100% in the Grand. The decline in breeding populations of the southwestern willow flycatcher, along with other small, insectivorous, open-cup nesting birds -- among them the yellow warbler and least Bell's vireo -- is well documented. It has been reported (Unitt 1987) from historical and contemporary records that the southwestern willow flycatcher has declined precipitously throughout its range in the last 50 years. Parent birds in parasitized nests either desert the nest or raise the young cowbird at the expense of their own young. Human activities attract cowbirds, thereby increasing the threat to southwestern willow flycatchers. Reduction of cowbird populations in southwestern willow flycatcher Habitat has been shown to substantially benefit this species, along with other riparian bird species. The predominance of golf courses and agricultural areas, which both provide Habitat for the cowbird, may make control of this non-native bird difficult.

The following actions may be needed to ensure species persistence and long-term viability if biological monitoring indicates that such actions are warranted. This list is not comprehensive but identifies some of the known or likely threats to this species. More detailed information on the Management and Monitoring Programs can be found in Section 8.0. Actions may include:

1. Control and manage activities that degrade southwestern willow flycatcher Habitat in conserved areas. These activities include brown-headed cowbird nest parasitism, clearing or alteration of riparian vegetation, persistence or invasion of exotic plant species, human disturbance, edge effects, and predation of adults and nests by domestic animals.
2. Restrict human access to southwestern willow flycatcher-occupied Habitat during the breeding season, from May 1 to September 15.
3. Enhance Habitat through the restoration of disturbed Habitats or the creation of new Habitat where feasible. In particular, removal of tamarisk from existing riparian areas would enhance Habitat for southwestern willow flycatcher and other riparian birds. Any Habitat restoration should balance management of southwestern willow flycatcher Habitat with management actions for other riparian-dependent species by ensuring a mix of vegetation successional stages in riparian Habitats.
4. Maintain upland buffers for all occupied Habitat. Buffers should be a minimum of 50 feet wide. Access to surface water is important for this species within the Habitat area.

9.7.4.3 Species Conservation Analysis

Conservation Area Reserve Design. The configuration of proposed Conservation Areas will benefit the southwestern willow flycatcher as suitable Habitat, including riparian areas, on public lands is often adjoining or surrounded by existing Conservation Areas. The Mission Creek site is conserved and managed by the Wildlands Conservancy; it is surrounded by BLM Wilderness such that all the riparian Habitat will be conserved. Habitat in Whitewater Canyon is partly on BLM land and partly on private land. Acquisition of the private lands from willing sellers will facilitate management of activities in the area that could impact the riparian Habitat; however, there is access to the area from Whitewater Road, and it is impractical to completely exclude access to the Conservation Area. A management plan for the area will need to be developed within three years of Plan approval to guide management actions to protect the riparian Habitat. Chino Canyon is currently privately owned; however, discussions are in progress with the landowner for

acquisition of the riparian area. Willow Hole is part of a BLM ACEC and includes adjacent lands owned by CVMC and CNLM.

The Planning Team did not attempt to describe Core Habitat for this species. With very limited Habitat available for this flycatcher, all locations were considered as part of a metapopulation. Hence, all available riparian Habitat for breeding and Habitat which may be used in migration were included in the MSHCP Reserve System. The presence of potential breeding Habitat for this species within each of the Conservation Areas is shown in Table 9-21a; migratory Habitat is shown in Table 9-21b.

9.7.4.4 Take Analysis

Significance of the Plan Area to Southwestern Willow Flycatcher

The southwestern willow flycatcher occurs in the Plan Area as a likely breeding bird, and as a migrant. Given the limited availability of suitable riparian Habitat in the Plan Area, their status here could be described as part of a metapopulation. The extent of breeding in the Plan Area is not known as only Mission Creek has been confirmed as a breeding location (R. McKernan, pers. comm.). Breeding Habitat is present in a number of the Conservation Areas and the willow flycatcher is considered as breeding species within the Plan Area. Throughout its range, the majority of sites where this species occurs are comprised of small numbers of flycatchers (Marshall 2000). The significance of small populations which may be part of a larger metapopulation, as regional sources of colonizers, at least is some years, is noted as a reason to ensure Conservation of these sites (Marshall 2000). The willow flycatchers in the Coachella Valley are probably part of such a metapopulation. This subspecies of the willow flycatcher is listed as endangered by both the state and federal governments. Within the Plan Area it has been recorded in riparian Habitat from Whitewater Canyon and Mission Creek, Thousand Palms Oasis, Cottonwood Spring in Joshua Tree National Park, and Dos Palmas. Outside the Plan Area their breeding range includes dense riparian forests and woodlands in Southern California, southern Nevada, Arizona, New Mexico, Utah, western Texas, and northern Baja California and Sonora.

Effects of Take on the Southwestern Willow Flycatcher

The primary importance of the proposed MSHCP to the southwestern willow flycatcher is that it provides Conservation (including Habitat protection, management and monitoring) of breeding Habitat and Habitat used by this species in migration. The Plan ensures the long-term conservation of breeding and migratory Habitat as well as the associated Essential Ecological Processes, including the hydrological regimes that support riparian vegetation.

Breeding Habitat. With respect to breeding Habitat, there are 2,730 acres of modeled Habitat for the southwestern willow flycatcher within the Plan Area. Approximately 2,672 acres of this modeled breeding Habitat occur within the Conservation Areas and the Plan would ensure Conservation of 2,563 of these acres (94% of the total modeled Habitat). Approximately 1,526 acres (56%) 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 1,037 acres (38%) of the modeled breeding Habitat for southwestern willow flycatcher.

Within the Conservation Areas under the worst case scenario, 109 acres of Take of modeled breeding Habitat (4%) could occur (See Table 9-21a and Table 4-114). Take of willow flycatcher

breeding Habitat within the Conservation Areas must be consistent with the Conservation Objectives for this species to: 1) ensure Conservation of Core Habitat; 2) protect Essential Ecological Processes needed to maintain willow flycatcher Habitat; and 3) maintain Biological Corridors and Linkages among conserved populations to provide for population fluctuation and enhance genetic diversity. 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 species.

Outside of the Conservation Areas, there are 59 acres (2%) of modeled Habitat authorized for Take. Some of this acreage occurs as small fragments of marginal Habitat at the margins of suitable riparian areas. Some of this acreage occurs along the Coachella Valley Stormwater Channel north of the Conservation Area boundary. Impacts to Habitat along this portion of the Stormwater channel will be mitigated by establishment of replacement permanent riparian forest by CVWD (see below).

Migratory Habitat. There are 57,589 acres of modeled migratory Habitat for the southwestern willow flycatcher within the Plan Area. Approximately 43,177 acres of this modeled migratory Habitat occur within the Conservation Areas and the Plan would ensure Conservation of 40,846 of these acres (71% of the total modeled Habitat). Approximately 21,312 acres (37%) of the modeled migratory Habitat are within Existing Conservation Lands and would be managed as part of the Reserve System. The Plan would conserve an additional 19,534 acres (34%) of the modeled migratory Habitat for southwestern willow flycatcher.

Within the Conservation Areas under the worst case scenario, 2,331 acres of Take of modeled migratory Habitat (4%) could occur (See Table 9-21b and Table 4-114). Take of willow flycatcher migratory Habitat within the Conservation Areas must be consistent with the Conservation Objectives for this species to: 1) ensure Conservation of riparian Habitat, and 2) protect Essential Ecological Processes including hydrological regimes needed to maintain riparian Habitat. 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 species.

Outside of the Conservation Areas, there are 13,040 acres (23%) of modeled migratory Habitat authorized for Take. The migratory Habitat outside the Conservation Areas consists of slivers of Habitat, including desert dry wash woodland, along various washes from Desert Hot Springs area to the margins of the Cathedral City and Rancho Mirage cove areas and around Deep Canyon in Palm Desert. Larger patches of migratory Habitat occur northwest of the Salton Sea in desert saltbush scrub and desert sink scrub, natural communities used by willow flycatchers in migration that are highly fragmented in a matrix of agriculture, and in the eastern part of the Plan Area south of Interstate 10.

Although the percentage of southwestern willow flycatcher modeled migratory Habitat that could be lost to development within the next 75 years appears to be substantial, evaluation of the impacts of Take requires an assessment of the quality of this Habitat. The establishment of Conservation Areas where this species is protected is a significant improvement over the piecemeal and fragmenting nature of development patterns within this Habitat occurring now. The actual reduction in Habitat value is expected to be considerably less than indicated by the raw acreage numbers because:

1. Conserved Habitat areas are large enough to contain self-sustaining metapopulations populations of willow flycatchers and incorporate key Habitat elements, including riparian Habitat for breeding and desert dry wash woodland and other Habitats for migration.
2. 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.
3. As a result of implementing the Conservation Objectives to protect riparian natural communities the Plan would ensure that there is no net loss of wetland Habitats. For all riparian natural communities where disturbance is authorized by the Plan, an equivalent number of acres as that subject to disturbance would be replaced.
4. Potential Development would not adversely impact the Essential Ecological Processes needed to maintain currently viable Habitat. Conservation Areas were carefully designed to protect the watershed for riparian Habitat, desert dry wash woodland, and other Habitats for this species.
5. 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,

The issuance of Take Permits, therefore, will not likely jeopardize the continued existence of the southwestern willow flycatcher and the implementation of the MSHCP will provide for the Conservation of the species.

Measures to Avoid, Minimize, and Mitigate Take of Southwestern Willow Flycatcher

To mitigate the Take of southwest willow flycatcher, the Permittees will protect and manage, in perpetuity, 1,037 acres of the modeled breeding Habitat and 19,534 acres of migratory Habitat for this species. The 1,526 acres of breeding Habitat and 21,312 acres of migratory modeled Habitat within Existing Conservation Lands will be monitored and managed to ensure that Conservation Objectives are met. The Plan will thus ensure Conservation, through protection and management, of 2,563 acres of breeding Habitat and 40,846 acres of migratory Habitat for this species.

Existing Conservation Areas within the Plan boundary currently protect 38% of the Habitat for the southwestern willow flycatcher. The Conservation Areas in the Plan would protect 94% of the occupied and potential breeding Habitat and 71% of the potential migratory Habitat for this species. The Conservation Areas include the potential breeding Habitat for southwestern willow flycatchers in Whitewater Canyon, Chino Canyon, the Thousand Palms Preserve, the Whitewater River mouth near the Salton Sea, Cottonwood Springs in Joshua Tree National Park, and Dos Palmas. The Plan includes 100% of the known breeding locations for this flycatcher. Other suitable Habitat for breeding sites in the Plan Area occurs in Palm Canyon, Murray Canyon, and Andreas Canyon on the Agua Caliente Indian Reservation; portions of these canyons are currently protected as part of the Indian Canyons Heritage Park. Though nesting has not been confirmed in Andreas Canyons, southwestern willow flycatchers are known to occur in this location. The Agua Caliente are preparing a separate MSHCP for reservation lands.

The model for the southwestern willow flycatcher, and other riparian birds, includes Habitat used in migration, including desert dry wash woodland and desert saltbush scrub. A complete list of the natural communities that may be used in migration is given in the description of model parameters in the Appendix I. Other natural Habitat used by southwestern willow flycatchers in migration or foraging will be conserved in Stubbe and Cottonwood Canyons, Oasis de los Osos, Snow Creek and Falls Creek in the Snow Creek/Windy Point Conservation Area, Mission Creek, the Thousand Palms Preserve, the Coachella Valley Stormwater Channel and Delta near the Salton Sea, Dos Palmas, and Cottonwood Spring in Joshua Tree National Park Conservation Area. Habitat disturbance, subject to the conditions of any required streambed alteration or Section 404 permits, would be allowed in those portions of these natural communities not conserved by the Plan.

Where disturbance of a given number acres of riparian natural communities is authorized, an equivalent number of acres would be replaced to ensure that the no net loss occurs and the Conservation Objective is achieved.

CVWD will establish 44 acres of permanent Sonoran cottonwood-willow riparian forest in the Coachella Valley Stormwater Channel and Delta Conservation area as described in Section 4.3.20 to replace riparian Habitat that is periodically altered by flood control maintenance activities. Temporary Habitat disturbance for flood control channel maintenance purposes would be permitted by the Plan in the Coachella Valley Stormwater Channel.

Additionally, 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. The Plan also limits human access to flycatcher occupied Habitat during the breeding season.

Overall Impacts to Southwestern Willow Flycatcher

Implementation of the Plan is expected to maintain and enhance population viability of the southwestern willow flycatcher by protecting Habitat for potential nesting and conserving Habitat known to be used in migration. The Plan will also enhance riparian Habitat through implementation of management prescriptions to remove non-native tamarisk and other invasive species. An agreement with CVWD regarding creation of riparian vegetation along the Whitewater River could result in enhanced Habitat for flycatchers as well. Another benefit is the focus of attention on the presence of brown-headed cowbirds, including Adaptive Management activities to control their impacts to riparian birds such as the southwestern willow flycatcher.

9.7.4.5 Species Account: Background

Distribution, Abundance, and Trends. The southwestern willow flycatcher is restricted to dense riparian woodlands and forests along the river and stream systems of Southern California, primarily in Kern, San Diego, San Bernardino, and Riverside Counties. Their breeding range also includes southern Nevada, Arizona, New Mexico, Utah, western Texas, and possibly southwestern Colorado. They are reported as breeding birds in Mexico, in extreme northern Baja California and Sonora. They winter in Mexico, Central America, and northern South America. This flycatcher can be found at sites where a dense growth of willows (*Salix* sp.), *Baccharis,* arrowweed (*Pluchea* sp.), or other plants occurs in thickets. These thickets are often associated with a scattered overstory of cottonwood (*Populus fremontii*) and other riparian trees. This species has also been found nesting in Southern California in relatively narrow bands of riparian Habitat and can utilize extremely small remnant riparian areas (one medium size willow tree) during migration (T. Newkirk-Gonzales, pers. comm.).

The historic range of the southwestern willow flycatcher in California included riparian areas throughout the southern third of the state; it was reported as common in the Los Angeles basin, the San Bernardino/Riverside area, and in San Diego County. It was also a common breeder along the lower Colorado River, near Yuma, Arizona. Currently, stable nesting groups are reported from only two locations, along the South Fork of the Kern River and along the Santa Margarita River on Camp Pendleton. Elsewhere, they exist only in small, scattered, remnant, and isolated populations. Major causes of the decline are cowbird parasitism and destruction or disturbance in riparian Habitats.

In surveys by biologists from the University of California, Riverside, Center for Conservation Biology (Center for Conservation Biology, University of California, Riverside 2004) willow flycatchers were detected at Cottonwood Springs in Joshua Tree National Park, Dos Palmas Preserve, Mission Creek, Thousand Palms Oasis, and Whitewater Canyon. It is not known whether these individuals were *Empidonax traillii extimus*, the subspecies that breeds in southern California (Unitt 1987; Sedgwick 2000), or whether they were a different subspecies that occurs as migrants in southern California but breed farther north (e.g. *E. t. brewsteri*). Incidental willow flycatchers, likely early fall migrants, were also recorded at Chino Canyon, Cottonwood Springs, Dos Palmas Preserve, and Mission Creek during vegetation surveys in August (Center for Conservation Biology, University of California, Riverside 2004).

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, pers. comm.). 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 exists, 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 Whitewater River near the Salton Sea, at the Thousand Palms Preserve, and at Dos Palmas Preserve/ACEC.

Southwestern willow flycatchers also migrate through the Plan Area en route to other breeding areas. In migration, they may use desert fan palm oasis woodland, mesquite hummocks,

mesquite bosque, arrowweed scrub, desert dry wash woodland, southern sycamore-alder riparian woodland, Sonoran cottonwood-willow riparian forest, and southern arroyo willow riparian forest.

The birds begin to arrive in Southern California to breed late in the spring, generally from May 15 through the summer months, until August. Males establish and defend territories beginning shortly after arrival in mid-May. Most birds begin nesting within one week after pair formation, which occurs 10 to 14 days after their arrival. The young fledge in early July and begin to disperse approximately two weeks after leaving the nest.

They construct their nests in dense thickets of willows, mulefat, and other trees and shrubs approximately 4 to 7 meters in height. They virtually always nest near surface water or saturated soil. They have not been found nesting in Habitats where the riparian zone is very narrow, or where the distance between willow patches and individual shrubs is great. The southwestern willow flycatcher is an insectivore, foraging within and above dense riparian vegetation, sometimes adjacent to nest sites.

Associated Covered Species. Other riparian species occurring in similar Habitat, including the yellow-breasted chat, summer tanager, least Bell's vireo, and yellow warbler, will benefit from conservation and Adaptive Management actions for southwestern willow flycatcher. Riparian bird species will be considered as a guild in the Plan with regard to their general presence in riparian areas. However, each of these riparian bird species may require slightly different structural features or successional stages for optimal breeding Habitat, which may require different management strategies.

9.7.5 Crissal Thrasher *Toxostoma crissali*

Status **Federal:** **No official status**
State: **Species of Special Concern**

9.7.5.1 Species Conservation Goals and Objectives

Conserve and manage populations within the MSHCP Reserve System according to the following criteria:

Goal 1: Protect at least two Core Habitat areas that include occupied Habitat, and associated Essential Ecological Processes, allowing evolutionary processes and natural population fluctuations to occur. Minimize fragmentation, human-caused disturbance, and edge effects to Core Habitat by conserving contiguous Habitat patches and effective Linkages between patches of Core Habitat.

Objective 1a. Ensure conservation of Core Habitat including at least 1,307 acres in the following Conservation Areas:

- Dos Palmas Conservation Area
- Coachella Valley Stormwater Channel and Delta Conservation Area

Please refer to Section 4.3 and Table 9-22 for specific acreages to be protected by this Conservation Objective.

Objective 1b. Ensure implementation of avoidance, mitigation, and minimization measures as described in Section 4.4.

Goal 2: Protect Other Conserved Habitat, to provide sufficient area and variety of Habitat types to accommodate population fluctuations, allow for genetic diversity, and to conserve the range of environmental conditions within which this thrasher is known to occur.

Objective 2. Through adherence to other Conservation Objectives (for another species, a natural community, Essential Ecological Process area, Biological Corridor, or Linkage area) conserve Other Conserved Habitat for this thrasher in the following Conservation Areas:

- Willow Hole Conservation Area
- Thousand Palms Conservation Area
- Indio Hills Palms Conservation Area
- East Indio Hills Conservation Area

Please refer to Section 4.3 and Table 9-22 for specific acreages to be protected by this Conservation Objective.

Goal 3: Protect Essential Ecological Processes, which may include hydrological regimes necessary to maintain Habitat for this species.

Goal 4: Maintain Biological Corridors and Linkages among all conserved populations.

Goal 5: Ensure conservation of the crissal thrasher 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.

Objective 5. Implement biological monitoring and Adaptive Management to ensure self-sustaining populations within each Core Habitat area.

Table 9-22: Summary of Habitat within Conservation Areas Crissal Thrasher

Conservation Area	*Total Acres of Habitat*	*Acres of Disturbance Authorized*	*Acres of Existing Conservation Lands*	*Remaining Acres to be Conserved*	*Total Acres Conserved in MSHCP Reserve System*	*Designation*
Willow Hole	294	28	16	250	266	Other Cons. Habitat
Thousand Palms	58	0	58	0	58	Other Cons. Habitat
Indio Hills Palms	3	1	1	1	2	Other Cons. Habitat
East Indio Hills	47	5	0	42	42	Other Cons. Habitat
Dos Palmas	536	38	155	343	498	Core Habitat
CV Stormwater Channel & Delta	896	87	28	781	809	Core Habitat
Total – All Habitat	*1,834*	*159*	*258*	*1,418*	*1,676*	--
Total – Core Habitat	*1,432*	*125*	*183*	*1,124*	*1,307*	--
Total – Other Cons. Habitat	*402*	*34*	*75*	*293*	*368*	--

9.7.5.2 Threats, Limiting Factors, and Adaptive Management

Threats to the crissal thrasher's continued occurrence within the Plan Area include the loss of Habitat to agriculture and urbanization, groundwater overdraft that reduces available water for honey mesquite; water diversions that reduce water availability; Habitat modification for flood control at the Whitewater River delta; tamarisk infestations which degrade and dry up desert saltbush scrub, mesquite bosque, and mesquite hummocks Habitat; and significant fragmentation of available Habitat. Fragmentation increases edge effects, including predation from domestic pets, road mortality, and exotic species invasions. Brown-headed Cowbirds are not known to pose a threat to crissal thrasher. Even with appropriate Habitat management practices, the crissal thrasher population within the Plan Area is small and will probably require immigration from Habitats outside the area being addressed in this Plan to maintain long-term viability.

The following actions may be needed to ensure species persistence and long-term viability if biological monitoring indicates that such actions are warranted. This list is not comprehensive but identifies some of the known or likely threats to this species. More detailed information on the Management and Monitoring Programs can be found in Section 8.0. Actions may include:

1. Evaluate the impacts of groundwater management on crissal thrasher Habitat, particularly mesquite areas, to determine if the water sources for this Habitat are adequately protected or if additional water sources may be needed.
2. Control invasive species if it is determined from the monitoring results that they impact thrasher Habitat. This may include cooperation with the Dos Palmas Ecosystem Management Plan.
3. Schedule activities that may cause disturbance to nesting crissal thrashers to avoid the breeding season from January 15 through June 15 or until the young have fledged.
4. Establish 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.

9.7.5.3 Species Conservation Analysis

Conservation Area Reserve Design. The distribution of Habitat for the crissal thrasher is quite patchy, particularly in the vicinity of the Salton Sea where areas occupied by mesquite hummocks and desert saltbush scrub are highly fragmented. The MSHCP Reserve System includes areas of contiguous mesquite hummocks Habitat at Willow Hole and the Thousand Palms Preserve, and mesquite hummocks, arrowweed scrub, and desert saltbush scrub Habitat at Dos Palmas and the Whitewater River delta area.

The Planning Team did not attempt to assess population status as a means of identifying Core Habitat for this species. Instead, the Plan includes 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. 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. For each area, see Table 9-22 for a breakdown of Existing Conservation Lands and remaining lands to be conserved.

Core Habitat Areas:

1. ***Dos Palmas.*** The Dos Palmas area includes approximately 536 acres that have been delineated, based on vegetation, as modeled Habitat for the crissal thrasher. The Plan will conserve approximately 498 acres of the Core Habitat in this Conservation Area. The presence of both mesquite hummocks and desert saltbush scrub make this area particularly suitable for this species. Additional information on crissal thrasher occurrence and distribution is still needed for this Conservation Area.
2. ***Coachella Valley Stormwater Channel and Delta.*** There are approximately 896 acres of modeled Habitat for this species within this Conservation Area, of which the Plan will conserve approximately 809 acres. The Habitat in this Conservation area is narrow with a high edge to area ratio. More information is needed on the distribution of the crissal thrasher here.

Other Conserved Habitat Areas:

1. ***Willow Hole.*** The Plan includes approximately 294 total acres of modeled Habitat within this Conservation Area, of which the Plan will conserve approximately 266 acres. However, 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. Additional information on the occurrence and distribution of crissal thrasher in this area is needed.
2. ***Thousand Palms.*** The Plan includes approximately 58 acres of crissal thrasher Habitat modeled in this Conservation Area, primarily in mesquite hummocks and mesquite associated with Thousand Palms Oasis. All 58 acres of this Habitat are already protected. More information is needed about the Habitat preferences and distribution of this thrasher within this Conservation Area.
3. ***Indio Hills Palms*.** This Conservation Area was considered as potential Habitat for the crissal thrasher and contains approximately 3 acres of modeled Habitat. The Plan ensures the protection of at least 2 acres of crissal thrasher Habitat in this Conservation Area. Mesquite areas along the toe of slope of the Indio Hills and associated with the palm oases in this Conservation Area could be Habitat for crissal thrasher.
4. ***East Indio Hills*.** This Conservation Area was considered as potential Habitat for the crissal thrasher and contains approximately 47 acres of modeled Habitat. The Plan protects approximately 42 acres of crissal thrasher Habitat in this Conservation Area. Adjacent Development in this area may increase edge effects for this species within this Conservation Area.

9.7.5.4 Take Analysis

Significance of the Plan Area to Crissal Thrasher

The crissal thrasher is found in the Plan Area from the area around Dos Palmas and the Salton Sea. Throughout its range, crissal thrasher is known as a resident of dense thickets and woodlands of shrubs or low trees in desert riparian and desert wash Habitats. It ranges from southeastern California to southern Nevada, southwestern Utah, and western Texas southward. The crissal thrasher has no official state or federal status although it is considered a Species of Special Concern in California. It also occurs in the eastern Mojave Desert and in the Imperial and Borrego Valleys, but its numbers have declined in recent decades (Grinnell and Miller 1944, Remsen 1978, Garrett and Dunn 1981).

Effects of Take on the Crissal Thrasher

Conservation of Habitat blocks of adequate size for this species is difficult, as the natural communities it depends on, 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 Planning Team attempted to include all the available Habitat for this species that was not highly fragmented. The Plan ensures the long-term Conservation including Habitat protection, management, and monitoring for crissal thrasher. It includes conservation of Essential Ecological

Processes, including the hydrological regimes that support mesquite hummock and mesquite bosque vegetation.

There are 6,852 acres of modeled Habitat for the crissal thrasher within the Plan Area of which approximately 1,432 acres are identified as Core Habitat. The Plan would ensure Conservation of 1,307 acres (91% of total) of the Core Habitat and 368 acres (92% of total) of the Other Conserved Habitat for crissal thrasher. Each of the conserved Core Habitat areas would be greater than 400 acres. Approximately 258 acres (4%) 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 1,418 acres (21%) of the modeled Habitat for crissal thrasher in the Plan Area.

Within the Conservation Areas under the worst case scenario, 159 acres of Take of modeled crissal thrasher Habitat (2%) could occur (See Table 9-22 and Table 4-114). Take of crissal thrasher Habitat within the Conservation Areas must be consistent with the Conservation Objectives for this species to: 1) ensure Conservation of Core Habitat; 2) protect Essential Ecological Processes including hydrological regimes needed to maintain crissal thrasher Habitat; 3) maintain Biological Corridors and Linkages among conserved populations to provide for population fluctuation and enhance genetic diversity; and 4) implement biological monitoring and Adaptive Management to ensure long-term persistence of this species. In addition, avoidance, minimization, and mitigation measures for crissal thrasher would be adhered to. 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 crissal thrasher.

Outside of the Conservation Areas, there are 5,013 acres (73%) of modeled Habitat authorized for Take. The modeled Habitat for crissal thrasher outside the Conservation Areas is primarily remnant patches of mesquite and desert saltbush scrub surrounded by agricultural areas in the eastern Coachella Valley. These mesquite patches and fragments of desert saltbush scrub were not included in the Conservation Area because of the high degree of fragmentation and the associated edge effects.

The raw acreage numbers and percentage of indicate a substantial acreage of crissal thrasher modeled Habitat that could be lost to development within the next 75 years. Evaluation of the impacts of Take requires an assessment of the quality of this Habitat. The establishment of Conservation Areas where this species is protected is a significant improvement over the piecemeal fragments of Habitat, only 4% of modeled Habitat that is currently conserved. The actual reduction in Habitat value is expected to be considerably less because:

1. Conserved Habitat areas are large enough to contain self-sustaining metapopulations populations of crissal thrashers and incorporate key Habitat elements, including mesquite hummocks, mesquite bosque, and desert saltbush scrub.
2. 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.
3. As a result of implementing the Conservation Objectives Core Habitat for crissal thrasher allowing evolutionary processes and natural population fluctuations to occur will be conserved. Minimize fragmentation, human-caused disturbance, and edge effects to Core

Habitat by conserving contiguous Habitat patches and effective linkages between patches of Core Habitat.

4. Potential Development would not adversely impact the Essential Ecological Processes needed to maintain currently viable Habitat. Implementing Conservation Objectives will ensure that hydrological regimes that support the mesquite Habitats for crissal thrashers are maintained.

5. 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,

The issuance of Take Permits, therefore, will not likely jeopardize the continued existence of the crissal thrasher and the implementation of the MSHCP will provide for the Conservation of the species.

Measures to Avoid, Minimize, and Mitigate Take of Crissal Thrasher

The Permittees will protect and manage, in perpetuity, 1,418 acres of the modeled Habitat to mitigate the Take of crissal thrasher. The 258 acres of modeled Habitat within Existing Conservation Lands will be monitored and managed to ensure that Conservation Objectives are met. The Plan will thus ensure Conservation, through protection and management, of 1,676 acres of crissal thrasher Habitat in the MSHCP Reserve System.

As part of the avoidance, minimization, and mitigation measures required by the Plan, 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.

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. In addition, CVWD will restore 40 acres of permanent mesquite hummocks, if feasible, on their lands in the East Indio Hills Conservation Area as described in Section 4.3.15.

Existing Conservation Areas within the Plan boundary currently protect only 4% of the Habitat for the crissal thrasher. The Conservation Areas in the Plan would protect 28% of the occupied and potential Habitat for this species. The Conservation Areas include the Core Habitat for crissal thrasher in the Dos Palmas and Coachella Valley Stormwater Channel and Delta Conservation Areas. The Conservation Areas include 5 of the 15 known occurrences for this bird, including known locations on the Thousand Palms Preserve, the Whitewater River delta near the Salton Sea, and at Dos Palmas. Other suitable Habitat for this species in the Plan Area occurs and will be conserved in the Willow Hole, Thousand Palms, Indio Hills Palms, and East Indio Hill Conservation Areas.

Additionally, the Plan calls for Management and Monitoring Programs to ensure the Conservation of this species, including control of activities that degrade crissal thrasher 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 as described in 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.

Overall Impacts to Crissal Thrasher

The proposed Conservation Areas in the Plan include approximately 1,834 acres of modeled Habitat for the crissal thrasher, 27% of the available Habitat in the Plan Area. The Conservation Areas include 5 of the 15 known occurrences for this bird, including known locations on the Thousand Palms Preserve, the Whitewater River delta near the Salton Sea, and at Dos Palmas. Conservation of Habitat blocks of adequate size for this species is difficult, as the natural communities it depends on, 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 Planning Team attempted to include all the available Habitat for this species that was not highly fragmented.

The crissal thrasher will benefit from the establishment of the MSHCP Reserve System which will include Conservation of Habitat in the Dos Palmas and Coachella Valley Stormwater Channel and Delta Conservation Areas where they are known to occur. Only 4% of the modeled Habitat for this species is currently conserved. Implementation of the Plan is expected to provide for Conservation of the crissal thrasher within the Plan Area, as 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. 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 effectively compensate for potential adverse effects to this bird species.

9.7.5.5 Species Account: Background

Distribution, Abundance, and Trends. The crissal thrasher is a ground-dwelling relative of the mockingbird that occurs in the Plan Area. The distribution of Habitat for the crissal thrasher is quite patchy, particularly in the vicinity of the Salton Sea where areas occupied by mesquite hummocks and desert saltbush scrub are highly fragmented. They occupy arid Habitats and are year-round residents in the MSHCP area, though they may make seasonal elevation migrations (up to 40 km) (Sheppard 1996). Crissal Thrashers are associated with desert washes, riparian brush and mesquite thickets at lower elevations and dense scrub in arroyos at higher elevations (Cody 1999). In the Coachella Valley (low elevation) the species occurs in areas dominated by mesquite hummocks and thickets with acacias, arrowweed, and in desert saltbush scrub (Hanna 1933). The species commonly nests in mesquite (Gilman 1902, Hanna 1933).

The mean territory size for crissal thrasher in the Granite Mountains was estimated to be 4.92 ha, although the defended area is thought to be larger (Cody 1999). Like the Le Conte's thrasher, crissal thrashers are secretive, feeding under the cover of dense vegetation making them difficult to locate with the exception of singing males that often perch on taller vegetation. Crissal

thrashers have dark brown bodies with a dark chestnut crissum (the feathers also known as the undertail coverts) and lack the contrast between the tail and body seen in Le Conte's thrashers.

The nest of crissal thrasher an open cup rather large twiggy nest built low to the ground and well hidden in dense mesquite or other thick desert vegetation. Crissal thrasher clutch size is typically two to three eggs with an incubation time of 14 days and fledging after 11 to 13 days (Erhlich et al. 1988).

The crissal Thrasher seldom flies in the open, but moves furtively among streamside mesquite thickets, willows, and other tangles. This bird resembles the California Thrasher in its habit of gathering food by hacking the ground with its heavy curved bill, but their ranges do not overlap. Except during the hottest months and briefly after molting, it delivers its loud melodious song year-round. Crissal thrashers will sing year-round, although peak singing activity occurs during the mating season, from February through April. Singing may occur throughout the day, but is most common in the morning (0700-0730), at noon (1100-1300), and in the late afternoon (1630-1800). During late summer crissal thrashers may be less territorial as juveniles are dispersing and as some adults make short distance movements, so less singing occurs. The peak for mating and vocalizations for crissal thrashers appears to be between February and April (Center for Conservation Biology, University of California, Riverside 2004).

Associated Covered Species. Crissal thrashers are found in Habitat that also may be used by riparian bird species during migration, including the least Bell's vireo, summer tanager, yellow warbler, yellow-breasted chat, and southwestern willow flycatcher. Conservation measures for one species will benefit the other, however, additional information is needed on how these two species partition the Habitat. In mesquite hummock areas, Coachella Valley round-tailed ground squirrels would occur with crissal thrashers. Other species including the Coachella Valley fringe-toed lizard, flat-tailed horned lizard, and Palm Springs pocket mouse may occur within the same Habitat as the crissal thrasher.

9.7.6 Le Conte's Thrasher *Toxostoma lecontei*

Status **Federal:** **No official status**
State: **Species of Special Concern**

9.7.6.1 Species Conservation Goals and Objectives

Conserve and manage populations within the MSHCP Reserve System according to the following criteria:

Goal 1: Ensure species persistence in the Plan Area by conserving large enough areas to support a self-sustaining population (or metapopulation), including required Habitat across a range of environmental conditions. Conserve Habitat, and associated Essential Ecological Processes, allowing evolutionary processes and natural population fluctuations to occur. Minimize fragmentation, human-caused disturbance, and edge effects to Core Habitat by conserving contiguous Habitat patches and effective Linkages between patches of Core Habitat.

Objective 1a. Conserve Habitat in the following Conservation Areas:

- Cabazon Conservation Area
- Stubbe and Cottonwood Canyons Conservation Area
- Snow Creek/Windy Point Conservation Area
- Whitewater Canyon Conservation Area
- Highway 111/I-10 Conservation Area
- Whitewater Floodplain Conservation Area
- Upper Mission Creek/Big Morongo Canyon Conservation Area
- Willow Hole Conservation Area
- Edom Hill Conservation Area
- Thousand Palms Conservation Area
- Indio Hills/Joshua Tree National Park Linkage Conservation Area
- Indio Hills Palms Conservation Area
- East Indio Hills Conservation Area
- Joshua Tree National Park Conservation Area
- Desert Tortoise and Linkage Conservation Area
- Mecca Hills/Orocopia Mountains Conservation Area
- Dos Palmas Conservation Area
- Coachella Valley Stormwater Channel and Delta Conservation Area
- Santa Rosa and San Jacinto Mountains Conservation Area
- Dos Palmas Conservation Area

Please refer to Section 4.3 and Table 9-23 for specific acreages to be protected by this Conservation Objective.

Objective 1b. Ensure conservation of Le Conte's thrasher nest sites through avoidance, minimization, and mitigation measures described in Section 4.4.

Goal 2: Ensure conservation of Le Conte's thrasher 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.

Objective 2. Implement Monitoring and Adaptive Management actions to ensure self-sustaining populations within each Core Habitat area.

Table 9-23: Summary of Habitat within Conservation Areas Le Conte's Thrasher

Conservation Area	*Total Acres of Habitat In Conserv Areas*	*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	4,083	N/A	42	(4,041)[1]	42	Other Cons. Habitat
Stubbe & Cottonwood Canyons	1,265	123	31	1,111	1,142	Other Cons. Habitat
Snow Creek/ Windy Point	2,788	248	312	2,228	2,540	Other Cons. Habitat
Whitewater Canyon	6	1	0	5	5	Other Cons. Habitat
Highway 111/ I-10	389	39	0	350	350	Other Cons. Habitat
Whitewater Floodplain	7,308	442	2,893	3,974	6,867	Other Cons. Habitat
Upper Mission Creek/Big Morongo Canyon	3,898	349	537	3,012	3,549	Other Cons. Habitat
Willow Hole	5,392	464	749	4,179	4,928	Other Cons. Habitat
Long Canyon	712	N/A	12	(700) [1]	12	Other Cons. Habitat
Edom Hill	2,582	228	299	2,055	2,354	Other Cons. Habitat
Thousand Palms	11,058	552[3]	6,627	3,879	10,506	Other Cons. Habitat
West Deception	1,393	N/A	0	(1,393) [1]	0	Other Cons. Habitat

Table 9-23 (cont.)

Conservation Area	*Total Acres of Habitat In Conserv Areas*	*Acres of Disturbance Authorized*	*Acres of Existing Conservation Lands*	*Remaining Acres to be Conserved*	*Total Acres to be Conserved in MSHCP Reserve System*	*Designation*
Indio Hills/ Joshua Tree N.P. Linkage	6,396	606	333	5,457	5,790	Other Cons. Habitat
Indio Hills Palms	106	1	98	7	105	Other Cons. Habitat
East Indio Hills	2,142	157	571	1,414	1,985	Other Cons. Habitat
Joshua Tree National Park	4,330	25	4,083	222	4,305	Other Cons. Habitat
Desert Tortoise & Linkage	49,414	2,843	20,982	25,589	46,571	Other Cons. Habitat
Mecca Hills/ Orocopia Mountains	17,467	652	10,949	5,866	16,815	Other Cons. Habitat
Dos Palmas	14,882	743	7,450	6,689	14,139	Other Cons. Habitat
CV Stormwater Channel & Delta	784	78	0	706	706	Other Cons. Habitat
Santa Rosa & San Jacinto Mountains	11,093	1,087	3,284	6,722	10,006	Other Cons. Habitat
Total – All Habitat	*147,488*	*8,639*	*59,252*	*73,463 (6,134)[1]*	*132,715*	--
Totals – Other Conserved Habitat	*147,488*	*8,639*	*59,252*	*73,463(6,134)[1]*	*132,715*	--

[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.

[3] Of this Authorized Take, 147 acres can be used only in Section 8, T4S R6E.

9.7.6.2 Threats, Limiting Factors, and Adaptive Management

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. Other threats may include shooting, collisions with cars, and the predation of young by house cats.

The following actions may be needed to ensure species persistence and long-term viability if biological monitoring indicates that such actions are warranted. This list is not comprehensive but identifies some of the known or likely threats to this species. More detailed information on the Management and Monitoring Programs can be found in Section 8.0. Actions may include:

1. Control and manage activities that degrade Le Conte's thrasher Habitat. In particular, OHV activity can destroy nesting substrate and creosote bushes used for nesting. Similarly, shooting should not be allowed, as the Le Conte's thrasher is the largest and most conspicuous species in creosote scrub Habitat at certain times of the year.
2. Control invasive species if it is determined from the monitoring results that they impact thrasher Habitat. Although brood parasitism by the brown-headed cowbird has not been documented in the literature, 11 of 11 Le Conte's thrasher pairs accepted artificially introduced cowbird eggs in a study. Cowbird control should be considered if monitoring indicates it is a problem.
3. As part of the Monitoring Program, establish a research element 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.

9.7.6.3 Species Conservation Analysis

Conservation Area Reserve Design. As previously noted, Habitat needs and population numbers for this bird are poorly known. Additional Habitat surveys are needed to determine the distribution and abundance of Le Conte's thrashers within the Plan Area. The Plan provides for large blocks of Habitat that supports Le Conte's thrashers, in the San Gorgonio Pass area around Stubbe Canyon east to Whitewater Canyon, in the Snow Creek area, in the Mission Creek area, along Mission Creek and Big Morongo wash, in the Willow Hole to Edom Hill area, in the Thousand Palms Preserve and sand source area, and in the Shaver's Valley and Dos Palmas areas in the eastern portion of the Plan Area. This Conservation Area configuration would also maintain connectivity with populations to the east of the Plan Area in the Colorado Desert and, potentially, to the north of the Plan Area in the Mojave Desert. Within the Conservation Areas, management actions to reduce edge effects will be significant for this species (see discussion in Section 8.0 under Management Program).

With so little data available on the distribution and abundance of this species within the Plan Area, the Planning Team did not attempt to quantitatively assess Core Habitat. A model was completed for this species and areas of Other Conserved Habitat were identified. The emphasis in Conservation planning for this species was to include large blocks of potential Habitat in proposed Conservation Areas where suitable Le Conte's thrasher Habitat exists. With so little data on the occurrence 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 for this

species is present. For each area, see Table 9-23 for a breakdown of Existing Conservation Lands and remaining lands to be conserved. The Planning Team identified and assessed the sufficiency of the following Conservation Areas as Other Conserved Habitat:

Other Conserved Habitat Areas:

1. ***Cabazon.*** There are approximately 4,083 acres of modeled Habitat for this thrasher in the Cabazon Conservation Area. The Plan will conserve approximately 42 acres of Other Conserved Habitat here.

2. ***Stubbe and Cottonwood Canyons.*** This Conservation Area includes approximately 1,265 acres of modeled Habitat. The Plan will conserve approximately 1,142 acres of Other Conserved Habitat here. The area has not been surveyed for this species and no known occurrences have been reported from this Conservation Area.

3. ***Snow Creek/Windy Point.*** There are approximately 2,788 acres of Le Conte's thrasher Habitat modeled in this Conservation Area, of which the Plan will conserve approximately 2,540 acres. Occurrence information and density estimates are not available for this thrasher in the Snow Creek area.

4. ***Whitewater Canyon.*** This Conservation Area includes limited potential Habitat below the toe of slope for a total of approximately 6 acres of modeled Habitat, of which approximately 5 acres will be conserved.

5. ***Highway 111/I-10 Conservation Area.*** This area was added to the Plan primarily as Habitat for the Coachella Valley Jerusalem cricket. This area includes approximately 389 acres of modeled Habitat for Le Conte's thrasher, of which approximately 350 acres will be conserved. The area, however, has not been surveyed for this species and no known occurrences have been reported from this Conservation Area.

6. ***Whitewater Floodplain*.** The Conservation Area includes approximately 7,308 acres of modeled Habitat for this thrasher, of which approximately 6,867 acres will be conserved under the Plan. The largest patch of Habitat within this Conservation Area is the existing Whitewater Floodplain Preserve and additional Habitat south and east of the existing preserve boundary.

7. ***Upper Mission Creek/Big Morongo Canyon.*** The Conservation Area includes approximately 3,898 acres of modeled Habitat for this thrasher, of which approximately 3,549 acres will be conserved under the Plan. Information on the occurrence and distribution of Le Conte's thrasher in the upper Mission Creek area is very limited. Although suitable Habitat for this species certainly occurs within this Conservation Area, it has not been well surveyed.

9. ***Willow Hole.*** The Conservation Area includes approximately 5,392 total acres of modeled Habitat within this Conservation Area. The Plan will conserve approximately 4,928 acres of this Habitat.

10. ***Edom Hill.*** This Conservation Area includes scattered Habitat totaling approximately 2,582 acres between Willow Hole and the Thousand Palms Preserve in the Indio Hills. The Plan will conserve approximately 2,354 acres of this Habitat.

11. ***Thousand Palms.*** The Conservation Area includes approximately 11,058 acres of Le Conte's thrasher Habitat modeled in this Conservation Area. The Plan will conserve

approximately 10,506 acres of this Habitat.

12. ***Indio Hills/Joshua Tree National Park Linkage.*** The Conservation Area includes approximately 6,396 acres of modeled Habitat for the Le Conte's thrasher. The Plan will conserve approximately 5,790 acres of this Habitat. This area could provide a refugium in that some of the potential Habitat occurs at elevations from 1,000 to 1,120 feet, well above the 200 to 600 foot elevation at other known occurrences on the Thousand Palms Preserve.

13. ***Indio Hills Palms.*** This Conservation Area was considered as potential Habitat for the Le Conte's thrasher and contains approximately 106 acres of modeled Habitat. The Plan will conserve approximately 105 acres of this Habitat.

14. ***East Indio Hills.*** This Conservation Area was considered as potential Habitat for the Le Conte's thrasher and contains approximately 2,142 acres of modeled Habitat. The Plan will conserve approximately 1,985 acres of this Habitat.

15. ***Joshua Tree National Park.*** The Conservation Area includes approximately 4,330 acres of modeled Habitat for the Le Conte's thrasher. The Plan will conserve approximately 4,305 acres of this Habitat.

16. ***Desert Tortoise and Linkage.*** The Conservation Area includes approximately 49,414 acres of modeled Habitat for the Le Conte's thrasher. The Plan will conserve approximately 46,571 acres of this Habitat.

17. ***Mecca Hills/Orocopia Mountains.*** The Conservation Area includes approximately 17,467 acres of modeled Habitat for the Le Conte's thrasher. The Plan will conserve approximately 16,815 acres of this Habitat.

18. ***Dos Palmas.*** The Dos Palmas area includes approximately 14,882 acres that have been delineated, based on topography and vegetation, as modeled Habitat for the Le Conte's thrasher. The Plan will conserve approximately 14,139 acres of this Habitat.

19. ***Coachella Valley Stormwater Channel and Delta.*** There are approximately 784 acres of modeled Habitat for this species within this Conservation Area. The Plan will conserve approximately 706 acres of this Habitat.

20. ***Santa Rosa and San Jacinto Mountains.*** There are approximately 11,093 acres of modeled Habitat for this species within this Conservation Area. The Plan will conserve approximately 10,006 acres of this Habitat.

9.7.6.4 Take Analysis

Significance of the Plan Area to Le Conte's Thrasher

The Le Conte's thrasher appears to occur at low densities in suitable Habitat throughout the Plan Area. This species has no official federal or state status although it is considered as a Species of Special Concern by the State of California. Le Conte's thrasher is an uncommon resident of the deserts of the American southwest and northwestern Mexico. It is found in the San Joaquin Valley and in the Mojave and Colorado Deserts of California and Nevada southward into northeastern Baja California, and farther south into central and coastal Baja California. It also occurs in the Sonoran Desert from extreme southwest Utah and western Arizona south into western Sonora, Mexico. Within this range, distribution is patchy. The elevational distribution is generally between sea level and 1,150 meters, though in Death Valley it occurs down to -81 meters, and in

the Mojave Desert it is known up to approximately 1,600 meters. The species requires undisturbed substrate for foraging under desert shrubs. Agriculture and urban Development have eliminated considerable former Habitat in the San Joaquin Valley, portions of the Mojave Desert, Imperial and Coachella Valleys, the Las Vegas area, and south and west of Phoenix. Based on false-infrared satellite imagery of 243 historic localities in the U.S. as of 1993, at least 26% no longer had suitable Habitat patches within 3 km. Within the Plan Area, Le Conte's thrashers are known to occur in the Upper Mission Creek/Big Morongo Canyon, Whitewater Floodplain, Willow Hole, Edom Hill, Thousand Palms, and Desert Tortoise and Linkage Conservation Areas.

Effects of Take on the Le Conte's Thrasher

The Plan ensures long-term Conservation including Habitat protection, management, and monitoring for Le Conte's thrasher.

There are 243,242 acres of modeled Habitat for Le Conte's thrasher within the Plan Area. 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 132,715 acres (54% of total) of this modeled Habitat. Approximately 59,252 acres (24%) 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 73,463 acres (30%) of the modeled Habitat for Le Conte's thrasher in the Plan Area. Of the 33 known locations for this species in the Plan Area, 19 are within the Conservation Areas.

Within the Conservation Areas under the worst case scenario, 8,639 acres of Take of modeled Le Conte's thrasher Habitat (4%) 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; 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 87,235 acres (36%) 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, in marginal patches of Habitat along Interstate 10 throughout the Plan Area, east of Dillon Road, along the eastern shore of Salton Sea, and in desert saltbush scrub interspersed with agriculture. These acres were not included in the Conservation Area because of the small patch size, high degree of fragmentation, and the associated edge effects.

The raw acreage numbers and percentage of indicate a substantial acreage of Le Conte's thrasher modeled Habitat that could be lost to development within the next 75 years. Evaluation of the impacts of Take requires an assessment of the quality of this Habitat. The actual reduction

in Habitat value is expected to be considerably less because:

1. 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.
2. Take within the Conservation Areas 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.
3. As a result of implementing the Conservation Objectives Other Conserved Habitat for Le Conte's thrasher 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.
4. 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.

The issuance of Take Permits, therefore, will not likely jeopardize the continued existence of the Le Conte's thrasher and the implementation of the MSHCP will provide for the Conservation of the species.

Measures to Avoid, Minimize, and Mitigate Take of Le Conte's Thrasher

The Permittees will protect and manage, in perpetuity, 73,463 acres of the modeled Habitat to mitigate the Take of Le Conte's thrasher. The 59,252 acres of modeled Habitat within Existing Conservation Lands will be monitored and managed to ensure that Conservation Objectives are met. The Plan will thus ensure Conservation, through protection and management, of 132,715 acres (54%) of Le Conte's thrasher Habitat in the MSHCP Reserve System.

As part of the avoidance, minimization, and mitigation measures required by the Plan, construction activities in all the Conservation Areas will avoid Le Conte's thrasher nesting sites as described in Section 4.4.

Under the Plan, 19 of the 33 known occurrences for this species in the Plan Area will be conserved. Habitat would also be conserved in a range of environmental conditions from Snow Creek in the west of the Plan Area to the Shavers Valley area in the extreme east of the Plan Area. The Conservation Areas which provide Other Conserved Habitat for Le Conte's thrasher are Stubbe and Cottonwood Canyons, Snow Creek/Windy Point, Whitewater Canyon, Highway 111/I-10, Whitewater Floodplain, Upper Mission Creek/Big Morongo Canyon, Mission Creek/Morongo Wash, Willow Hole, Edom Hill, Thousand Palms, Indio Hills/Joshua Tree National Park Linkage, Indio Hills Palms, East Indio Hills, Joshua Tree National Park, Desert Tortoise and Linkage, Mecca Hills/Orocopia Mountains, Dos Palmas, Coachella Valley Stormwater Channel and Delta, and the Santa Rosa and San Jacinto Mountains.

Within the Conservation Areas, Essential Habitat will be avoided to the Maximum Extent Feasible. Thus, implementation of the Plan will maintain and enhance population viability of the species by protecting large Habitat areas that otherwise would be subject to conversion to other uses.

Additionally, the Plan calls for Management and Monitoring Programs to ensure the Conservation of this species, including control of activities that degrade Le Conte's thrasher 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 also provides for a research element as part of the Monitoring Program that addresses the distribution of this thrasher, its home range size, dispersal distances and barriers to dispersal, and its population density throughout the Plan Area.

Overall Impacts to Le Conte's Thrasher

As a result of this Plan, 54% of the modeled Habitat for this species in the Plan Area will be conserved. Habitat would be conserved in a range of environmental conditions from Snow Creek in the west of the Plan Area to the Shavers Valley area in the extreme east of the Plan Area. The Conservation Areas which provide Other Conserved Habitat for Le Conte's thrasher are Stubbe and Cottonwood Canyons, Snow Creek/Windy Point, Whitewater Canyon, Highway 111/I-10, Whitewater Floodplain, Upper Mission Creek/Big Morongo Canyon, Mission Creek/Morongo Wash, Willow Hole, Edom Hill, Thousand Palms, Indio Hills/Joshua Tree National Park Linkage, Indio Hills Palms, East Indio Hills, Joshua Tree National Park, Desert Tortoise and Linkage, Mecca Hills/Orocopia Mountains, Dos Palmas, Coachella Valley Stormwater Channel and Delta, and the Santa Rosa and San Jacinto Mountains. 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. Thus, implementation of the Plan will maintain and enhance population viability of the species by protecting large Habitat areas that otherwise would be subject to conversion to other uses.

The Le Conte's thrasher will benefit from the establishment of the MSHCP Reserve System which will include Conservation of Habitat in from the western to the eastern limits of the Plan Area. Only 24% of the modeled Habitat for this species is currently conserved. 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.

9.7.6.5 Species Account: Background

Distribution, Abundance, and Trends. The Le Conte's thrasher's typical Habitat consists of sparsely vegetated desert flats, dunes, alluvial fans, or gently rolling hills having a high proportion of one or more species of saltbush (*Atriplex* spp.) and/or cylindrical cholla cactus (*Opuntia* spp.) 0.9 - 1.9 meters high. It also occupies other desert Habitats with similar structural profiles but lacking saltbush/shadscale or cholla cactus. In its typical Habitat, shrubs are well scattered with contiguous or closed cover usually less than 15 meters in any direction, even along the sides of arroyos. Based on what is known of the species' Habitat requirements throughout its range, it may be reasonable to assume that desert dry wash woodland bordered by mixed woody and succulent scrub community or Sonoran creosote bush scrub below toe of slope provides suitable Habitat. Within the Habitat, the ground is generally bare or with sparse patches of grasses and annuals forming low ground cover (average height less than 30 cm.). This thrasher is rarely found in Habitats consisting entirely of creosote bush (*Larrea*). The majority of shrubs rarely exceed 2.5 meters in height, except for isolated desert trees, yuccas, or tall, thin shrubs such as ocotillo. Substrates are typically sandy and rarely composed of a large proportion of rock or of deep silty clays. The Habitat requires accumulated leaf litter under most plants as diurnal cover for most arthropod prey. Surface water rarely exists anywhere within several kilometers of most territories except temporarily, following infrequent rains.

Typical territories rarely have topographical relief greater than 10 - 20 meters, although many broad canyon floors with large flood plains and poorly vegetated sides are acceptable. Narrow, boulder-strewn canyons with little or no sand deposition are used infrequently. The species commonly uses small arroyos, depressions, or streambeds traversing more level terrain with associated larger saltbush/shadscale and other desert shrubs. It also uses the vegetated margins of large, rolling sand dunes. Crissal and California thrashers prefer nearly continuous cover of shrub or riparian vegetation; both occupy Habitats with far more contiguous or closed cover that is far denser and usually taller than any vegetation typically inhabited by Le Conte's thrasher.

For nesting, Le Conte's thrasher prefers thick, dense, and thorny shrubs or cholla cactus. Cholla cactus and saltbush were used in 85% of 289 nest sites throughout the distribution of the species. The remaining 15% were in a large variety of desert shrubs, small trees, and yucca.

Within the Plan Area, there are historical records in the CNDDB and a few recent records. Historic records (date of record follows the location in parentheses) include the mouth of Whitewater Canyon (1930), Desert Hot Springs (1968), Edom Hill (1984), Andreas Canyon alluvial fan (1923), Mecca (1908), Indio (1924), Cabazon (1916), Whitewater River east of Palm Springs Airport (1920), 2 miles west of Thousand Palms (1921), Palm Canyon wash (1923), Whitewater River in Indian Wells (1919), and Shavers Valley (1986). Many of these areas have been impacted by Development. Records since 1990 include four records for the Desert Hot Springs area, two of which are west of Highway 62, a record for the area below Cottonwood Canyon (west of Whitewater Canyon), a record for the area south of I-10 and west of Gene Autry Trail, a record for the Willow Hole ACEC area, a record for Pushwalla Canyon, a record for the Thousand Palms Oasis area, and a record for Indian Wells. These historical and current records suggest a widespread distribution of the species in the Plan Area, where there is appropriate Habitat. This would include most of the non-mountainous areas that have not been disturbed by urbanization or agriculture.

No data are available on population density in the Plan Area. However, average density in Maricopa, California was 4.63 pairs/km^2. Other density estimates have ranged from less than one pair per square kilometer to 1.7 pairs/km^2. Other estimates have been 6 pairs/mi^2, or 2.3 pairs/km^2 (Engels 1940), and 10 pairs/mi^2, or 3.86 pairs/km^2, in one study area in the San Joaquin Valley and 0 – 5 pairs/mi^2, or 0 - 1.93/km^2, throughout the range (Sheppard 1970). The home range limits vary with time and interactions with neighbors, if any; pairs may occupy about 40 - 100 ha in aggregate over a period of a few years.

Associated Covered Species: Le Conte's thrashers are found in Habitat that also may be used by riparian bird species during migration, primarily desert dry wash woodland, including the least Bell's vireo, summer tanager, yellow warbler, yellow-breasted chat, and southwestern willow flycatcher. They also may be associated with crissal thrasher, desert tortoise, Palm Springs pocket mouse, Coachella Valley round-tailed ground squirrel, flat-tailed horned lizard, and Coachella Valley milkvetch among other species.

9.7.7 Least Bell's Vireo *Vireo bellii pusillus*

Status **Federal:** **Endangered**
State: **Endangered**

9.7.7.1 Species Conservation Goals and Objectives

Conserve and manage populations within the MSHCP Reserve System according to the following criteria:

Goal 1: Ensure species persistence in the Plan Area by conserving existing breeding Habitat and an assemblage of native Habitats that are likely important for migration. Conserve Habitat, and associated Essential Ecological Processes, allowing evolutionary processes and natural population fluctuations to occur. Minimize fragmentation, human-caused disturbance, and edge effects to Core Habitat by conserving contiguous Habitat patches and effective Linkages between patches of Core Habitat.

Objective 1a. Ensure conservation of the riparian natural communities that this vireo depends on, Sonoran cottonwood-willow riparian forest, southern arroyo willow riparian forest, southern sycamore-alder riparian woodland, mesquite hummocks (migration), desert dry wash woodland (migration), desert saltbush scrub (migration), desert sink scrub (migration), mesquite bosque (migration), coastal and valley freshwater marsh (migration), arrowweed Scrub (migration), and cismontane alkali marsh (migration), in the following Conservation Areas:

- Cabazon Conservation Area
- Stubbe and Cottonwood Canyons Conservation Area
- Snow Creek/Windy Point Conservation Area
- Whitewater Canyon Conservation Area
- Upper Mission Creek/Big Morongo Canyon Conservation Area

- Willow Hole Conservation Area
- Thousand Palms Conservation Area
- Indio Hills Palms Conservation Area
- Joshua Tree National Park Conservation Area
- Desert Tortoise and Linkage Conservation Area
- Mecca Hills/Orocopia Mountains Conservation Area
- Dos Palmas Conservation Area
- Coachella Valley Stormwater Channel & Delta Conservation Area
- Santa Rosa and San Jacinto Mountains Conservation Area

Please refer to Section 4.3 and Table 9-24a and 9-24b for specific acreages to be protected by this Conservation Objective.

Objective 1b. Ensure that CVWD will establish permanent riparian Habitat, including at least 44 acres of Sonoran cottonwood-willow riparian forest in the Coachella Valley Stormwater Channel and Delta Conservation Area, to replace the Habitat that is periodically altered by flood control maintenance activities. This Habitat will provide for the conservation of the riparian birds covered by the Plan.

Table 9-24a: Summary of Habitat within Conservation Areas Least Bell's Vireo – Breeding Habitat

Conservation Area	*Total Acres of Habitat in Conserv. Areas*	*Acres of Disturbance Authorized*	*Acres of Existing Conservation Lands*	*Remaining Acres to be Conserved*	*Total Acres to be Conserved in MSHCP Reserve System*
Cabazon	100	2	78	20	98
Stubbe & Cottonwood Canyons	266	2	241	23	264
Whitewater Canyon	167	11	60	96	156
Upper Mission Creek/ Big Morongo Canyon	204	14	62	128	190
Willow Hole	126	11	17	98	115
Thousand Palms	198	0	198	0	198
Indio Hills Palms	97	5	47	45	92
East Indio Hills	39	4	0	35	35
Joshua Tree National Park	5	0	5	0	5
Desert Tortoise & Linkage	0	0	0	0	0
Mecca Hills/ Orocopia Mountains	1	0	1	0	1

Conservation Area	*Total Acres of Habitat in Conserv. Areas*	*Acres of Disturbance Authorized*	*Acres of Existing Conservation Lands*	*Remaining Acres to be Conserved*	*Total Acres to be Conserved in MSHCP Reserve System*
Dos Palmas	182	8	98	76	174
CV Stormwater Channel & Delta	82	8	0	74	74
Santa Rosa & San Jacinto Mountains	1,579	70	822	687	1,509
Total – Breeding Habitat	*3,046*	*135*	*1,629*	*1,282*	*2,911*

Table 9-24b: Summary of Habitat within Conservation Areas Least Bell's Vireo – Migratory Habitat

Conservation Area	*Total Acres of Habitat in Conserv. Areas*	*Acres of Disturbance Authorized*	*Acres of Existing Conservation Lands*	*Remaining Acres to be Conserved*	*Total Acres to be Conserved in MSHCP Reserve System*
Cabazon	0	0	0	0	0
Stubbe & Cottonwood Canyons	289	26	34	229	263
Whitewater Canyon	0	0	0	0	0
Upper Mission Creek/ Big Morongo Canyon	278	17	112	149	261
Willow Hole	169	17	0	152	152
Thousand Palms	748	4	710	34	744
Indio Hills Palms	79	4	42	33	75
East Indio Hills	8	1	0	7	7
Joshua Tree National Park	2,195	13	2,063	119	2,182
Desert Tortoise & Linkage	13,564	764	5,920	6,880	12,800
Mecca Hills/ Orocopia Mountains	9,435	319	6,241	2,875	9,116
Dos Palmas	10,129	641	3,716	5,772	9,488
CV Stormwater Channel & Delta	1,983	177	214	1,592	1,806

Conservation Area	*Total Acres of Habitat in Conserv. Areas*	*Acres of Disturbance Authorized*	*Acres of Existing Conservation Lands*	*Remaining Acres to be Conserved*	*Total Acres to be Conserved in MSHCP Reserve System*
Santa Rosa & San Jacinto Mountains	3,958	324	2,157	1,477	3,634
Total – Migratory Habitat	*42,835*	*2,307*	*21,209*	*19,319*	*40,528*

Goal 2: Protect Essential Ecological Processes, including hydrological regimes, necessary to maintain breeding and migration Habitat for this species.

Objective 2. Ensure protection of Essential Ecological Process areas through Conservation Area Conservation Objectives for Essential Ecological Processes.

Goal 3: Ensure conservation of the least Bell's vireo by maintaining the long-term persistence of self-sustaining populations or metapopulations and conserving Habitat quality through biological monitoring and Adaptive Management actions in the Plan Area.

Objective 3. Implement biological monitoring and Adaptive Management to ensure persistence of this vireo in the Plan area.

9.7.7.2 Threats, Limiting Factors, and Adaptive Management

The most significant threats to the least Bell's vireo in the Plan Area are nest parasitism by the brown-headed cowbird, invasion of non-native plants in riparian Habitats, destruction of Habitat as a result of flood control activities, and degradation of Habitat as a result of edge effects related to human activities. Brown-headed cowbird parasitism has been described as a primary cause for the decline of least Bell's vireos in Central and Northern California as well as in Southern California. The decline in breeding populations of lowland riparian passerine species, including the least Bell's vireo, along with other small, insectivorous, open-cup nesting birds -- among them the yellow warbler and southwestern willow flycatcher -- is well documented. It has been suggested that because the least Bell's vireo is most restricted to lowland riparian forests where cowbird parasitism is likely to be greatest, this species has suffered the largest aggregate reduction in numbers. Parasitized vireo pairs either desert the nest or raise the young cowbird at the expense of their own young. Human activities, including golf courses and agriculture, attract cowbirds, thereby increasing the threat to least Bell's vireos. Reduction of cowbird populations in least Bell's vireo Habitat has been shown to substantially benefit this species. The predominance of golf courses and agricultural areas, which both provide Habitat for the cowbird, may make control of this non-native bird difficult.

The following actions may be needed to ensure species persistence and long-term viability if biological monitoring indicates that such actions are warranted. This list is not comprehensive but identifies some of the known or likely threats to this species. More detailed information on the

Management and Monitoring Programs can be found in Section 8.0. Actions may include:

1. Control and manage activities that degrade least Bell's vireo Habitat in conserved areas. These activities include brown-headed cowbird nest parasitism, clearing or alteration of riparian vegetation, persistence or invasion of exotic plant species, human disturbance, edge effects, and predation of adults and nests by domestic animals.
2. Restrict human access to least Bell's vireo occupied Habitat during the breeding season, from March 15 to September 15.
3. Enhance Habitat through the restoration of disturbed Habitats or the creation of new Habitat where feasible. In particular, removal of tamarisk from existing riparian areas would enhance Habitat for least Bell's vireos and other riparian birds. Any Habitat restoration should balance management of least Bell's vireo Habitat with management actions for other riparian-dependent species by ensuring a mix of vegetation successional stages in riparian Habitats.
4. Maintain upland buffers for all occupied Habitat. Buffers should be a minimum of 50 feet wide wherever feasible.

9.7.7.3 Species Conservation Analysis

Conservation Area Reserve Design. The configuration of Conservation Areas is generally beneficial to the Conservation of the least Bell's vireo, as existing Conservation Areas often surround occupied Habitat on public lands. The Mission Creek site is conserved and managed by the Wildlands Conservancy; it is surrounded by BLM Wilderness. Habitat in Whitewater Canyon is partly on BLM land and partly on private land. Acquisition of the private lands from willing sellers will facilitate management of activities in the area that could impact the riparian Habitat; however, there is access to the area from Whitewater Road, and it is impractical to completely exclude access to the proposed Conservation Area in Whitewater Canyon. Management prescriptions need to be incorporated in the BLM's Whitewater Canyon ACEC management plan. Chino Canyon is currently privately owned; however, discussions are in progress with the landowner for acquisition of the riparian area. Willow Hole is part of a BLM ACEC and includes adjacent lands owned by the CVMC.

1. The Planning Team did not attempt to estimate population density to evaluate Core Habitat for this species. With very limited Habitat available for this vireo, all locations were considered as part of a metapopulation. Hence, all available riparian Habitat for breeding and Habitat which may be used in migration were included in the MSHCP Reserve System. The presence of potential breeding Habitat for this species within each of the Conservation Areas is shown in Table 9-24a; migratory Habitat is shown in Table 9-24b.

9.7.7.4 Take Analysis

Significance of the Plan Area to Least Bell's Vireo

The least Bell's vireo was formerly known to inhabit dense willow thickets along streams throughout California's Sacramento and San Joaquin Valleys, from Red Bluff south, from coastal areas inland to the foothills of the Sierra Nevada, and in Owens and Death Valleys. This subspecies is endemic to California and northern Baja California. Currently, U.S. populations are known only from Santa Barbara County and Southern California. Major causes of the decline are cowbird parasitism and destruction of riparian Habitats. Breeding pairs have been observed in the counties of Monterey, San Benito, Inyo, Santa Barbara, San Bernardino, Ventura, Los Angeles, Orange, Riverside, and San Diego, with the highest concentration in San Diego County along the Santa Margarita River (Small 1996). In San Diego County, however, significant population increases in the period from 1986 to 1996 are primarily due to management of local cowbird populations (USFWS 1998).

Currently available census data indicate that most of the populations of this species have undergone tremendous growth. The population in southern California has increased from an estimated 300 pairs in 1986 to an estimated 1,346 pairs in 1996 (USFWS 1998).

Within the Plan Area, The least Bell's vireo is known to occur as a breeding bird in Chino Canyon and in Andreas Canyon. Other suitable breeding Habitat may occur in Millard Canyon, Whitewater Canyon, Mission Creek, Palm Canyon, Murray Canyon, at Oasis de los Osos, at the Willow Hole-Edom Hill Preserve/ACEC, along the Whitewater River near the Salton Sea, and at Dos Palmas. As with other riparian bird species, least Bell's vireos within the Coachella Valley are probably part of a metapopulation and as such are an important element of the avian community.

Effects of Take on the Least Bell's Vireo

The primary importance of the proposed MSHCP to the least Bell's vireo is that it provides Conservation (including Habitat protection, management, and monitoring) of breeding and migratory Habitat. The Plan ensures the long-term conservation and enhancement of breeding and migratory Habitat as well as the associated Essential Ecological Processes, including the hydrological regimes that support riparian vegetation.

Breeding Habitat. With respect to breeding Habitat, there are 3,675 acres of modeled Habitat for the least Bell's vireo within the Plan Area. Approximately 3,046 acres of this modeled breeding Habitat occur within the Conservation Areas and the Plan would ensure Conservation of 2,911 of these acres (96% of the total modeled Habitat). Approximately 1,629 acres (44%) 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 1,282 acres (35%) of the modeled breeding Habitat for least Bell's vireo.

Within the Conservation Areas under the worst case scenario, 135 acres of Take of modeled breeding Habitat (4%) could occur (See Table 9-24a and Table 4-114). Take of least Bell's vireo breeding Habitat within the Conservation Areas must be consistent with the Conservation Objectives for this species to: 1) ensure Conservation of breeding and migratory Habitat; 2) protect Essential Ecological Processes, including hydrological regimes, needed to maintain vireo Habitat;

and 3) implement the Monitoring Program and Adaptive Management actions to ensure Conservation 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 species.

Outside of the Conservation Areas, there are 626 acres (17%) of modeled breeding Habitat authorized for Take. The area of breeding Habitat outside the Conservation Areas is primarily mesquite hummocks that remain as small fragments in a matrix of agriculture. Mesquite hummocks outside the Conservation Areas also occur west of Dos Palmas ACEC, and west of Dillon Road. These acres were not included in the Conservation Area because of the small patch size, high degree of fragmentation, and the associated edge effects.

Migratory Habitat. There are 56,643 acres of modeled migratory Habitat for the least Bell's vireo within the Plan Area. Approximately 42,835 acres of this modeled migratory Habitat occur within the Conservation Areas and the Plan would ensure Conservation of 40,528 of these acres (72% of the total modeled Habitat). Approximately 21,209 acres (37%) 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 19,319 acres (34%) of the modeled migratory Habitat for least Bell's vireo.

Within the Conservation Areas under the worst case scenario, 2,307 acres of Take of modeled migratory Habitat (4%) could occur (See Table 9-24b and Table 4-114). Take of least Bell's vireo migratory Habitat within the Conservation Areas must be consistent with the Conservation Objectives for this species as noted above.

Outside of the Conservation Areas, there are 12,470 acres (22%) of modeled migratory Habitat authorized for Take. Portions of the natural communities included in the migratory Habitat model for least Bell's vireo in marginal or fragmented areas of desert dry wash woodland, mesquite hummocks, desert saltbush scrub, and desert sink scrub. The desert saltbush scrub and desert sink scrub occur in patches in the agricultural areas north of the Salton Sea and along the west shore of the Sea.

The evaluation of impacts of Take for least Bell's vireo requires an assessment of the quality of the affected Habitat. The actual reduction in Habitat value is expected to be considerably less than indicated by the raw acreage numbers because:

1. Conserved Habitat areas are large enough to contain self-sustaining metapopulations populations of least Bell's vireo and incorporate key Habitat elements, including riparian Habitat for breeding and desert dry wash woodland and other Habitats for migration.
2. Take within the Conservation Areas would not eliminate or significantly impact any breeding Habitat. Conservation Objectives require any approved development within Conservation Areas to ensure protection of breeding Habitat.
3. As a result of implementing the Conservation Objectives to protect riparian natural communities the Plan would ensure that there is no net loss of wetland Habitats. For all riparian natural communities where disturbance is authorized by the Plan, an equivalent number of acres as that subject to disturbance would be replaced.
4. Potential Development would not adversely impact the Essential Ecological Processes

needed to maintain currently viable Habitat. Conservation Areas were carefully designed to protect the watershed for riparian Habitat, desert dry wash woodland, and other Habitats for this species.

5. 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,

The issuance of Take Permits, therefore, will not likely jeopardize the continued existence of the least Bell's vireo and the implementation of the MSHCP will provide for the Conservation of the species.

Measures to Avoid, Minimize, and Mitigate Take of Least Bell's Vireo

To mitigate the Take of least Bell's vireo, the Permittees will protect and manage, in perpetuity, 1,282 acres of the modeled breeding Habitat and 19,319 acres of migratory Habitat for this species. The 1,629 acres of breeding Habitat and 21,209 acres of migratory modeled Habitat within Existing Conservation Lands will be monitored and managed to ensure that Conservation Objectives are met. The Plan will thus ensure Conservation, through protection and management, of 2,911 acres of breeding Habitat and 40,528 acres of migratory Habitat for this species.

Existing Conservation Areas within the Plan boundary currently protect 38% of the Habitat for the least Bell's vireo. The Conservation Areas in the Plan would protect 79% of the occupied and potential breeding Habitat and 72% of the potential migratory Habitat for this species. 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 Whitewater River mouth near the Salton Sea, Cottonwood Springs in Joshua Tree National Park, and Dos Palmas. The Reserve System will include 24 of the 37 known locations for this vireo. Other suitable Habitat for breeding sites in the Plan Area occurs in Palm Canyon, Murray Canyon, and Andreas Canyon on the Agua Caliente Indian Reservation; portions of these canyons are currently protected as part of the Indian Canyons Heritage Park.

The model for the least Bell's vireo, and other riparian birds, includes Habitat used in migration, including desert dry wash woodland and desert saltbush scrub. A complete list of the natural communities that may be used in migration is given in the description of model parameters in Appendix I. Other natural Habitat used by this vireo in migration or foraging will be conserved in Stubbe and Cottonwood Canyons, Oasis de los Osos, Snow Creek and Falls Creek in the Snow Creek/Windy Point Conservation Area, Mission Creek, the Thousand Palms Preserve, the Coachella Valley Stormwater Channel and Delta near the Salton Sea, Dos Palmas, and Cottonwood Spring in Joshua Tree National Park Conservation Area. Habitat disturbance, subject to the conditions of any required streambed alteration or Section 404 permits, would be allowed in those portions of these natural communities not conserved by the Plan.

Where disturbance of a given number acres of riparian natural communities is authorized, an equivalent number of acres would be replaced to ensure that the no net loss occurs and the Conservation Objective is achieved.

CVWD will establish 44 acres of permanent Sonoran cottonwood-willow riparian forest in the Coachella Valley Stormwater Channel and Delta Conservation Area as described in Section

4.3.20 to replace riparian Habitat that is periodically altered by flood control maintenance activities. Temporary Habitat disturbance for flood control channel maintenance purposes would be permitted by the Plan in the Coachella Valley Stormwater Channel.

Additionally, the Plan calls for Management and Monitoring Programs to ensure the Conservation of this species, including control of activities that degrade vireo 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. The Plan also limits human access to Bell's vireo occupied Habitat during the breeding season.

Overall Impacts to Least Bell's Vireo

As shown in Table 9-24a, the MSHCP Reserve System would protect 84% of the potential and known breeding Habitat for this species. All of the known breeding locations for this species (with the exception of one limited precision record from Cabazon, reported by Grinnell in 1913) would be protected. The proposed Conservation Areas include the important breeding Habitat for least Bell's vireo in riparian woodland and forest communities and desert fan palm oasis woodland. An aspect of the statistics in Tables 9-24a and Table 9-24b bears explanation. The model for the least Bell's vireo, and other riparian birds, includes Habitat used in migration, including desert dry wash woodland, mesquite bosque and hummocks, and desert saltbush scrub. Not all of the Habitat in these natural communities will be protected in the proposed Conservation Areas. Habitat disturbance, subject to the conditions of any required streambed alteration or Section 404 permits, would be allowed in those portions of these natural communities not conserved by the Plan. Proposed Conservation Areas include riparian Habitat in Whitewater Canyon, Chino Canyon, and Willow Hole/Edom Hill ACEC where the species has been known to breed. Other natural Habitat used by least Bell's vireo in migration or foraging will be conserved in Stubbe and Cottonwood Canyons, Oasis de los Osos, Snow/Falls Creek, Mission Creek, the Thousand Palms Preserve, the Whitewater River delta near the Salton Sea, Dos Palmas, and Cottonwood Spring in Joshua Tree National Park. In total, the Plan would conserve 72% of the Habitat potentially used in migration by least Bell's vireo, according to the model. Temporary Habitat disturbance for flood control channel maintenance purposes would be permitted by the Plan in the Coachella Valley Stormwater channel. CVWD will establish offsite replacement riparian Habitat as described in Section 4.3.21.

Implementation of the Plan is expected to maintain and enhance population viability of the least Bell's vireo by protecting its known breeding locations in the Plan Area and conserving Habitats that may be used in migration. The Plan will also enhance riparian Habitat through implementation of management prescriptions to remove non-native tamarisk and other invasive species from riparian areas. An agreement with CVWD will result in creation of additional riparian vegetation along the Coachella Valley Stormwater channel.

9.7.7.5 Species Account: Background

Distribution, Abundance, and Trends. The least Bell's vireo inhabits riparian woodland Habitats along the riverine systems of Southern California, primarily in San Diego, Santa Barbara, and Riverside Counties. They also breed in northern Baja California and are seen in migration in southern Baja California. This vireo species occurs at sites with two primary features: (1) a dense shrub cover within 1 to 2 meters (3 to 6 feet) off the ground, where nests are typically placed, and (2) a dense, stratified canopy for foraging (Goldwasser 1981, USFWS 1998). Typical riparian

Habitats are those which may include cottonwoods (*Populus fremontii*), oak woodlands, and a dense understory of species such as willow (*Salix* spp.), mulefat (*Baccharis salicifolia*), and California wild rose (*Rosa californica*); in desert areas, arrow-weed (*Pluchea sericea*) and wild grape (*Vitis girdiana*) may be dominant species in these riparian woodlands.

The least Bell's vireo is known to occur as a breeding bird in Chino Canyon and in Andreas Canyon. Other suitable breeding Habitat may occur in Millard Canyon, Whitewater Canyon, Mission Creek, Palm Canyon, Murray Canyon, at Oasis de los Osos, at the Willow Hole-Edom Hill Preserve/ACEC, along the Whitewater River near the Salton Sea, and at Dos Palmas. Breeding and other Habitat in Andreas, Palm, and Murray Canyons is on the Agua Caliente Indian Reservation; the canyons are part of the Indian Canyons Heritage Park and are not included in this Plan. Some least Bell's vireos, particularly if sighted near the Salton Sea or at other locations on the valley floor, could be subspecies *arizonae*, but the Plan will address all least Bell's vireo Habitat as if occupied by subspecies *pusillus*.

Least Bell's vireos also migrate through the Plan Area en route to other breeding areas. In migration, they may use desert fan palm oasis woodland, mesquite hummocks, mesquite bosque, arrowweed scrub, desert dry wash woodland, southern sycamore-alder riparian woodland, Sonoran cottonwood-willow riparian forest, and southern arroyo willow riparian forest.

The least Bell's vireos typically arrive in Southern California to breed from mid-March to early April and remain until late September. Most birds spend the winter in southern Baja California and Mexico. During the breeding season, male vireos establish and defend territories; they maintain a stubborn attachment to these sites throughout the breeding season. Nests are constructed in dense thickets of willow or mulefat, one to two meters from the ground. These vireos may also make their nests in other riparian tree and shrub species.

Associated Covered Species. Other riparian species that occur in similar Habitat, including the yellow-breasted chat, southwestern willow flycatcher, summer tanager, and yellow warbler, will benefit from conservation and Adaptive Management actions for least Bell's vireo. Riparian bird species will be considered as a guild in the Plan with regard to their general presence in riparian areas. However, each of these riparian bird species may require slightly different structural features or successional stages for optimal breeding Habitat, which may require different management strategies.

9.7.8 Gray Vireo
Vireo vicinior

Status **Federal:** **No official Status**
State: **Species of Special Concern**

9.7.8.1 Species Conservation Goals and Objectives

Conserve and manage populations within the MSHCP Reserve System according to the following criteria:

Goal 1: Ensure species persistence in the Plan Area by conserving large enough areas to support a self-sustaining population. Conserve Habitat, and associated Essential Ecological Processes, allowing evolutionary processes and natural population fluctuations to occur. Minimize fragmentation, human-caused disturbance, and edge effects to Core Habitat by conserving contiguous Habitat patches and effective Linkages between patches of Core Habitat.

Objective 1. Conserve occupied or potential Habitat, including Other Conserved Habitat, within the following Conservation Areas:

- Whitewater Canyon Conservation Area
- Joshua Tree National Park Conservation Area
- Santa Rosa and San Jacinto Mountains Conservation Area

Please refer to Section 4.3 and Table 9-25 for specific acreages to be protected by this Conservation Objective.

Table 9-25: Summary of Habitat within Conservation Areas
Gray Vireo

Conservation Area	*Total Acres of Habitat*	*Acres of Disturbance Authorized*	*Acres of Existing Conservation Lands*	*Remaining Acres to be Conserved*	*Total Acres Conserved in MSHCP Reserve System*	*Designation*
Cabazon	26	N/A	0	(26) [1]	0	Other Cons. Habitat
Stubbe & Cottonwood Canyons	9	0	9	0	9	Other Cons. Habitat
Snow Creek/ Windy Point	6	1	1	4	5	Other Cons. Habitat
Whitewater Canyon	4,927	19	4,739	169	4,908	Other Cons. Habitat
Upper Mission	14	0	14	0	14	Other Cons. Habitat

Conservation Area	*Total Acres of Habitat*	*Acres of Disturbance Authorized*	*Acres of Existing Conservation Lands*	*Remaining Acres to be Conserved*	*Total Acres Conserved in MSHCP Reserve System*	*Designation*
Creek/ Big Morongo Canyon						
Joshua Tree National Park	30,653	134	29,311	1,208	30,519	Other Cons. Habitat
Santa Rosa & San Jacinto Mountains	67,401	1,312	54,276	11,813	66,089	Other Cons. Habitat
Total – All Habitat	*103,036*	*1,466*	*88,350*	*13,194 (26)*[1]	*101,544*	--
Total – Other Cons. Habitat	*103,036*	*1,466*	*88,350*	*13,194 (26)*[1]	*101,544*	--

[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.

Goal 2: Ensure conservation of gray vireo 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.

Objective 2. Implement biological monitoring and Adaptive Management to ensure persistence of this vireo within the Plan Area.

9.7.8.2 Threats, Limiting Factors, and Adaptive Management

The reasons for the decline in gray vireo populations in recent decades are not well understood. One major cause of this decline may be parasitism by the brown-headed cowbird. Remsen (1978) has described the gray vireo as highly susceptible to cowbird parasitism. Human activities, including residential Development, golf courses and agriculture, attract cowbirds thereby increasing this potential threat to gray vireos. Reduction of cowbird populations in gray vireo Habitat may substantially benefit this species. Another possible cause for their decline could be Habitat changes and senescence of the vegetation due to fire suppression activities since the turn of the century. Research is needed to determine the causes of this species' decline.

The following actions may be needed to ensure species persistence and long-term viability if biological monitoring indicates that such actions are warranted. This list is not comprehensive but identifies some of the known or likely threats to the gray vireo. More detailed information on the Management and Monitoring Programs can be found in Section 8.0. Actions may include:

1. Determine the distribution and abundance of the gray vireo throughout the Plan Area. This would include coordination with Joshua Tree National Park biologists to conduct surveys for this species in appropriate Habitat within the park.

2. Control brown-headed cowbird nest parasitism if it is deemed to be a significant factor in the decline of this species. Any sign of parasitism or regular observations of cowbirds in breeding Habitat may warrant a cowbird control effort. Control invasive species if it is determined from the monitoring results that they impact gray vireo Habitat.

3. Coordinate with USFS, BLM, and NPS regarding appropriate management prescriptions for pinyon-juniper woodland and chaparral Habitats. Consideration should be given to the use of prescribed fire and/or standards for controlling wildfires to maintain or restore gray vireo Habitat.

9.7.8.3 Species Conservation Analysis

Conservation Area Configuration Issues. The configuration of proposed Conservation Areas in the Santa Rosa and San Jacinto Mountains is beneficial to the Conservation of gray vireos, as all potential Habitat is included, with the exception of areas where residential Development occurs on private lands in the Pinyon Flat area. Most of the potential Habitat for this species occurs on public lands managed by the USFS and includes contiguous blocks of Habitat. All of the potential Habitat in Joshua Tree National Park is surrounded by other protected areas of the park. Nearly 5,000 acres of potential Habitat occur in the Whitewater Canyon Conservation Area on BLM and USFS lands in the San Gorgonio Wilderness. The Habitat needs and population numbers for this bird are poorly known. Additional Habitat surveys are needed to determine whether viable populations exist within the Plan Area. More information will need to be gathered as part of Plan implementation to determine where occupied Habitat for this species occurs and to establish Adaptive Management goals that will maintain its Habitat.

With so little known about this species, the Planning Team did not attempt to identify Core Habitat within the Plan Area. The emphasis in Conservation planning for this species was to include large blocks of potential Habitat in proposed Conservation Areas where suitable gray vireo Habitat exists. Virtually all potential Habitat for this species will be conserved within the MSHCP Reserve System. For each area, see Table 9-25 for a breakdown of Existing Conservation Lands and remaining lands to be conserved. The Planning Team identified the following Conservation Areas as Other Conserved Habitat:

1. ***Whitewater Canyon.*** This Conservation Area includes approximately 4,927 acres of modeled gray vireo Habitat, of which approximately 4,908 acres will be conserved under the Plan.

2. ***Joshua Tree National Park.*** The Joshua Tree National Park Conservation Area includes approximately 30,653 acres that have been delineated, based on topography and vegetation, as modeled Habitat for the gray vireo. Approximately 30,519 acres of this potential Habitat will be conserved under the Plan.

3. ***Santa Rosa and San Jacinto Mountains.*** There are approximately 67,401 acres of modeled Habitat for this species within this Conservation Area, of which approximately 66,089 acres will be protected under the Plan. In this Conservation Area, breeding gray vireos are known from the San Jacinto and Santa Rosa Mountains, from Mountain Center to Pinyon Flat and Sugarloaf Mountain.

9.7.8.4 Take Analysis

Significance of the Plan Area to Gray Vireo

Within the Plan Area, the occurrence and status of the gray vireo is little known. The summer range of the gray vireo was formerly more widespread, with breeding birds recorded at many locations on the desert slopes of San Bernardino, Riverside and San Diego Counties, in the Walker Pass area of Kern County, in Joshua Tree National Park, and in the northern and western foothills of the San Gabriel Mountains. The gray vireo is also known as a migrant in Whitewater Canyon (McCaskie 1963, Garrett and Dunn 1981). This vireo has no official state or federal status although it is considered a Species of Special Concern by the State of California.

Effects of Take on the Gray Vireo

The primary importance of the proposed MSHCP to the gray vireo is that it provides Conservation (including Habitat protection, management, and monitoring) of Habitat where gray vireos are known to occur as well as additional potential Habitat. The Plan ensures the long-term conservation and enhancement of breeding and migratory Habitat through implementation of management prescriptions.

There are 105,562 acres of modeled Habitat for the gray vireo within the Plan Area. Approximately 103,036 acres of this modeled Habitat occur within the Conservation Areas and the Plan would ensure Conservation of 101,544 of these acres (96% of the total modeled Habitat). The two known occurrences for the gray vireo are both within the Santa Rosa and San Jacinto Mountains Conservation Area. Approximately 88,350 acres (84%) 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 13,194 acres (12%) of the modeled Habitat for the gray vireo.

Within the Conservation Areas under the worst case scenario, 1,466 acres of Take of modeled Habitat (1%) could occur (See Table 9-25 and Table 4-114). Take of gray vireo Habitat within the Conservation Areas must be consistent with the Conservation Objectives for this species to: 1) ensure Conservation of occupied and potential Habitat; 2) evaluate the need for management prescriptions for pinyon-juniper woodland and chaparral Habitat; and 3) implement the Monitoring Program and Adaptive Management actions to ensure Conservation 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 the gray vireo.

Outside of the Conservation Areas, there are 2,447 acres (2%) of modeled Habitat authorized for Take. The majority of the acreage is comprised of the undeveloped areas within the existing low density residential areas in the Pinyon Flat/Pinyon Crest communities along Highway 74, other developed areas, Highway 74 itself as well as an extensive road network in this area.

The evaluation of impacts of Take for gray vireo requires is limited by the available data on this species occurrence in the Plan Area. The impact of potential Take of gray vireos is expected to be reduced because:

1. Conserved Habitat areas are large enough to support a self-sustaining metapopulation of gray vireos and incorporate key Habitat elements.

2. Take within the Conservation Areas would not eliminate or significantly impact any known gray vireo Habitat. Conservation Objectives require any approved development within Conservation Areas to ensure protection of occupied Habitat.
3. As a result of implementing the Conservation Objectives for the natural communities within gray vireo Habitat.
4. Lands in the MSHCP Reserve System would be managed and monitored to address significant uncertainties about this species, including distribution and abundance, Habitat preferences, and potential stressors to gray vireo,

The issuance of Take Permits, therefore, will not likely jeopardize the continued existence of the gray vireo and the implementation of the MSHCP will provide for the Conservation of the species.

Measures to Avoid, Minimize, and Mitigate Take of Gray Vireo

To mitigate the Take of gray vireo, the Permittees will protect and manage, in perpetuity, 13,194 acres of occupied and potential Habitat. The 88,350 acres of occupied and potential Habitat within Existing Conservation Lands will be monitored and managed to ensure that Conservation Objectives are met. The Plan will thus ensure Conservation, through protection and management, of a total of 101,544 acres of modeled Habitat for this species.

Existing Conservation Areas within the Plan boundary currently protect 84% of the modeled Habitat for the gray vireo. Both of the two known locations for gray vireo in the Plan Area would be conserved. Natural Habitat used by this vireo in migration or foraging will be conserved in Whitewater Canyon, Joshua Tree National Park Conservation Area, and the Santa Rosa and San Jacinto Mountains.

Additionally, the Plan calls for Management and Monitoring Programs to ensure the Conservation of this species, including control of activities that degrade vireo habitat, and control of invasive species such as brown-headed cowbird if they are determined through monitoring to be a threat. The Monitoring Program will also include data collection to determine the distribution and abundance of the gray vireo in suitable Habitat in the Plan Area.

The Plan also provides for coordinated management efforts to maintain and enhance or restore gray vireo Habitat. The Habitat preferences of the gray vireo and the reasons for its apparent decline are not known. Additional data from the Monitoring Program will contribute to informed management efforts to enhance gray vireo Habitat areas.

Overall Impacts to Gray Vireo

As shown in Table 9-25, the Plan would protect 96% of the potential Habitat for this species. All of the known locations for this species would be protected under this Plan. Habitat would also be conserved in a range of environmental conditions from Cabazon in the west end of the Plan Area to the Joshua Tree National Park in the north and east ends of the Plan Area. The Conservation Areas that provide significant acres of Habitat for gray vireo are Whitewater Canyon, Joshua Tree National Park, and the Santa Rosa and San Jacinto Mountains. Other Conservation Areas that contain very small acres of potential gray vireo Habitat are Cabazon, Stubbe and

Cottonwood Canyons, Snow Creek/Windy Point, and Upper Mission Creek/Big Morongo Canyon. Those limited areas where Incidental Take could be permitted for this species are primarily locations in the already developed area around Pinyon Flat in the Santa Rosa Mountains.

Implementation of the Plan will maintain and enhance population viability of the gray vireo by protecting additional potential Habitat for this species. The Plan will also enhance gray vireo Habitat through implementation of management prescriptions, which could include control of brown-headed cowbird parasitism and prescribed burning to revitalize Habitat. Implementation for this species will include research to determine the extent of its occurrence within the Plan Area and Habitat management needs.

9.7.8.5 Species Account: Background

Distribution, Abundance, and Trends. The gray vireo is a small passerine about the size of a house sparrow that inhabits arid, shrub-covered slopes in pinyon-juniper, juniper, and chamise-redshank chaparral Habitats on foothills and mesas. Suitable Habitat typically occurs from 2,000 to 6,500 feet (600-2,000 m) (Zeiner et al. 1990). In its preferred Habitat it is found in areas with sparse to moderate cover and scattered small trees. Although junipers are the dominant trees in gray vireo Habitat, oaks may also be common.

The summer range of the gray vireo is from New Mexico, southern Nevada, southern Utah, southern Colorado, western Texas, Arizona, and southeastern California. This species winters primarily south of the Mexican border and in southwestern Arizona. In California, breeding gray vireos are known from the northeastern slopes of the San Bernardino Mountains in the vicinity of Rose Mine and Round Valley, in the San Jacinto and Santa Rosa Mountains from Mountain Center to Pinyon Flat and Sugarloaf Mountain, and on the southern slopes of the Laguna Mountains near Campo and Kitchen Creek. It is also known from the mountains of the eastern Mojave Desert, including the Grapevine, Kinston, Clark and New York Mountains.

Descriptions by Grinnell and Swarth (1913) indicate that the gray vireo was a common summer resident on the slopes of the Santa Rosa and San Jacinto Mountains. Their observation sites include a ridge at 4,200 feet near Potrero Spring and north of Asbestos Mountain, and down to 3,000 feet near the head of Palm Canyon. Along the trail from Vandeventer Flat to Pinyon Flat, "many birds" were noted at 3,000 to 4,500 feet, as far east as Omstott Creek, which coincided with the limit of *Adenostoma* species. Based on known territory size and amount of suitable Habitat, they estimated that 480 pairs were present. While it is not known how many birds may still exist in the area, sightings are rare. One pair was present near Pinyon Flats in 1977 (Goldwasser 1978a). One to four pairs were observed south of Highway 74 near the Santa Rosa Peak Road in 1979, and a nesting pair was observed in there in 1981 (R. McKernan, pers. comm.). According to USFS records (Freeman, pers. comm.), one individual was seen in Pinyon Flat in July 1997. According to Garrett and Dunn (1981), much fieldwork is needed to document the extent and causes of decline of this formerly more widespread species. Regular surveys for this species have not been conducted in the Plan Area.

The gray vireo usually arrives from its wintering areas in Mexico from the end of March to early May. It generally departs by the end of August. The nest of the gray vireo is an open cup of plant fibers, bits of leaves, spider silk, and bark strips, often hung from twigs or a forked branch in a shrub or small tree, usually two to eight feet above ground (Zeiner et al. 1990). Eggs are laid

from mid-May to mid-June. Gray vireos feed by gleaning insects and invertebrates from bushes and small trees. In New Mexico, territories encompass 100 acres or more (Schwarz 1991).

Associated Covered Species. Another Covered Species that occurs in similar Habitat is the Peninsular bighorn sheep, which occurs in pinyon-juniper dominated woodlands up to about 4,000 feet. Desert tortoise may also occur in the same Habitat at elevations to approximately 3,800 feet.

9.7.9 Yellow Warbler *Dendroica petechia brewsteri*

Status **Federal:** **No official status**
State: **Species of Special Concern**

9.7.9.1 Species Conservation Goals and Objectives

Conserve and manage populations within the MSHCP Reserve System according to the following criteria:

Goal 1: Ensure species persistence in the Plan Area by conserving existing breeding Habitat and an assemblage of native Habitats that are likely important for migration. Conserve Habitat, and associated Essential Ecological Processes, allowing evolutionary processes and natural population fluctuations to occur. Minimize fragmentation, human-caused disturbance, and edge effects to Core Habitat by conserving contiguous Habitat patches and effective Linkages between patches of Core Habitat.

Objective 1a. Ensure conservation of the riparian natural communities that this warbler depends on, Sonoran cottonwood-willow riparian forest, southern arroyo willow riparian forest, southern sycamore-alder riparian woodland, mesquite hummocks (migration), desert dry wash woodland (migration), desert saltbush scrub (migration), desert sink scrub (migration), mesquite bosque (migration), coastal and valley freshwater marsh (migration), arrowweed scrub (migration), and cismontane alkali marsh (migration), in the following Conservation Areas:

- Cabazon Conservation Area
- Stubbe and Cottonwood Canyons Conservation Area
- Snow Creek/Windy Point Conservation Area
- Whitewater Canyon Conservation Area
- Upper Mission Creek/Big Morongo Canyon Conservation Area
- Willow Hole Conservation Area
- Thousand Palms Conservation Area
- Indio Hills Palms Conservation Area
- Joshua Tree National Park Conservation Area
- Desert Tortoise and Linkage Conservation Area
- Mecca Hills/Orocopia Mountains Conservation Area
- Dos Palmas Conservation Area
- Coachella Valley Stormwater Channel & Delta Conservation Area

- Santa Rosa and San Jacinto Mountains Conservation Area

Please refer to Section 4.3 and Tables 9-26a and 9-26b for specific acreages to be protected by this Conservation Objective.

Objective 1b. Ensure that CVWD will establish permanent riparian Habitat, including at least 44 acres of Sonoran cottonwood-willow riparian forest in the Coachella Valley Stormwater Channel and Delta Conservation Area, to replace the Habitat that is periodically altered by flood control maintenance activities. This Habitat will provide for the conservation of the riparian birds covered by the Plan.

Goal 2: Protect Essential Ecological Processes, including hydrological regimes, necessary to maintain Core Habitat and Other Conserved Habitat for this species.

Objective 2. Ensure protection of Essential Ecological Process areas through Conservation Area Conservation Objectives for Essential Ecological Processes.

Goal 3: Ensure conservation of the yellow warbler by maintaining the long-term persistence of self-sustaining populations or metapopulations and conserving Habitat quality through biological monitoring and Adaptive Management actions in the Plan Area.

Objective 3. Implement biological monitoring and Adaptive Management to ensure persistence of this warbler in the Plan area.

Table 9-26a: Summary of Habitat within Conservation Areas Yellow Warbler – Breeding 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*
Cabazon	87	1	78	8	86
Stubbe & Cottonwood Canyons	266	2	241	23	264
Whitewater Canyon	167	11	60	96	156
Upper Mission Ck./ Big Morongo Canyon	204	14	62	128	190
Willow Hole	1	0	1	0	1
Thousand Palms	141	0	141	0	141
Indio Hills Palms	93	5	46	42	88
East Indio Hills	0	0	0	0	0
Joshua Tree National Park	5	0	5	0	5
Desert Tortoise & Linkage	0	0	0	0	0
Mecca Hills/ Orocopia Mtns.	1	0	1	0	1
Dos Palmas	125	6	69	50	119
CV Storm-water Channel & Delta	8	1	0	7	7
Santa Rosa & San Jacinto Mountains	1,574	69	822	683	1,505
Total – Breeding Habitat	*2,672*	*109*	*1,526*	*1,037*	*2,563*

Table 9-26b: Summary of Habitat within Conservation Areas Yellow Warbler – Migratory 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*
Cabazon	13	1	0	12	12
Stubbe & Cottonwood Canyons	289	26	34	229	263
Whitewater Canyon	0	0	0	0	0
Upper Mission Creek/ Big Morongo Canyon	278	17	112	149	261
Willow Hole	294	28	16	250	266
Thousand Palms	805	4	767	34	801
Indio Hills Palms	83	4	43	36	79
East Indio Hills	47	5	0	42	42
Joshua Tree National Park	2,195	13	2,063	119	2,182
Desert Tortoise & Linkage	13,564	764	5,920	6,880	12,800
Mecca Hills/ Orocopia Mountains	9,435	319	6,241	2,875	9,116
Dos Palmas	10,184	644	3,745	5,795	9,540
CV Stormwater Channel & Delta	2,047	183	214	1,650	1,864
Santa Rosa & San Jacinto Mountains	3,963	325	2,157	1,481	3,638
Total – Migratory Habitat	*43,197*	*2,333*	*21,312*	*19,552*	*40,864*

9.7.9.2 Threats, Limiting Factors, and Adaptive Management

The primary threats to the yellow warbler in the Plan Area are cowbird parasitism and destruction or degradation of Habitat from flood control and other human activities. Cowbird parasitism is well documented, and the yellow warbler is one of the most common hosts. One cowbird may lay an egg in up to 12 different nests in a breeding season, and yellow warblers lay a single clutch per season. Human activities, including golf courses and agriculture, attract cowbirds, thereby increasing the threat to yellow warblers.

The following actions may be needed to ensure species persistence and long-term viability if biological monitoring indicates that such actions are warranted. This list is not comprehensive but identifies some of the known or likely threats to this warbler. More detailed information on the Management and Monitoring Programs can be found in Section 8.0. Actions may include:

1. Restrict activities that degrade yellow warbler Habitat in conserved areas. These activities include clearing or alteration of riparian vegetation, invasion of exotic plant species, human disturbance, brown-headed cowbird parasitism, and predation of adults and nests by domestic animals.
2. Restrict human access to yellow warbler occupied Habitat during the breeding season.
3. Enhance Habitat through the restoration of disturbed Habitats or the creation of new Habitat where feasible. Any Habitat restoration should balance management of yellow warbler Habitat with management actions for other riparian-dependent species by ensuring a mix of vegetation successional stages in riparian Habitats.
4. Maintain upland buffers for all occupied Habitat. Buffers should be a minimum of 50 feet wide wherever feasible.

9.7.9.3 Species Conservation Analysis

Conservation Area Reserve Design. The configuration of Conservation Areas is beneficial to the Conservation of the yellow warbler, as existing Conservation Areas often surround occupied Habitat on public lands. The Mission Creek site is conserved and managed by the Wildlands Conservancy; it is surrounded by BLM Wilderness. Habitat in Whitewater Canyon is partly on BLM land and partly on private land. Acquisition of the private lands from willing sellers will facilitate management of activities in the area that could impact the riparian Habitat; however, there is access to the area from Whitewater Road, and it is impractical to completely exclude access to the proposed Conservation Area in Whitewater Canyon. Management prescriptions need to be incorporated in the BLM's Whitewater Canyon ACEC management plan. Chino Canyon is currently privately owned; however, discussions are in progress with the landowner for acquisition of the riparian area. Willow Hole is part of a BLM ACEC and includes adjacent lands owned by CVMC and CNLM.

9.7.9.4 Take Analysis

Significance of the Plan Area to Yellow Warbler

Within the Plan Area, the yellow warbler is known or believed to occur as a breeding bird at Whitewater Canyon, Mission Creek, Chino Canyon, in the Whitewater River near the Salton Sea, and at Cottonwood Spring in Joshua Tree National Park. Many yellow warblers also migrate through the Plan Area en route to other breeding areas. The yellow warbler occurs in riparian areas throughout Alaska, Canada, the United States, and parts of Mexico. The yellow warbler has no official federal status and is considered a Species of Special Concern by the State of California.

While the amount of Habitat in the Plan Area is relatively small, it is part of a larger network of Habitat in the Colorado Desert. Even if the Habitat in the Plan Area is not able to support a viable population, it contributes to the larger metapopulation. Populations in the southwest have declined dramatically in recent years in lowland areas of southern California, the Colorado River, the Sacramento, and San Joaquin Valleys (Lowther et al. 1999).

Effects of Take on the Yellow Warbler

The primary importance of the proposed MSHCP to the yellow warbler is that it provides Conservation (including Habitat protection, management, and monitoring) of breeding Habitat and Habitat used by this species in migration. The Plan ensures the long-term conservation of breeding and migratory Habitat as well as the associated Essential Ecological Processes, including the hydrological regimes that support riparian vegetation.

Breeding Habitat. With respect to breeding Habitat, there are 2,730 acres of modeled Habitat for the yellow warbler within the Plan Area. Approximately 2,672 acres of this modeled breeding Habitat occur within the Conservation Areas and the Plan would ensure Conservation of 2,563 of these acres (94% of the total modeled Habitat). Approximately 1,526 acres (56%) 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 1,037 acres (38%) of the modeled breeding Habitat for yellow warbler.

There are 23 known occurrences for the yellow warbler in the Plan Area and 17 of these locations are within the Conservation Areas. Nine of these known occurrences were unprotected in 1996. These known locations may include an observation of one or more individuals. They are not separated here as to breeding or migration.

Within the Conservation Areas under the worst case scenario, 109 acres of Take of modeled breeding Habitat (4%) could occur (See Table 9-21a and Table 4-114). Take of yellow warbler breeding Habitat within the Conservation Areas must be consistent with the Conservation Objectives for this species to: 1) ensure Conservation of Core Habitat; 2) protect Essential Ecological Processes needed to maintain yellow warbler Habitat; and 3) maintain Biological Corridors and Linkages among conserved populations to provide for population fluctuation and enhance genetic diversity. 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 species.

Outside of the Conservation Areas, there are 59 acres (2%) of modeled Habitat authorized for Take. As the species distribution model for the yellow warbler is the same as for the southwestern willow flycatcher, the areas affected are the same. Some of this acreage occurs as small slivers of Habitat at the margins of suitable riparian areas. Some of this acreage occurs along the Coachella Valley Stormwater Channel north of the Conservation Area boundary. Impacts to Habitat along this portion of the Stormwater channel will be mitigated by establishment of replacement permanent riparian forest by CVWD (see below).

Migratory Habitat. There are 57,589 acres of modeled migratory Habitat for the yellow warbler within the Plan Area. Approximately 43,197 acres of this modeled migratory Habitat occur within the Conservation Areas and the Plan would ensure Conservation of 40,864 of these acres

(71% of the total modeled Habitat). Approximately 21,312 acres (37%) of the modeled migratory Habitat are within Existing Conservation Lands and would be managed as part of the Reserve System. The Plan would conserve an additional 19,552acres (34%) of the modeled migratory Habitat for yellow warbler.

Within the Conservation Areas under the worst case scenario, 2,333 acres of Take of modeled migratory Habitat (4%) could occur (See Table 9-21b and Table 4-114). Take of yellow warbler migratory Habitat within the Conservation Areas must be consistent with the Conservation Objectives for this species to: 1) ensure Conservation of riparian Habitat, and 2) protect Essential Ecological Processes including hydrological regimes needed to maintain riparian Habitat. 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 the yellow warbler.

Outside of the Conservation Areas, there are 13,020 acres (23%) of modeled migratory Habitat authorized for Take. The modeled yellow warbler migratory Habitat outside the Conservation Areas includes: 1) desert dry wash woodland west of Thermal Canyon and east of Dillon Road in an area fragmented by the I-10 freeway; 2) small patches of desert saltbush scrub and mesquite hummocks surrounded by agriculture north and west of the Salton Sea; 3) slivers of Habitat, including desert dry wash woodland, along various washes from Desert Hot Springs area to the margins of the Cathedral City and Rancho Mirage cove areas and around Deep Canyon in Palm Desert. These are areas with existing impacts from fragmentation, edge effects, and associated disturbance.

The model for the yellow warbler, and other riparian birds, includes Habitat used in migration, including desert dry wash woodland, mesquite bosque, mesquite hummocks, and desert saltbush scrub. Not all of the Habitat in these natural communities will be protected in the proposed Conservation Areas. Habitat disturbance, subject to the conditions of any required streambed alteration or Section 404 permits, would be allowed in those portions of these natural communities not conserved by the Plan.

Evaluation of the impacts of Take of yellow warbler migratory Habitat that could be lost to Development within the next 75 years requires an assessment of the quality of this Habitat. The establishment of Conservation Areas where this species is protected is a significant improvement over the current unprotected status where only 67% of riparian Habitat in the Plan Area is protected. The actual reduction in Habitat value is expected to be considerably less than indicated by the raw acreage numbers because:

1. Conserved Habitat areas are large enough to contain self-sustaining metapopulations of yellow warblers and to incorporate key Habitat elements, including riparian Habitat for breeding and desert dry wash woodland and other Habitats for migration.
2. As a result of implementing the Conservation Objectives to protect riparian natural communities the Plan would ensure that there is no net loss of wetland Habitats. For all riparian natural communities where disturbance is authorized by the Plan, an equivalent number of acres as that subject to disturbance would be replaced.
3. Potential Development would not adversely impact the Essential Ecological Processes needed to maintain currently viable Habitat. Conservation Areas were carefully designed

to protect the watershed for riparian Habitat, desert dry wash woodland, and other Habitats used by yellow warblers.

4. Lands in the MSHCP Reserve System would be managed and monitored to address significant edge effect problems, impacts from introduced exotic species, and other stressors to yellow warblers,

The issuance of Take Permits, therefore, will not likely jeopardize the continued existence of the yellow warbler and the implementation of the MSHCP will provide for the Conservation of the species.

Measures to Avoid, Minimize, and Mitigate Take of Yellow Warbler

To mitigate the Take of yellow warbler, the Permittees will protect and manage, in perpetuity, 1,037 acres of the modeled breeding Habitat and 19,552 acres of migratory Habitat for this species. The 1,526 acres of breeding Habitat and 21,312 acres of migratory modeled Habitat within Existing Conservation Lands will be monitored and managed to ensure that Conservation Objectives are met. The Plan will thus ensure Conservation, through protection and management, of 2,563 acres of breeding Habitat and 40,864 acres of migratory Habitat for yellow warblers.

Existing Conservation Areas within the Plan boundary currently protect 38% of the Habitat for the yellow warbler. The Conservation Areas in the Plan would protect 94% of the occupied and potential breeding Habitat and 71% of the potential migratory Habitat for this species. The Conservation Areas include the potential breeding Habitat for yellow warblers in Whitewater Canyon, Chino Canyon, the Thousand Palms Preserve, the Whitewater River mouth near the Salton Sea, Cottonwood Springs in Joshua Tree National Park, and Dos Palmas. The Plan includes 74% of the known occurrences for this warbler. Other suitable Habitat for breeding sites in the Plan Area occurs in Palm Canyon, Murray Canyon, and Andreas Canyon on the Agua Caliente Indian Reservation; portions of these canyons are currently protected as part of the Indian Canyons Heritage Park. The Agua Caliente are preparing a separate MSHCP for reservation lands.

The model for the yellow warbler, and other riparian birds, includes Habitat used in migration, including desert dry wash woodland and desert saltbush scrub. Other natural Habitat used by yellow warblers in migration or foraging will be conserved in Stubbe and Cottonwood Canyons, Oasis de los Osos, Snow Creek and Falls Creek in the Snow Creek/Windy Point Conservation Area, Mission Creek, the Thousand Palms Preserve, the Coachella Valley Stormwater Channel and Delta near the Salton Sea, Dos Palmas, and Cottonwood Spring in Joshua Tree National Park Conservation Area. Habitat disturbance, subject to the conditions of any required streambed alteration or Section 404 permits, would be allowed in those portions of these natural communities not conserved by the Plan. However, where disturbance of a given number acres of riparian natural communities is authorized, an equivalent number of acres would be replaced to ensure that the no net loss occurs and the Conservation Objective is achieved.

CVWD will establish 44 acres of permanent Sonoran cottonwood-willow riparian forest in the Coachella Valley Stormwater Channel and Delta Conservation area as described in Section 4.3.20 to replace riparian Habitat that is periodically altered by flood control maintenance activities. Temporary Habitat disturbance for flood control channel maintenance purposes would be permitted by the Plan in the Coachella Valley Stormwater Channel.

Additionally, the Plan calls for Management and Monitoring Programs to ensure the Conservation of this species, including control of activities that degrade yellow warbler 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. The Plan also limits human access to yellow warbler occupied Habitat during the breeding season.

Overall Impacts to Yellow Warbler

Implementation of the Plan is expected to maintain and enhance population viability of the yellow warbler by protecting Habitat for potential nesting and conserving Habitat known to be used in migration. The Plan will also enhance riparian Habitat through implementation of management prescriptions to remove non-native tamarisk and other invasive species. An agreement with CVWD regarding creation of riparian vegetation along the Whitewater River could result in enhanced Habitat for warblers and other riparian birds as well. Another benefit is the focus of attention on the presence of brown-headed cowbirds, including Adaptive Management activities to control their impacts to riparian birds such as the yellow warbler.

The Plan would protect potential Habitat for yellow warbler, including 94% of the potential breeding Habitat. All of the known locations for this species and 71% of the Habitat that may be used in migration would be protected. The proposed Conservation Areas include the important breeding Habitat for yellow warbler in riparian woodland and forest communities and desert fan palm oasis woodland. Proposed Conservation Areas include riparian Habitat in Whitewater Canyon, Mission Creek, Chino Canyon, the Whitewater River near the Salton Sea, and Cottonwood Spring in Joshua Tree National Park where the species has been known to breed. Other natural Habitat used by yellow warbler in migration or foraging will be conserved in Stubbe and Cottonwood Canyons, Oasis de los Osos, Snow/Falls Creek, Mission Creek, the Thousand Palms Preserve, the Whitewater River delta near the Salton Sea, Dos Palmas, and Cottonwood Spring in Joshua Tree National Park. The other known breeding site in the Coachella Valley is Andreas Canyon. This site is on the Agua Caliente Indian Reservation and is currently protected as part of the Indian Canyons Heritage Park. The Agua Caliente are preparing a separate MSHCP for the reservation.

9.7.9.5 Species Account: Background

Distribution, Abundance, and Trends. The yellow warbler occurs in riparian areas throughout Alaska, Canada, the United States, and parts of Mexico. A tropical subspecies occurs in Central and South America. The yellow warbler prefers wetlands and mature riparian woodlands dominated by cottonwoods, alders, and willows. It also uses well-watered, second growth woodlands and gardens. The yellow warbler winters south to the Bahamas, Central America and South America to Peru, Bolivia, and Brazil. The species breeds throughout the United States and Canada. The population is fluctuating in North America, declining in some areas and increasing in others. It was once a locally abundant summer resident in riparian areas throughout California. Currently, populations are reduced and locally extirpated (e.g., Sacramento Valley and San Joaquin Valley). This species was once a common resident in San Francisco, however, there are no recent breeding records for that 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 Nevada. 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. Destruction of riparian Habitats and cowbird parasitism are the major causes of the decline.

The yellow warbler is known or believed to occur as a breeding bird at Whitewater Canyon, Mission Creek, Chino Canyon, Andreas Canyon, in the Whitewater River near the Salton Sea, and at Cottonwood Spring in Joshua Tree National Park. Many yellow warblers also migrate through the Plan Area en route to other breeding areas. In migration, the yellow warbler may use desert fan palm oasis woodland, mesquite hummocks, mesquite bosque, arrowweed scrub, desert dry wash woodland, desert sink scrub, desert saltbush scrub, southern sycamore-alder riparian woodland, Sonoran cottonwood-willow riparian forest, coastal and valley freshwater marsh, and cismontane alkali marsh in the Plan Area. The species would also use urban areas in migration. No conservation measures are proposed in urban areas; however, it is anticipated that suitable landscape trees and shrubs will continue to thrive in urban areas.

Yellow warblers typically arrive from their wintering areas from late March to May. They tend to nest in locations of intermediate height and shrub density. The nest is built in an upright fork or crotch of a large tree, or sometimes a sapling or bush, generally 6 to 8 feet above the ground. The nest is a well-formed cup of interwoven plant fibers and down, fine grasses, lichens, mosses, spider silk, hairs, etc. Usually four to five eggs are laid in spring or early summer. Incubation is 11 days, and the young leave the nest at 9 to 12 days old. The yellow warbler feeds on caterpillars, cankerworms, moth larvae, bark beetles, borers, weevils, small moths, aphids, grasshoppers, and spiders, and occasionally feeds on a few species of berries.

Associated Covered Species. Other riparian species that occur in similar Habitat, including the least Bell's vireo, southwestern willow flycatcher, summer tanager, and yellow-breasted chat, will benefit from conservation and Adaptive Management actions for the yellow warbler. Riparian bird species will be considered as a guild in the Plan with regard to their general presence in riparian areas. However, each of these riparian bird species may require slightly different structural features or successional stages for optimal breeding Habitat, which may require different management strategies.

9.7.10 Yellow-Breasted Chat *Icteria virens*

Status Federal: **No official status**
State: **Species of Special Concern**

9.7.10.1 Species Conservation Goals and Objectives

Conserve and manage populations within the MSHCP Reserve System according to the following criteria:

Goal 1: Ensure species persistence in the Plan Area by conserving existing breeding Habitat and an assemblage of native Habitats that are likely important for migration. Conserve Habitat, and associated Essential Ecological Processes, allowing evolutionary processes

and natural population fluctuations to occur. Minimize fragmentation, human-caused disturbance, and edge effects to Core Habitat by conserving contiguous Habitat patches and effective Linkages between patches of Core Habitat.

Objective 1. Ensure conservation of the riparian natural communities that this warbler depends on, Sonoran cottonwood-willow riparian forest, southern arroyo willow riparian forest, southern sycamore-alder riparian woodland, mesquite hummocks (migration), desert dry wash woodland (migration), desert saltbush scrub (migration), desert sink scrub (migration), mesquite bosque (migration), coastal and valley freshwater marsh (migration), arrowweed scrub (migration), and cismontane alkali marsh (migration), in the following Conservation Areas:

- Cabazon Conservation Area
- Stubbe and Cottonwood Canyons Conservation Area
- Snow Creek/Windy Point Conservation Area
- Whitewater Canyon Conservation Area
- Upper Mission Creek/Big Morongo Canyon Conservation Area
- Willow Hole Conservation Area
- Thousand Palms Conservation Area
- Indio Hills Palms Conservation Area
- Joshua Tree National Park Conservation Area
- Desert Tortoise and Linkage Conservation Area
- Mecca Hills/Orocopia Mountains Conservation Area
- Dos Palmas Conservation Area
- Coachella Valley Stormwater Channel & Delta Conservation Area
- Santa Rosa and San Jacinto Mountains Conservation Area

Please refer to Section 4.3 and Tables 9-27a and 9-27b for specific acreages to be protected by this Conservation Objective.

Objective 1b: Ensure that CVWD will establish permanent riparian Habitat including at least 44 acres of Sonoran cottonwood-willow riparian forest in the Coachella Valley Stormwater Channel and Delta Conservation Area to replace Habitat that is periodically altered by flood control maintenance activities. This Habitat will provide for the Conservation of the riparian birds covered by the Plan.

Goal 2. Protect Essential Ecological Processes, including hydrological regimes, necessary to maintain Core Habitat and Other Conserved Habitat for this warbler.

Objective 2. Ensure protection of Essential Ecological Process areas through Conservation Area Conservation Objectives for Essential Ecological Processes.

Goal 3: Ensure conservation of yellow-breasted chat by maintaining the long-term persistence of self-sustaining populations or metapopulations and conserving Habitat quality through biological monitoring and Adaptive Management actions in the Plan Area.

Objective 3. Implement biological monitoring and Adaptive Management to ensure persistence of this chat in the Plan Area.

Table 9-27a: Summary of Habitat within Conservation Areas Yellow-Breasted Chat – Breeding 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*
Cabazon	87	1	78	8	86
Stubbe & Cottonwood Canyons	266	2	241	23	264
Whitewater Canyon	167	11	60	96	156
Upper Mission Creek/ Big Morongo Canyon	204	14	62	128	190
Willow Hole	1	0	1	0	1
Thousand Palms	141	0	141	0	141
Indio Hills Palms	93	5	46	42	88
East Indio Hills	0	0	0	0	0
Joshua Tree National Park	5	0	5	0	5
Desert Tortoise & Linkage	0	0	0	0	0
Mecca Hills/ Orocopia Mountains	1	0	1	0	1
Dos Palmas	404	19	212	173	385
CV Stormwater Channel & Delta	8	1	0	7	7
Santa Rosa & San Jacinto Mountains	1,574	69	822	683	1,505
Total – Breeding Habitat	*2,951*	*122*	*1,669*	*1,160*	*2,829*

Table 9-27b: Summary of Habitat within Conservation Areas Yellow-Breasted Chat – Migratory 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*
Cabazon	13	1	0	12	12
Stubbe & Cottonwood Canyons	289	26	34	229	263
Whitewater Canyon	0	0	0	0	0
Upper Mission Ck/ Big Morongo Canyon	278	17	112	149	261
Willow Hole	294	28	16	250	266
Thousand Palms	805	4	767	34	801
Indio Hills Palms	83	4	43	36	79
East Indio Hills	47	5	0	42	42
Joshua Tree National Park	2,195	13	2,063	119	2,182
Desert Tortoise & Linkage	13,564	764	5,920	6,880	12,800
Mecca Hills/ Orocopia Mountains	9,435	319	6,241	2,875	9,116
Dos Palmas	9,908	631	3,602	5,675	9,277
CV Storm-water Channel & Delta	2,047	183	214	1,650	1,864
Santa Rosa & San Jacinto Mountains	3,963	325	2,157	1,481	3,638
Total – Migratory Habitat	*42,921*	*2,320*	*21,169*	*19,432*	*40,601*

9.7.10.2 Threats, Limiting Factors, and Adaptive Management

The primary threat to the yellow-breasted chat in the Plan Area is destruction or degradation of Habitat from flood control and other human activities. The extent to which this species is impacted by cowbird parasitism is not known.

Current knowledge about occurrence and the ecology of this species in the Plan Area is limited but given known threats, the following actions may be needed to ensure species persistence and long-term viability if biological monitoring indicates that such actions are warranted. This list is not comprehensive but identifies some of the known or likely threats to this species. More detailed information on the Management and Monitoring Programs can be found in Section 8.0. Actions may include:

1. Restrict activities that degrade yellow-breasted chat Habitat in conserved areas. These activities include clearing or alteration of riparian vegetation, invasion of exotic plant species, human disturbance, brown-headed cowbird parasitism, and predation of adults and nests by domestic animals.
2. Restrict human access to yellow-breasted chat occupied Habitat during the breeding season.
3. Enhance Habitat through the restoration of disturbed Habitats or the creation of new Habitat where feasible. Any Habitat restoration should balance management of yellow-breasted chat Habitat with management actions for other riparian-dependent species by ensuring a mix of vegetation successional stages in riparian Habitats.
4. Maintain upland buffers for all occupied Habitat. Buffers should be a minimum of 50 feet wide wherever feasible.

9.7.10.3 Species Conservation Analysis

Conservation Area Configuration Issues. The configuration of Conservation Areas is generally beneficial to the Conservation of the yellow-breasted chat, as existing Conservation Areas often surround occupied Habitat on public lands. The Mission Creek site is conserved and managed by the Wildlands Conservancy; it is surrounded by BLM Wilderness. Habitat in Whitewater Canyon is partly on BLM land and partly on private land. Acquisition of the private lands from willing sellers will facilitate management of activities in the area that could impact the riparian Habitat; however, there is access to the area from Whitewater Road, and it is impractical to completely exclude access to the proposed Conservation Area in Whitewater Canyon. Management prescriptions need to be incorporated in the BLM's Whitewater Canyon ACEC management plan. Chino Canyon is currently privately owned; however, discussions are in progress with the landowner for acquisition of the riparian area. Willow Hole is part of a BLM ACEC and includes adjacent lands owned by CVMC.

The Planning Team did not attempt to delineate Core Habitat for this species. With very limited Habitat available for this chat, all locations were considered as part of a metapopulation. Hence, all available riparian Habitat for breeding and Habitat which may be used in migration were included in the MSHCP Reserve System. The presence of potential breeding Habitat for this

species within each of the Conservation Areas is shown in Table 9-27a; migratory Habitat is shown in Table 9-27b.

9.7.10.4 Take Analysis

Significance of the Plan Area to Yellow-Breasted Chat

The yellow-breasted chat occurs in the Plan Area as a likely breeding bird, and as a migrant. Given the limited availability of suitable riparian Habitat in the Plan Area, their status here could be described as part of a metapopulation. The extent of breeding in the Plan Area is not known as only Mission Creek has been confirmed as a breeding location (R. McKernan, pers. comm.). This chat is considered a California Species of Special Concern but has no official federal status. Within the Plan Area it has been recorded in riparian Habitat from Whitewater Canyon and Mission Creek, Thousand Palms Oasis, Cottonwood Spring in Joshua Tree National Park, and Dos Palmas.

Outside the Plan Area the yellow-breasted chat is found throughout most of the United States, southern Canada, parts of Mexico, and south to Panama in the appropriate Habitat. In southern California the species breeds locally on the coast and very locally inland and at lower elevations nearly throughout the region (Garrett and Dunn 1981).

Effects of Take on the Yellow-Breasted chat

The primary importance of the proposed MSHCP to the yellow-breasted chat is that it provides Conservation (including Habitat protection, management and monitoring) of breeding Habitat and Habitat used by this species in migration. The Plan ensures the long-term conservation of breeding and migratory Habitat as well as the associated Essential Ecological Processes, including the hydrological regimes that support riparian vegetation.

Breeding Habitat. With respect to breeding Habitat, there are 3,007 acres of modeled Habitat for the yellow-breasted chat within the Plan Area. Approximately 2,951 acres of this modeled breeding Habitat occur within the Conservation Areas and the Plan would ensure Conservation of 2,829 of these acres (94% of the total modeled Habitat). Approximately 1,669 acres (55%) 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 1,160 acres (38%) of the modeled breeding Habitat for yellow-breasted chat.

Within the Conservation Areas under the worst case scenario, 122 acres of Take of modeled breeding Habitat (4%) could occur (See Table 9-21a and Table 4-114). Take of yellow-breasted chat breeding Habitat within the Conservation Areas must be consistent with the Conservation Objectives for this species to: 1) ensure Conservation of Core Habitat; 2) protect Essential Ecological Processes needed to maintain chat Habitat; and 3) maintain Biological Corridors and Linkages among conserved populations to provide for population fluctuation and enhance genetic diversity. 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 species.

Outside of the Conservation Areas, there are 58 acres (2%) of modeled Habitat authorized for Take. Some of this acreage occurs as small slivers of Habitat at the margins of suitable riparian areas. Some of this acreage occurs along the Coachella Valley Stormwater Channel north of the Conservation Area boundary. Impacts to Habitat along this portion of the stormwater channel will be mitigated by establishment of replacement permanent riparian forest by CVWD (see below).

Migratory Habitat. There are 57,312 acres of modeled migratory Habitat for the yellow-breasted chat within the Plan Area. Approximately 42,921 acres of this modeled migratory Habitat occur within the Conservation Areas and the Plan would ensure Conservation of 40,601 of these acres (71%) of the total modeled Habitat. Approximately 21,169 acres (37%) 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 19,432 acres (34%) of the modeled migratory Habitat for yellow-breasted chat.

Within the Conservation Areas under the worst case scenario, 2,320 acres of Take of modeled migratory Habitat (4%) could occur (See Table 9-21b and Table 4-114). Take of yellow-breasted chat migratory Habitat within the Conservation Areas must be consistent with the Conservation Objectives for this species to: 1) ensure Conservation of riparian Habitat, and 2) protect Essential Ecological Processes including hydrological regimes needed to maintain riparian Habitat. 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 species.

Outside of the Conservation Areas, there are 13,020 acres (23%) of modeled migratory Habitat authorized for Take. The migratory Habitat outside the Conservation Areas consists of slivers of Habitat, including desert dry wash woodland, along various washes from Desert Hot Springs area to the margins of the Cathedral City and Rancho Mirage cove areas and around Deep Canyon in Palm Desert. Larger patches of migratory Habitat occur northwest of the Salton Sea in desert saltbush scrub and desert sink scrub that is highly fragmented in a matrix of agriculture, and in the eastern part of the Plan Area south of Interstate 10.

Although the percentage of yellow-breasted chat modeled Habitat that could be lost to development within the next 75 years appears to be substantial, evaluation of the impacts of Take requires an assessment of the quality of this Habitat. The establishment of Conservation Areas where this species is protected is a significant improvement over the piecemeal and fragmenting nature of development patterns within this Habitat occurring now. The actual reduction in Habitat value is expected to be considerably less than indicated by the raw acreage numbers because:

1. Conserved Habitat areas are large enough to contain self-sustaining metapopulations populations of chats and incorporate key Habitat elements, including riparian Habitat for breeding and desert dry wash woodland and other Habitats for migration.
2. 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.

3. As a result of implementing the Conservation Objectives to protect riparian natural communities the Plan would ensure that there is no net loss of wetland Habitats. For all riparian natural communities where disturbance is authorized by the Plan, an equivalent number of acres as that subject to disturbance would be replaced.
4. Potential Development would not adversely impact the Essential Ecological Processes needed to maintain currently viable Habitat. Conservation Areas were carefully designed to protect the watershed for riparian Habitat, desert dry wash woodland, and other Habitats for this species.
5. 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,

The issuance of Take Permits, therefore, will not likely jeopardize the continued existence of the yellow-breasted chat and the implementation of the MSHCP will provide for the Conservation of the species.

Measures to Avoid, Minimize, and Mitigate Take of Yellow-Breasted Chat

To mitigate the Take of the yellow-breasted chat, the Permittees will protect and manage, in perpetuity, 1,160 acres of the modeled breeding Habitat and 19,432 acres of migratory Habitat for this species. The 1,669 acres of breeding Habitat and 21,169 acres of migratory modeled Habitat within Existing Conservation Lands will be monitored and managed to ensure that Conservation Objectives are met. The Plan will thus ensure Conservation, through protection and management, of 2,829 acres of breeding Habitat and 40,601 acres of migratory Habitat for this species.

Existing Conservation Areas within the Plan boundary currently protect 38% of the Habitat for the yellow-breasted chat. The Conservation Areas in the Plan would protect 94% of the occupied and potential breeding Habitat and 71% of the potential migratory Habitat for this species. The Conservation Areas include the potential breeding Habitat for yellow-breasted chat in Whitewater Canyon, Chino Canyon, the Thousand Palms Preserve, the Whitewater River mouth near the Salton Sea, Cottonwood Springs in Joshua Tree National Park, and Dos Palmas. The Plan includes 100% of the known breeding locations for this chat. Other suitable Habitat for breeding sites in the Plan Area occurs in Palm Canyon, Murray Canyon, and Andreas Canyon on the Agua Caliente Indian Reservation; portions of these canyons are currently protected as part of the Indian Canyons Heritage Park. The Agua Caliente are preparing a separate MSHCP for reservation lands.

The model for the yellow-breasted chat, and other riparian birds, includes Habitat used in migration, including desert dry wash woodland and desert saltbush scrub. A complete list of the natural communities that may be used in migration is given in the description of model parameters in Appendix I. Other natural Habitat used by yellow-breasted chat in migration or foraging will be conserved in Stubbe and Cottonwood Canyons, Oasis de los Osos, Snow Creek and Falls Creek in the Snow Creek/Windy Point Conservation Area, Mission Creek, the Thousand Palms Preserve, the Coachella Valley Stormwater Channel and Delta near the Salton Sea, Dos Palmas, and Cottonwood Spring in Joshua Tree National Park Conservation Area. Habitat disturbance, subject to the conditions of any required streambed alteration or Section 404 permits, would be allowed in those portions of these natural communities not conserved by the Plan.

Where disturbance of a given number acres of riparian natural communities is authorized, an equivalent number of acres would be replaced to ensure that the no net loss occurs and the Conservation Objective is achieved.

CVWD will establish 44 acres of permanent Sonoran cottonwood-willow riparian forest in the Coachella Valley Stormwater Channel and Delta Conservation area as described in Section 4.3.20 to replace riparian Habitat that is periodically altered by flood control maintenance activities. Temporary Habitat disturbance for flood control channel maintenance purposes would be permitted by the Plan in the Coachella Valley Stormwater Channel.

Additionally, the Plan calls for Management and Monitoring Programs to ensure the Conservation of this species, including control of activities that degrade yellow-breasted chat 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.

Overall Impacts to Yellow-Breasted chat

Implementation of the Plan is expected to maintain and enhance population viability of the yellow-breasted chat by protecting Habitat for potential nesting and conserving Habitat known to be used in migration. The Plan will also enhance riparian Habitat through implementation of management prescriptions to remove non-native tamarisk and other invasive species. An agreement with CVWD regarding creation of riparian vegetation along the Whitewater River could result in enhanced Habitat for chats as well. Another benefit is the focus of attention on the presence of brown-headed cowbirds, including Adaptive Management activities to control their impacts to riparian birds such as the yellow-breasted chat.

9.7.10.5 Species Account: Background

Distribution, Abundance, and Trends. The yellow-breasted chat is found throughout most of the United States, southern Canada, parts of Mexico, and south to Panama in the appropriate Habitat. It is more often heard than seen, preferring to stay under cover in dense riparian thickets. The yellow-breasted chat nests in dense riparian thickets and brushy tangles in the lower portions of foothill canyons and in the lowlands. Its nest is a cup of dried leaves, coarse straw, and bark, lined with grasses, fine plant stems and leaves, built low in a bush, vine, or briar; there are typically three to five eggs laid from early May to mid-July. It is primarily an insect eater but also eats wild berries and wild grapes.

This species is known to breed or is likely to breed in Whitewater Canyon, Mission Creek, Chino Canyon, and the Whitewater River between Mecca and the Salton Sea. It is possible that it breeds elsewhere in the Plan Area as well. In migration, the yellow-breasted chat may use desert fan palm oasis woodland, mesquite hummocks, mesquite bosque, arrowweed scrub, desert dry wash woodland, desert sink scrub, desert saltbush scrub, southern sycamore-alder riparian woodland, Sonoran cottonwood-willow riparian forest, coastal and valley freshwater marsh, and cismontane alkali marsh in the Plan Area. It has been observed at Dos Palmas, the Thousand Palms Preserve, and Willow Hole. It has also been observed in Andreas Canyon on the Agua Caliente Indian Reservation. Individuals observed in these locations may have been in migration to other breeding areas outside the Plan Area.

The yellow-breasted chat is in a general state of decline. The primary threat is loss of Habitat, mainly due to flood control activities; the chat is also subject to cowbird parasitism. Human activities, including golf courses and agriculture, attract cowbirds, thereby increasing the threat to the species.

Associated Covered Species. Other riparian species that occur in similar Habitat, including the least Bell's vireo, yellow-breasted chat, summer tanager, and yellow warbler, will benefit from conservation and Adaptive Management actions for the yellow-breasted chat. Riparian bird species will be considered as a guild in the Plan with regard to their general presence in riparian areas. However, each of these riparian bird species may require slightly different structural features or successional stages for optimal breeding Habitat, which may require different management strategies.

9.7.11 Summer Tanager *Piranga rubra cooperi*

Status	**Federal:**	**No official status**
	State:	**Species of Special Concern**

9.7.11.1 Species Conservation Goals and Objectives

Conserve and manage populations within the MSHCP Reserve System according to the following criteria:

Goal 1: Ensure species persistence in the Plan Area by conserving existing breeding Habitat and an assemblage of native Habitats that are likely important for migration. Conserve Habitat, and associated Essential Ecological Processes, allowing evolutionary processes and natural population fluctuations to occur. Minimize fragmentation, human-caused disturbance, and edge effects to Core Habitat by conserving contiguous Habitat patches and effective Linkages between patches of Core Habitat.

Objective 1a. Ensure conservation of the riparian natural communities that this tanager depends on, Sonoran cottonwood-willow riparian forest, southern arroyo willow riparian forest, southern sycamore-alder riparian woodland, mesquite hummocks (migration), desert dry wash woodland (migration), desert saltbush scrub (migration), desert sink scrub (migration), mesquite bosque (migration), coastal and valley freshwater marsh (migration), arrowweed scrub (migration), and cismontane alkali marsh (migration), in the following Conservation Areas:

- Cabazon Conservation Area
- Stubbe and Cottonwood Canyons Conservation Area
- Snow Creek/Windy Point Conservation Area
- Whitewater Canyon Conservation Area
- Upper Mission Creek/Big Morongo Canyon Conservation Area
- Willow Hole Conservation Area
- Thousand Palms Conservation Area

- Indio Hills Palms Conservation Area
- Joshua Tree National Park Conservation Area
- Desert Tortoise and Linkage Conservation Area
- Mecca Hills/Orocopia Mountains Conservation Area
- Dos Palmas Conservation Area
- Coachella Valley Stormwater Channel & Delta Conservation Area
- Santa Rosa and San Jacinto Mountains Conservation Area

Please refer to Section 4.3 and Tables 9-28a and 9-28b for specific acreages to be protected by this Conservation Objective.

Objective 1b. Ensure that CVWD will establish permanent riparian Habitat, including at least 44 acres of Sonoran cotton-wood-willow riparian forest in the Coachella Valley Stormwater Channel and Delta Conservation Area, to replace the Habitat that is periodically altered by flood control maintenance activities. This Habitat will provide for the Conservation of the riparian birds covered by the Plan.

Goal 2: Protect Essential Ecological Processes, including hydrological regimes, necessary to maintain Core Habitat and Other Conserved Habitat for this species.

Objective 2. Ensure protection of Essential Ecological Process areas through Conservation Area Conservation Objectives for Essential Ecological Processes.

Goal 3: Ensure conservation of summer tanager by maintaining the long-term persistence of self-sustaining populations or metapopulations and conserving Habitat quality through biological monitoring and Adaptive Management actions in the Plan Area.

Objective 3. Implement biological monitoring and Adaptive Management to ensure persistence of this warbler in the Plan area.

9.7.11.2 Threats, Limiting Factors, and Adaptive Management

The major threat for summer tanagers is loss of Habitat due to human activity, including flood control. Cowbird parasitism may be a contributing factor, although parasitism of summer tanager nests appears to vary significantly by geographic area. In southern Illinois, 11 of 13 nests observed were parasitized, while in the South Fork Kern River Valley only one of 16 nests was subject to parasitism. The extent of cowbird parasitism in the Plan Area is not known. Collisions with wind turbines and other towers during migration could also be a source of mortality. In Leon County, Florida, 146 summer tanagers were killed at a television tower during spring migration. The actuality or potential of mortality from wind turbines, communication towers, and transmission towers in the Plan Area is not known. Overall, in California, the population of summer tanagers has declined severely in response to elimination of riparian willow and cottonwood forest. The species is designated a Species of Special Concern by the state.

Table 9-28a: Summary of Habitat within Conservation Areas Summer Tanager – Breeding Habitat

Conservation Area	*Total Acres of Habitat in Conserv. Areas*	*Acres of Disturbance Authorized*	*Acres of Existing Conservation Lands*	*Remaining Acres to be Conserved*	*Total Acres to be Conserved in MSHCP Reserve System*
Cabazon	87	1	78	8	86
Stubbe & Cottonwood Canyons	266	2	241	23	264
Whitewater Canyon	167	11	60	96	156
Upper Mission Creek/ Big Morongo Canyon	204	14	62	128	190
Willow Hole	1	0	1	0	1
Thousand Palms	141	0	141	0	141
Indio Hills Palms	93	5	46	42	88
East Indio Hills	0	0	0	0	0
Joshua Tree National Park	5	0	5	0	5
Desert Tortoise & Linkage	0	0	0	0	0
Mecca Hills/ Orocopia Mtns.	1	0	1	0	1
Dos Palmas	125	6	69	50	119
CV Storm-water Channel & Delta	8	1	0	7	7
Santa Rosa & San Jacinto Mountains	1,574	69	822	683	1,505
Total – Breeding Habitat	*2,672*	*109*	*1,526*	*1,037*	*2,563*

Table 9-28b: Summary of Habitat within Conservation Areas Summer Tanager – Migratory Habitat

Conservation Area	*Total Acres of Habitat in Conserv. Areas*	*Acres of Disturbance Authorized*	*Acres of Existing Conservation Lands*	*Remaining Acres to be Conserved*	*Total Acres to be Conserved in MSHCP Reserve System*
Cabazon	13	1	0	12	12
Stubbe & Cottonwood Canyons	289	26	34	229	263
Whitewater Canyon	0	0	0	0	0
Upper Mission Creek /Big Morongo Canyon	278	17	112	149	261
Willow Hole	294	28	16	250	266
Thousand Palms	805	4	767	34	801
Indio Hills Palms	83	4	43	36	79
East Indio Hills	47	5	0	42	42
Joshua Tree National Park	2,195	13	2,063	119	2,182
Desert Tortoise & Linkage	13,564	764	5,920	6,880	12,800
Mecca Hills/ Orocopia Mountains	9,435	319	6,241	2,875	9,116
Dos Palmas	10,184	644	3,745	5,795	9,540
CV Stormwater Channel & Delta	2,047	183	214	1,650	1,864
Santa Rosa & San Jacinto Mountains	3,963	325	2,157	1,481	3,638
Total – Migratory Habitat	*43,197*	*2,333*	*21,312*	*19,552*	*40,864*

The following actions may be needed to ensure species persistence and long-term viability if biological monitoring indicates that such actions are warranted. This list is not comprehensive but identifies some of the known or likely threats to the summer tanager. More detailed information on the Management and Monitoring Programs can be found in Section 8.0. Actions may include:

1. Control and manage activities that degrade summer tanager Habitat in conserved areas. These activities include clearing or alteration of riparian vegetation, invasion of exotic plant species, human disturbance, brown-headed cowbird parasitism, and predation of adults and nests by domestic animals.
2. Restrict human access to summer tanager occupied Habitat during the breeding season.
3. Enhance Habitat through the restoration of disturbed Habitats or the creation of new Habitat where feasible. Any Habitat restoration should balance management of summer tanager Habitat with management actions for other riparian-dependent species by ensuring a mix of vegetation successional stages in riparian Habitats.
4. Maintain upland buffers for all occupied Habitat. Buffers should be a minimum of 50 feet wide wherever feasible.
5. Determine the effects of upstream diversions on the maintenance of the riparian Habitat in the Whitewater Canyon.

9.7.11.3 Species Conservation Analysis

Conservation Area Reserve Design. The configuration of Conservation Areas is generally beneficial to the Conservation of the summer tanager, as existing Conservation Areas often surround occupied Habitat on public lands. The Mission Creek site is conserved and managed by the Wildlands Conservancy; it is surrounded by BLM Wilderness. Habitat in Whitewater Canyon is partly on BLM land and partly on private land. Acquisition of the private lands from willing sellers will facilitate management of activities in the area that could impact the riparian Habitat; however, there is access to the area from Whitewater Road, and it is impractical to completely exclude access to the proposed Conservation Area in Whitewater Canyon. Management prescriptions need to be incorporated in the BLM's Whitewater Canyon ACEC management plan. Chino Canyon is currently privately owned; however, discussions are in progress with the landowner for acquisition of the riparian area. Willow Hole is part of a BLM ACEC and includes adjacent lands owned by the CVMC.

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. Summer tanagers typically nest in a later successional stage of riparian Habitat with large cottonwood trees. Along the Whitewater River, restoration and management of Habitat for the summer tanager may result in less desirable Habitat for other riparian birds that prefer earlier successional stages. Appropriate Habitat for the summer tanager in areas proposed for restoration along the Whitewater River may not be readily achievable and may constrain the amount of optimum Habitat for other, more sensitive species.

The Planning Team did not attempt to describe Core Habitat for this species. With very limited Habitat available for this tanager, as with other riparian birds, all locations were considered as part of a metapopulation. Hence, all available riparian Habitat for breeding and Habitat which

may be used in migration were included in the MSHCP Reserve System. The presence of potential breeding Habitat for this species within each of the Conservation Areas is shown in Table 9-28a; migratory Habitat is shown in Table 9-28b.

9.7.11.4 Take Analysis

Significance of the Plan Area to Summer Tanager

Within the Plan Area, the summer tanager is known or believed to occur as a breeding bird at Whitewater Canyon and Mission Creek. Summer tanagers also migrate through the Plan Area en route to other breeding areas. The summer tanager breeds across the southern United States, from California as far north as the Kern River valley to Florida, and in the eastern United States, as far north as 40° N. Two subspecies are currently recognized. One, *P. r. cooperi*, breeds in the southwest from California to west Texas and northern Mexico. The other, *P. r. rubra*, occupies the remainder of the range to the east. The western subspecies inhabits riparian woodlands and, at higher elevations, woodlands dominated by mesquite and salt cedar. The summer tanager winters from central Mexico south through Central America to Bolivia and Brazil. It occurs in small numbers in winter in Southern California, southern Arizona and in southern Florida. The summer tanager has no federal status and is considered a California Species of Special Concern.

Effects of Take on the Summer Tanager

The primary importance of the proposed MSHCP to the summer tanager is that it provides Conservation (including Habitat protection, management, and monitoring) of breeding Habitat and Habitat used by this species in migration. The Plan ensures the long-term conservation of breeding and migratory Habitat as well as the associated Essential Ecological Processes, including the hydrological regimes that support riparian vegetation.

Breeding Habitat. With respect to breeding Habitat, there are 2,730 acres of modeled Habitat for the summer tanager within the Plan Area. Approximately 2,672 acres of this modeled breeding Habitat occur within the Conservation Areas and the Plan would ensure Conservation of 2,563 of these acres (94% of the total modeled Habitat). Approximately 1,526 acres (56%) 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 1,037 acres (38%) of the modeled breeding Habitat for summer tanager.

There are 23 known occurrences for the summer tanager in the Plan Area and 17 of these locations are within the Conservation Areas. Nine of these known occurrences were unprotected in 1996. These known locations may include an observation of one or more individuals. They are not separated here as to breeding or migration.

Within the Conservation Areas under the worst case scenario, 109 acres of Take of modeled breeding Habitat (4%) could occur (See Table 9-21a and Table 4-114). Take of summer tanager breeding Habitat within the Conservation Areas must be consistent with the Conservation Objectives for this species to: 1) ensure Conservation of Core Habitat; 2) protect Essential Ecological Processes needed to maintain summer tanager Habitat; and 3) maintain Biological Corridors and Linkages among conserved populations to provide for population fluctuation and enhance genetic diversity. 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 species.

Outside of the Conservation Areas, there are 59 acres (2%) of modeled Habitat authorized for Take. As the species distribution model for the summer tanager is the same as for the southwestern willow flycatcher, the areas affected are the same. Some of this acreage occurs as small slivers of Habitat at the margins of suitable riparian areas. Some of this acreage occurs along the Coachella Valley Stormwater Channel north of the Conservation Area boundary. Impacts to Habitat along this portion of the Stormwater channel will be mitigated by establishment of replacement permanent riparian forest by CVWD (see below).

Migratory Habitat. There are 57,589 acres of modeled migratory Habitat for the summer tanager within the Plan Area. Approximately 43,197 acres of this modeled migratory Habitat occur within the Conservation Areas and the Plan would ensure Conservation of 40,864 of these acres (71% of the total modeled Habitat). Approximately 21,312 acres (37%) of the modeled migratory Habitat are within Existing Conservation Lands and would be managed as part of the Reserve System. The Plan would conserve an additional 19,552acres (34%) of the modeled migratory Habitat for summer tanager.

Within the Conservation Areas under the worst case scenario, 2,333 acres of Take of modeled migratory Habitat (4%) could occur (See Table 9-21b and Table 4-114). Take of summer tanager migratory Habitat within the Conservation Areas must be consistent with the Conservation Objectives for this species to: 1) ensure Conservation of riparian Habitat, and 2) protect Essential Ecological Processes including hydrological regimes needed to maintain riparian Habitat. 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 the summer tanager.

Outside of the Conservation Areas, there are 13,020 acres (23%) of modeled migratory Habitat authorized for Take. The modeled summer tanager migratory Habitat outside the Conservation Areas includes desert dry wash woodland west of Thermal Canyon and east of Dillon Road in an area fragmented by the I-10 freeway and small slivers of Habitat, including desert dry wash woodland, along various washes from Desert Hot Springs area to the margins of the Cathedral City and Rancho Mirage cove areas and around Deep Canyon in Palm Desert. Larger patches of migratory Habitat occur northwest of the Salton Sea in desert saltbush scrub and desert sink scrub, natural communities used by summer tanagers in migration that are highly fragmented in a matrix of agriculture, and in the eastern part of the Plan Area south of Interstate 10.

The model for the summer tanager, and other riparian birds, includes Habitat used in migration, including desert dry wash woodland, mesquite bosque, mesquite hummocks, and desert saltbush scrub. Not all of the Habitat in these natural communities will be protected in the proposed Conservation Areas. Habitat disturbance, subject to the conditions of any required streambed alteration or Section 404 permits, would be allowed in those portions of these natural communities not conserved by the Plan.

Evaluation of the impacts of Take of summer tanager migratory Habitat that could be lost to Development within the next 75 years requires an assessment of the quality of this Habitat. The establishment of Conservation Areas where this species is protected is a significant improvement over the current unprotected status of 67% of riparian Habitat in the Plan Area. The actual reduction in Habitat value is expected to be considerably less than indicated by the raw acreage numbers because:

1. Conserved Habitat areas are large enough to contain self-sustaining metapopulations of summer tanagers and to incorporate key Habitat elements, including riparian Habitat for breeding and desert dry wash woodland and other Habitats for migration.
2. As a result of implementing the Conservation Objectives to protect riparian natural communities the Plan would ensure that there is no net loss of wetland Habitats. For all riparian natural communities where disturbance is authorized by the Plan, an equivalent number of acres as that subject to disturbance would be replaced.
3. Potential Development would not adversely impact the Essential Ecological Processes needed to maintain currently viable Habitat. Conservation Areas were carefully designed to protect the watershed for riparian Habitat, desert dry wash woodland, and other Habitats used by summer tanagers.
4. Lands in the MSHCP Reserve System would be managed and monitored to address significant edge effect problems, impacts from introduced exotic species, and other stressors to summer tanagers,

The issuance of Take Permits, therefore, will not likely jeopardize the continued existence of the summer tanager and the implementation of the MSHCP will provide for the Conservation of the species.

Measures to Avoid, Minimize, and Mitigate Take of Summer Tanager

To mitigate the Take of summer tanager, the Permittees will protect and manage, in perpetuity, 1,037 acres of the modeled breeding Habitat and 19,552 acres of migratory Habitat for this tanager. The 1,526 acres of breeding Habitat and 21,312 acres of migratory modeled Habitat within Existing Conservation Lands will be monitored and managed to ensure that Conservation Objectives are met. The Plan will thus ensure Conservation, through protection and management, of 2,563 acres of breeding Habitat and 40,864 acres of migratory Habitat for summer tanagers.

Existing Conservation Areas within the Plan boundary currently protect 38% of the Habitat for the summer tanager. The Conservation Areas in the Plan would protect 94% of the occupied and potential breeding Habitat and 71% of the potential migratory Habitat for this species. The Conservation Areas include the potential breeding Habitat for summer tanagers in Whitewater Canyon, Chino Canyon, the Thousand Palms Preserve, the Whitewater River mouth near the Salton Sea, Cottonwood Springs in Joshua Tree National Park, and Dos Palmas. The Plan includes 71% of the known occurrences for the summer tanager. Other suitable Habitat for breeding sites in the Plan Area occurs in Palm Canyon, Murray Canyon, and Andreas Canyon on the Agua Caliente Indian Reservation; portions of these canyons are currently protected as part of the Indian Canyons Heritage Park. The Agua Caliente are preparing a separate MSHCP for reservation lands.

The model for the summer tanager, and other riparian birds, includes Habitat used in migration, including desert dry wash woodland and desert saltbush scrub. Other natural Habitat used by summer tanagers in migration or foraging will be conserved in Stubbe and Cottonwood Canyons, Oasis de los Osos, Snow Creek and Falls Creek in the Snow Creek/Windy Point Conservation Area, Mission Creek, the Thousand Palms Preserve, the Coachella Valley Stormwater Channel and Delta near the Salton Sea, Dos Palmas, and Cottonwood Spring in Joshua Tree National Park Conservation Area. Habitat disturbance, subject to the conditions of any required streambed alteration or Section 404 permits, would be allowed in those portions of these natural communities not conserved by the Plan. However, where disturbance of a given number acres of riparian natural communities is authorized, an equivalent number of acres would be replaced to ensure that the no net loss occurs and the Conservation Objective is achieved.

CVWD will establish 44 acres of permanent Sonoran cottonwood-willow riparian forest in the Coachella Valley Stormwater Channel and Delta Conservation Area as described in Section 4.3.20 to replace riparian Habitat that is periodically altered by flood control maintenance activities. Temporary Habitat disturbance for flood control channel maintenance purposes would be permitted by the Plan in the Coachella Valley Stormwater Channel.

Additionally, the Plan calls for Management and Monitoring Programs to ensure the Conservation of this species, including control of activities that degrade summer tanager 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. The Plan also limits human access to summer tanager occupied Habitat during the breeding season.

Overall Impacts to Summer Tanager

Implementation of the Plan is expected to maintain and enhance population viability of the summer tanager by protecting Habitat for potential nesting and conserving Habitat known to be used in migration. The Plan will also enhance riparian Habitat through implementation of management prescriptions to remove non-native tamarisk and other invasive species. An agreement with CVWD regarding creation of riparian vegetation along the Whitewater River could result in enhanced Habitat for summer tanagers and other riparian birds as well. Another benefit is the focus of attention on the presence of brown-headed cowbirds, including Adaptive Management activities to control their impacts to riparian birds such as the summer tanager.

The Plan would protect potential Habitat for summer tanagers, including 94% of the potential breeding Habitat and 71% of the Habitat that may be used in migration. The proposed Conservation Areas include the important riparian communities and desert fan palm oasis woodland. Proposed Conservation Areas include riparian Habitat in Whitewater Canyon, Mission Creek, Chino Canyon, the Whitewater River near the Salton Sea, and Cottonwood Spring in Joshua Tree National Park. Migratory Habitat will be conserved in Stubbe and Cottonwood Canyons, Oasis de los Osos, Snow/Falls Creek, Mission Creek, the Thousand Palms Preserve, the Whitewater River delta near the Salton Sea, Dos Palmas, and Cottonwood Spring in Joshua Tree National Park.

9.7.11.5 Species Account: Background

Distribution, Abundance, and Trends. The North American breeding population of summer tanagers has remained generally stable since the mid-1970s, although some populations

in the eastern United States and along the Colorado River have declined. It was formerly considered common in the lower Colorado River valley by Grinnell (1914), but only 216 individuals were estimated to be present by 1976 (Rosenberg et al. 1991). Habitat destruction is the likely cause of the decrease.

Little is known of the breeding biology of the species. Summer tanagers nest in mature riparian groves dominated by cottonwoods and willows. Early arrivals from wintering grounds may appear in late March, but the main migration is April through early May. Nesting is primarily May through June. The nest is built on a horizontal limb of large trees including cottonwoods, usually 10 to 35 feet above the ground, and often over an opening such as a creek bed. The nest is a loosely built, shallow cup of weed stems, leaves, bark, and grasses, lined with fine grasses. From three to five, but usually four eggs are laid. Incubation is approximately 12 days. Tanagers eat insects, including bees and wasps, and small wild fruits.

This species is known or suspected to nest in the Plan Area in Mission Creek, the Whitewater Canyon, and Palm Canyon, and also migrates through the area on its way to more coastal and northern Habitats. There are also records from the Whitewater River delta and the Thousand Palms Preserve, but whether it nests in these areas or only uses them in migration is not known.

Associated Covered Species. Other riparian species that occur in similar Habitat, including least Bell's vireo, yellow-breasted chat, southwestern willow flycatcher, and yellow warbler, will benefit from conservation and Adaptive Management actions for summer tanager. Riparian bird species will be considered as a guild in the Plan with regard to their general presence in riparian areas. However, each of these riparian bird species may require slightly different structural features or successional stages for optimal breeding Habitat, which may require different management strategies.

9.8 Mammals

This section contains species accounts, including Species Conservation Goals and Objectives, Habitat parameters, and significant threats, for each of the four mammal species proposed for coverage under this Plan. The mammals include the federal endangered Peninsular bighorn sheep and three small mammals with no formal status, the Palm Springs pocket mouse, the Coachella Valley round-tailed ground squirrel, which has recently been given federal candidate for listing status, and the southern yellow bat. Measures specific to a given species that are not addressed in the general conservation approach (See Section 9.0) are listed as species-specific conservation measures.

9.8.1 Southern Yellow Bat *Lasiurus ega*

Status **Federal:** **No official status**
State: **Species of Special Concern**

9.8.1.1 Species Conservation Goals and Objectives

Conserve and manage populations within the MSHCP Reserve System according to the following criteria:

Goal 1: Conserve existing, naturally occurring, occupied Habitat and additional potential Habitat (presumed to be occupied), and associated Essential Ecological Processes, allowing evolutionary processes and natural population fluctuations to occur. Minimize fragmentation, human-caused disturbance, and edge effects to Core Habitat by conserving contiguous Habitat patches and effective Linkages between patches of Core Habitat.

.

Objective 1. Ensure conservation of the natural community that this species depends on, desert fan palm oasis woodland, within the following Conservation Areas:

- Whitewater Canyon Conservation Area
- Willow Hole Conservation Area
- Thousand Palms Conservation Area
- Indio Hills Palms Conservation Area
- Joshua Tree National Park Conservation Area
- Mecca Hills/Orocopia Mountains Conservation Area
- Dos Palmas Conservation Area
- Santa Rosa and San Jacinto Mountains Conservation Area

Please refer to Section 4.3 and Table 9-29 for specific acreages to be protected by this Conservation Objective.

Goal 2: Protect Essential Ecological Processes, including hydrological regimes, necessary to maintain desert fan palm oasis woodland and Other Conserved Habitat for this species.

Objective 2. Ensure protection of Essential Ecological Process areas through Conservation Area Conservation Objectives for Essential Ecological Processes.

Goal 3: Ensure conservation of southern yellow bat 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.

Objective 3. Implement biological monitoring and Adaptive Management to ensure persistence of the yellow bat in the Plan area.

Table 9-29: Summary of Habitat within Conservation Areas Southern Yellow Bat

Conservation Area	*Total Acres of Habitat in Conserv. Areas*	*Acres of Disturbance Authorized*	*Acres of Existing Conservation Lands*	*Remaining Acres to be Conserved*	*Total Acres to be Conserved in MSHCP Reserve System*	*Designation*
Whitewater Canyon	1	0	1	0	1	Other Cons. Habitat
Willow Hole	20	2	1	17	18	Other Cons. Habitat
Thousand Palms	137	0	137	0	137	Other Cons. Habitat
Indio Hills Palms	93	5	46	42	88	Other Cons. Habitat
Joshua Tree National Park	5	0	5	0	5	Other Cons. Habitat
Mecca Hills/ Orocopia Mountains	1	0	1	0	1	Other Cons. Habitat
Dos Palmas	125	6	69	50	119	Other Cons. Habitat
Santa Rosa & San Jacinto Mountains	934	53	400	481	881	Other Cons. Habitat
Total – All Habitat	*1,316*	*66*	*660*	*590*	*1,250*	--
Total – Other Cons. Habitat	*1,316*	*66*	*660*	*590*	*1,250*	--

9.8.1.2 Threats, Limiting Factors, and Adaptive Management

The most serious threat to this species is the loss of Habitat created by dead palm fronds on standing live palm trees. This can result from fire or pruning when trees are used for landscape purposes. If loss of fronds occurs in the spring before the young can fly, it could result in the loss of a year's reproduction. Fires may be naturally occurring from lightning or may be the result of vandalism. Small colonies may be lost in residential areas or resorts and golf courses where the fronds from the trees are trimmed. Pesticides may impact food availability for this species, particularly where agricultural areas occur adjacent to roosting Habitat.

The following actions may be needed to ensure species persistence and long-term viability

if biological monitoring indicates that such actions are warranted. This list is not comprehensive but identifies some of the known or likely threats to this species. More detailed information on the Management and Monitoring Programs can be found in Section 8.0. Actions may include:

1. Control and manage activities that degrade yellow bat Habitat. In particular, control and manage those activities that result in disturbance or alteration to the vegetation structure of desert fan palm oases and the skirts of dead fronds on individual palm trees. Measures, such as prohibiting trimming palm fronds above 12 feet from ground level on Reserve Lands during the yellow bat breeding season to the extent the CVCC has control, shall be implemented.
2. Control invasive species if it is determined from the monitoring results that they impact yellow bat Habitat.
3. Assess, as part of the Monitoring and Management Programs, whether a fire management plan is needed to reduce or avoid the impact of fire on this species. The Plan must also recognize that fire may be part of the ecology of *Washingtonia filifera* and may be beneficial.
4. Restore and enhance degraded Habitat as necessary according to monitoring results.
5. As part of the Monitoring Program, gather data on the distribution and Habitat parameters of the southern yellow bat throughout the MSHCP Reserve System.

9.8.1.3 Species Conservation Analysis

Conservation Area Reserve Design. The potential Habitat for the southern 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. The Conservation Area system for this species will include most of the palm oases along the San Andreas Fault and all of the oases occurring in the San Jacinto and Santa Rosa Mountains (except for those on the Agua Caliente Indian Reservation), in the Mecca Hills, and in Cottonwood Canyon in Joshua Tree National Park. This Conservation Area configuration should not affect the ability of the species to disperse relative to existing conditions. Because this species moves locally in groups from one palm grove to the next (Wildlife Society 1996), the proximity of groves to each other could be important. There is no information, however, on the dispersal distance for the species; therefore, this needs to be determined. The Plan will seek to improve existing conditions by encouraging landowners where other palms occur to leave dead palm fronds intact to maintain viable Habitat.

The Planning Team did not attempt to describe Core Habitat for this species. Instead, all available desert fan palm oasis woodland Habitat was included in the MSHCP Reserve System. With very little data available on the occurrence of this species within these palm oases, it was not possible for the Planning Team to evaluate and determine Core Habitat. Available Habitat within the palm oases was considered as Other Conserved Habitat. The presence of Other Conserved Habitat for this species within each of the Conservation Areas is shown in Table 9-29.

9.8.1.4 Take Analysis

Significance of the Plan Area to Southern Yellow Bat

The southern yellow bat occurs in extreme southeastern California, the southwest to Texas and the northwestern portion of Mexico, including Baja (Burt and Grossenheider 1976). In California this bat, also known as the southwestern yellow bat is known only from Riverside, Imperial, and San Diego Counties south to the Mexican border. It has been recorded below 2000 feet (600 meters) in valley foothill riparian, desert riparian, desert dry wash woodland, and palm oasis Habitats (CDFG 1988-1990). Due to a lack of data, the breeding status of the yellow bat in California is uncertain. The southern yellow bat is a California Species of Special Concern although it has no official federal status. Its range may be expanding due to the use of palm trees for landscaping.

The yellow bat is believed to occur throughout the Coachella Valley in palm oases and in residential areas with untrimmed palm trees. There is no estimate of the population size of this species in the Plan Area. However, the Coachella Valley is probably very important to this species, as it has a significant number of the native palm oases in southeastern California. While very few surveys have been conducted for the species in the Plan Area, it is known to occur at the Thousand Palms Preserve (K. Nicol, pers. comm.), Dos Palmas Preserve/ACEC (C. Barrows, pers. comm.), and on the Applegarth Ranch (K. Nicol, pers. comm.) in the Thermal area.

Effects of Take on the Southern Yellow Bat

The focus of Conservation efforts for the southern yellow bat is to ensure conservation of a primary Habitat area, the desert fan palm oases. The Plan ensures the long-term Conservation including Habitat protection, management, and monitoring for southern yellow bat. It includes Conservation of Essential Ecological Processes, including the hydrological regimes that support desert fan palm oases.

There are 1,329 acres of modeled Habitat for the southern yellow bat within the Plan Area. Core Habitat was not designated for this species. The Plan would ensure Conservation of a total of 1,250 acres (94%) of the modeled Habitat or Other Conserved Habitat for southern yellow bat. Approximately 660 acres (50%) 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 590 acres (44%) of the modeled Habitat for southern yellow bat in the Plan Area. There are three known locations for this species, two of which are on Existing Conservation Lands within the Conservation Areas. The third known location is in a palm oasis on land held for conservation by a non-profit land trust.

Within the Conservation Areas under the worst case scenario, 66 acres of Take of modeled southern yellow bat Habitat (5%) could occur (See Table 9-29 and Table 4-114). Take of southern yellow bat Habitat within the Conservation Areas must be consistent with the Conservation Objectives for this species to: 1) ensure Conservation of existing occupied Habitat and additional potential Habitat; 2) protect Essential Ecological Processes including hydrological regimes needed to maintain desert fan palm oasis woodlands as southern yellow bat Habitat; 3) implement biological monitoring and Adaptive Management to ensure Conservation of Habitat quality and long-term persistence of this species. So, although some Take could occur within the Conservation

Areas, the actual impacts to desert fan palm oases are likely to be minimal. The Conservation Objectives required by the Plan will provide for protection of Habitat to ensure the Conservation of southern yellow bat.

Outside of the Conservation Areas, there are 12 acres (<1%) of modeled Habitat authorized for Take. One of the known locations occurs on a privately held parcel near Thermal, California, which includes a planted oasis of *Washingtonia filifera* fan palms. This property is very near the Santa Rosa and San Jacinto Mountains Conservation Area, but is not within a proposed Conservation Area. Southern yellow bats were mist netted at this location in 1999. This oasis is currently held for conservation by a local land trust, the Friends of the Desert Mountains.

The establishment of Conservation Areas where yellow bats would be protected is a significant improvement over the current situation. The impacts of potential Take for this species is expected to be very low because:

1. Conserved Habitat areas are large enough to contain self-sustaining metapopulations populations of southern yellow bats and incorporate key Habitat elements, including desert fan palm oases, riparian areas, roost sites, and foraging areas.
2. Take within the Conservation Areas would not eliminate or significantly impact any known populations. Conservation Objectives specifically require Conservation of desert fan palm oasis woodland as Habitat for southern yellow bats.
3. Potential Development would not adversely impact the Essential Ecological Processes needed to maintain currently viable Habitat. Implementing Conservation Objectives will ensure that hydrological groundwater regimes that support the desert fan palm oasis woodland as Habitat for southern yellow bats are maintained.
4. Habitat for the yellow bat in the MSHCP Reserve System would be managed and monitored to address activities that result in disturbance or alteration of the vegetation structure in palm oases, potential impacts from invasive species, the potential need for a fire management plan, and other stressors to this species, The Plan also provides for specific data gathering on the distribution and Habitat parameters of this species as part of the Monitoring Program.

The issuance of Take Permits, therefore, will not likely jeopardize the continued existence of the southern yellow bat and the implementation of the MSHCP will provide for the Conservation of the species.

Measures to Avoid, Minimize, and Mitigate Take of Southern Yellow Bat

The Permittees will protect and manage, in perpetuity, 590 acres of the modeled Habitat to mitigate the Take of southern yellow bat. The 660 acres of modeled Habitat within Existing Conservation Lands will be monitored and managed to ensure that Conservation Objectives are met. The Plan will thus ensure Conservation, through protection and management, of 1,250 acres of southern yellow bat Habitat in the MSHCP Reserve System.

Existing Conservation Areas within the Plan boundary currently protect only 50% of the Habitat for the southern yellow bat. The Conservation Areas in the Plan would protect an additional

44% of the occupied and potential Habitat for this species. To address specific impacts to desert fan palm oasis woodlands, which provide Habitat for southern yellow bat, the Plan requires Conservation of this natural community in the Whitewater Canyon, Willow Hole, Thousand Palms, Indio Hills Palms, Joshua Tree National Park, Mecca Hills/Orocopia Mountains, Dos Palmas, and Santa Rosa and San Jacinto Mountains Conservation Areas. The Conservation Areas include 2 of the 3 known occurrences for this bat. The third known occurrence is on privately held conservation land outside the Conservation Areas.

Additionally, the Plan calls for Management and Monitoring Programs to ensure the Conservation of this species, including control of activities that degrade southern yellow bat 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 southern yellow bat Habitat in mesquite areas as described in Section 9.7.5.2. The Plan also provides for data gathering as part of the Monitoring Program that addresses the distribution and Habitat parameters of this little known bat species throughout the Plan Area.

Overall Impacts to Southern Yellow Bat

Under the Plan, 94% of the approximately 1,329 acres of naturally occurring Habitat of the species in the Plan Area will be conserved. The conserved area includes all of the known occupied, naturally-occurring Habitat. It should be noted that a significant amount of potential Habitat occurs on the Agua Caliente Indian Reservation and is not part of this Plan. The Agua Caliente Band of Cahuilla Indians is preparing its own MSHCP, and potential conservation on reservation lands will be addressed in that plan. Under the Plan, Take would be permitted on 82 acres, or 6%, of the naturally occurring Habitat outside the Conservation Areas.

Implementation of the Plan will maintain and enhance population viability of the southern yellow bat by conserving its palm oasis Habitat, providing increased study of the ecology of the species, and by encouraging private landowners to manage potential Habitat in landscaped areas to maintain Habitat values.

9.8.1.5 Species Account: Background

Distribution, Abundance, and Trends. The southern yellow bat roosts in trees, primarily palm trees. It appears to prefer the dead fronds of palm trees. It feeds on flying insects such as beetles and true bugs, and forages over water and among trees. This species is thought to be non-colonial, although aggregations of up to 15 have been found in the same roost site. Yellow bats probably do not hibernate; activity has been observed year-round in both the southern and northern portions of the range. This species probably forms small maternity groups in trees and palms. Pregnancy occurs from April to June, with lactation occurring in June and July. Females carry from one to four embryos. In Texas, bat pups have been found on fronds that have been trimmed from trees (Mirowsky 1997). There is very little information available on the life history of this species.

Associated Covered Species. Because riparian birds may also use palm oases in migration, protection of the oases for the southern yellow bat may benefit least Bell's vireo, southwestern willow flycatcher, yellow-breasted chat, summer tanager, and yellow warbler.

9.8.2 Coachella Valley Round-Tailed Ground Squirrel *Spermophilus tereticaudus chlorus*

Status **Federal:** **Candidate**
State: **Species of Special Concern**

9.8.2.1 Species Conservation Goals and Objectives

Conserve and manage populations within the MSHCP Reserve System according to the following criteria:

Goal 1: Protect Core Habitat areas that include occupied Habitat, and associated Essential Ecological Processes, allowing evolutionary processes and natural population fluctuations to occur. Minimize fragmentation, human-caused disturbance, and edge effects to Core Habitat by conserving contiguous Habitat patches and effective Linkages between patches of Core Habitat.

Objective 1. Ensure conservation of Core Habitat within the following Conservation Areas:

- Snow Creek/Windy Point Conservation Area
- Whitewater Floodplain Conservation Area
- Willow Hole Conservation Area
- Thousand Palms Conservation Area

Please refer to Section 4.3 and Table 9-30 for specific acreages to be protected by this Conservation Objective.

Goal 2: Protect Other Conserved Habitat to provide sufficient area and variety of Habitat types to accommodate for population fluctuations, allow for and genetic diversity, and to conserve the range of environmental conditions within which this ground squirrel is known to occur.

Objective 2. Conserve Other Conserved Habitat for this ground squirrel through adherence to other Conservation Objectives (for another species, a natural community, Essential Ecological Process area, Biological Corridor, or Linkage area) in the following Conservation Areas:

- Cabazon Conservation Area
- Stubbe and Cottonwood Canyons Conservation Area
- Whitewater Canyon Conservation Area
- Highway 111/I-10 Conservation Area
- Upper Mission Creek/Big Morongo Canyon Conservation Area
- Edom Hill Conservation Area
- Thousand Palms Conservation Area
- Indio Hills/Joshua Tree National Park Linkage Conservation Area
- Indio Hills Palms Conservation Area
- East Indio Hills Conservation Area

- Joshua Tree National Park Conservation Area
- sert Tortoise and Linkage Conservation Area
- Mecca Hills/Orocopia Mountains Conservation Area
- Dos Palmas Conservation Area
- Coachella Valley Stormwater Channel and Delta Conservation Area
- Santa Rosa and San Jacinto Mountains Conservation Area

Please refer to Section 4.3 and Table 9-30 for specific acreages to be conserved by other Conservation Objectives.

Goal 3: Protect Essential Ecological Processes, including sand source/transport systems, necessary to maintain Core Habitat and Other Conserved Habitat for this species.

Objective 3. Ensure protection of Essential Ecological Process areas through Conservation Area Conservation Objectives for Essential Ecological Processes.

Goal 4: Maintain Biological Corridors and Linkages among all conserved populations.

Objective 4. Note: Specific additional details on these Biological Corridors and Linkages, and requirements for the installation of wildlife underpasses, are found in the Conservation Area descriptions in Section 4.3. Key Habitat Linkages and Biological Corridors include the following:

- Fornat Wash Biological Corridor
- Stubbe Canyon Wash Biological Corridor
- Whitewater River Biological Corridor
- Mission Creek Biological Corridor
- Willow Wash Biological Corridor, which maintains potential Habitat connectivity for Coachella Valley round-tailed ground squirrel between the Willow Hole and Whitewater Floodplain Conservation Areas
- Possible future wildlife undercrossings at Indian Avenue and Gene Autry Trail in the Whitewater Floodplain Conservation Area
- Possible future widened culverts or undercrossings at Palm Drive
- Possible future widened culverts or undercrossings at Mountain View Road, and Varner Road in the Willow Hole Conservation Area
- Possible future wildlife undercrossings along Ramon Road, Washington Street, and Thousand Palms Canyon Road in the Thousand Palms Conservation Area

Goal 5: Ensure conservation of the Coachella Valley round-tailed ground squirrel 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.

Objective 5: Implement monitoring and Adaptive Management actions to ensure self-sustaining populations within each Core Habitat area.

Table 9-30: Summary of Habitat within Conservation Areas

Coachella Valley Round-Tailed Ground Squirrel

Conservation Area	*Total Acres of Habitat in Conserv. Areas*	*Acres of Disturbance Authorized*	*Acres of Existing Conserv. Lands*	*Remaining Acres to be Conserved*	*Total Acres to be Conserved in MSHCP Reserve System*	*Designation*
Cabazon	934	0	24	(910)[1]	24	Other Cons. Habitat
Stubbe & Cottonwood Canyons	421	40	21	360	381	Other Cons. Habitat
Snow Creek/ Windy Point	2,814	245	360	2,209	2,569	Core Habitat
Whitewater Canyon	110	9	18	83	101	Other Cons. Habitat
Hwy 111/I-10	389	39	0	350	350	Other Cons. Habitat
Whitewater Floodplain	6,115 / 40	346 / 4	2,655 / 0	3,114 / 36	5,769 / 36	Core / Other Cons. Habitat
Upper Mission Creek/Big Morongo Canyon	2,773	21	160	2,352	2,512	Other Cons. Habitat
Willow Hole	3,146 / 1,518	260 / 151	551 / 11	2,335 / 1,356	2,886 / 1,367	Core / Other Cons. Habitat
Long Canyon	769	0	101	(668)[1]	101	Other Cons. Habitat
Edom Hill	1,835	158	254	1,423	1,677	Other Cons. Habitat
Thousand Palms	8,513 / 532	468[2]/ 26	5,071 / 275	2,974 / 231	8,045 / 506	Core / Other Cons. Habitat
West Deception	1,533	0	10	(1,523)[1]	10	Other Cons. Habitat
Indio Hills/Joshua Tree National Park Linkage	165	17	0	148	148	Other Cons. Habitat
Indio Hills Palms	145	9	59	77	136	Other Cons. Habitat
East Indio Hills	1,476	112	360	1,004	1,364	Other Cons. Habitat
Joshua Tree National Park	2	1	0	1	1	Other Cons. Habitat
Desert Tortoise & Linkage	43	4	1	38	39	Other Cons. Habitat
Mecca Hills/Orocopia	240	1	232	7	239	Other Cons. Habitat

Conservation Area	*Total Acres of Habitat in Conserv. Areas*	*Acres of Disturbance Authorized*	*Acres of Existing Conserv. Lands*	*Remaining Acres to be Conserved*	*Total Acres to be Conserved in MSHCP Reserve System*	*Designation*
Mountains						
Dos Palmas	4,490	186	2,631	1,673	4,304	Other Cons. Habitat
Coachella Valley Storm-water Channel & Delta	211	19	20	172	192	Other Cons. Habitat
Santa Rosa & San Jacinto Mountains	1,328	135	543	650	1,193	Other Cons. Habitat
Total – All Habitat	*39,542*	*2,491*	*13,357*	*20,593 (3,101)*[1]	*33,950*	--
Total – Core Habitat	*20,588*	*1,319*[2]	*8,637*	*10,632*	*19,269*	--
Total – Other Cons. Habitat	*18,954*	*1,172*	*4,720*	*9,661 (3,101)*[1]	*14,681*	--

[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] Of this Authorized Take, 147 acres can only be used in Section 8, T4S, R6E of the Thousand Palms Conservation Area.

9.8.2.2 Threats, Limiting Factors, and Adaptive Management

Threats to the Coachella Valley round-tailed ground squirrel in the Plan Area include loss of Habitat as a result of urbanization and agricultural Development, including the loss of mesquite hummocks due to lowered water tables, and related impacts. As ground dwelling small mammals, they are susceptible to impacts from OHVs and other surface disturbances that could crush their burrows. At the urban interface, impacts from domestic pets (cats and dogs) and small predator populations could pose a threat. As they seem to prefer open areas with adequate visibility, invasive exotic plants such as Saharan mustard (*Brassica tournefortii*) and Russian thistle (*Salsola tragus*) may reduce Habitat suitability. This species has been observed crossing two- and four-lane roads; in high traffic areas, however, roads within suitable Habitat could increase mortality significantly. While the Coachella Valley round-tailed ground squirrel does not require active blowsand areas, maintenance of their Habitat will depend on protection of ecosystem processes associated with sand dunes.

The following actions may be needed to ensure species persistence and long-term viability if biological monitoring indicates that such actions are warranted. This list is not comprehensive but identifies some of the known or likely threats to ground squirrels. More detailed information on the Management and Monitoring Programs can be found in Section 8.0. Actions may include:

1. Control and manage activities that degrade ground squirrel Habitat. In particular, control and manage those activities that result in sand compaction and vegetation destruction, or which may crush their burrows, including OHV travel within Core Habitat (except on designated routes of travel, if any); vegetation manipulation or clearing; and other human disturbance. Fencing, patrol and enforcement may be necessary to accomplish this goal.
2. Control invasive species if it is determined from the monitoring results that there are impacts to the ground squirrel or its Habitat.
3. Restore and enhance degraded Habitat as necessary according to monitoring results. This may include restoration of mesquite hummocks if research and monitoring results indicate restoration is warranted.
4. As part of the Monitoring Program, establish a research element that addresses the distribution, abundance, and Habitat parameters of the Coachella Valley round-tailed ground squirrel throughout the MSHCP Reserve System.

9.8.2.3 Species Conservation Analysis

Conservation Area Reserve Design. The Coachella Valley round-tailed ground squirrel occurs throughout the Plan Area, and at least some potential Habitat for this species occurs in all the Conservation Areas. The proposed Conservation Areas in the MSHCP Reserve System include those areas judged by the Planning Team to be the most viable known Habitat for this species, from the Snow Creek area east to Dos Palmas. The Planning Team selected Core Habitat from the Habitat model for this species using the following four criteria: (1) Core Habitat is sufficiently large that it can 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) Core Habitat is not fragmented by Development, including roads, in such a way to isolate populations. In addition to creating barriers to dispersal for this species, roads can contribute to edge effects, including exotic plant species that colonize disturbed areas; (3) Core Habitat has intact Essential Ecological Processes, including sand source and sand delivery systems. While this species does not appear to require, or even prefer, active blowsand, natural disturbance from aeolian and fluvial processes (wind and flooding) may be necessary to maintain the Habitat and was considered essential; and (4) Core Habitat has effective connections to other Biological Corridors and/or Linkages, to allow gene flow among populations. For more detail on the process used to identify Conserved Habitat for this species, see Section 3.2.2.3 and 3.6 in Appendix I.

Core Habitat Areas:

1. ***Snow Creek/Windy Point.*** There are approximately 2,814 acres of ground squirrel Habitat modeled in this Conservation Area, of which approximately 2,569 acres will be conserved under the Plan. In a limited survey for this species in June 1997 (K. Barrows et al. 1997) approximately 20 individuals were observed on the west side of Snow Creek Road. Another survey by Katie Barrows on July 1, 1996 (K. Barrows, pers. comm.) reported approximately 30 squirrels on both sides of Snow Creek Road. Specific density estimates, however, are not available for the Coachella Valley round-tailed ground squirrel in the Snow Creek area. The only density estimates for this species are from Ryan (1968), for sand dunes and creosote flats in Palm Desert on the Deep Canyon floodplain, which range from 2.2 to 2.3 animals per acre, depending on the time of year. For this species, Snow

Creek Road was not considered a significant impediment to movement of ground squirrels from one side to the other due to the relatively low traffic volume. The Coachella Valley round-tailed ground squirrel has been observed crossing Snow Creek Road (K. Barrows, pers. comm.). Because much of the existing land on either side of Snow Creek Road is currently held by public and private conservation groups, the traffic levels are not expected to increase greatly. The Planning Team considered this Conservation Area as Core Habitat for the Coachella Valley round-tailed ground squirrel.

2. ***Whitewater Floodplain*.** Nearly all of the land included in this Conservation Area is potential Habitat for the Coachella Valley round-tailed ground squirrel. The Plan includes approximately 6,115 acres of Core Habitat on the existing preserve and throughout the Conservation Area, of which the Plan will conserve approximately 5,769 acres. The largest patch of Habitat within this Conservation Area is the existing Whitewater Floodplain Preserve and additional Habitat south and east of the existing preserve boundary. The Coachella Valley round-tailed ground squirrel occurs on the northern portion of the preserve, within the hummocky dunes on the fringe-toed lizard study plot (M. Fisher and A. Muth, pers. comm.). The area along the southern portion of the preserve supports good numbers of this species as well (K. Barrows 1995). In surveys for the Plan in 1995, 54 individuals were detected along four transects on the Whitewater Floodplain Preserve, south of the fringe-toed lizard study plot**.** The Planning Team did consider this area as Core Habitat for the Coachella Valley round-tailed ground squirrel.

3. ***Willow Hole.*** The Willow Hole Preserve area includes Habitat primarily south of the San Andreas Fault where sandy deposits from Mission Creek and Big Morongo Wash provide suitable sand dune and sand hummock Habitat for the Coachella Valley round-tailed ground squirrel. Data for the presence of this round-tailed ground squirrel in the Willow Hole vicinity come from the surveys of Dodero (1995) and K. Barrows (1995) who both reported the Habitat to be of high quality and the density of squirrels to be high. Cameron Barrows (pers. comm.) has also reported that he observes a high density of ground squirrels in the mesquite dune areas of the Willow Hole-Edom Hill Preserve/ACEC during annual monitoring transects for the fringe-toed lizard. This area provides suitable Habitat and was considered as Core Habitat. The Planning Team recommends an undercrossing be included in any future widening of Varner Road to allow animals to cross from Willow Hole and Edom Hill areas to Stebbins Dune and Flat Top Mountain on the south side of Varner. An undercrossing or culvert on Mountain View would also provide better connectivity. The Habitat east of Palm Drive, including Habitat west of Mountain View and south of Varner, constitutes 3,146 acres of essentially contiguous Core Habitat. The Conservation Objective is to conserve at least 2,880 acres of Core Habitat in this eastern portion of the Conservation Area. Additional survey data are needed to determine the status of ground squirrels west of Palm Drive. This Habitat patch was considered as Other Conserved Habitat. In addition to Core Habitat, at least 1,367 acres of Other Conserved Habitat will be protected.

4. ***Thousand Palms.*** The Plan includes approximately 8,513 acres of ground squirrel Habitat modeled in this Conservation Area, of which the Plan will conserve approximately 8,045 acres. In addition to Core Habitat, at least 506 acres of Other Conserved Habitat will be protected. There are two Core Habitat areas on the existing Thousand Palms Preserve. One of these Core Habitat areas includes the main dune system in the area south of Ramon Road and west of Washington Avenue. It also includes the area designated for acquisition to protect the sand transport system west of the preserve. The ground squirrels seem to prefer the more hummocky areas with regularly spaced creosote bushes or other vegetation that

occur west, north, and east of the most active blowsand areas. The second Core Habitat area includes the sand dune Habitat north of Thousand Palms oasis and north of the Indio Hills (north of Ramon Road and west of Thousand Palms Canyon Road) where 3,320 acres of ground squirrel Habitat occur. These two Core Habitat areas are separated by approximately 2 miles of undisturbed Habitat not modeled for this species. While Coachella Valley round-tailed ground squirrels would not be expected to be resident in this intervening Habitat, it does not represent a barrier to genetic exchange over time. The Coachella Valley round-tailed ground squirrel also is scattered throughout much of the preserve where sandy substrates occur. Cameron Barrows (pers. comm.) describes their density here as low to moderate by comparison to the higher densities at Willow Hole. Once again, the Planning Team considered this area as Core Habitat also.

Other Conserved Habitat Areas

1. ***Cabazon.*** There are approximately 934 acres of modeled Habitat for this ground squirrel in the Cabazon Conservation Area. Approximately 24 acres of this Habitat is already conserved as Existing Conservation Land. Observations of this species in this Conservation Area are limited to historical records prior to 1970. The remaining 910 acres are within the Essential Ecological Process fluvial sand transport area, which is not covered by a specific Conservation Objective. Because of existing land use patterns and associated edge effects in these areas, they would be unsuitable for Habitat protection through acquisition.

2. ***Stubbe and Cottonwood Canyons.*** This Conservation Area includes very limited, scattered sandy substrate for a total of approximately 421 acres of modeled Habitat, of which the Plan will conserve approximately 381 acres. The area has not been surveyed for this species and no known occurrences have been reported from this Conservation Area. The area was not considered as large enough to provide Core Habitat for the ground squirrel.

3. ***Whitewater Canyon.*** This Conservation Area includes very limited, scattered sandy substrate for a total of approximately 110 acres of modeled Habitat, of which the Plan will conserve approximately 101 acres. The substrates in this Conservation Area are more gravelly, stony, or cobbly than at other locations and would not be expected to support more than low numbers of ground squirrels.

4. ***Highway 111/I-10.*** This area was added to the Plan primarily as Habitat for the Coachella Valley Jerusalem cricket. This area includes approximately 389 acres of modeled Habitat for Coachella Valley round-tailed ground squirrels, of which approximately 350 acres will be conserved under the Plan. The area has not been surveyed for this species and no known occurrences have been reported from this Conservation Area. The area was not considered large enough to provide Core Habitat for the ground squirrel.

5. ***Long Canyon, West Deception Canyon.*** These Conservation Areas do not have specific Conservation Objectives for species Habitat. These two Conservation Areas include approximately 769 acres and 1,533 acres of modeled ground squirrel Habitat, respectively. These acres are within the Essential Ecological Process fluvial sand transport area, which is not covered by a specific Conservation Objective. Because of existing land use patterns and associated edge effects in these areas, they would be unsuitable for Habitat protection through acquisition.

6. ***Upper Mission Creek/Big Morongo Canyon.*** The Plan includes approximately 2,773 acres of modeled Habitat for this ground squirrel in this Conservation Area, of which approximately 2,512 acres will be conserved under the Plan. Information on the occurrence

and distribution of this ground squirrel in the upper Mission Creek area is very limited. Although suitable Habitat for this species certainly occurs within this Conservation Area, it is mostly in scattered small patches. There is one recorded occurrence for this species, in sandy substrate west of Big Morongo wash. Habitat along this narrow corridor was too limited, with potentially high edge effects, to be considered as Core Habitat by the Planning Team. The Planning Team did not designate Core Habitat in this Conservation Area.

8. ***Edom Hill.*** This Conservation Area includes scattered sandy substrate Habitat between Willow Hole and the Thousand Palms Preserve in the Indio Hills. There are approximately 1,835 acres of modeled Habitat, of which approximately 1,677 acres will be conserved under the Plan. There is one known occurrence within this Conservation Area, an observation in May 1999 by Matt McDonald (1999).

9. ***Indio Hills/Joshua Tree National Park Linkage.*** The Plan includes approximately 165 acres of potential Habitat for the Coachella Valley round-tailed ground squirrel in this Conservation Area, of which the Plan will conserve approximately 148 acres. Known occurrences for this species have not, however, been recorded in this Conservation Area. The soils in this area, particularly north of Dillon Road, are more compacted and gravelly, stony, or cobbly than at other locations and would not be expected to support more than low numbers of ground squirrels.

   This area could provide a refugium in that some of the potential Habitat occurs at elevations from 1,000 to 1,120 feet, well above the 200 to 600 foot elevation at other known occurrences on the Thousand Palms Preserve. Dillon Road probably allows for some safe crossing by this species. Should traffic volumes increase significantly on Dillon Road, a culvert or other undercrossing could be necessary to maintain a connection with the Thousand Palms Conservation Area.

10. ***East Indio Hills.*** This Conservation Area contains approximately 1,476 acres of Other Conserved Habitat, of which the Plan will conserve approximately 1,364 acres. The Habitat at the most eastern end of the Indio Hills, particularly along the north-facing slope is very suitable for this species. Surveys in 1995 (K. Barrows 1995) and casual observations between 1987 and the present (K. Barrows, pers. comm.) found this species to be relatively common in this area. A report of surveys by Matt McDonald (1999) of USFWS in the spring and summer of 1999 described the density of ground squirrels in mesquite hummocks west and east of Dillon Road as high. However, due to the size and impacts from adjacent Development, this area was not considered as Core Habitat but as Other Conserved Habitat for this species within this Conservation Area.

11. ***Mecca Hills/Orocopia Mountains.*** This Conservation Area includes approximately 240 acres of modeled Habitat for the Coachella Valley round-tailed ground squirrel, of which approximately 239 acres will be conserved under the Plan. Known occurrences for this species have not been reported for this Conservation Area. The soils in this area are generally gravelly or cobbly and would not be expected to support more than low numbers of ground squirrels.

12. ***Dos Palmas.*** The Dos Palmas area includes approximately 4,490 acres that have been delineated, based on soil types and vegetation, as modeled Habitat for the Coachella Valley round-tailed ground squirrel, of which the Plan will conserve 4,304 acres. The closest known occurrence is from an observation by Robert McKernan (pers. comm.) in the vicinity of the Coachella Canal west of Dos Palmas, outside this Conservation Area. More distribution and occurrence data would be necessary to confirm the potential for this area

to constitute Core Habitat.

13. ***Coachella Valley Stormwater Channel and Delta.*** There are approximately 211 acres of modeled Habitat for this species within this Conservation Area, of which the Plan will conserve approximately 192 acres. Known occurrences of this species in this Conservation Area include an observation from July 2001 by Ken Corey (2001) of USFWS. The Habitat in this Conservation area is narrow with a high edge to area ratio. More information is needed on the distribution of the Coachella Valley round-tailed ground squirrel here.

14. ***Santa Rosa and San Jacinto Mountains.*** There are approximately 1,328 acres of modeled Habitat for this species within this Conservation Area, of which the Plan will conserve approximately 1,193 acres. Most of the modeled Habitat for this ground squirrel is located in the Snow Creek/Windy Point Conservation Area where bighorn sheep Habitat overlaps the sand dune areas.

15. ***Other Conservation Areas.*** There are three Conservation Areas with very limited Coachella Valley round-tailed ground squirrel Habitat, Indio Hills Palms with 145 acres, Joshua Tree National Park with 2 acres, and Desert Tortoise and Linkage with 43 acres.

9.8.2.4 Take Analysis

Significance of the Plan Area to Coachella Valley Round-Tailed Ground Squirrel

The Coachella Valley round-tailed ground squirrel is a subspecies of the more widely distributed round-tailed ground squirrel (*Spermophilus tereticaudus)* that inhabits desert areas of the southwestern United States and northwestern Mexico.

The Plan Area includes all of the known range for the Coachella Valley subspecies of the more widely distributed round-tailed ground squirrel. This subspecies is endemic to the Plan Area. The Coachella Valley round-tailed ground squirrel is a candidate for listing under FESA and is considered a species of special concern by the State of California. The Coachella Valley round-tailed ground squirrel is associated with sandy substrates, including sand areas within creosote bush and alkali sink scrub (Ingles 1965) and mesquite hummocks. The range for this subspecies essentially corresponds with the valley floor of the Coachella Valley. Within the Plan Area, the current and historical distribution for the Coachella Valley round-tailed ground squirrel is from San Gorgonio Pass to the vicinity of the Salton Sea (Grinnell and Dixon 1918, Hall 1981). Individuals of this species have been observed at the south end of La Quinta near Jefferson Avenue and along the Coachella Canal near Box Canyon. The range of this species in the eastern part of the Plan Area is not well known.

Effects of Take on the Coachella Valley Round-Tailed Ground Squirrel

The primary importance of the proposed MSHCP to Coachella Valley round-tailed ground squirrel is that it provides Conservation (including Habitat protection, management and monitoring) of the species across its entire range. The Plan ensures the long-term conservation of Core Habitat, the associated Essential Ecological Processes, and connectivity between these Habitat areas. In addition, the Conservation Areas provide protection across an array of Habitat variables, including moisture, soil character, elevation, vegetation, within the entire range of this subspecies.

There are 101,723 acres of modeled Habitat for this species within the Plan Area of which approximately 20,588 acres are identified as Core Habitat. The Plan would ensure Conservation of 94% (19,269 acres) of the Core Habitat and 77% (14,681 acres) of the Other Conserved Habitat for this ground squirrel. Each of the conserved Core Habitat areas would be greater than 2,000 acres. Approximately 13,357 acres (13%) of the modeled Habitat are within Existing Conservation Lands and would be managed as part of the Reserve System. Overall, the Plan would conserve an additional 33,950 acres (33%) of the modeled Habitat for Coachella Valley round-tailed ground squirrel in the Plan Area.

Within the Conservation Areas under the worst case scenario, 2,491 acres of Take of modeled Habitat (2%) could occur. There would be approximately 1,319 acres (6% of all Core Habitat) of Core Habitat and 1,172 acres of Other Conserved Habitat (6% of all Other Conserved Habitat) subject to Take Authorization (See Table 9-30 and Table 4-114). Take of ground squirrel Habitat within the Conservation Areas must be consistent with the Conservation Objectives for this species to: 1) ensure Conservation of Core Habitat; 2) protect Essential Ecological Processes needed to maintain ground squirrel Habitat; and 3) maintain Biological Corridors and Linkages among conserved populations to provide for population fluctuation and enhance genetic diversity. 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 species.

Outside of the Conservation Areas, there are 58,628 acres of modeled Habitat authorized for Take. The Habitat outside the Conservation Areas is already highly fragmented, surrounded by existing Development, and has a compromised sand source/transport system. The potential for this compromised Habitat to provide for the long-term persistence of ground squirrel populations is low. These areas are primarily 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 area no longer has a viable sand transport/wind corridor and is highly fragmented by major roads. These fragmented blocks are more susceptible to edge effects, including mortality on roads and predation by feral animals. Roads and low-density residential Development generally fragment the area near Desert Hot Springs. Modeled Habitat not included in the Conservation Areas in the area east of Highway 62 includes coarser soils and an apparently lower density of ground squirrels. Observations of Coachella Valley round-tailed ground squirrels in the area are limited to one observation (K. Barrows et al. 1997) of one individual south of Dillon Road, just west of Big Morongo Canyon wash and four individuals at the Mission Springs Water District water treatment facility.

Although the percentage of ground squirrel modeled Habitat that could be lost to development within the next 75 years appears to be substantial, evaluation of the impacts of Take

requires an assessment of the quality of this Habitat. The establishment of Conservation Areas where this species is protected is a significant improvement over the piecemeal and fragmenting nature of development patterns within this Habitat occurring now. The actual reduction in Habitat value is expected to be considerably less than indicated by the raw acreage numbers because:

1. Conserved Habitat areas are large enough to contain self-sustaining populations of ground squirrels and incorporate key Habitat elements, including sandy substrates and hummocks.
2. 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.
3. 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.
4. 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.
5. 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,

The issuance of Incidental Take Permits, therefore, will not likely jeopardize the continued existence of this species and the implementation of the MSHCP will provide for the Conservation of the species.

<u>Measures to Avoid, Minimize, and Mitigate Take of Coachella Valley Round-Tailed Ground Squirrel</u>

To mitigate the Take of Coachella Valley round-tailed ground squirrel, the Plan will ensure the protection and management, in perpetuity, of 20,593 acres of the modeled Habitat for this species. The 13,357 acres of modeled Habitat within Existing Conservation Lands will be monitored and managed to ensure that Conservation Objectives are met. The Plan will thus ensure Conservation, through protection and management, of 33,950 acres of Additional Conservation Lands for this species.

The proposed Conservation Areas in the Plan would protect the Core Habitat areas from Cabazon to Windy Point, including Snow Creek; the Willow Hole area, including additional Habitat west of Palm Drive and on Flat Top Mountain; and all of the occupied and potential Habitat on the Thousand Palms Preserve. In addition, occupied Habitat that met the Core Habitat standard set by the Planning Team, and which provides significant Habitat for this ground squirrel, will be conserved at the Whitewater Floodplain Preserve. Other Conserved Habitat from a range of environmental conditions within which this ground squirrel is known to occur will be protected in the following Conservation Areas: Cabazon, Stubbe and Cottonwood Canyons, Whitewater Canyon, Highway 111/I-10, Upper Mission Creek/Big Morongo Canyon, Mission Creek/Morongo Wash, Edom Hill, Indio Hills/Joshua Tree National Park Linkage, Indio Hills Palms, East Indio

Hills, Joshua Tree National Park, Desert Tortoise and Linkage, Mecca Hills/Orocopia Mountains, Dos Palmas, Coachella Valley Stormwater Channel and Delta, and the Santa Rosa and San Jacinto Mountains. Reserve Design criteria used to establish the Conservation Areas require Conservation of Essential Ecological Processes. The MSHCP Reserve System will incorporate and protect additional sand source/sand transport areas for Snow Creek/Windy Point, the Whitewater Floodplain Conservation Area, Willow Hole and Flat Top Mountain, and the Thousand Palms Preserve.

Additionally, the Plan calls for Management and Monitoring Programs to ensure the Conservation of this species, including control of activities that degrade ground squirrel Habitat, control of invasive species where necessary, and restoration and enhancement of degraded Habitat as necessary according to monitoring results. The Plan also calls for a research element that addresses the distribution, abundance, and Habitat parameters of the Coachella Valley round-tailed ground squirrel throughout the MSHCP Reserve System.

Coachella Valley round-tailed ground squirrel Habitat occupancy rates are substantially higher in mesquite hummocks than other Habitat types (Center for Conservation Biology, University of California, Riverside 2004, L. Ball, pers. comm.). It is therefore desirable to preserve the mesquite hummock areas. Substantial stands of mesquite hummocks and dunes are conserved within the Willow Hole and Thousand Palms Conservation Areas. The Plan includes provisions relative to Conservation of mesquite hummocks to: 1) monitor groundwater to determine whether substantial lowering of the water table occurs. Should monitoring detect such a substantial lowering, appropriate Adaptive Management actions will be taken (See Section 8.0); 2) monitor groundwater levels in the Willow Hole and Thousand Palms Conservation Areas and ameliorate the effects of substantial lowering of the water table on mesquite hummocks and associated Covered Species as a Changed Circumstance; 3) as a Permittee, CVWD will enhance and manage Coachella Valley round-tailed ground squirrel Habitat on land it owns in the East Indio Hills Conservation Area to mitigate and provide for the conservation of impacts to this species from CVWD's operation and management activities in the Coachella Valley Stormwater Channel and Delta Conservation Area. (See Section 4.3.16 for additional details). CVWD will restore and enhance mesquite and Coachella Valley round-tailed ground squirrel Habitat on site in the East Indio Hills Conservation Area if a study determines restoration to be feasible; 4) the potential for mesquite hummock restoration and enhancement will be evaluated through monitoring and Adaptive Management and will be considered in the context of Conservation Objectives for all Covered Species and natural communities.

Overall Impacts to Coachella Valley Round-Tailed Ground Squirrel under the Plan

Within the Conservation Areas under the worst case scenario, 2,491 acres of Take of modeled Habitat (2%) could occur. There would be approximately 1,319 acres (6% of all Core Habitat) of Core Habitat and 1,172 acres of Other Conserved Habitat (6% of all Other Conserved Habitat) subject to Take Authorization (See Table 9-30 and Table 4-119). Take of ground squirrel Habitat within the Conservation Areas must be consistent with the Conservation Objectives for this species to: 1) ensure Conservation of Core Habitat; 2) protect Essential Ecological Processes needed to maintain ground squirrel Habitat; and 3) maintain Biological Corridors and Linkages among conserved populations to provide for population fluctuation and enhance genetic diversity. 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 species.

Outside of the Conservation Areas, there are 58,628 acres of modeled Habitat authorized for Take. The Habitat outside the Conservation Areas is already highly fragmented, surrounded by existing Development, and has a compromised sand source/transport system. The potential for these to provide for the long-term persistence of ground squirrel populations is low. These areas are primarily 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 area no longer has a viable sand transport/wind corridor and is highly fragmented by major roads. These fragmented blocks are more susceptible to edge effects, including mortality on roads and predation by feral animals. Roads and low-density residential Development generally fragment the area near Desert Hot Springs. Modeled Habitat not included in the Conservation Areas in the area east of Highway 62 includes coarser soils and an apparently lower density of ground squirrels. Observations of Coachella Valley round-tailed ground squirrels in the area are limited to one observation (K. Barrows et al. 1997) of one individual south of Dillon Road, just west of Big Morongo Canyon wash and four individuals at the Mission Springs Water District water treatment facility.

The Conservation Areas benefit this species by securing the long-term sand transport-delivery systems for the Core Habitat and Other Conserved Habitat. At the present time, the sand transport corridors for the Snow Creek area, the Willow Hole area, and for the Thousand Palms Preserve are unprotected; the MSHCP Reserve System would protect these areas. Potential Linkage areas would be protected between Highway 111 and Interstate 10 near Snow Creek. From Willow Hole east, Habitat that typically supports this species along the south-facing slopes of Edom Hill would be protected, providing a Linkage with Habitat to the east on the Thousand Palms Preserve. Essential Ecological Processes, including wind corridors and sand sources for the Habitat named above, would be protected under the Plan. Habitat at Dos Palmas would be conserved in the proposed Plan. Those areas where Take could be permitted for this species are primarily 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 area no longer has a viable sand transport/wind corridor and is highly fragmented by major roads. These fragmented blocks are more susceptible to edge effects, including mortality on roads and predation by feral animals. Roads and low-density residential Development generally fragment the area near Desert Hot Springs.

Therefore, implementation of this Plan will maintain and enhance population viability of the Coachella Valley round-tailed ground squirrel, as significant Habitat that is now unprotected will be conserved. The Plan will also secure the Essential Ecological Processes necessary to

maintain this Habitat.

9.8.2.5 Species Account: Background

Distribution, Abundance, and Trends. The Coachella Valley round-tailed ground squirrel is typically associated with sand fields and dune formations (Bradley and Deacon 1971), although it does not require active blowsand areas. This small ground squirrel seems to prefer areas where hummocks of sand accumulate at the base of large shrubs that provide burrow sites and adequate cover (Grinnell and Dixon 1918, Cameron Barrows, pers. comm.). Various authors have referred to the use of mesquite Habitat by round-tailed ground squirrels (Allen and Price 1895, Elliot 1904, Grinnell and Dixon 1918, Vorhies 1945, Drabek 1973, Dunford 1975). Although numerical data were not presented, McDonald (1999) reported relatively high densities of Coachella Valley round-tailed ground squirrel in a mesquite hummocks and active sand field Habitat at the east end of the Indio Hills. In surveys for this Plan, Dodero (1995) reported observing this squirrel at Willow Hole in the central portion of the dune as well as at the southern periphery, at the edge of mesquite clumps. He also reported that these squirrels are most abundant at Willow Hole in the dune area where the transition from desert dune to Sonoran creosote scrub takes place. C. Barrows (pers. comm. 2001) suggests that they are most abundant in more mesic sand dune Habitats, often associated with mesquite hummocks. They may also be found in areas where sandy substrates occur in creosote bush scrub and desert saltbush scrub or in desert sink scrub that supports herbaceous growth. In addition to wind blown sand Habitats, they may occur in areas of more coarse sands, associated with washes. According to Mark Fisher of the UC Deep Canyon Desert Research Center (Mark Fisher, pers. comm.), the Coachella Valley round-tailed ground squirrel used to occur on this reserve in sandy patches associated with washes and was reported from 1979 to 1984. He indicated that this ground squirrel has not been observed in the Deep Canyon area since the 1980s when the population was extirpated by the effects of a severe drought. According to Ryan (1968), the highest concentrations of this species in the Deep Canyon area were not in aeolian dunes but in areas of somewhat coarser sand, slightly pebbly ground cover, or packed silt.

Very little quantitative data are available to describe the population density for this species throughout the Plan Area. Density estimates for round-tailed ground squirrels in Arizona range from 2.1 individuals per acre (5.3/ha) on a 63-hectare site in south-central Arizona (Drabek 1973) to 16/acre (40/ha) on a crowded site (Dunford 1977). It is likely that densities in the Coachella Valley would be less than in Arizona where average annual rainfall and vegetation density are relatively higher. The Coachella Valley round-tailed ground squirrel occurs in small colonies widely scattered in suitable sandy Habitats (Ryan 1968). According to Jaeger (1961), 10 to 15 animals per square mile (0.01 to 0.02/acre) is probably an average number. From trap data in the creosote-palo verde Habitat, Ryan (1968) estimated 1.1 individuals per acre during 30 April through 2 May, 2.3 individuals per acre during October, and 1.1 individuals per acre during January. Drabek (1973) found mean home range estimates of 0.74/acre for adults and 0.77/acre for juveniles.

Based on input from various observers, including members of the Planning Team, areas where the Coachella Valley round-tailed ground squirrel occurs in relatively high density have been identified. This squirrel occurs in good populations in the vicinity of Snow Creek, from Fingal's Finger to Windy Point; it has also been observed further west near Cabazon. It occurs around the Whitewater River channel north and west of Palm Springs, including the Whitewater

Floodplain Preserve. It has been observed along the Mission Creek wash and likely occurs in suitable Habitat in the southern parts of Desert Hot Springs. Habitat, including mesquite hummocks and sand dunes, at the Willow Hole-Edom Hill Preserve/ACEC has been described as high quality for this species (Dodero 1995), and many individuals were observed there during surveys for the Plan. Table 9-31 provides results of various surveys for Coachella Valley round-tailed ground squirrel. Data on the number of individuals of Coachella Valley round-tailed ground squirrel along a 1 km. transect at the Willow Hole-Edom Hill Preserve/ACEC have been collected during annual monitoring surveys for the fringe-toed lizard (CNLM 2000); the mean number of squirrels per survey per year ranges from two to seven squirrels from 1990 to 1994 and from four to 10 squirrels from 1998 to 2000.

Table 9-31: Results of Various Surveys for Coachella Valley Round-Tailed Ground Squirrel

LOCATION	Year of Observation	Number of *CVRTGS* Observed	Number of Transects
SNOW CREEK ROAD	1996 [5] 1997 [5]	±30 ±20	- 4
WINDY POINT	1995a[1]	Not observed	-
WHITEWATER FLOODPLAIN PRESERVE	1995b[2]	54 (13.5)	4
WEST OF PALM DRIVE	2001[4]	1	-
WILLOW HOLE PRESERVE	1995a[1] 1995b[2]	Many squirrels 92 (9.2)	- 10
EDOM HILL	1999[3]	Low	
THOUSAND PALMS PRESERVE	1995b[2]	466 (12.9)	36
EAST END INDIO HILLS (1999)	1995b[2] 1999[3]	107 (35.7) High	3
DEEP CANYON (within Santa Rosa & San Jacinto Mountains Conservation Area)	1964[3]	Density from 1.1 to 2.3/acre	-

[1] Records from 1995a are from a report on biological surveys completed for this Plan by M. Dodero (Dodero 1995).

[2] Records from 1995b are from a report on biological surveys completed for this Plan by Katie Barrows (1995); in this survey, squirrels were counted along 10-meter-wide transects of variable length. Number in parentheses is number of animals per transect.

[3] Observations for 1999 were reported by Matt McDonald, USFWS, Carlsbad Field Office, (McDonald 1999) from surveys conducted between 29 April and 11 August 1999; density is described on a qualitative basis, as no counts were made.

[4] Density estimates based on trapping results from an unreported number of quadrants by Ryan (1968) in Mammals of Deep Canyon.

[5] Observations are from an informal survey on the west side of Snow Creek Road (Katie Barrows et al. 1997). Observations in 1996 are by Katie Barrows on July 1, 1996 (K. Barrows, pers. comm.) from both sides of Snow Creek Road.

From the Willow Hole-Edom Hill ACEC, this ground squirrel can be found in sandy Habitats east toward the Thousand Palms Preserve. It occurs in good numbers on the dunes of the Thousand Palms Preserve. It is also common on the sand dunes at the east end of the Indio Hills. Habitat is still present for this ground squirrel on the so-called Big Dune south of Interstate 10, although surveys for this species have not been conducted in this area because it is on private land without access.

The burrows of the Coachella Valley round-tailed ground squirrel are typically located at the base of a large creosote bush or other shrub, often on a small mound or hummock. The entry is several inches across leading to tunnels that are not usually deep or over five or six feet in length (Jaeger 1961). Young are born in March or April in litters of four to 12. In winter, they remain in their underground burrows for much of the time. They feed on seeds and green leaves of desert plants, including the stems of Mormon tea (*Ephedra* sp.), leaves and beans of mesquite, cactus fruit, ocotillo blossoms (Hoffmeister 1986), and agricultural crops, but may occasionally take small lizards (including flat-tailed horned lizards) and insects; they have also been observed to feed on carrion.

Associated Covered Species. Within the Plan Area, other species of concern whose Habitat overlaps with that of the Coachella Valley round-tailed ground squirrel include flat-tailed horned lizard, Palm Springs pocket mouse, Coachella Valley fringe-toed lizard, Coachella Valley milkvetch, Coachella Valley giant sand-treader cricket, Coachella Valley Jerusalem cricket, and burrowing owl.

9.8.3 Palm Springs Pocket Mouse *Perognathus longimembris bangsi*

Status	**Federal:**	**No official status**
	State:	**Species of Special Concern**

9.8.3.1 Species Conservation Goals and Objectives

Conserve and manage populations within the MSHCP Reserve System according to the following criteria:

Goal 1: Protect Core Habitat areas that include occupied Habitat Conserve Habitat, and associated Essential Ecological Processes, allowing evolutionary processes and natural population fluctuations to occur. Minimize fragmentation, human-caused disturbance, and edge effects to Core Habitat by conserving contiguous Habitat patches and effective Linkages between patches of Core Habitat.

Objective 1. Ensure conservation of Core Habitat within the following Conservation Areas:

- Snow Creek/Windy Point Conservation Area
- Whitewater Floodplain Conservation Area
- Upper Mission Creek/Big Morongo Canyon Conservation Area

- ❖ Willow Hole Conservation Area
- ❖ Thousand Palms Conservation Area

Please refer to Section 4.3 and Table 9-32 for specific acreages to be protected by this Conservation Objective.

Goal 2: Protect Other Conserved Habitat, to provide sufficient area and variety of Habitat types to accommodate population fluctuations, allow for and genetic diversity, and to conserve the range of environmental conditions within which this pocket mouse is known to occur.

Objective 2. Conserve Other Conserved Habitat for this mouse through adherence to other Conservation Objectives (for another species, a natural community, Essential Ecological Process area, Biological Corridor, or Linkage area) in the following Conservation Areas:

- ❖ Cabazon Conservation Area
- ❖ Stubbe and Cottonwood Canyons Conservation Area
- ❖ Whitewater Canyon Conservation Area
- ❖ Highway 111/I-10 Conservation Area
- ❖ Upper Mission Creek/Big Morongo Canyon Conservation Area
- ❖ Mission Creek/Morongo Wash Conservation Area
- ❖ Edom Hill Conservation Area
- ❖ Indio Hills/Joshua Tree National Park Linkage Conservation Area
- ❖ Indio Hills Palms Conservation Area
- ❖ East Indio Hills Conservation Area
- ❖ Joshua Tree National Park Conservation Area
- ❖ Desert Tortoise and Linkage Conservation Area
- ❖ Mecca Hills/Orocopia Mountains Conservation Area
- ❖ Dos Palmas Conservation Area
- ❖ Coachella Valley Stormwater Channel and Delta Conservation Area
- ❖ Santa Rosa and San Jacinto Mountains Conservation Area

Please refer to Section 4.3 and Table 9-32 for specific acreages to be conserved by other Conservation Objectives.

Goal 3: Protect Essential Ecological Processes, including sand source/transport systems, necessary to maintain Core Habitat and Other Conserved Habitat for this species.

Objective 3. Ensure protection of Essential Ecological Process areas through Conservation Area Conservation Objectives for Essential Ecological Processes.

Goal 4: Maintain Biological Corridors and Linkages among all conserved populations.

Objective 4. Note: Specific additional details on these Biological Corridors and Linkages, and requirements for the installation of wildlife underpasses, are found in the Conservation Area descriptions in Section 4.3. Key Habitat Linkages and Biological Corridors include the following:

- ❖ Fornat Wash Biological Corridor

- Stubbe Canyon Wash Biological Corridor
- Whitewater River Biological Corridor
- Mission Creek Biological Corridor
- Willow Wash Biological Corridor, which maintains potential Habitat connectivity for Palm Springs pocket mouse between the Willow Hole and Whitewater Floodplain Conservation Areas
- Highway 62 Biological Corridor
- Morongo Wash, including Palm Springs pocket mouse Habitat, to maintain potential Habitat connectivity between Core Habitat in the Upper Mission Creek/Big Morongo Canyon Conservation Area and the Willow Hole Conservation Area
- Interstate 10 Biological Corridors, which maintain potential Habitat connectivity for Palm Springs pocket mouse between the Joshua Tree National Park Conservation Area and the Mecca Hills/Orocopia Mountains Conservation Area
    a. Conserve Corridor 1, centered on Thermal Canyon
    b. Conserve Corridor 2 centered on the E. Cactus City Wash and Hazy Gulch culverts
    c. Conserve Corridor 3 centered on the Happy Gulch culvert
    d. Conserve Corridor 4 centered on the Desperation Arroyo culvert
    e. Conserve Corridor 5 centered on the Desperation Arroyo, West Buried Mountain Wash, Buried Mountain Wash, Resurrection Wash, West Saddle Gulch, Saddle Gulch, West Cotton Gulch, Cotton Gulch, East Cotton Gulch, and Paul Gulch culverts
- Possible future wildlife undercrossings at Indian Avenue and Gene Autry Trail in the Whitewater Floodplain Conservation Area
- Possible future widened culverts or undercrossings at Palm Drive
- Possible future widened culverts or undercrossings at Mountain View Road, and Varner Road in the Willow Hole Conservation Area
- Possible future wildlife undercrossings along Ramon Road, Washington Street, and Thousand Palms Canyon Road in the Thousand Palms Conservation Area

Goal 5: Ensure conservation of the Palm Springs pocket mouse by maintaining the long-term persistence of self-sustaining populations and conserving Habitat quality 275 through biological monitoring and Adaptive Management actions in the Plan Area.

Objective 5: Implement monitoring and Adaptive Management actions to ensure self-sustaining populations within each Core Habitat area.

Table 9-32: Summary of Habitat within Conservation Areas Palm Springs Pocket Mouse

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	934	N/A	24	(910)[1, 3]	24	Other Cons. Habitat
Stubbe & Cottonwood Canyons	1,210	118	26	1,066	1,092	Other Cons. Habitat
Snow Creek/ Windy Point	2,744 / 53	241 / 5	334 / 0	2,169 / 48	2,503 / 48	Core / Other Cons. Habitat
Whitewater Canyon	166	14	30	122	152	Other Cons. Habitat
Hwy 111/I-10	389	39	0	350	350	Other Cons. Habitat
Whitewater Floodplain	6,981 / 19	407 / 2	2,914 / 0	3,660 / 17	6,574 / 17	Core / Other Cons. Habitat
Upper Mission Creek/Big Morongo Canyon	3,806 / 392	339 / 30	498 / 85	2,969 / 277	3,467 / 362	Core / Other Cons. Habitat
Willow Hole	4,610 / 217	405 / 20	564 / 13	3,641 / 184	4,205 / 197	Core / Other Cons. Habitat
Long Canyon	788	N/A	101	(687)[1, 3]	101	Other Cons. Habitat
Edom Hill	1,342	115	189	1,038	1,227	Other Cons. Habitat
Thousand Palms	11,707 / 425	518[2] / 15	7,601 / 269	3,588 / 141	11,189/ 410	Core/ Other Cons. Habitat
West Deception	2,818	N/A	10	1 (2,807)[1, 3]	11	Other Cons. Habitat
Indio Hills /Joshua Tree National Park Linkage	7,059	661	445	5,953	6,398	Other Cons. Habitat
Indio Hills Palms	458	19	264	175	439	Other Cons. Habitat
East Indio Hills	1,651	117	480	1,054	1,534	Other Cons. Habitat
Joshua Tree National Park	35	4	0	31	31	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*
Desert Tortoise & Linkage	2,122	169	436	1,517	1,953	Other Cons. Habitat
Mecca Hills/Orocopia Mountains	1,946	148	462	1,336	1,798	Other Cons. Habitat
Dos Palmas	8,147	353	4,617	3,177	7,794	Other Cons. Habitat
Coachella Valley Stormwater Channel & Delta	172	15	20	137	157	Other Cons. Habitat
Santa Rosa & San Jacinto Mountains	5,565	502	1,869	3,194	5,063	Other Cons. Habitat
Total – All Habitat	*65,756*	*4,339*	*21,251*	*35,762 (4,404)*[1]	*57,013*	--
Total – Core Habitat	*29,848*	*1,993*	*11,911*	*15,944*	*27,734*	--
Total – Other Conserved Habitat	*35,908*	*2,346*	*9,340*	*19,818 (4,404)*[1]	*29,279*	--

[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. In these cases there are no "Acres Authorized for Take."

[2] Of this Authorized Take, 147 acres can only be used in Section 8, T4S, R6E of the Thousand Palms Conservation Area.

[3] A portion of this species Habitat model occurs within a fluvial sand transport area

[4] .

9.8.3.2 Threats, Limiting Factors, and Adaptive Management

Threats to this species and its Habitat within the Coachella Valley include agricultural Development, urban Development, construction of roads, railroads, airports and other structures, OHV use, illegal trash dumping, and domestic animal predators.

The following actions may be needed to ensure species persistence and long-term viability if biological monitoring results indicate that such actions are warranted. This list is not comprehensive but identifies some of the known or likely threats to pocket mice. More detailed information on the Management and Monitoring Programs can be found in Section 8.0. Actions

may include:

1. Control and manage activities that degrade pocket mouse Habitat. In particular, control those activities that adversely affect this species, which may include OHV travel within Core Habitat (except on designated routes of travel, if any); vegetation manipulation or clearing; and other human disturbance. Fencing, patrol and enforcement may be necessary to accomplish this goal.
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 pocket mouse Habitat or populations.
3. Restore and enhance degraded Habitat as necessary according to monitoring results.
4. Where necessary, develop fire management guidelines within conserved areas to protect populations from fires and disturbances associated with fire suppression. Fire management is primarily an issue in the western, more mesic, portion of the Plan Area where alien annual grasses may facilitate the spread of fire.
5. Complete studies to determine where Habitat interfaces occur between *P.l. bangsi* and other subspecies.

9.8.3.3 Species Conservation Analysis

Conservation Area Reserve Design. The Palm Springs pocket mouse occurs throughout the Plan Area, and at least some potential Habitat for this species occurs in all the Conservation Areas. The Planning Team selected Core Habitat from the Habitat model for this species using the following four criteria: (1) Core Habitat is sufficiently large that it can support a self-sustaining population independent of other Core Habitat areas; (2) Core Habitat is not fragmented by Development, including roads. Lightly traveled two-lane roads that have limited potential for expansion (e.g. Snow Creek Road) were not considered barriers to this species. Where roads have the potential to fragment Core Habitat, the Plan provides for wildlife underpasses to be constructed when road widening could cause potential fragmentation; (3) Core Habitat has intact Essential Ecological Processes, including sand source and sand delivery systems; while this species may not depend on active blowsand areas, long-term maintenance of the sand dunes and sand fields where it occurs was considered essential; and (4) Core Habitat area provides suitable areas to act as refugia in the event of large-scale flood events or other extreme conditions (climate change, extended drought). Natural features such as ridges and washes or features such as roads (as a buffer from Development) are used to minimize edge effects from Development. In addition to new Conservation Areas at Snow Creek and Mission Creek, existing Conservation Areas will be expanded to include adjacent Habitat areas, Essential Ecological Process areas, and Linkages. Linkages will also help maintain predator-prey relationships in the Conservation Areas by providing for movement of predators such as coyotes and foxes.

For each area, see Table 9-32 for a breakdown of Existing Conservation Lands and remaining lands to be conserved. The Planning Team identified and assessed the sufficiency of the following Conservation Areas as Core Habitats:

Core Habitat Areas:

1. ***Snow Creek/Windy Point.*** There are approximately 2,744 acres of pocket mouse Core

Habitat within this Conservation Area, of which the Plan will conserve approximately 2,503 acres. Shana Dodd's density estimates for the Snow Creek area range from 43.9 to 73.1 individuals per hectare or 17.56 to 29.4 animals per acre (Dodd 1996, 1999). Using the lower density figure would result in an estimate of 47,061 pocket mice occurring in this area. 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 two-lane Snow Creek Road was not considered a significant impediment to movement of pocket mice from one side to the other due to the relatively low traffic volume. Because much of the existing land on either side of Snow Creek Road is currently held by public and private conservation groups, the traffic levels are not expected to increase greatly. The Snow Creek area could provide a refugium for this species in the event of a major flood in the portions of the area that are above the 500-year floodplain (FEMA). The Planning Team considered this area as Core Habitat for this species.

2. ***Whitewater Floodplain*.** Nearly all of the land included in this Conservation Area is potential Habitat for the Palm Springs pocket mouse, according to the species distribution model. The Plan includes approximately 1,240 acres of modeled Habitat on the existing preserve, approximately 420 acres of Habitat adjacent to the southeastern corner of the preserve, and Habitat throughout the floodplain to comprise a total of approximately 6,981 acres, of which the Plan will conserve approximately 6,574 acres. Trap results from Shana Dodd (1996) were from two locations on the existing preserve. One individual was trapped on her transect at the eastern edge near Date Palm Drive, an area of relatively active blowsand. 10 individuals were trapped in the southwestern portion of the preserve, an area of low sand hummocks; *P.l. bangsi* is expected to occur throughout the preserve, except possibly in the very high wind-formed dunes where no vegetation occurs (Dodd 1996). A relatively small patch of Habitat, including 371 acres of potential pocket mouse Habitat, lies east of Gene Autry Trail and was historically connected with Habitat at the Whitewater Floodplain Preserve. Gene Autry Trail, a two-lane road, has heavy traffic and is already scheduled for widening. A wildlife undercrossing will be installed when the road is widened to six lanes. No known occurrences for Palm Springs pocket mouse have been recorded here; individuals of this species, however, have been trapped north of the railroad tracks, between the tracks and Interstate 10 (Chambers Group 2000). The Planning Team considered the modeled Habitat within this entire Conservation Area as Core Habitat for the Palm Springs pocket mouse.

3. ***Upper Mission Creek/Big Morongo Canyon.*** The Conservation Area includes approximately 3,806 acres of modeled Core Habitat for Palm Springs pocket mouse, of which the Plan will conserve approximately 3,467 acres. A density plot placed west of Highway 62 and south of the Mission Creek drainage (SE ¼ of Section 20, T. 2S, R. 4E) by Dodd (1996) resulted in a density of 14.54 individuals per acre. The trapping completed by Dodd (1999) on the east side of Highway 62 in the Mission Creek channel resulted in the capture of 30 individuals, the highest ratio of individuals captured per trap night. While Highway 62 is certainly a major impediment to movement for animal species, the presence of a significant under crossing at Mission Creek allows connectivity between the Habitat on both sides of the highway to be maintained. The Planning Team did consider this area as Core Habitat for the Palm Springs pocket mouse.

4. ***Thousand Palms.*** The Conservation Area includes approximately 11,707 acres of modeled Habitat for Palm Springs pocket mouse in this Conservation Area, of which the Plan will conserve approximately 11,189 acres. The Thousand Palms Preserve includes Habitat for

Palm Springs pocket mouse in the main dune system, in the area south of Ramon Road and west of Washington Avenue. Because Ramon Road and Washington Avenue receive moderate traffic volumes, the main dune system is somewhat isolated from the remaining Palm Springs pocket mouse Habitat on the preserve. The Palm Springs pocket mouse population is not well studied on the preserve and no known occurrences have been located in this portion of the Conservation Area. Because the Habitat is similar to that found in areas where Palm Springs pocket mouse is known to occur (the Whitewater Floodplain Preserve, dune areas of Snow Creek, and at the Willow Hole-Edom Hill Preserve/ACEC), the presence of Palm Springs pocket mouse is probable. One density plot sampled by Dodd in 1996, in the vicinity of Willis Palms north of Ramon Road, did not result in sufficient individuals trapped to estimate density. Dodd (1996, 1999) characterizes this preserve as having moderate density and estimates that a reasonable estimate of density could be made based on trap results on the density plot. She suggests that densities in the vicinity of this plot do not likely exceed 6.4 individuals per acre (16/ha). The Planning Team included this area as Core Habitat.

Most of the known occurrences for Palm Springs pocket mouse on the Thousand Palms Preserve are north of Ramon Road and west of Thousand Palms Canyon Road (Dodd 1996, 1999, USFWS 1997). The Habitat patch delineated in this area includes 4,272 acres of potential pocket mouse Habitat. On the east side of Thousand Palms Canyon Road, the model for this species predicts that there are 1,861 acres of potential Habitat. Because each of these areas could support a self-sustaining population of this species, the Planning Team designated them as Core Habitat.

5. ***Willow Hole.*** Data for the presence of Palm Springs pocket mouse in the Willow Hole vicinity comes from the trapping results of Dodd (1996). The number of individuals trapped on the one density plot sampled in 1996 was insufficient to estimate density. It should be noted that trapping was not completed west of Palm Drive or south of Varner Road. However, Dodd (1996) did report that the Habitat and soils are relatively similar throughout this site and Palm Springs pocket mouse would be expected to occur over most of the study area. West of Palm Drive, the Habitat occurs primarily south of the San Andreas Fault where sandy deposits from Mission Creek and Big Morongo Wash provide suitable Habitat for Palm Springs pocket mouse.

   There is some fragmentation in this area as a result of roads, including Palm Drive, Mountain View Drive, and Varner Road. These roads likely reduce the unimpeded movement of pocket mice from one Habitat patch to another; culverts under Palm Drive provide for connectivity between the Habitat east and west of Palm Drive. There are a total of 4,610 acres of Core Habitat and 217 acres of Other Conserved Habitat. The Plan will ensure conservation of at least 4,205 acres of Core Habitat and 197 acres of Other Conserved Habitat.

Other Conserved Habitat Areas:

1. ***Cabazon.*** There are approximately 934 acres of modeled Habitat for this pocket mouse in the Cabazon Conservation Area, of which the Plan will conserve approximately 24 acres. The area was not considered large enough to provide Core Habitat for the pocket mouse.

2. ***Stubbe and Cottonwood Canyons.*** This Conservation Area includes limited, scattered sandy substrate for a total of approximately 1,210 acres of modeled Habitat, of which the

Plan will conserve approximately 1,092 acres. The area has not been surveyed for this species and no known occurrences have been reported from this Conservation Area. The area was not considered large enough to provide Core Habitat for the Palm Springs pocket mouse.

3. ***Whitewater Canyon.*** This Conservation Area includes very limited, scattered sandy substrate for a total of approximately 166 acres of modeled Habitat, of which the Plan will conserve approximately 152 acres. The substrates in this Conservation Area are more gravelly, stony, or cobbly than at other locations and would not be expected to support more than low numbers of pocket mice.

4. ***Highway 111/I-10.*** This Conservation Area includes approximately 389 acres of Habitat for the pocket mouse, of which the Plan will conserve approximately 350 acres. This area was added to the MSHCP Reserve System primarily as Habitat for the Coachella Valley Jerusalem cricket. However, the area can also be considered as a Linkage for the Palm Springs pocket mouse. According to Shana Dodd (pers. comm. 2000) the area could have value as a Linkage to the Whitewater River and Snow Creek in that it provides adequate shrub cover for this species. The area has not been surveyed for Palm Springs pocket mouse; however, if the area supports pocket mice at a density comparable to the lowest density on the Snow Creek density plots then this area could be considered contiguous Core Habitat. In 1996, Shana Dodd trapped 18 individuals west of density plot with the highest sampled density, 29.24 animals/acre.

5. ***Long Canyon, West Deception Canyon.*** These Conservation Areas do not have specific Conservation Objectives for species Habitat. Each of the Conservation Areas includes 788 acres and 2,818 acres of modeled pocket mouse Habitat, respectively. These acres are within the Essential Ecological Process fluvial sand transport area, which is not covered by a specific Conservation Objective. Because of existing land use patterns and associated edge effects in these areas, they would be unsuitable for Habitat protection through acquisition.

6. ***Upper Mission Creek/Big Morongo Canyon.*** There are approximately 392 acres of modeled Habitat for this pocket mouse within this Conservation Area, of which the Plan will conserve approximately 362 acres.

8. ***Edom Hill.*** This Conservation Area includes scattered sandy substrate Habitat, which provides a Linkage between the Willow Hole and the Thousand Palms Conservation Areas in the Indio Hills. No records for the Palm Springs pocket mouse have been recorded from this Conservation Area. There are approximately 1,342 acres of Other Conserved Habitat, of which the Plan will conserve approximately 1,227 acres.

9. ***Indio Hills/Joshua Tree National Park Linkage.*** The Conservation Area includes approximately 7,059 acres of potential Habitat for the Palm Springs pocket mouse, of which the Plan will conserve approximately 6,398 acres. Shana Dodd (1996) reported that this species was detected in very low numbers, primarily at two transects immediately north of Dillon Road, south of Fan Hill. Bob James also trapped this species in Pushwalla Canyon north of Dillon Road (USFWS 1997). The soils in this area, particularly north of Dillon Road, are more compacted, stony, and cobbly than at other locations where trapping was completed (Dodd 1996). Jim Cornett (pers. comm.) has also reported trapping this species in the vicinity of Dillon Road and Thousand Palms Canyon Road. He also cited the cobbly nature of the substrate here and the indication that Palm Springs pocket mouse would occur at lower densities. Still no data are available to estimate the density of individuals in this

Conservation Area. Without adequate data to evaluate the extent of occupied Habitat, the Planning Team did not designate this area as Core Habitat for this species. Additional Habitat for this species is indicated in the West Deception Canyon Conservation Area, although no known occurrences of the species have been recorded there.

This area could provide a refugium in that the transects where the species was recorded (Dodd 1996) were at 1,000 and 1,120 feet, well above the 200 to 600 foot elevation at other known occurrences on the Thousand Palms Preserve. Some safe crossing by this species, particularly during the night hours when it is active, could occur across Dillon Road. Should traffic volumes increase significantly on Dillon Road, a culvert or other undercrossing could be necessary to maintain a connection with the Thousand Palms Canyon Conservation Area.

10. ***East Indio Hills.*** This Conservation Area includes approximately 1,651 acres of modeled Habitat for this pocket mouse, of which approximately 1,534 acres will be conserved by the Plan.

11. ***Desert Tortoise and Linkage.*** This Conservation Area includes approximately 2,122 acres of modeled Habitat for the Palm Springs pocket mouse, of which the Plan will conserve approximately 1,953 acres. Palm Springs pocket mouse was recorded in Thermal Canyon (USFWS 1997) and in Shavers Valley (Dodd 1999). The Shavers Valley area may approach the eastern limit of this subspecies; a 1976 University of California, Berkeley Museum of Vertebrate Zoology record for Palm Springs pocket mouse is southeast of Shavers Valley in the Salt Creek Wash area. Dodd described that, although the Habitat appears suitable, this species appears to be at very low densities in this area. The Habitat distribution map did not allow a complete prediction of potential Habitat because soils data, on which the model was based, is not available for this part of Riverside County. There is insufficient data to determine whether this area could serve as Core Habitat for the Palm Springs pocket mouse.

12. ***Mecca Hills/Orocopia Mountains.*** This Conservation Area includes approximately 1,946 acres of modeled Habitat for the Palm Springs pocket mouse, of which the Plan will conserve approximately 1,798 acres. Dodd (1999) described that although the Habitat appears suitable, this species appears to be at very low densities in this area. The Habitat distribution map did not allow a complete prediction of potential Habitat because soils data, on which the model was based, is not available for this part of Riverside County.

13. ***Dos Palmas.*** The Dos Palmas area includes Habitat that appears to be of high quality for this species (Dodd 1999). However, only two individuals were captured here on two different trap lines. Shana Dodd indicates that she would expect the species to occur in low numbers throughout the region, especially in fine sandy areas. She suggests that the low densities for this species may relate to decreased precipitation and higher temperatures in the east end of the Coachella Valley; drier conditions would likely result in reduced availability of annual plants as a food source for the pocket mouse, compared to the west end of the valley. The Dos Palmas area includes approximately 8,147 acres of modeled Habitat for this species, of which the Plan will conserve 7,794 acres.

14. ***Coachella Valley Stormwater Channel and Delta.*** There are approximately 172 acres of modeled Habitat for this species within this Conservation Area, of which the Plan will conserve approximately 157 acres. The Habitat in this Conservation area has a high edge to area ratio. More information is needed on the occurrence and distribution of the Palms Springs pocket mouse here.

15. ***Santa Rosa and San Jacinto Mountains.*** There are approximately 5,565 acres of modeled Habitat for this species within this Conservation Area, of which the Plan will conserve approximately 5,063 acres. Most of the modeled Habitat for this pocket mouse is located adjacent to the Snow Creek/Windy Point Conservation Area where bighorn sheep Habitat overlaps the sand dune areas.

16. ***Other Conservation Areas.*** There are two Conservation Areas with very limited Palm Springs pocket mouse Habitat, Indio Hills Palms with 458 acres and Joshua Tree National Park with 35 acres.

9.8.3.4 Take Analysis

Significance of the Plan Area to Palm Springs Pocket Mouse

The Plan Area contains the major portion of the range of the Palm Springs pocket mouse, 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). The Palm Springs pocket mouse has no federal status and is considered a species of special concern by the State of California.

Within the Plan Area, the east to west range of the Palm Springs pocket mouse does not appear to differ from what has been described in the past (Dodd 1996). This pocket mouse can be found in the Cabazon area as the western limits of the Plan Area in suitable Habitat and has also been recorded in the Shaver's Valley area near the eastern limits of the Plan Area. In the Coachella Valley, much of the Habitat for this species south of the I-10 freeway has been impacted by Development and fragmentation. Relatively undisturbed Habitat for the Palm Springs pocket mouse can still be found in the northern parts of the Plan Area. Within its historic range Habitat for this pocket mouse has been greatly reduced by urbanization and agriculture in the Coachella Valley.

The Plan Area still presents opportunities for Conservation of a large portion of this species total range. Although comprehensive surveys for this species have not been done, core populations have been identified. These populations occur in the Snow Creek/Windy Point Conservation Area, the area with the highest known population density for the species (Dodd, 1996), the Whitewater Floodplain Conservation Area, Upper Mission Creek/Big Morongo Canyon Conservation Area, and the Thousand Palms Conservation Area.

Effects of Take on the Palm Springs Pocket Mouse

The primary importance of the proposed MSHCP to Palm Springs pocket mouse is that it provides Conservation (including Habitat protection, management and monitoring) of the species across nearly all of its entire range. The Plan ensures the long-term conservation of Core Habitat, the associated Essential Ecological Processes, and connectivity between these Habitat areas. In addition, the Conservation Areas provide protection of lands with an array of Habitat variables, including moisture, soil character, elevation, and vegetation, from the northern, eastern, and western limits for this subspecies.

There are 142,539 acres of modeled Habitat for this species within the Plan Area of which approximately 29,848 acres are identified as Core Habitat. The Plan would ensure Conservation of 27,734 acres (93%) of the Core Habitat and 29,279 acres (81%) of the Other Conserved Habitat for Palm Springs pocket mouse. The five conserved Core Habitat areas range in size from 2,503 acres to over 11,000 acres. Approximately 21,251 acres (15%) 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 35,762 acres (25%) of the modeled Habitat for Palm Springs pocket mouse.

Within the Conservation Areas under the worst case scenario, 4,339 acres of Take of modeled Habitat (3%) could occur. There would be approximately 1,993 acres of Core Habitat (7% of all Core Habitat) and 2,346 acres of Other Conserved Habitat (7% of all Other Conserved Habitat) subject to Take Authorization (See Table 9-32 and Table 4-114). Take of pocket mouse Habitat within the Conservation Areas must be consistent with the Conservation Objectives for this species to: 1) ensure Conservation of Core Habitat; 2) protect Essential Ecological Processes needed to maintain pocket mouse Habitat; and 3) maintain Biological Corridors and Linkages among conserved populations to provide for population fluctuation and enhance genetic diversity. 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 the Palm Springs pocket mouse.

Outside of the Conservation Areas, there are 70,808 acres (50%) of modeled Habitat authorized for Take. 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. The potential for pocket mouse populations to persist long-term in these areas is low. 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 more susceptible to edge effects, including mortality on roads and predation by feral animals. Roads and low-density residential Development generally fragment the area near Desert Hot Springs. Modeled Habitat not included in the Conservation Areas in the area east of Highway 62 includes coarser soils although the density of Palm Springs pocket mouse in this area is not known. Other areas outside the Conservation Areas have an unknown density of Palm Springs pocket mouse and were not considered Core Habitat.

The percentage of Palm Springs pocket mouse modeled Habitat that could be subject to Take appears to be substantial, although evaluation of the impacts of Take requires an assessment of the quality of this Habitat. The establishment of Conservation Areas where this species is

protected is a significant improvement over the current situation where only 15% of the Palm Springs pocket mouse modeled Habitat is conserved. The actual reduction in Habitat value is expected to be considerably less than indicated by the raw acreage numbers because:

1. Conserved Habitat areas are large enough to contain self-sustaining populations of pocket mice and incorporate key Habitat elements, including sandy substrates and annual vegetation as forage.
2. Take within the Conservation Areas would not eliminate or substantially impact any core populations. Conservation Objectives require any approved Development within Conservation Areas to ensure protection of Core Habitat.
3. Implementation of the Conservation Objectives to protect Habitat for this species will provide connectivity; the Plan has been carefully crafted to ensure connectivity for the Palm Springs pocket mouse. 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 and Dos Palmas.
4. 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.
5. 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,

The issuance of Take Permits, therefore, will not likely jeopardize the continued existence of Palm Springs pocket mouse and the implementation of the MSHCP will provide for the Conservation of the species.

Measures to Avoid, Minimize, and Mitigate Take of Palm Springs Pocket Mouse

To mitigate the Take of this pocket mouse, the Permittees will protect and manage, in perpetuity, 35,762 acres of the modeled Habitat for this species. The 21,251 acres of modeled Habitat within Existing Conservation Lands will be monitored and managed to ensure that Conservation Objectives are met. The Plan will thus ensure Conservation, through protection and management, of 57,013 acres of Additional Conservation Lands for this species.

The proposed Conservation Areas in the Plan would protect the Core Habitat areas for this pocket mouse from Cabazon to Thousand Palms. This includes 77% of the known occurrences for the Palm Springs pocket mouse. The Plan includes all five of the Core Habitat areas identified by the Planning Team, including the area with the highest known population density for the species, which occurs in the Snow Creek/Windy Point Conservation Area (Dodd, 1996). Other Core Habitat areas to be conserved include the Whitewater Floodplain Conservation Area, Upper Mission Creek/Big Morongo Canyon Conservation Area, and the Thousand Palms Conservation Area. In addition, Other Conserved Habitat from a range of environmental conditions within which this pocket mouse is known to occur will be protected in the following Conservation Areas: Cabazon, Stubbe and Cottonwood Canyons, Whitewater Canyon, Highway 111/I-10, Mission Creek/Morongo Wash, Willow Hole, Edom Hill, Indio Hills/Joshua Tree National Park Linkage,

Indio Hills Palms, East Indio Hills, Joshua Tree National Park, Desert Tortoise and Linkage, Mecca Hills/Orocopia Mountains, Dos Palmas, Coachella Valley Stormwater Channel and Delta, and the Santa Rosa and San Jacinto Mountains. Reserve Design criteria used to establish the Conservation Areas require Conservation of Essential Ecological Processes.

The Conservation Areas benefit this species by securing the long-term sand transport-delivery systems for the Core Habitat and Other Conserved Habitat. At the present time, the sand transport corridors for the Snow Creek area, the Willow Hole area, and for the Thousand Palms Preserve are unprotected. The Conservation Areas will incorporate and protect additional sand source/sand transport areas for Snow Creek/Windy Point, the Whitewater Floodplain Conservation Area, Willow Hole and Flat Top Mountain, and the Thousand Palms Preserve. Potential Linkage areas would be protected between Highway 111 and Interstate 10 near Snow Creek. From Willow Hole east, Habitat that could support this species along the south-facing slopes of Edom Hill would be protected, providing a Linkage with Habitat to the east on the Thousand Palms Preserve. Essential Ecological Processes, including wind corridors and sand sources for the Habitat named above, would be protected under the Plan. Habitat at Dos Palmas would be conserved in the proposed Plan.

Additionally, the Plan calls for Management and Monitoring Programs to ensure the Conservation of this species, including control of activities that degrade pocket mouse Habitat such as OHV trespass, control of invasive species where necessary, development of fire management guidelines where appropriate, and restoration and enhancement of degraded Habitat as necessary according to monitoring results. The Plan also calls for data gathering on the distribution, Habitat parameters, and ecology of the Palm Springs pocket mouse as part of the Monitoring Program.

<u>Overall Impacts to Palm Springs Pocket Mouse under the Plan</u>

Implementation of the Plan will maintain and enhance population viability of the Palm Springs pocket mouse, which currently receives no protection outside of the existing CVFTL Preserve system. Management and monitoring prescriptions will further enhance long-term Conservation of this species.

The Palm Springs pocket mouse will benefit from the establishment of the MSHCP Reserve System which will include Core Habitat in the Snow Creek/Windy Point Conservation Area, Whitewater Floodplain Conservation Area, Upper Mission Creek/Big Morongo Canyon Conservation Area, Willow Hole Conservation Area, and the Thousand Palms Conservation Area. The proposed Conservation Areas in the Plan would protect 93% of the Core Habitat areas for this pocket mouse from Cabazon to Thousand Palms. This includes 77% of the known occurrences for the Palm Springs pocket mouse. Implementation of the Plan is expected to provide for persistence of the Palm Springs pocket mouse 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 Conservation Objectives and measures such as management to minimize OHV impacts in pocket mouse Habitat, monitoring to better understand the distribution and ecology of this species, and long-term protection, management, and enhancement of Palm Springs pocket mouse Habitat is expected to effectively compensate for potential adverse effects to this species.

9.8.3.5 Species Account: Background

Distribution, Abundance, and Trends. The Palm Springs pocket mouse is one of seven subspecies of *Perognathus longimembris*, the "little pocket mouse" that occurs 2 in Southern California. The species is the smallest of the Heteromyidae family that also includes kangaroo rats, kangaroo mice, and spiny pocket mice. The Palm Springs pocket mouse 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). There is no evidence that this subspecies' range is different than what has been described in the past (Dodd 1996), although its Habitat has been greatly reduced by urbanization and agriculture in the Coachella Valley.

The Palm Springs pocket mouse is known to hybridize with the Los Angeles pocket mouse (*P.l. brevinasus*) along its western boundary. Although the extent is not known, hybridization also occurs with other subspecies, including the Jacumba pocket mouse (*P. l. internationalis*) to the south and the little pocket mouse (*P. l. longimembris*) to the north.

Generally, their Habitat is described as having level to gently sloping topography, sparse to moderate vegetative cover, and loosely packed or sandy soils. The species was found broadly distributed in the Plan Area on slopes ranging from 0% to approximately 15% (Dodd 1996). The Plan Area contains the major portion of the range of this species, 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. The species occurs on three existing preserves: the Thousand Palms Preserve, the Whitewater Floodplain Preserve, and the Willow Hole-Edom Hill Preserve/ACEC. It occurs at the highest reported densities for the Plan Area 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 this 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. bangsi* and not *P. longimembris* have not been finalized.

Our understanding of the ecology of the Palm Springs pocket mouse arises largely from the observations of mammalogists studying other species. Pocket mice of the *P. longimembris* 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).

Table 9-33: Results of Live Trapping for Palm Springs Pocket Mouse [1]

LOCATION	Number of Transects/ Trap Nights	Number of *P.l. bangsi* Trapped	Number of Individuals/ Trap Night	Density Estimate [2]
SNOW CREEK/WINDY POINT (1995) ----- SNOW CREEK/WINDY POINT (1999)	7/775 ----- 2/592	75 ----- 40/33	0.10 ----- 0.10/0.17	29.24/acre, 17.56/acre [2] ----- 32.64/acre, 25.3/acre[3]
WHITEWATER FLOODPLAIN PRESERVE (1995)	2/275	11	0.04	NA
W. OF HIGHWAY 62 (1995)	6/1548	8	0.005	14.56/acre
MISSION CREEK (1999)	4/180	30	0.17	NA
WILLOW HOLE – EDOM HILL (1995)	6/1440	18	0.01	(5)
INDIO HILLS TO JOSHUA TREE NATIONAL PARK CORRIDOR (1995)	10/2000	5	0.003	(5)
THOUSAND PALMS PRESERVE (1995)	5/1150	10	0.009	(8) [6.4/acre]
THOUSAND PALMS – TTP SAND SOURCE AREA (1999)	3/180	4	0.02	NA
EAST END INDIO HILLS (1999)	5/435	4	0.009	NA
MARTINEZ CANYON – EAST END OF SANTA ROSA MOUNTAINS (1999)	9/890	0	-	NA
SHAVERS VALLEY – S. OF JOSHUA TREE NATIONAL PARK	6/875	4	0.005	NA
DOS PALMAS	2/1070	2	0.002	NA

[1] Results are from Dodd (1996 and 1999) based on live trapping surveys from March to July 1995 and between 8 April and 28 May 1999.

[2] In 1995, Dodd sampled density plots; *P.l bangsi* numbers were sufficient to calculate density on three of the six density plots (two plots at Snow Creek and one plot W. of Highway 62). Numbers given are shown in number of individuals per acre, converted from number of individuals per hectare reported by Dodd. Numbers in parentheses under Density Estimate are the number of *P.l bangsi captured* where accurate density estimates could not be calculated.

[3] Density estimates (Spencer et al. 2000) are for two trap grids located west of Snow Creek Road and north of Snow Creek Village. The two grids were trapped for eight consecutive nights from 27 July to 3 August 1999 and for two nights on 1 and 2 September 1999. Numbers given are shown in number of individuals per acre, converted from number of individuals per hectare reported by Spencer.

Estimates of home range size are not available for the Palm Springs pocket mouse. In Joshua Tree National Park, home ranges of *P. longimembris* ranged from 38.7 to 84.4 meters (Chew and Butterworth 1964) and densities ranged from 0.85 to 1.74 individuals/ha. In Nevada, home ranges of males 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 ha in early spring to 0.80 ha in late fall. 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. Her live trapping data, which are summarized in Table 9-33 below, indicate that this species is most abundant throughout

the Snow Creek to Windy Point area. She describes the Palm Springs pocket mouse 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/ACEC. Dodd (1996) described the density of this species at Willow Hole as moderate. Additional density estimates were made for the Palm Springs pocket mouse, based on live trapping on two 0.5 ha (1.2 acre) grids located west of Snow Creek Road, approximately ½-mile north of Snow Creek Village in the Snow Creek area (Spencer et al. 2000). The minimum density was 32.6 individuals per acre (81.6 individuals/ha) and 25.3 individuals per acre (63.3 individuals/ha), on two adjacent grids.

Associated Covered Species. This species is generally associated with sandy soils. The Palm Springs pocket mouse is a near-endemic to the Plan Area; the type locality for the species is from Palm Springs (Mearns 1898). It does, however, occur in the vicinity of Borrego Springs and on the east side of the San Felipe Narrows (Hall 1981), which are not within the Plan Area. Other target species whose Habitat overlaps with that of the Palm Springs pocket mouse include the flat-tailed horned lizard, Coachella Valley round-tailed ground squirrel, Coachella Valley giant sand-treader cricket, Coachella Valley milkvetch, Coachella Valley Jerusalem cricket, Coachella Valley fringe-toed lizard, and the burrowing owl.

9.8.4 Peninsular Bighorn Sheep *Ovis canadensis nelsoni*

Status	**Federal:**	**Endangered**
	State:	**Threatened**

9.8.4.1 Species Conservation Goals and Objectives

Conserve and manage populations within the MSHCP Reserve System according to the following criteria:

Goal 1: Ensure species persistence in the Plan area by securing Essential Habitat, and associated Essential Ecological Processes, allowing evolutionary processes and natural population fluctuations to occur. Minimize fragmentation, human-caused disturbance, and edge effects to Core Habitat by conserving contiguous Habitat patches and effective Linkages between patches of Core Habitat.

Objective 1a. Ensure conservation of Essential Habitat, from a range of environmental conditions within which this bighorn sheep is known to occur, to provide for population fluctuation and genetic diversity, within the following Conservation Areas:

- Cabazon Conservation Area
- Snow Creek/Windy Point Conservation Area
- Santa Rosa and San Jacinto Mountains Conservation Area

Please refer to Section 4.3 and Table 9-34 for specific acreages to be protected by this Conservation Objective.

Objective 1b. Ensure implementation of avoidance, minimization, and mitigation measures as described in Section 4.4, and Land Use Adjacency Guidelines as described in Section 4.5.

Objective 1c. Ensure that implementation of the MSHCP is consistent with the recovery strategy delineated in the Recovery Plan for Bighorn Sheep in the Peninsular Ranges, California (USFWS 2000).

Objective 1d. Ensure that any Development allowed does not fragment Essential Habitat, and that edge effects from such Development are minimized.

Goal 2: Maintain connectivity by preventing Habitat fragmentation within and between the four recovery regions within Essential Habitat areas to allow dispersal and movement of bighorn sheep.

Objective 2. Include Habitat Linkages and Biological Corridors within Essential Habitat areas to allow dispersal and movement of bighorn sheep.

Goal 3: Ensure conservation of the Peninsular bighorn sheep 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.

Objective 3: Implement monitoring and Adaptive Management actions to ensure self-sustaining populations within each Core Habitat area

Table 9-34: Summary of Habitat within Conservation Areas Peninsular Bighorn Sheep

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	264	(181)[1]	0	83	83	Essential Habitat
Snow Creek/Windy Point	705	65	53	587	640	Essential Habitat
Santa Rosa & San Jacinto Mtns. - All Recovery Zones	168,935	3,802	135,577	29,556	165,133	Essential Habitat
Total	*169,904*	*3,867 (181)*	*135,630*	*30,226*	*165,856*	Essential Habitat

[1] There are 181 acres in the fluvial sand transport Essential Ecological Process area, where the only Conservation Objective is to maintain fluvial sand transport.

9.8.4.2 Threats, Limiting Factors, and Adaptive Management

The Peninsular bighorn sheep is endangered because of the loss and fragmentation of Habitat, disease, and predation. A limiting factor is that the sheep live in a narrow band of Habitat in which they must find the resources needed to survive in a harsh desert environment. This band of Habitat is at the lower elevations of the Peninsular Ranges and includes canyon bottoms, alluvial fans, and mountain slopes. Within the narrow band of Habitat, bighorn sheep need to be able to move daily, seasonally, and annually to make use of the sparse and sometimes sporadically available resources found within their home ranges. Habitat loss is considered to be one of the greatest threats to this bighorn sheep's continued existence. As humans encroach into the Habitat, the resources, and the survival potential of a particular ewe group that depends on them, may be eliminated. Habitat loss can impact the sheep's ability to forage, reproduce, find water, avoid predators, and move among important resource areas and between ewe groups. Habitat fragmentation is recognized as a major threat to Peninsular bighorn sheep because of the dual effect of restricting animals to a smaller area and severing connections between ewe groups, thus creating genetic isolation. Roads and human use of an area can create Habitat fragmentation. Habitat modification in bighorn Habitat, such as constructing golf courses and residences that attract sheep, creates threats that place sheep at risk of collisions with vehicles, poisoning by toxic landscape plants, entanglement in wire fences, harassment by dogs, and exposure to pathogens and chemicals such as herbicides and insecticides. Disease and predation, particularly by mountain lions, are also significant threats. The most impacted portions of Peninsular bighorn sheep Habitat have been alluvial fans and canyon mouths. Protection of remaining alluvial fans and canyon

mouths in the species' Habitat is, therefore, of the highest importance. Many actions needed for the recovery of the species are beyond the scope of this Plan; however, the Plan needs to be consistent with the recovery plan where elements overlap.

A public use and trails plan is needed to provide for trail use in bighorn sheep Habitat that is compatible with bighorn sheep Conservation Goals and that affords a reasonable level of use to the public. Allowable trail uses are described in Section 7.3.3.2 and the full Trails Plan is found in Section 2 of the EIR/EIS.

The following actions may be needed to ensure species persistence and long-term viability if biological monitoring indicates that such actions are warranted. This list is not comprehensive but identifies some of the known or likely threats to bighorn sheep. More detailed and specific information on the biological monitoring and management actions described here and proposed for this species can be found in Section 8.0, MSHCP Reserve System Management and Monitoring Program. Some of these actions may include:

1. Protect Essential Habitat for the Peninsular bighorn sheep as delineated in the final *Recovery Plan for Bighorn Sheep in the Peninsular Ranges, California* (USFWS 2000).
2. Control and manage activities that degrade Peninsular bighorn sheep Essential Habitat within the Conservation area. This could include human disturbance, Habitat fragmentation, and edge effects.
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 the bighorn sheep or to its Habitat. Tamarisk is an identified threat to this species' Habitat and a control program is underway.
4. Limit human access to lambing areas from January 15 to June 30 and from water source areas from July 1 to September 30.
5. Restore and enhance degraded Habitat as necessary according to monitoring results.
6. Where necessary, develop fire management guidelines within conserved areas to protect populations from fires and disturbances associated with fire suppression. Fire management is primarily an issue in the western, more mesic, portion of the Plan area where alien annual grasses may facilitate the spread of fire.

9.8.4.3 Species Conservation Analysis

Conservation Area Reserve Design. The Habitat of the Peninsular bighorn sheep occurs in a continuous band at the lower elevations of the San Jacinto and Santa Rosa Mountains in the Plan area. In order to meet the Conservation Objectives for Peninsular bighorn sheep in the MSHCP Reserve System, special measures are required to ensure protection of Essential Habitat. These measures are described in detail in Section 4.3.21 on the Santa Rosa and San Jacinto Mountains Conservation Area and are summarized below in Section 9.8.4.4.

The species distribution map shows the final Peninsular bighorn sheep Essential Habitat boundary as presented in the *Recovery Plan for Bighorn Sheep in the Peninsular Ranges, California* (USFWS 2000). This final Essential Habitat boundary was made available to the GIS team in November 2000. The boundary for the Santa Rosa and San Jacinto Mountains

Conservation Area is concurrent with the Essential Habitat line, with a few exceptions. See Section 4.3.21 for details about Conservation and Take areas (in the form of Habitat loss) in the Santa Rosa and San Jacinto Mountains Conservation Area, which contains the vast majority of Peninsular bighorn sheep Habitat.

Table 9-34 identifies the amount of Essential bighorn sheep Habitat that will be conserved in the Cabazon, Snow Creek/Windy Point, and Santa Rosa and San Jacinto Mountains Conservation Areas.

9.8.4.4 Analysis: Impacts of Disturbance

Significance of the Plan Area to Peninsular Bighorn Sheep

The Peninsular bighorn sheep is restricted to the lower, east-facing desert slopes of the Peninsular Ranges in southern California and Mexico. The Peninsular Ranges extend from the San Jacinto Mountains south to the Jacumba Mountains near the California border, and south into Mexico, forming the backbone of Baja California. Bighorn sheep inhabit the eastern slopes of the Peninsular Ranges in Habitat characterized by steep slopes and cliffs, rugged canyons, washes, and alluvial fans. Current taxonomy places the Peninsular bighorn sheep in the Nelson subspecies (*Ovis canadensis nelsoni).* The bighorn sheep occupying the Peninsular Ranges of southern California are listed as a distinct vertebrate population segment.

The Plan Area includes four of the eight subpopulations, or ewe groups, of the Peninsular bighorn sheep metapopulation. The ewe groups are designated by the area in which they occur. The four ewe groups in the Plan Area are the San Jacinto Mountains group, the northern Santa Rosa Mountains (northwest of Highway 74) group, the Deep Canyon group (southeast of Highway 74 through Martinez Canyon), and the southern Santa Rosa Mountains group (south of Martinez Canyon). The territories of these ewe groups are the basis for the four recovery regions delineated in the Recovery Plan and illustrated in Figure 4-26e.

Essential Habitat for Peninsular bighorn sheep is present in three of the Conservation Areas within the Plan Area. These Conservation Areas are Cabazon, Snow Creek/Windy Point and Santa Rosa and San Jacinto Mountains.

Effects of Disturbance on the Peninsular Bighorn Sheep

The primary importance of the proposed MSHCP Reserve System to Peninsular bighorn sheep is that it provides Conservation (including Habitat protection, management and monitoring) of the species across a substantial portion of its range. The Plan ensures the long-term conservation of Essential Habitat and connectivity between these Habitat areas. In addition, the Conservation Areas provide protection of lands with an array of Habitat variables, including lamb rearing Habitat, escape terrain, access to water, and foraging areas for Peninsular bighorn sheep.

There are 172,811 acres of modeled Essential Habitat for this species within the Plan Area as described in the *Recovery Plan for Bighorn Sheep in the Peninsular Ranges, California* (USFWS 2000). Core Habitat was not designated for this species. The Plan would ensure Conservation of 165,856 (97%) of the Essential Habitat for Peninsular bighorn sheep. Approximately 135,630 acres (78%) of the Essential Habitat are within Existing Conservation

Lands and would be managed as part of the Reserve System. The Plan would conserve an additional 30,226 acres (19%) of the Essential Habitat for Peninsular bighorn sheep.

Within the Conservation Areas under the worst case scenario, 3,867 acres of disturbance of Essential Habitat (1%) could occur (See Table 9-34 and Table 4-114). Disturbance of bighorn sheep Essential Habitat within the Conservation Areas must be consistent with the Conservation Objectives for this species to: 1) ensure Conservation of Essential Habitat; 2) ensure connectivity by preventing fragmentation and maintaining Biological Corridors and Linkages within Essential Habitat to allow dispersal, provide for population fluctuation, and enhance genetic diversity; and 3) ensure Conservation of Habitat quality through biological monitoring and Adaptive Management. So, although some disturbance 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 the Peninsular bighorn sheep.

Outside of the Conservation Areas, there are 2,666 acres (1%) of Essential Habitat authorized for disturbance. This Habitat occurs on lands previously approved for Development through specific plans that are still in effect. The Development potential for private lands in the mountainous Habitat is limited by terrain, availability of utilities, road access and environmental considerations, including impacts to bighorn sheep.

The establishment of Conservation Areas where Peninsular bighorn sheep is protected is a significant improvement over the current situation as coordinated protection, a Management Program, and a Monitoring Program will be implemented for bighorn sheep Essential Habitat. The actual impacts of disturbance to this species are expected to be low because:

1. Conserved Essential Habitat areas are large enough to contain self-sustaining subpopulations of a larger metapopulation of bighorn sheep and incorporate key Habitat elements, including lamb rearing Habitat, access to water, escape terrain, and foraging areas.
2. Implementation of the MSHCP is consistent with the recovery strategy delineated in the *Recovery Plan for Bighorn Sheep in the Peninsular Ranges, California* (USFWS 2000).
3. Implementation of the Conservation Objectives to protect Habitat for this species will provide connectivity; the Plan has been carefully crafted to ensure connectivity for the Peninsular bighorn sheep. 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 throughout the San Jacinto and Santa Rosa Mountains and south to the remainder of the Peninsular Ranges outside the Plan Area.
4. Lands in the MSHCP Reserve System would be managed and monitored to address significant edge effect problems, human disturbance, fragmentation, potential impacts to Habitat from introduction of exotic species, and other stressors to bighorn sheep.

The issuance of Permits, therefore, will not likely jeopardize the continued existence of Peninsular bighorn sheep and the implementation of the MSHCP will provide for the Conservation of the species.

<u>Measures to Avoid, Minimize, and Mitigate Disturbance of Peninsular Bighorn Sheep</u>

To mitigate the Disturbance to Peninsular bighorn sheep, the Permittees will protect and manage, in perpetuity, 30,226 acres of Essential Habitat for this species. The 134,819 acres of Essential Habitat within Existing Conservation Lands will be monitored and managed to ensure that Conservation Objectives are met. The Plan will thus ensure Conservation, through protection and management, of 165,856 acres of Essential bighorn sheep Habitat.

The proposed Conservation Areas in the Plan would protect the Core Habitat areas for bighorn sheep from Cabazon to Snow Creek and throughout the San Jacinto and Santa Rosa Mountains. This includes 97% of the Essential Habitat for Peninsular bighorn sheep.

To minimize the impacts to bighorn sheep Essential Habitat, Required Measures and special provisions apply, within a zone generally defined as within 0.5 mile of the urban interface, the lower boundary of the Santa Rosa and San Jacinto Mountains Conservation Area. The exclusions from this zone are areas where lambing or water sources intersect that area (see Figures 4.27e(1) through 4.27e(4)). Within this half-mile zone, each of four recovery regions are delineated for each of the four ewe groups as identified in the *Recovery Plan for Bighorn Sheep of the Peninsular Ranges, California* (USFWS 2000). Within these recovery regions, conservation measures apply in five types of areas, described in detail in Section 4.3.21. Special provisions apply to some areas within the Santa Rosa and San Jacinto Mountains Conservation Area, including west of Chino Canyon, in Palm Hills, along Highway 74, and near the mouth of Martinez Canyon. Some areas would require a Minor Amendment and specific criteria to be met. Other areas would require the use of the HANS process or a Major Amendment to be processed before Development could occur (see Section 6.5.2). For additional discussion of the Required Measures with regard to special provisions, HANS, and Minor/Major Amendments see Section 4.3.21.

Avoidance, minimization, and mitigation measures (See Section 4.4) would be required for any approved disturbance within Essential bighorn sheep Habitat in the Conservation Areas. Construction of Covered Activities in Peninsular bighorn sheep Habitat in the Cabazon, Snow Creek/Windy Point, and Santa Rosa and San Jacinto Mountains Conservation Areas would be conducted outside of the January 1 to June 30 lambing season unless otherwise authorized through a Minor Amendment to the Plan with concurrence from the Wildlife Agencies. Operation and maintenance of Covered Activities, including but not limited to refinishing the inside of water storage tanks, may occur during the January 1 to June 30 period if necessary. These measures also address the threat of toxic or invasive plant species in or adjacent to bighorn sheep Habitat. 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, the Permittees will develop and implement a plan to remove or prevent access to toxic plants by Peninsular bighorn sheep.

To minimize the potential for disturbance to bighorn sheep as a result of trail use, a Santa Rosa and San Jacinto Mountains Trails Plan (Trails Plan) was developed as a Compatible Activity within the Santa Rosa and San Jacinto Mountains Conservation Area. Implementation of this Trails Plan (see Section 7.3.3.2 of the Plan and Sections 2.0 and 5.0 of the EIR/EIS) would minimize the risk of potential adverse impacts to bighorn sheep from recreational activities, consistent with the Conservation Objectives.

Additionally, the Plan calls for Management and Monitoring Programs to ensure the Conservation of this species, including control of activities that degrade Peninsular bighorn sheep

Essential Habitat. This will include control of invasive species where necessary (tamarisk is already being removed from Essential Habitat areas), development of fire management guidelines where appropriate, and restoration and enhancement of degraded Habitat as necessary according to monitoring results.

Bighorn sheep are a California Fully Protected Species. All Covered Activities of the Plan must avoid actions that would result in violation of Section 4700 of the Fish and Game Code that addresses Fully Protected Species. In Essential bighorn sheep Habitat, the Habitat must be avoided or measures approved by the Wildlife Agencies taken to ensure that no take of an individual occurs, other than projects where Fish and Game Code Section 2081.7 is applicable.

Overall Impacts to Peninsular Bighorn Sheep under the Plan

Implementation of the Plan will maintain and enhance population viability of the Peninsular bighorn sheep by acquiring Essential Habitat and helping to implement the Recovery Plan. The Plan is neither the same as nor a substitute for the Recovery Plan for the Peninsular bighorn sheep. The goals of the Plan for the Peninsular bighorn sheep are consistent with the Recovery Plan.

The Peninsular bighorn sheep will benefit from the establishment of the MSHCP Reserve System which will include Essential Habitat in the Cabazon Conservation Area, Snow Creek/Windy Point Conservation Area, and Santa Rosa and San Jacinto Mountains Conservation Area. The proposed Conservation Areas in the Plan would protect 97% of the Essential Habitat for Peninsular bighorn sheep within the Plan Area. Implementation of the Plan is expected to provide for long-term Conservation of the Peninsular bighorn sheep 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 Conservation Objectives and measures such as management to minimize disturbance in bighorn sheep Habitat, monitoring to better understand the distribution and ecology of this species, and long-term protection, management, and enhancement of Peninsular bighorn sheep Habitat is expected to effectively compensate for potential adverse effects to this species.

9.8.4.5 Species Account: Background

Distribution, Abundance, and Trends. The Peninsular bighorn sheep is restricted to the east-facing, lower elevation slopes (below 1,400 meters) of the Peninsular Ranges in the Sonoran desert life zone. Range-wide estimates of abundance for the U.S. population, from the San Jacinto Mountains to the Mexican border, began in the 1970s. The highest population estimate was 1,171 in 1974 (Weaver 1975). Surveys in the 1970s, 1980s, and 1990s indicate that significant declines have occurred in multiple ewe groups. The synergistic effects from Habitat loss, disease, human disturbance, and predation are believed to have caused the decline. The 1998 range-wide population was estimated to be 334 animals (excluding lambs). Approximately half of these were in the Plan area in four subpopulations, or ewe groups. The San Jacinto (Recovery Region 1) and Northern Santa Rosa (Recovery Region 2) ewe groups have the smallest populations, excluding lambs. These two groups are especially vulnerable. Table 9-35 provides adult population estimates for bighorn sheep in the four recovery regions within the Plan Area, from 1996 to 2004; data for the 2005 year were not yet available.

Table 9-35: Adult Population Estimates for Peninsular Bighorn Sheep Ewe Groups and Subgroups 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
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.

The breeding behavior of bighorn sheep is described as polygynous, in that males mate with more than one female. Females typically produce one offspring per year after they reach sexual maturity at approximately two years of age. Males typically live 10 to 12 years and females live 12 to 14 years (Ostermann 2001).

Bighorn sheep in the Peninsular Ranges range from the lower elevations of desert mountain slopes and canyons from the valley floor up to approximately 4,500 feet (Jorgensen and Turner 1975, USFWS 2000). In contrast to most mountain sheep, Peninsular Ranges bighorn sheep tend to favor the lower elevation habitat which makes them particularly vulnerable to habitat loss and human disturbance (Ostermann 2001).

The Essential Habitat for bighorn sheep in the northern portion of the Peninsular Ranges which is within the Plan Area borders the rapidly urbanizing Coachella Valley area. Urban encroachment into alluvial fans, bajadas, and canyons within Peninsular bighorn sheep habitat in the San Jacinto and northern Santa Rosa Mountains began in the 1950s and continues today (Ostermann 2001). DeForge and Scott (1982) described the situation of bighorn sheep using urban areas during the hot summer months in the mid-1950s. Urbanization was considered the leading cause of mortality for Peninsular bighorn sheep from 1991 to 1996 (Bighorn Institute 1999). Until very recently, disease has not been considered a limiting factor for bighorn sheep in the Peninsular Ranges outside the Northern Santa Rosa Mountains ewe group (USFWS 2000). In other portions of the Santa Rosa Mountains recruitment has been relatively high (Rubin et al. 2000).

Bighorn sheep in the Peninsular Ranges were listed as threatened by the State of California in 1971 and endangered by the U.S. Fish and Wildlife Service in 1998 (USFWS 1998).Among the reasons hypothesized as contributing to the decline in PBS populations since the 1970s are habitat loss and fragmentation, disease, drought, population declines potentially resulting from low recruitment, and high predation rates (Wehausen et al. 1987, USFWS 2000, Ostermann 2001). Urban development and low adult survivorship are considered among the greatest threats to the metapopulation (USFWS 1999).

More recently, the number of adult bighorn sheep in the four recovery regions within the Plan Area has shown a stable or positive trend, as shown in Table 9-35. Recovery Regions 3 and 4 in particular show a more positive trend in population numbers since 1996. The San Jacinto population in Recovery Region 1 increased slightly and appears to be stable during this period. Ongoing monitoring of bighorn sheep populations will continue to monitor the status of these ewe groups.

Associated Covered Species. Other species of concern which occur in the same general area as bighorn sheep include gray vireo, desert tortoise, and the riparian bird species.

INTENTIONALLY LEFT BLANK