10.0 Natural Community Accounts and Conservation Measures

10.1 General Conservation Approach for Natural Communities

This section outlines the overall Conservation approach for all natural communities proposed for inclusion in the Plan. The implementation of this Conservation approach is described in Section 4.0 for protection-related activities, including acquisition, and in Section 8.0 for management-related activities. Section 4.3 subsections on each Conservation Area contain specific Conservation Objectives for natural communities. Additional information and the complete Conservation strategy for each natural community are found here.

These natural communities provide the Habitats for the species to be covered under the Plan. Conservation of these natural communities also includes Conservation of the rich biological diversity of the Plan Area on an ecosystem-wide basis, consistent with the NCCP goals provided by CDFG.

10.1.1 Conservation: Acquisition and Related Protection Actions

The following Conservation approaches involve acquisition and other protection actions that will be applied to achieve Conservation of all natural communities.

1. Conserve, restore, and manage representative stands of each natural community in one or more Conservation Areas. The maximum number of available natural community stands is delineated for Conservation wherever feasible. Table 10-1 shows the Conservation Areas where each natural community is conserved and identifies the number of acres conserved.
2. Conserve natural community occurrences representative of the range of environmental conditions within which the community is known to occur. Incorporate a range of environmental gradients (e.g. slope, elevation, aspect) and high Habitat diversity.
3. Protect Essential Ecological Processes that sustain natural communities. Essential Ecological Processes, including the sand source areas and sand transport systems, hydrological systems, including watershed features and flooding regimes, and fire regimes will be conserved.

10.1.2 Conservation: Adaptive Management Actions

1. Implement Management and Monitoring Programs to contribute to maintenance of natural communities within Conservation Areas. Additional research on natural community composition, ecology, and dynamics may be included in these actions.
2. Restore and enhance degraded natural communities, using native species only, as necessary according to monitoring results.
3. Identify activities, and any restrictions on those activities, allowed within Conservation Areas that are compatible with the Conservation of species, Habitats, and natural communities, and their associated ecological functions.
4. Control threats, which may include Habitat fragmentation, invasive plant and animal species, alteration of ecological processes, including hydrological regimes and sand transport, OHV use, and edge effects.

10.1.3 Summary of Natural Communities Conserved in Conservation Areas

The following Table 10-1 provides a summary of the occurrence of each natural community within each Conservation Area. The number of acres of each natural community to be conserved according to the Conservation Objectives is also shown. This table is intended to provide an overview of the natural communities to be conserved within each Conservation Area.

10.2 Natural Community Conservation Strategies: Sand Dunes and Sand Fields

This section contains a natural community Conservation strategy and a natural community account, including characteristics, typical species, and significant threats, for each of the seven sand-affiliated natural communities proposed for coverage in the Plan. General Conservation measures, which are common to all these sand dune and sand field types, are listed below.

1. Conserve the sand source/transport systems to ensure sustainability of the sand dunes and sand fields. Maintain and enhance aeolian (wind-blown) and fluvial (water-borne) sand transport systems and existing hydrological regimes.
2. Control disturbance and compaction of sand dunes and sand fields.
3. Avoid stabilization of sand dunes due to spread of non-native plant species and effects from adjacent Development.

Table 10-1a: Natural Communities to Be Conserved in Conservation Areas

Natural Community	*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 to be conserved within each Conservation Area based on Conservation Objectives									
Active desert dunes	◇	◇	62	◇	◇	◇	◇	◇	◇	◇
Stabilized and partially stabilized desert dunes	◇	◇	◇	◇	◇	◇	◇	348	◇	◇
Active desert sand fields	◇	◇	◇	◇	◇	436	◇	33	◇	69
Ephemeral desert sand fields	◇	◇	1,035	◇	◇	2,821	◇	1,032	◇	◇
Stabilized and partially stabilized desert sand fields	◇	◇	147	◇	◇	537	◇	181	◇	28
Stabilized shielded desert sand fields	◇	◇	◇	◇	◇	◆	◇	◇	◇	◇
Mesquite hummocks	12	◇	◇	◇	◇	◇	◇	114	◇	◇
Sonoran creosote bush scrub	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Sonoran mixed woody and succulent scrub	◇	◆	◇	◆	◇	◆	◆	◆	◆	◆
Mojave mixed woody scrub	◇	◇	◇	◇	◇	◇	◆	◇	◇	◇
Desert saltbush scrub	◇	◇	◇	◇	◇	◇	◇	152	◇	◇
Desert sink scrub	◇	◇	◇	◇	◇	◇	◇	◇	◇	◇
Chamise chaparral	◆	◆	◇	◆	◇	◇	◇	◇	◇	◇
Redshank chaparral	◇	◇	◇	◇	◇	◇	◇	◇	◇	◇

Table 10-1a (cont.)

Natural Community	*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 to be conserved within each Conservation Area based on Conservation Objectives									
Semi-desert chaparral	◆	◆	◆	◆	◇	◇	◇	◇	◇	◇
Interior live oak Chaparral	◆	◆	◇	◆	◇	◇	◇	◇	◇	◇
Cismontane alkali marsh	◇	◇	◇	◇	◇	◇	◇	◇	◇	◇
Coastal and valley Freshwater marsh	◇	◇	◇	◇	◇	◇	◇	◇	◇	◇
Southern arroyo willow riparian forest	◆	◇	◇	◇	◇	◇	◇	◇	◇	◇
Sonoran cottonwood-willow riparian forest	◇	267	◇	166	◇	◇	100	◇	◇	◇
Mesquite bosque	◇	◇	◇	◇	◇	◇	◇	◇	◇	◇
Desert dry wash Woodland	◇	263	◇	◇	◇	◇	263	◇	◇	◇
Desert fan palm oasis woodland	◇	◇	◇	1	◇	◇	◇	1	◇	◇
Southern sycamore-alder riparian woodland	◆	◇	◇	◇	◇	◇	104	◇	◇	◇
Arrowweed Scrub	◇	◇	◇	◇	◇	◇	◇	◇	◇	◇
Mojavean pinyon-juniper woodland	◇	◇	◇	◇	◇	◇	◆	◇	◇	◇
Peninsular juniper woodland and scrub	◇	◇	◇	◇	◇	◇	◇	◇	◇	◇

Table 10-1b: Natural Communities Protected in Conservation Areas

Natural Community	*Thousand Palms*	*West Deception Canyon*	*Indio Hills/ Joshua Tree National Park Linkage*	*Indio Hills Palms*	*East Indio Hills*	*Joshua Tree Nat'l Park*	*Desert Tortoise Linkage*	*Mecca Hills/ Orocopia Mountains*	*Dos Palmas*	*Coachella Valley Stormwater Channel and Delta*	*Santa Rosa and San Jacinto Mountains*
	Acres to be conserved within each Conservation Area based on Conservation Objectives										
Active desert dunes	419	◇	◇	◇	4	◇	◇	◇	◇	◇	◆
Stabilized and partially stabilized desert dunes	◇	◇	◇	◇	◇	◇	◇	◇	◇	◇	◇
Active desert sand fields	3,452	◇	◇	◇	◇	◇	◇	◇	◇	◇	◇
Ephemeral desert sand fields	◇	◇	◇	◇	◇	◇	◇	◇	◇	◇	◆
Stabilized and partially stabilized desert sand fields	◇	◇	◇	◇	298	◇	◇	◇	◇	◇	◆
Stabilized shielded desert sand fields	◇	◇	◇	◇	476	◇	◇	◇	◇	◇	◆
Mesquite hummocks	58	◇	◇	2	39	◇	◇	◇	52	67	◆
Sonoran creosote bush scrub	◆	◆	◆	◆	◆	◆	◆	◆	◆	◇	◆
Sonoran mixed woody and succulent scrub	◆	◇	◇	◆	◆	◇	◆	◇	◇	◇	◆
Mojave mixed woody scrub	◇	◆	◆	◇	◇	56,299	◆	◇	◇	◇	◇
Desert saltbush scrub	◇	◇	◇	◇	7	◇	◇	◇	◇	642	◇
Desert sink scrub	◇	◇	◇	◇	◇	◇	◇	◇	6,708	1,106	◇

Table 10-1b (cont.)

Natural Community	*Thousand Palms*	*West Deception Canyon*	*Indio Hills/ Joshua Tree Nat'l Park Linkage*	*Indio Hills Palms*	*East Indio Hills*	*Joshua Tree Nat'l Park*	*Desert Tortoise Linkage*	*Mecca Hills/ Orocopia Mountains*	*Dos Palmas*	*Coachella Valley Stormwater Channel and Delta*	*Santa Rosa and San Jacinto Mountains*
	Acres to be conserved within each Conservation Area based on Conservation Objectives										
Chamise chaparral	◇	◇	◇	◇	◇	◇	◇	◇	◇	◇	◇
Redshank chaparral	◇	◇	◇	◇	◇	◇	◇	◇	◇	◇	12,261
Semi-desert chaparral	◇	◇	◇	◇	◇	◇	◇	◇	◇	◇	17,318
Interior live oak Chaparral	◇	◇	◇	◇	◇	◇	◇	◇	◇	◇	◆
Cismontane alkali marsh	◇	◇	◇	◇	◇	◇	◇	◇	321	◇	◇
Coastal and valley freshwater marsh	◇	◇	◇	◇	◇	◇	◇	◇	◇	55	◇
Southern arroyo willow riparian forest	◇	◇	◇	◇	◇	◇	◇	◇	◇	◇	32
Sonoran cottonwood-willow riparian forest	4	◇	◇	◇	◇	◇	◇	◇	◇	◆	58
Mesquite bosque	◇	◇	◇	◇	◇	◇	◇	◇	446	◇	◇
Desert dry wash Woodland	744	◇	◇	75	◇	2,182	12,800	8,999	1,773	◇	3,635

Table 10-1b (cont.)

Natural Community	*Thousand Palms*	*West Deception Canyon*	*Indio Hills/ Joshua Tree Nat'l Park Linkage*	*Indio Hills Palms*	*East Indio Hills*	*Joshua Tree Nat'l Park*	*Desert Tortoise Linkage*	*Mecca Hills/ Orocopia Mountains*	*Dos Palmas*	*Coachella Valley Stormwater Channel and Delta*	*Santa Rosa and San Jacinto Mountains*
	Acres to be conserved within each Conservation Area based on Conservation Objectives										
Desert fan palm oasis woodland	137	◇	◇	88	◇	5	◇	1	119	◇	880
Southern sycamore-alder riparian woodland	◇	◇	◇	◇	◇	◇	◇	◇	◇	◇	548
Arrowweed scrub	◇	◇	◇	◇	◇	◇	◇	◇	277	◇	◇
Mojavean pinyon-juniper woodland	◇	◇	◇	◇	◇	30,519	◇	◇	◇	◇	◇
Peninsular juniper woodland and scrub	◇	◇	◇	◇	◇	◇	◇	◇	◇	◇	36,458

◆ = Natural community present in this Conservation Area but with no specific Conservation Objective; natural community conserved by virtue of Conservation Objectives for ecological process areas, Biological Corridors, or Core Habitat for Covered Species

◇ = Natural community not present in this Conservation Area.

10.2.1 Active Desert Dunes

10.2.1.1 Natural Community Conservation Goals and Objectives

Conserve and manage occurrences of this natural community within the MSHCP Reserve System according to the following criteria:

Goal 1: Conserve natural community occurrences representative of the range of environmental conditions within which the community is known to occur. Incorporate a range of environmental gradients (e.g. slope, elevation, aspect) and high Habitat diversity.

Objective 1. Ensure Conservation of this natural community within the following Conservation Areas:

- Snow Creek/Windy Point Conservation Area
- Thousand Palms Conservation Area
- East Indio Hills Conservation Area

Please refer to Section 4.3 and Table 10-2 for specific acreages to be protected by this Conservation Objective.

Table 10-2: Summary of Natural Community within Conservation Areas: Active Desert Dunes

CONSERVATION AREA	*Land within the Conservation Areas*				
	Total Acres of Natural Community in Conservation Area	*Total Acres Subject to Impacts*	*Acres within Existing Conservation Lands*	*Remaining Acres to be Conserved*	*Total Acres to be Conserved in MSHCP Reserve System*
SNOW CREEK/ WINDY POINT	69	7	0	62	62
THOUSAND PALMS	421	2	405	14	419
EAST INDIO HILLS	5	1	0	4	4
SANTA ROSA & SAN JACINTO MTNS	57	6	0	51	51
TOTAL	**552**	**16**	**405**	**131**	**536**

Goal 2: Protect Essential Ecological Processes, including sand source/transport systems, necessary to maintain this natural community.

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

Goal 3: Ensure Conservation of Habitat quality through protection, monitoring and Adaptive Management, and restoration where necessary, to contribute to maintenance of this community within Conservation Areas.

Objective 3. Implement Monitoring Program and Adaptive Management actions to ensure Conservation of this natural community.

10.2.1.2 Threats, Limiting Factors, and Adaptive Management

Threats to this natural community include interruption of Essential Ecological Processes, notably the sand source and sand transport system by barriers, including roads, buildings, and vegetation. Fragmentation of active desert dunes by roads results in alteration to these ecological processes and may increase the likelihood of invasive plant species becoming established. Active desert dunes may also be threatened by invasive non-native plants that can stabilize sand. Other stressors to this natural community may come as a result of natural phenomena. Periods of above average rainfall promote the growth of plants that ultimately stabilize the dunes. At the opposite end of the spectrum, a prolonged drought period without large storm events results in a decline in the delivery of sand to the active dune areas. The effects of these natural stressors will ultimately be reversed as periods of below average rainfall or large storm events occur. Nevertheless, these natural stressors will impact the species that inhabit active desert dunes.

The following actions may be needed to ensure persistence of active desert dunes 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 natural community. In addition to conserving the active desert dunes natural community, the Plan will integrate monitoring and Adaptive Management actions into the Management and Monitoring Programs for this natural community. Monitoring Programs will be designed to provide feedback so that management activities can be adjusted to maximize natural community Conservation. More detailed and specific information on the biological monitoring and management actions described here and proposed for this natural community can be found in Section 8.0, MSHCP Reserve Management and Monitoring Program. Actions may include:

1. Control and manage activities that degrade active desert dunes. In particular, control and manage the primary threats to the sand community, including OHVs and factors (including

invasive plants) that contribute to the loss or stabilization of active dunes.

2. Identify actions to reduce impacts from, and control where feasible, invasive species if it is determined from monitoring results that there are impacts to the active desert dune community.
3. Implement monitoring to track, and ultimately distinguish between, changes due to human or natural causes. Significant variables may include sand compaction, native ant numbers, live perennial shrub abundance, and invasive exotic plant abundance.
4. Restore and enhance degraded active desert dunes as necessary according to results from biological monitoring.

10.2.1.3 Natural Community Conservation Analysis

Conservation Area Configuration Issues. The Conservation Areas in the MSHCP Reserve System include occurrences of active desert dunes judged by the Planning Team to be likely to persist long-term. This determination was based on the presence of a relatively intact natural community, the absence of fragmentation impacts, and the presence of intact Essential Ecological Processes necessary to maintain this community. To the extent they occur, contiguous stands of this natural community were selected when available. Also, to the extent possible, the Planning Team attempted to include a range of environmental gradients (e.g. slope, elevation, aspect) within which this natural community occurs. Natural disturbance from aeolian and fluvial processes (wind and flooding) are essential to the long-term maintenance of this natural community. The Conservation Areas accomplish this goal by securing the long-term sand transport-delivery systems that are Essential Ecological Processes for active desert dunes.

The occurrence of active desert dunes is limited within the Plan Area to three Conservation Areas, Snow Creek/Windy Point, Thousand Palms, and East Indio Hills. At the present time, the sand transport corridors for the Snow Creek area and for the Thousand Palms Preserve are unprotected; the MSHCP Reserve System would protect these areas. The presence of active desert dunes within each of the Conservation Areas is shown in Table 10-2. The Planning Team identified and assessed the sufficiency for this natural community in the following Conservation Areas:

1. ***Snow Creek/Windy Point.*** There are approximately 69 acres of active desert dunes mapped in this Conservation Area, of which the Plan will ensure conservation of approximately 62 acres. The active desert dunes at Snow Creek are maintained via a sand transport system from the San Gorgonio River. The MSHCP Reserve System will conserve this sand transport-delivery system. OHV activity in this dune area is very high and will need to be controlled.
2. ***Thousand Palms.*** There are approximately 421 acres of active desert dunes mapped in this Conservation Area, of which the Plan will ensure that approximately 419 acres are conserved. The Plan will also ensure Conservation of the sand source areas that provide sand to the active desert dunes on the Thousand Palms Preserve. The Management and

Monitoring Program will assess the extent to which the active desert dunes within the Thousand Palms Conservation Area may be more susceptible to stabilizing factors than similar dune areas to the west. In the central and eastern areas of the Coachella Valley, sand delivery systems, including large-scale storm events, are more compromised by roads and barriers to wind.

3. ***East Indio Hills.*** There are approximately 5 acres of active desert dunes mapped in this Conservation Area. The Plan will ensure that at least 4 of these acres are conserved. The active desert dunes in the East Indio Hills Conservation Area are limited to a small area on the northern slope of the Indio Hills. At the present time, OHV activity is severe and has degraded much of this natural community. The sand sources for this area are at least partly compromised. Like the Thousand Palms Conservation Area, the active desert dunes here may be more susceptible to stabilizing factors than similar dune areas to the west.

Conservation and Disturbance Levels. The MSHCP Reserve System would provide protection of active desert dunes in three Conservation Areas identified by the Planning Team: Snow Creek/Windy Point, Thousand Palms, and East Indio Hills Conservation Areas. In addition to conserving currently unprotected Habitat, the Plan benefits this natural community by securing the long-term sand transport-delivery systems necessary to maintain active desert dunes. The important Essential Ecological Processes, including wind corridors and sand sources, will be protected under the Plan. Conservation of at least 536 acres, or 96%, of active desert dunes will ensure that this natural community is sustained within the Plan Area.

10.2.1.4 Natural Community Account: Background

Description. These dunes are essentially barren expanses of actively moving sand; their size and shape are determined by abiotic site factors rather than by stabilizing vegetation. The dunes may intergrade with stabilized and partially stabilized desert dunes. This community occurs within a creosote bush scrub matrix. However, the dunes are the defining feature for this natural community. Perennial shrub species are sparse but may include creosote bush (*Larrea tridentata*), four-wing saltbush (*Atriplex canescens*), California croton (*Croton californicus*), sandpaper plant (*Petalonyx thurberi*), and indigo bush (*Psorothamnus arborescens*). These perennial shrubs are not common on these active dunes in part because their slow-growing stems do not keep pace with the rate of burial by loose sand (Barbour et al. 1993). In high rainfall years, annual wildflowers, including desert sand verbena (*Abronia villosa*) and dune evening primrose (*Oenothera deltoides*), may carpet the dunes. In the Plan Area, the active desert dunes are remnants of a once extensive dune system. Approximately 561 acres still exist in the Plan Area, primarily under protected status within the CVFTL Preserve. The remainder occurs near Windy Point and in a small patch of active dunes at the east end of the Indio Hills, west of Dillon Road and north of Interstate 10. For the remaining dune areas, protecting the sand sources and sand transport-delivery system that sustains the dunes is essential.

Distribution within the Coachella Valley. Within the MSHCP Reserve System, active desert dunes occur in three of the Conservation Areas:

1. Snow Creek/Windy Point Conservation Area
2. Thousand Palms Conservation Area
3. East Indio Hills Conservation Area

Comparison with *Manual of California Vegetation*. Ultimately, the Plan will use the vegetation classification system in the *Manual of California Vegetation* (MCV) (Sawyer and Keeler-Wolf 1995). The natural community described by the Holland system as active desert dunes would be a part of the following MCV series:

1. Desert sand - verbena series

Associated Covered Species. Covered Species associated with active desert dunes are the flat-tailed horned lizard, Coachella Valley fringe-toed lizard, Coachella Valley giant sand-treader cricket, Coachella Valley Jerusalem cricket, Coachella Valley round-tailed ground squirrel, Palm Springs pocket mouse, and Coachella Valley milkvetch. Le Conte's thrasher may also be associated with this natural community.

Essential Ecological Processes. The Essential Ecological Processes that are significant to the maintenance of active desert dunes include sand source and sand transport systems. The hydrological regimes are an important part of the sand transport systems that move sand via fluvial processes to the dune areas. For active desert dunes, it is also essential that the wind corridor is unobstructed to allow aeolian processes to continue.

10.2.2 Stabilized and Partially Stabilized Desert Dunes

10.2.2.1 Natural Community Conservation Goals and Objectives

Conserve and manage occurrences of this natural community within the MSHCP Reserve System according to the following criteria:

Goal 1: Conserve natural community occurrences representative of the range of environmental conditions within which the community is known to occur. Incorporate a range of environmental gradients (e.g. slope, elevation, aspect) and high Habitat diversity.

Objective 1. Ensure Conservation of this natural community within the following Conservation Area:

- Willow Hole Conservation Area

Please refer to Section 4.3 and Table 10-3 for specific acreages to be protected by this Conservation Objective.

Table 10-3: Summary of Natural Community Within Conservation Areas: Stabilized and Partially Stabilized Desert Dunes

CONSERVATION AREA	*Land within the Conservation Areas*				
	Total Acres of Natural Community in Conservation Area	*Total Acres Subject to Impacts*	*Acres within Existing Conservation Lands*	*Remaining Acres to be Conserved*	*Total Acres to be Conserved in MSHCP Reserve System*
WILLOW HOLE	383	35	29	319	348
TOTAL	383	35	29	319	348

Goal 2: Protect Essential Ecological Processes, including sand source/transport systems, necessary to maintain this natural community.

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

Goal 3: Ensure Conservation of Habitat quality through protection, monitoring and Adaptive Management, and restoration where necessary, to contribute to maintenance of stabilized and partially stabilized desert dunes within Conservation Areas.

Objective 3. Implement biological monitoring and Adaptive Management actions to ensure Conservation of this natural community.

10.2.2.2 Threats, Limiting Factors, and Adaptive Management

Like active desert dunes, stabilized and partially stabilized desert dunes are threatened by interruption of the Essential Ecological Processes, including the sand source and sand transport system, and by barriers such as roads, buildings, and vegetation. This community may also be threatened by invasive, non-native plants that increase the rate and degree of sand stabilization. Natural fluctuations in annual rainfall, and periods of above average rainfall may increase stabilization and temporarily alter the Habitat availability for Covered Species. The extent to which this stabilization is a threat is not well understood.

The following actions may be needed to ensure persistence of this natural community if biological monitoring indicates that such actions are warranted. This list is not comprehensive but identifies some of the known or likely threats to stabilized and partially stabilized desert dunes. In

addition to conserving the stabilized and partially stabilized desert dunes natural community, the Plan will integrate biological monitoring and management actions into the Management and Monitoring Programs for this natural community. The Monitoring Program will be designed to provide feedback so that management activities can be adjusted to maximize natural community Conservation. More detailed and specific information on the biological monitoring and management actions described here and proposed for this natural community can be found in Section 8.0, MSHCP Reserve Management and Monitoring Program. Actions may include:

1. Control and manage activities that degrade stabilized and partially stabilized desert dunes. In particular, control and manage the primary threats to the sand community, including OHVs and invasive plants that contribute to the loss or further stabilization of this natural community.
2. Identify actions to reduce impacts from, and control where feasible, invasive species if it is determined from monitoring results that there are impacts to the stabilized and partially stabilized desert dune community.
3. Implement monitoring to track, and ultimately distinguish between, changes due to human or natural causes. Significant variables may include sand compaction, native ant numbers, live perennial shrub abundance, and invasive exotic plant abundance.
4. Restore and enhance degraded stabilized and partially stabilized desert dunes as necessary according to results from biological monitoring.

10.2.2.3 Natural Community Conservation Analysis

Conservation Area Reserve Design. The Conservation Areas in the MSHCP Reserve System include occurrences of stabilized and partially stabilized desert dunes judged by the Planning Team to be likely to persist long-term. This determination was based on the presence of a relatively intact natural community, the absence of fragmentation impacts, and the presence of intact Essential Ecological Processes necessary to maintain this community. To the extent they occur, contiguous stands of this natural community were selected when available. Also, to the extent possible, the Planning Team attempted to include a range of environmental gradients (e.g. slope, elevation, aspect) within which this natural community occurs. Natural disturbance from aeolian and fluvial processes (wind and flooding) are essential to the long-term maintenance of this natural community. The Conservation Areas accomplish this goal by securing the long-term sand transport-delivery systems that are Essential Ecological Processes for stabilized and partially stabilized desert dunes.

1. ***Willow Hole.*** There are approximately 383 acres of stabilized and partially stabilized desert dunes mapped in this Conservation Area, of which approximately 348 acres will be conserved as a result of the Plan. The stabilized and partially stabilized desert dunes within the Willow Hole Conservation Area are maintained via a sand transport system from Mission Creek and Big Morongo Wash. The MSHCP Reserve System will conserve this

sand transport and delivery system. The Willow Hole Conservation Area includes 77% of the total acres of this natural community within the Plan Area.

Conservation Levels. The MSHCP Reserve System would provide protection of stabilized and partially stabilized desert dunes in one Conservation Area, the Willow Hole Conservation Area. In addition to conserving currently unprotected Habitat, the Plan benefits this natural community by securing the long-term sand transport-delivery systems necessary to maintain stabilized and partially stabilized desert dunes. The important Essential Ecological Processes, including wind corridors and sand sources, would be protected under the Plan.

Conservation of at least 348 acres, or 77%, of stabilized and partially stabilized desert dunes will ensure that this natural community is sustained within the Plan Area.

10.2.2.4 Natural Community Account: Background

Description. These are sand dune accumulations that are stabilized or partially stabilized by evergreen and/or deciduous shrubs, scattered low annuals, and perennial grasses. Stabilized and partially stabilized desert dunes are characterized by prominent dune features, with consistent cover of vegetation. This community may intergrade with active desert dunes in windier sites, and with stabilized and partially stabilized desert sand fields, or sandier phases of creosote bush scrub. This community includes perennial plant species typical of a creosote bush scrub matrix, with perennial shrub species including creosote bush, four-wing saltbush, California croton, and indigo bush. However, the dune characteristics are the defining feature. The total cover of vegetation increases as the dunes are progressively stabilized. Stabilization varies based on input of sand, rainfall, which influences vegetative cover, and other factors. There are approximately 418 acres in the Plan Area, mostly in the vicinity of Willow Hole.

Distribution within the Coachella Valley. Within the MSHCP Reserve System, stabilized and partially stabilized desert dunes occur in one of the Conservation Areas:

1. Willow Hole Conservation Area

Comparison with *Manual of California Vegetation*. Ultimately, the Plan will use the vegetation classification system in the MCV (Sawyer and Keeler-Wolf 1995). The natural community described by the Holland system as stabilized and partially stabilized desert dunes would be a part of the following MCV series:

1. Desert sand - verbena series

Associated Covered Species. Covered Species associated with stabilized and partially stabilized desert dunes are the flat-tailed horned lizard, Coachella Valley fringe-toed lizard, Coachella Valley giant sand-treader cricket, Coachella Valley Jerusalem cricket, Coachella Valley round-tailed ground squirrel, Palm Springs pocket mouse, and Coachella Valley milkvetch. Le Conte's thrasher may also be associated with this natural community.

Essential Ecological Processes. The Essential Ecological Processes that are significant to the maintenance of stabilized and partially stabilized desert dunes include sand source and sand transport systems. The hydrological regimes are an important part of the sand transport systems that move sand via fluvial processes to the dune areas. Annual rainfall provides the water necessary for vegetation to develop and stabilize these dunes. Fluctuations in rainfall contribute to varying degrees of stabilization.

10.2.3 Active Desert Sand Fields

10.2.3.1 Natural Community Conservation Goals and Objectives

Conserve and manage occurrences of this natural community within the MSHCP Reserve System according to the following criteria:

Goal 1: Conserve natural community occurrences representative of the range of environmental conditions within which the community is known to occur. Incorporate a range of environmental gradients (e.g. slope, elevation, aspect) and high Habitat diversity.

Objective 1. Ensure Conservation of this natural community within the following Conservation Areas:

- Whitewater Floodplain Conservation Area
- Willow Hole Conservation Area
- Edom Hill Conservation Area
- Thousand Palms Conservation Area

Please refer to Section 4.3 and Table 10-4 for specific acreages to be protected by this Conservation Objective.

Goal 2: Protect Essential Ecological Processes, including sand source/transport systems, necessary to maintain this natural community.

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

Table 10-4: Summary of Natural Community within Conservation Areas: Active Desert Sand Fields

CONSERVATION AREA	***Land within the Conservation Areas***				
	Total Acres of Natural Community in Conservation Area	*Total Acres Subject to Impacts*	*Acres within Existing Conservation Lands*	*Remaining Acres to be Conserved*	*Total Acres to be Conserved in MSHCP Reserve System*
WHITEWATER FLOODPLAIN	485	49	1	435	436
WILLOW HOLE	37	4	0	33	33
EDOM HILL	73	4	32	37	69
THOUSAND PALMS	3,543	91	2,632	820	3,452
TOTAL	**4,138**	**148**	**2,665**	**1,325**	**3,990**

Goal 3: Ensure Conservation of Habitat quality through protection, monitoring and Adaptive Management, and restoration where necessary, to contribute to maintenance of this community within Conservation Areas.

Objective 3. Implement biological monitoring and Adaptive Management actions to ensure Conservation of this natural community.

10.2.3.2 Threats, Limiting Factors, and Adaptive Management

Threats to this natural community include interruption of Essential Ecological Processes, notably the sand source and sand transport system by barriers such as roads, buildings, and vegetation. Fragmentation of active desert sand fields by roads results in alteration of Essential Ecological Processes and may increase the likelihood of invasive plant species becoming established. Active desert sand fields may also be threatened by invasive, non-native plants that can stabilize sand. Active desert sand fields are similar to active desert dunes in that natural fluctuations that result in variable input of sand and vegetation stabilization are part of this dynamic system. Periods of above average rainfall promote the growth of plants that ultimately stabilize the active desert sand fields. At the opposite end of the spectrum, a prolonged drought period without large storm events results in a decline in the delivery of sand to the active sand field areas. The effects of these natural stressors will ultimately be reversed as periods of below average rainfall or large storm events occur. Nevertheless, these natural stressors will impact the species that inhabit active desert sand fields.

The following actions may be needed to ensure this natural community is sustained if biological monitoring indicates that such actions are warranted. This list is not comprehensive but identifies some of the known or likely threats to active desert sand fields. In addition to conserving active desert sand fields, the Plan will integrate biological monitoring and management actions into a Management and Monitoring Program for this natural community. The Monitoring Program will be designed to provide feedback so that management activities can be adjusted to maximize natural community Conservation. More detailed and specific information on the biological monitoring and management actions described here and proposed for this natural community can be found in Section 8.0, MSHCP Reserve Management and Monitoring Program. Actions may include:

1. Control and manage activities that degrade active desert sand fields. In particular, control and manage the primary threats to the sand community, including OHVs and factors that contribute to the loss or stabilization of active fields.
2. Identify actions to reduce impacts from, and control where feasible, invasive species if it is determined from monitoring results that there are impacts to the active desert sand field community.
3. Implement monitoring to track, and ultimately distinguish between, changes due to human or natural causes. Significant variables may include sand compaction, native ant numbers, live perennial shrub abundance, and invasive exotic plant abundance.
4. Restore and enhance degraded active desert sand fields as necessary according to results from biological monitoring.

10.2.3.3 Natural Community Conservation Analysis

Conservation Area Reserve Design. The proposed Conservation Areas in the MSHCP Reserve System include stands of this natural community judged by the Planning Team to be likely to be sustained long-term. This determination was based on the presence of a relatively intact natural community, the absence of fragmentation impacts, and the presence of intact Essential Ecological Processes necessary to maintain this community. To the extent they occur, contiguous stands of this natural community were selected when available. Also, to the extent possible, the Planning Team attempted to include a range of environmental gradients (e.g. slope, elevation, aspect) within which this natural community occurs. Natural disturbance from aeolian and fluvial processes (wind and flooding) are essential to the long-term maintenance of this natural community.

The Conservation Areas accomplish this goal by securing the long-term sand transport-delivery systems that are Essential Ecological Processes for active desert sand fields.

Active desert sand fields occur within the Plan Area in four Conservation Areas, Whitewater Floodplain, Willow Hole, Edom Hill, and Thousand Palms. At the present time, the

sand transport corridors for these Conservation Areas are unprotected; the MSHCP Reserve System would protect these areas. The presence of active desert sand fields within each of the Conservation Areas evaluated is shown in Table 10-4. The Planning Team identified and assessed Conservation for this natural community in the following Conservation Areas:

1. ***Whitewater Floodplain.*** There are approximately 485 acres of active desert sand fields mapped in this Conservation Area. Approximately 436 acres of this natural community will be conserved in this Conservation Area. The active desert sand fields within the Whitewater Floodplain Conservation Area are maintained via a sand transport system from the San Gorgonio and Whitewater Rivers. The MSHCP Reserve System will conserve these sand transport and delivery systems.

2. ***Willow Hole.*** Active desert sand fields occur on approximately 37 acres within the Willow Hole Conservation Area. The Plan will ensure that at least 33 of these acres will be conserved. This natural community includes the Stebbins Dune area along the northern slope of Flat Top Mountain. The Essential Ecological Processes, notably the sand transport system, that maintain this aeolian system will also be conserved in the Mission Creek and Big Morongo Wash drainages. OHV activity in this dune area is high and will need to be controlled.

3. ***Edom Hill.*** There are approximately 73 acres of active desert sand fields mapped in this Conservation Area. The Plan will ensure that approximately 69 of these acres in this Conservation Area are conserved. The active desert sand fields here primarily occur as isolated patches of active sand Habitat scattered in the Indio Hills.

4. ***Thousand Palms.*** There are approximately 3,543 acres of active desert sand fields mapped in this Conservation Area. The Plan will ensure that approximately 3,452 of these acres are conserved. Most of the extensive sandy areas on the Thousand Palms Preserve are classified as active desert sand fields. The Plan will also ensure Conservation of the sand source areas to the west and north that provide sand to the active desert sand fields on the Thousand Palms Preserve. The Management and Monitoring Programs will assess the extent to which the active desert sand fields within the Thousand Palms Conservation Area may be more susceptible to stabilizing factors than similar dune areas to the west. In the central and eastern areas of the Coachella Valley, sand delivery systems, including large-scale storm events, are more compromised by roads and barriers to wind.

Conservation and Disturbance Levels. The MSHCP Reserve System would provide protection of active desert sand fields in four Conservation Areas identified by the SAC and the Planning Team: Whitewater Floodplain, Willow Hole, Edom Hill, and Thousand Palms Conservation Areas. In addition to conserving currently unprotected Habitat, the Plan benefits this natural community by securing the long-term sand transport-delivery systems necessary to maintain active desert sand fields. The important Essential Ecological Processes, including wind corridors and sand sources, would be protected under the Plan. The only area not proposed for

protection that is mapped as active desert sand fields is located east of Date Palm Drive and south of Varner Road near Edom Hill. Much of the land within this area is owned by the Agua Caliente Band of Cahuilla Indians and is not a part of this Plan.

Conservation of 3,990 acres, or 72%, of active desert sand fields will ensure that this natural community is sustained within the Plan Area.

10.2.3.4 Natural Community Account: Background

Description. These sand fields are areas of active sand movement, with little or no vegetation, where accumulated sand is not of sufficient depth to form classic formations that characterize dune systems. The distinction between this community and active desert sand dunes is the absence in sand fields of prominent dune landforms. Sand fields may intergrade with active dunes, and stabilized and partially stabilized dunes and sand fields. They may be characterized by hummocks of sand forming behind individual shrubs or clumps of vegetation. Vegetation varies from scant cover of widely scattered shrubs and annual wildflowers to denser shrub cover. This community occurs within a creosote bush scrub matrix. Typical species include four wing saltbush, creosote bush, and indigo bush. Approximately 5,484 acres occur in the Plan Area. Many of these sand fields were probably once dune formations prior to fragmentation and interruption of wind corridors.

Distribution within the Coachella Valley. Within the MSHCP Reserve System, active desert sand fields occur in four of the Conservation Areas:

1. Whitewater Floodplain Conservation Area
2. Willow Hole Conservation Area
3. Edom Hill Conservation Area
4. Thousand Palms Conservation Area

Comparison with *Manual of California Vegetation*. Ultimately, the Plan will use the vegetation classification system in the MCV (Sawyer and Keeler-Wolf 1995). The natural community described by the Holland system as active desert sand fields would be a part of the following MCV series:

1. Desert sand - verbena series

Associated Covered Species. Covered Species associated with active desert sand fields are the flat-tailed horned lizard, Coachella Valley fringe-toed lizard, Coachella Valley giant sand-treader cricket, Coachella Valley Jerusalem cricket, Coachella Valley round-tailed ground squirrel, Palm Springs pocket mouse, and Coachella Valley milkvetch. Le Conte's thrasher may also be associated with this natural community.

Essential Ecological Processes. The Essential Ecological Processes that are significant to the maintenance of active desert sand fields include sand source and sand transport systems. The

hydrological regimes are an important part of the sand transport systems that move sand via fluvial processes to the sand field areas. Wind corridors must also be maintained to allow aeolian processes to continue.

10.2.4 Ephemeral Desert Sand Fields

10.2.4.1 Natural Community Conservation Goals and Objectives

Conserve and manage occurrences of this natural community within the MSHCP Reserve System according to the following criteria:

Goal 1: Conserve natural community occurrences representative of the range of environmental conditions within which the community is known to occur. Incorporate a range of environmental gradients (e.g. slope, elevation, aspect) and high Habitat diversity.

Objective 1. Ensure Conservation of this natural community within the following Conservation Areas:

- Snow Creek/Windy Point Conservation Area
- Whitewater Floodplain Conservation Area
- Willow Hole Conservation Area
- Santa Rosa and San Jacinto Mountains Conservation Area
  (*note: the SRSJM Conservation Area does not include a specific acre Conservation Objective for ephemeral desert sand fields but these acres will be conserved by other Conservation Objectives)*

Please refer to Section 4.3 and Table 10-5 for specific acreages to be protected by this Conservation Objective.

Goal 2: Protect Essential Ecological Processes, including sand source/transport systems, necessary to maintain ephemeral desert sand fields.

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

Goal 3: Ensure Conservation of Habitat quality through protection, monitoring and Adaptive Management, and restoration where necessary, to contribute to maintenance of this community within Conservation Areas.

Objective 3: Implement biological monitoring and Adaptive Management actions to ensure Conservation of this natural community.

Table 10-5: Summary of Natural Community within Conservation Areas: Ephemeral Desert Sand Fields

	Land within the Conservation Areas				
CONSERVATION AREA	***Total Acres of Natural Community in Conservation Area***	***Total Acres Subject to Impacts***	***Acres within Existing Conservation Lands***	***Remaining Acres to be Conserved***	***Total Acres to be Conserved in MSHCP Reserve System***
SNOW CREEK/ WINDY POINT	1,148	113	16	1,019	1,035
WHITEWATER FLOODPLAIN	2,959	138	1,584	1,237	2,821
WILLOW HOLE	1,133	101	126	906	1,032
SANTA ROSA & SAN JACINTO MOUNTAINS	38	2	22	14	36
TOTAL	**5,278**	**354**	**1,748**	**3,176**	**4,924**

10.2.4.2 Threats, Limiting Factors, and Adaptive Management

The input of new sand to the system is a critical feature for this natural community in that high wind velocities in the areas where this natural community occurs can deplete ephemeral sand field areas. One of the key stressors for ephemeral desert sand fields is at least in part a result of natural phenomena. Periods of prolonged drought without large storm events result in a decline in the delivery of sand to these sand field areas. The ephemeral desert sand fields will develop again as large storm events occur. These natural stressors will nevertheless have impacts on the species that inhabit ephemeral desert sand fields. Fragmentation by roads results in alteration to the Essential Ecological Processes that maintain these sand fields and may increase the likelihood of invasive plant species becoming established. Likewise, barriers such as roads, buildings, and planted vegetation (e.g. tree rows) interrupt the sand source and sand transport systems. The extent to which ephemeral desert sand fields may also be threatened by invasive, non-native plants that can stabilize sand is not fully understood and should be evaluated.

The following actions may be needed to ensure this natural community is sustained if biological monitoring indicates that such actions are warranted. This list is not comprehensive but identifies some of the known or likely threats to ephemeral desert sand fields. In addition to conserving ephemeral desert sand fields, the Plan will integrate biological monitoring and management actions into the Management and Monitoring Programs for this natural community. The Monitoring Program will be designed to provide feedback so that management activities can be adjusted to maximize natural community Conservation. More detailed and specific information on the biological monitoring and management actions described here and proposed for this natural community can be found in Section 8.0, MSHCP Reserve Management and Monitoring Program. Actions may include:

1. Control and manage activities that degrade ephemeral desert sand fields. In particular, control and manage the primary threats to the sand community, including loss of sand deposition in upwind areas and other factors that contribute to the loss or stabilization of these sand fields.
2. Identify actions to reduce impacts from, and control where feasible, invasive species if it is determined from monitoring results that there are impacts to the ephemeral desert sand field community.
3. Implement monitoring to track, and ultimately distinguish between, changes due to human or natural causes. Significant variables may include sand compaction, native ant numbers, live perennial shrub abundance, and invasive exotic plant abundance.
4. Restore and enhance degraded ephemeral desert sand fields as necessary according to results from biological monitoring.

10.2.4.3 Natural Community Conservation Analysis

Conservation Area Reserve Design. The Conservation Areas in the MSHCP Reserve System include occurrences of this natural community judged by the Planning Team to be likely to be sustained long-term. This determination was based on the presence of a relatively intact natural community, the absence of fragmentation impacts, and the presence of intact Essential Ecological Processes necessary to maintain this community. To the extent they occur, contiguous stands of this natural community were selected when available. Also, to the extent possible, the Planning Team attempted to include a range of environmental gradients (e.g. slope, elevation, aspect) within which this natural community occurs. Natural disturbance from aeolian and fluvial processes (wind and flooding) are essential to the long-term maintenance of ephemeral desert sand fields. The Conservation Areas accomplish this goal by securing the long-term sand transport-delivery systems that are Essential Ecological Processes for ephemeral desert sand fields.

The occurrence of ephemeral desert sand fields is limited to the western end of the Plan Area where high wind velocities result in loss of sand from the system. Ephemeral desert sand fields occur in four Conservation Areas: Snow Creek/Windy Point, Whitewater Floodplain,

Willow Hole, and Santa Rosa and San Jacinto Mountains Conservation Areas. At the present time, the sand transport corridors for the Snow Creek area, the Whitewater Floodplain, and the Willow Hole area are unprotected; the MSHCP Reserve System would protect these areas. The presence of ephemeral desert sand fields within each of the Conservation Areas is shown in Table 10-5. The Planning Team identified and assessed Conservation for this natural community in the following Conservation Areas:

1. ***Snow Creek/Windy Point***. There are approximately 1,148 acres of ephemeral desert sand fields mapped in this Conservation Area. The Plan will ensure Conservation of approximately 1,035 of these acres. The ephemeral desert sand fields at Snow Creek receive sand deposited from the San Gorgonio River. The MSHCP Reserve System will conserve this sand transport and delivery system. OHV activity in this dune area is very high and will need to be controlled.

2. ***Whitewater Floodplain.*** There are approximately 2,959 acres of ephemeral desert sand fields mapped in this Conservation Area. Approximately 2,821 acres will be conserved in this Conservation Area as a result of the Plan. Much of the sand Habitat in the Whitewater Floodplain Conservation Area is classified as ephemeral desert sand fields. These sand fields are maintained via a sand transport system from the San Gorgonio and Whitewater Rivers. The MSHCP Reserve System will conserve these sand transport and delivery systems.

3. ***Willow Hole***. Ephemeral desert sand fields occur on approximately 1,133 acres within the Willow Hole Conservation Area. Approximately 1,032 of these acres will be conserved under the Plan. This natural community occurs primarily west of Palm Drive in the vicinity of the San Andreas Fault dunes. The Essential Ecological Processes, notably the sand transport system, that maintain this aeolian system will also be conserved in the Mission Creek and Big Morongo Wash drainages.

4. ***Santa Rosa and San Jacinto Mountains.*** A portion of the ephemeral desert sand fields in the Snow Creek area fall within the Santa Rosa and San Jacinto Mountains Conservation Area. This Conservation Area boundary is based on the Essential Habitat line for Peninsular bighorn sheep, which includes some of the sand fields. The total acreage of ephemeral desert sand fields within this Conservation Area is approximately 38 acres. There is no specific Conservation Objective for this natural community. However, at least 36 of the acres are conserved as the result of a Conservation Objective for Palm Springs pocket mouse.

Conservation and Disturbance Levels. The MSHCP Reserve System would provide protection of ephemeral desert sand fields in four Conservation Areas identified by the SAC and the Planning Team: Snow Creek/Windy Point, Whitewater Floodplain, Willow Hole, and Santa Rosa and San Jacinto Mountains Conservation Areas. In addition to conserving currently unprotected Habitat, the Plan benefits this natural community by securing the long-term sand transport-delivery systems necessary to maintain ephemeral desert sand fields. The important

Essential Ecological Processes, including wind corridors and sand sources, would be protected under the Plan.

Conservation of 4,924 acres, or 86%, of stabilized ephemeral desert sand fields will ensure that this natural community is sustained within the Plan Area.

10.2.4.4 Natural Community Account: Background

Description. These are desert sand accumulations lacking dune formations and characterized by irregular deposition of sand materials such that sand accumulations are regularly blown off the Habitat area. This sand may not be replaced until additional sand is deposited by a major flood event or other movement process. This community occurs primarily at the western end of the Plan Area where wind speeds are consistently at or above 15 mph and sands are routinely blown away. This community occurs in areas where exposure to consistent winds tends to reduce vegetation cover. This community occurs within a Sonoran creosote bush scrub matrix. Perennial shrubs are generally widely scattered and include creosote bush, indigo bush, desert willow (*Chilopsis linearis*), and California croton. There are approximately 5,745 acres of this community in the Plan Area, primarily at the west end of the valley from the Snow Creek area to the Whitewater Floodplain Preserve where the constant high winds remove sand accumulations.

Distribution within the Coachella Valley. Within the MSHCP Reserve System, ephemeral desert sand fields occur in four of the Conservation Areas:

1. Snow Creek/Windy Point Conservation Area
2. Whitewater Floodplain Conservation Area
3. Willow Hole Conservation Area
4. Santa Rosa and San Jacinto Mountains Conservation Area

Comparison with *Manual of California Vegetation*. Ultimately, the Plan will use the vegetation classification system in the MCV (Sawyer and Keeler-Wolf 1995). The ephemeral desert sand fields natural community was developed by the Planning Team using the Holland (1986) numbering system. Ephemeral desert dunes would be a part of the following MCV series:

1. Desert sand - verbena series

Associated Covered Species. Covered Species associated with ephemeral desert sand fields are the flat-tailed horned lizard, Coachella Valley fringe-toed lizard, Coachella Valley giant sand-treader cricket, Coachella Valley Jerusalem cricket, Coachella Valley round-tailed ground squirrel, Palm Springs pocket mouse, and Coachella Valley milkvetch. Le Conte's thrasher may also be associated with this natural community.

Essential Ecological Processes. The Essential Ecological Processes that are significant to the maintenance of ephemeral desert sand fields include sand source and sand transport systems. The hydrological regimes are an important part of the sand transport systems that move sand via

fluvial processes to the dune areas. Large-scale storm events are a key factor in the maintenance of these sand fields.

10.2.5 Stabilized and Partially Stabilized Desert Sand Fields

10.2.5.1 Natural Community Conservation Goals and Objectives

Conserve and manage occurrences of this natural community within the MSHCP Reserve System according to the following criteria:

Goal 1: Conserve natural community occurrences representative of the range of environmental conditions within which the community is known to occur. Incorporate a range of environmental gradients (e.g. slope, elevation, aspect) and high Habitat diversity.

Objective 1. Ensure Conservation of this natural community within the following Conservation Areas:

- Snow Creek/Windy Point Conservation Area
- Whitewater Floodplain Conservation Area
- 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 10-6 for specific acreages to be protected by this Conservation Objective.

Goal 2: Protect Essential Ecological Processes, including sand source/transport systems, necessary to maintain this natural community.

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

Goal 3: Ensure Conservation of Habitat quality through protection, monitoring and Adaptive Management, and restoration where necessary, to contribute to maintenance of this community within Conservation Areas.

Objective 3. Implement biological monitoring and Adaptive Management actions to ensure Conservation of this natural community.

Table 10-6: Summary of Natural Community within Conservation Areas: Stabilized and Partially Stabilized Desert Sand Fields

CONSERVATION AREA	*Land within the Conservation Areas*				
	Total Acres of Natural Community in Conservation Area	*Total Acres Subject to Impacts*	*Acres within Existing Conservation Lands*	*Remaining Acres to be Conserved*	*Total Acres to be Conserved in MSHCP Reserve System*
SNOW CREEK/ WINDY POINT	157	10	54	93	147
WHITEWATER FLOODPLAIN	582	45	139	398	537
WILLOW HOLE	201	20	2	179	181
EDOM HILL	47	2	25	20	45
EAST INDIO HILLS	331	33	3	295	298
SANTA ROSA AND SAN JACINTO MOUNTAINS	20	2	0	18	18
TOTAL	**1,338**	**112**	**223**	**1,003**	**1,226**

10.2.5.2 Threats, Limiting Factors, and Adaptive Management

Threats to this natural community include interruption of Essential Ecological Processes, notably the sand source and sand transport system by barriers such as roads, buildings, and vegetation. Fragmentation of stabilized and partially stabilized desert sand fields by roads results in alteration to these ecological processes and may increase the likelihood of invasive plant species becoming established. Stabilized and partially stabilized desert sand fields may be particularly susceptible to invasive, non-native plants that might further stabilize sand.

The following actions may be needed to ensure this natural community is sustained if biological monitoring indicates that such actions are warranted. This list is not comprehensive but identifies some of the known or likely threats to stabilized and partially stabilized desert sand fields. In addition to conserving the stabilized and partially stabilized desert sand fields natural community, the Plan will integrate biological monitoring and management actions into a Management and Monitoring Program for this natural community. The Monitoring Program will be designed to provide feedback so that management activities can be adjusted to maximize natural community Conservation. More detailed and specific information on the biological monitoring

and management actions described here and proposed for this natural community can be found in Section 8.0, MSHCP Reserve Management and Monitoring Program. Actions may include:

1. Control and manage activities that degrade stabilized and partially stabilized desert sand fields.
2. Identify actions to reduce impacts from, and control where feasible, invasive species if it is determined from monitoring results that there are impacts to the stabilized and partially stabilized desert sand field natural community.
3. Implement monitoring to track, and ultimately distinguish between, changes due to human or natural causes. Significant variables may include sand compaction, native ant numbers, live perennial shrub abundance, and invasive exotic plant abundance.
4. Restore and enhance degraded stabilized and partially stabilized desert sand fields as necessary according to results from biological monitoring.

10.2.5.3 Natural Community Conservation Analysis

Conservation Area Reserve Design. The proposed Conservation Areas in the MSHCP Reserve System include stands of this natural community judged by the Planning Team to be likely to be sustained long-term. This determination was based on the presence of a relatively intact natural community, the absence of fragmentation impacts, and the presence of intact Essential Ecological Processes necessary to maintain this community. To the extent they occur, contiguous stands of this natural community were selected when available. Also, to the extent possible, the Planning Team attempted to include a range of environmental gradients (e.g. slope, elevation, aspect) within which this natural community occurs. Natural disturbance from aeolian and fluvial processes (wind and flooding) are essential to the long-term maintenance of this natural community. The Conservation Areas accomplish this goal by securing the long-term sand transport-delivery systems that are Essential Ecological Processes for stabilized and partially stabilized desert sand fields.

Stabilized and partially stabilized desert sand fields occur within the Plan Area in six Conservation Areas: Snow Creek/Windy Point, Whitewater Floodplain, Willow Hole, Edom Hill, East Indio Hills, and Santa Rosa and San Jacinto Mountains Conservation Areas. At the present time, the sand transport corridors for the Snow Creek area, Whitewater Floodplain, Willow Hole area, and Edom Hill areas are unprotected; the MSHCP Reserve System would protect these areas. The presence of stabilized and partially stabilized desert sand fields within each of the Conservation Areas is shown in Table 10-6. The Planning Team identified and assessed Conservation for this natural community in the following Conservation Areas:

1. ***Snow Creek/Windy Point.*** There are approximately 157 acres of stabilized and partially stabilized desert sand fields mapped in this Conservation Area. For this natural community, the Plan will ensure Conservation of approximately 147 acres in this Conservation Area.

The stabilized and partially stabilized desert sand fields at Snow Creek occur west of Fingal's Finger and is maintained via a sand transport system from the San Gorgonio River. The MSHCP Reserve System will conserve this sand transport and delivery system. OHV activity in this dune area is moderate and will need to be controlled.

2. ***Whitewater Floodplain.*** There are approximately 582 acres of stabilized and partially stabilized desert sand fields mapped in this Conservation Area. Approximately 537 acres of this natural community will be protected under the Plan. Stabilized and partially stabilized desert sand fields within the Whitewater Floodplain Conservation Area occur along the southern boundary, south of the recharge ponds. These sand fields are maintained via a sand transport system from the San Gorgonio and Whitewater Rivers. The MSHCP Reserve System will conserve these sand transport and delivery systems.

3. ***Willow Hole.*** Stabilized and partially stabilized desert sand fields occur on approximately 201 acres within the Willow Hole Conservation Area, of which approximately 181 acres will be conserved. The Essential Ecological Processes, notably the sand transport system, that maintain this aeolian system will also be conserved in the Mission Creek and Big Morongo Wash drainages.

4. ***Edom Hill.*** Scattered patches of stabilized and partially stabilized desert sand fields occur on the southern slopes of Edom Hill for a total of 47 acres within this Conservation Area. The Plan ensures that approximately 45 acres of stabilized and partially stabilized desert sand fields will be protected.

5. ***East Indio Hills.*** There are approximately 331 acres of stabilized and partially stabilized desert sand fields mapped in this Conservation Area. Approximately 298 acres of this natural community will be protected under the Plan. Protection of the Essential Ecological Processes, including the sand source and sand transport system, is not certain within this Conservation Area. OHV activity in this dune area is very high and will need to be controlled. Areas adjacent to the mapped occurrence of these stabilized and partially stabilized desert sand fields at the east end of the Indio Hills are currently undergoing Development.

6. ***Santa Rosa and San Jacinto Mountains.*** A very small portion, only approximately 20 acres, of the stabilized and partially stabilized desert sand fields in the Snow Creek area fall within the Santa Rosa and San Jacinto Mountains Conservation Area. The Plan will ensure Conservation of at least 18 of these acres as a result of a Conservation Objective for Palm Springs pocket mouse. This Conservation Area boundary is based on the Essential Habitat line for Peninsular bighorn sheep.

Conservation and Disturbance Levels. The MSHCP Reserve System would provide protection of stabilized and partially stabilized desert sand fields in six Conservation Areas identified by the SAC and the Planning Team: Snow Creek/Windy Point, Whitewater Floodplain, Willow Hole, Edom Hill, East Indio Hills, and Santa Rosa and San Jacinto Mountains

Conservation Areas. In addition to conserving currently unprotected Habitat, the Plan benefits this natural community by securing the long-term sand transport-delivery systems necessary to maintain these sand fields. The important Essential Ecological Processes, including wind corridors and sand sources, would be protected under the Plan. A very limited amount of this natural community could be subject to impacts in the areas adjacent to the East Indio Hills Conservation Area.

Conservation of 1,226 acres or 82% of stabilized and partially stabilized desert sand fields will ensure that this natural community is sustained and restored within the Plan Area.

10.2.5.4 Natural Community Account: Background

Description. This community consists of desert sand accumulations lacking dune formations that are stabilized by vegetation. A small patch occurs west of Fingal's Finger. The most extensive occurrence is north of Highway 111 from Windy Point to approximately Indian Avenue. Scattered patches occur in the Willow Hole and in the Edom Hill area. This is also the primary sand community at the east end of the Indio Hills. This community occurs within a creosote bush scrub matrix. Perennial plants occurring on these sand fields are the same as those listed for stabilized and partially stabilized desert dunes. Of the roughly 1,549 acres in the Plan Area, approximately 15% of this community currently occurs on public or private Existing Conservation Land.

Distribution within the Coachella Valley. Within the MSHCP Reserve System, stabilized and partially stabilized desert sand fields occur in six of the Conservation Areas:

1. Snow Creek/Windy Point Conservation Area
2. Whitewater Floodplain Conservation Area
3. Willow Hole Conservation Area
4. Edom Hill Conservation Area
5. East Indio Hills Conservation Area
6. Santa Rosa and San Jacinto Mountains Conservation Area

Comparison with *Manual of California Vegetation*. Ultimately, the Plan will use the vegetation classification system in the MCV (Sawyer and Keeler-Wolf 1995). The natural community described by the Holland system as stabilized and partially stabilized desert sand fields would be a part of the following MCV series:

1. Desert sand - verbena series

Associated Covered Species. Covered Species associated with stabilized and partially stabilized desert sand fields are the flat-tailed horned lizard, Coachella Valley fringe-toed lizard,

Coachella Valley giant sand-treader cricket, Coachella Valley Jerusalem cricket, Coachella Valley round-tailed ground squirrel, Palm Springs pocket mouse, and Coachella Valley milkvetch. Le Conte's thrasher and burrowing owl may also be associated with this natural community.

Essential Ecological Processes. The Essential Ecological Processes that are significant to the maintenance of stabilized and partially stabilized desert sand fields include sand source and sand transport systems. The hydrological regimes are an important part of the sand transport systems that move sand via fluvial processes to the dune areas.

10.2.6 Stabilized Shielded Desert Sand Fields

10.2.6.1 Natural Community Conservation Goals and Objectives

Conserve and manage occurrences of this natural community within the MSHCP Reserve System according to the following criteria:

Goal 1: Conserve natural community occurrences representative of the range of environmental conditions within which the community is known to occur. Incorporate a range of environmental gradients (e.g. slope, elevation, aspect) and high Habitat diversity.

Objective 1. Ensure Conservation of this natural community within the following Conservation Areas:

- Whitewater Floodplain Conservation Area
- East Indio Hills Conservation Area
- Santa Rosa and San Jacinto Mountains Conservation Area

Please refer to Section 4.3 and Table 10-7 for specific acreages to be protected by this Conservation Objective.

Goal 2: Protect Essential Ecological Processes, including sand source/transport systems, necessary to maintain this natural community.

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

Please refer to Section 4.3 and Table 10-7 for specific acreages to be protected by this Conservation Objective.

Table 10-7: Summary of Natural Community within Conservation Areas: Stabilized Shielded Desert Sand Fields

CONSERVATION AREA	*Land within the Conservation Areas*				
	Total Acres of Natural Community in Conservation Area	*Total Acres Subject to Impacts*	*Acres within Existing Conservation Lands*	*Remaining Acres to be Conserved*	*Total Acres to be Conserved in MSHCP Reserve System*
WHITEWATER FLOODPLAIN	1,591	79	806	707	1,513
EAST INDIO HILLS	515	39	120	356	476
SANTA ROSA AND SAN JACINTO MOUNTAINS	7	1	0	6	6
TOTAL	**2,113**	**119**	**926**	**1,069**	**1,995**

Goal 3: Ensure Conservation of Habitat quality through protection, monitoring and Adaptive Management, and restoration where necessary, to contribute to maintenance of this community within Conservation Areas.

Objective 3. Implement biological monitoring and Adaptive Management actions to ensure Conservation of this natural community.

10.2.6.2 Threats, Limiting Factors, and Adaptive Management

Stabilized shielded desert sand fields are already compromised by blockage or shielding of the sand source and sand transport systems by barriers such as roads, buildings, and vegetation. Fragmentation of these sand fields by roads results in further shielding and alteration of the sand transport system and may increase the likelihood of invasive plant species becoming established. The stabilized shielded desert sand fields may also be threatened by invasive, non-native plants that may further stabilize sand.

The following actions may be needed to ensure this natural community is sustained if biological monitoring indicates that such actions are warranted. This list is not comprehensive but identifies some of the known or likely threats to stabilized shielded desert sand fields. In addition to conserving the stabilized shielded desert sand fields natural community, the Plan will integrate monitoring and management actions into a Management and Monitoring Program for this natural community. Monitoring Programs will be designed to provide feedback so that management

activities can be adjusted to maximize natural community Conservation. More detailed and specific information on the biological monitoring and management actions described here and proposed for this natural community can be found in Section 8.0, MSHCP Reserve Management and Monitoring Program. Actions may include:

1. Control and manage activities that degrade stabilized shielded desert sand
2. Ensure that CVWD will deposit sand removed from the groundwater recharge basins during maintenance operations so as to optimize sand transport and flow within the MSHCP Reserve System as determined by adaptive management and in consultation with the RMOC.
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 stabilized shielded desert sand fields.
4. Implement monitoring to track, and ultimately distinguish between, changes due to human or natural causes. Significant variables may include sand compaction, native ant numbers, live perennial shrub abundance, and invasive exotic plant abundance.
5. Restore and enhance degraded stabilized shielded desert sand fields as necessary according to results from biological monitoring.

10.2.6.3 Natural Community Conservation Analysis

Conservation Area Reserve Design. The proposed Conservation Areas in the MSHCP Reserve System include stands of this natural community judged by the Planning Team to be likely to persist long-term. This determination was based on the presence of a relatively intact natural community, the absence of fragmentation impacts, and the presence of intact Essential Ecological Processes necessary to maintain this community. To the extent they occur, contiguous stands of this natural community were selected when available. Also, to the extent possible, the Planning Team attempted to include a range of environmental gradients (e.g. slope, elevation, aspect) within which this natural community occurs. The long-term sand transport-delivery systems for stabilized shielded desert sand fields have been at least partially compromised in the Whitewater Floodplain Conservation Area and below the southern slopes of the Indio Hills.

The occurrence of stabilized shielded desert sand fields is limited within the Plan Area to three Conservation Areas: Whitewater Floodplain, East Indio Hills, and the Santa Rosa and San Jacinto Mountains Conservation Areas. The presence of stabilized shielded desert sand fields within each of the Conservation Areas is shown in Table 10-7. The Planning Team identified and assessed Conservation for this natural community in the following Conservation Areas:

1. ***Whitewater Floodplain.*** There are approximately 1,591 acres of stabilized shielded desert sand fields mapped in this Conservation Area. Approximately 1,513 acres of this natural community will be protected by meeting the Conservation Objectives for sand transport.

The stabilized shielded desert sand fields within the Whitewater Floodplain Conservation Area occur downwind of the CVWD groundwater recharge ponds west of Indian Avenue which are in the path of the fluvial flows of the Whitewater River, and their presence has restricted flows to a narrower deposition area, which has affected the extent of suitable Habitat. The recharge ponds trap an unknown amount of sediment when water from the Colorado River Aqueduct, released into the Whitewater River approximately one mile north of I-10, flows down the river channel to the recharge ponds. As part of the Plan, CVWD will remove sands deposited within the recharge ponds and apply in the deposition area downwind of the recharge ponds.

2. ***East Indio Hills.*** Stabilized shielded desert sand fields occur on approximately 515 acres within the East Indio Hills Conservation Area. This natural community occurs primarily south of the Indio Hills in areas where the sand transport processes are shielded by Development or by the canal. The Plan will ensure the protection of approximately 476 acres of stabilized shielded desert sand fields in this Conservation Area. The Essential Ecological Processes, notably the sand transport system, may be permanently compromised.

3. ***Santa Rosa and San Jacinto Mountains.*** A small portion of the stabilized shielded desert sand fields, approximately 7 acres in total, fall within the Santa Rosa and San Jacinto Mountains Conservation Area. The Plan will ensure Conservation of at least 6 of these acres. This Conservation Area boundary is based on the Essential Habitat line for Peninsular bighorn sheep.

Conservation Levels. The MSHCP Reserve System would provide protection of stabilized shielded desert sand fields in three Conservation Areas: Whitewater Floodplain, East Indio Hills, Santa Rosa and San Jacinto Mountains Conservation Areas. The important Essential Ecological Processes, including wind corridors and sand sources, would be protected under the Plan. The Plan may also result in actions to enhance sand deposition in areas where aeolian and fluvial sand transport has been shielded. Conservation of 1,995 acres, or 15%, of stabilized shielded desert sand fields will occur within the Plan Area. Areas of this natural community where impacts to natural communities could occur are primarily in the Big Dune south of Interstate 10 where sand transport systems are entirely compromised and shielded and desert sand fields are highly fragmented.

10.2.6.4 Natural Community Account: Background

Description. This community is essentially similar to Stabilized and Partially Stabilized Desert Sand Fields except that sand source and sand transport systems, which would supply sand to the sand fields, have been interrupted or shielded. This natural community occurs west of the existing Whitewater Floodplain Preserve, adjacent to the recharge ponds, which shield this dune area. It also includes most of the remaining sand fields that make up the Big Dune south of Interstate 10, and portions of the sand fields south of the Indio Hills and east of the Thousand Palms Preserve. The long-term persistence of stabilized shielded desert sand fields is compromised by the interruption of the sand source and sand transport system. There are approximately 13,218

acres of this community in the Plan Area, of which only 7% is currently on public or private Existing Conservation Land.

Distribution within the Coachella Valley. Within the MSHCP Reserve System, stabilized shielded desert sand fields occur in three of the Conservation Areas:

1. Whitewater Floodplain Conservation Area
2. East Indio Hills Conservation Area
3. Santa Rosa and San Jacinto Mountains Conservation Area

Comparison with *Manual of California Vegetation*. Ultimately, the Plan will use the vegetation classification system in the MCV (Sawyer and Keeler-Wolf 1995). The stabilized shielded desert sand fields natural community was developed by the Planning Team using the Holland (1986) numbering system. Stabilized shielded desert sand fields would be a part of the following MCV series:

1. Desert sand - verbena series

Associated Covered Species. Covered Species associated with stabilized shielded desert sand fields are the flat-tailed horned lizard, Coachella Valley fringe-toed lizard, Coachella Valley giant sand-treader cricket, Coachella Valley Jerusalem cricket, Coachella Valley round-tailed ground squirrel, Palm Springs pocket mouse, and Coachella Valley milkvetch. Le Conte's thrasher may also be associated with this natural community.

10.2.7 Mesquite Hummocks

10.2.7.1 Natural Community Conservation Goals and Objectives

Conserve and manage occurrences of this natural community within the MSHCP Reserve System according to the following criteria:

Goal 1: Conserve natural community occurrences representative of the range of environmental conditions within which the community is known to occur. Incorporate a range of environmental gradients (e.g. slope, elevation, aspect) and high Habitat diversity.

Objective 1a. Ensure Conservation of this natural community within the following Conservation Areas:

- Cabazon Conservation Area
- Willow Hole Conservation Area
- Thousand Palms Conservation Area
- Indio Hills Palms Conservation Area
- East Indio Hills Conservation Area
- Dos Palmas Conservation Area
- Coachella Valley Stormwater Channel and Delta Conservation Area

- Santa Rosa and San Jacinto Mountains Conservation Area

Objective 1b. Conserve the watershed for mesquite hummocks within the East Indio Hills Conservation Area.

Please refer to Section 4.3 and Table 10-8 for specific acreages to be protected by this Conservation Objective.

Table 10-8: Summary of Natural Community within Conservation Areas: Mesquite Hummocks

CONSERVATION AREA	*Land within the Conservation Areas*				
	Total Acres of Natural Community in Conservation Area	*Total Acres Subject to Impacts*[1]	*Acres within Existing Conservation Lands*	*Remaining Acres to be Conserved*	*Total Acres to be Conserved in MSHCP Reserve System*
CABAZON	13	1[2]	0	12[3]	12
WILLOW HOLE	125	11	16	98	114
THOUSAND PALMS	58	0	58	0	58
INDIO HILLS PALMS	3	1	1	1	2
EAST INDIO HILLS	43	4	0	39	39
DOS PALMAS	55	3	29	23	52
CV STORMWATER CHANNEL AND DELTA	74	7	0	67	67
SANTA ROSA AND SAN JACINTO MOUNTAINS	5	1	0	4	4
TOTAL	**376**	**28**	**104**	**244**	**348**

[1] Pursuant to the avoidance, minimization and mitigation measures in Section 4.4, mesquite hummocks will be avoided to the maximum extent feasible.

[2] Disturbance of no more than one acre may occur, but it would be replaced to ensure that no net loss occurs and the Conservation Objective is achieved.

[3] This mesquite hummock area is surrounded by a fluvial sand transport area. The specific Conservation Objective for mesquite hummocks will ensure Conservation.

Goal 2: Protect Essential Ecological Processes, including hydrological regimes, necessary to maintain this natural community.

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

Goal 3: Ensure Conservation of Habitat quality through protection, monitoring and Adaptive Management, and restoration where necessary, to contribute to maintenance of this community within Conservation Areas.

Objective 3a. Implement biological monitoring and Adaptive Management actions to ensure Conservation of this natural community.

A mesquite hummock area in the East Indio Hills Conservation Area has a specific Conservation Objective (See Section 4.3.15). The Conservation Objective requires that, consistent with the research program described in Section 8.4.1.2, 80 acres of mesquite hummocks will be restored if 80% of the mesquite hummocks natural community in the south half of Section 17, T5S, R8E, is not conserved under the Plan. If the 80% is conserved, the Conservation Objective shall be to restore 40 acres of mesquite hummocks.

10.2.7.2 Threats, Limiting Factors, and Adaptive Management

Threats to this natural community include depletion of the groundwater and fragmentation. Depletion of ground water reduces water available to individual mesquite plants, even with their long tap roots. Lack of available water is evident in various mesquite hummock areas in the Coachella Valley by decadent and declining mesquite. Fragmentation of mesquite hummocks has already occurred as a result of roads, residential Development, and agriculture. Because these mesquite hummocks occur in small patches naturally, they are more susceptible to fragmentation and associated edge effects. For example, in some areas mesquite hummocks persist completely surrounded by residential and/or agricultural Development. These mesquite hummock areas are impacted by disturbance, increased predation of resident species by domestic animals, and other edge effects.

The following actions may be needed to ensure that mesquite hummocks are sustained if biological monitoring indicates that such actions are warranted. This list is not comprehensive but identifies some of the known or likely threats to mesquite hummocks. In addition to conserving the mesquite hummocks natural community, the Plan will integrate a Monitoring and Management Program for this natural community. Monitoring Programs will be designed to provide feedback so that management activities can be adjusted to maximize natural community Conservation. More detailed and specific information on the biological monitoring and management actions described here and proposed for this natural community can be found in Section 8.0, MSHCP Reserve Management and Monitoring Program. Actions may include:

1. Monitor the hydrological regimes that support mesquite hummocks. Monitor groundwater

level relative to maintenance of mesquite hummocks as part of the Management and Monitoring Program. This effort could involve determination of the level of existing groundwater monitoring by water districts and other entities. See Section 6.8.3.4 on Changed Circumstances for additional information.

2. Identify actions to reduce impacts from, and control where feasible, invasive species if it is determined from monitoring results that there are impacts to the mesquite hummocks.

3. Implement monitoring to track, and ultimately distinguish between, changes due to human or natural causes. Significant variables may include groundwater levels, live perennial shrub abundance, and invasive weed abundance.

4. As part of the Management and Monitoring Program, establish a research element that evaluates the potential for a mesquite hummocks restoration strategy. This may include restoration of mesquite hummocks if research and monitoring results indicate restoration is warranted. A preliminary discussion of a mesquite hummocks restoration strategy, including draft criteria, is included in the MSHCP Reserve System Management and Monitoring Program in Section 8.0.

5. Implement monitoring to track the recruitment of young mesquite plants into the mesquite hummock natural community in the Conservation Areas identified in Goal 1 (Section 10.2.7.1) and where recruitment is not occurring at a level needed to meet the Conservation Area's acreage goal, implement Adaptive Management measures to achieve a recruitment level needed to sustain the mesquite natural community.

10.2.7.3 Natural Community Conservation Analysis

Conservation Area Configuration Issues. The Planning Team selected those stands of mesquite hummocks judged to be likely to be sustained long-term. The determination of potential long-term persistence was based on the presence of a relatively intact natural community, the relative absence of fragmentation, and the presence of intact Essential Ecological Processes necessary to maintain this community. To the extent they occur, contiguous stands of this natural community were selected when available. Also, to the extent possible, the Planning Team attempted to include a range of environmental gradients (e.g. slope, elevation, aspect) within which this natural community occurs. Mesquite hummocks are widely scattered in the Plan Area, often in isolated patches associated with higher groundwater levels. The determination by the Planning Team of where to include mesquite hummocks in proposed Conservation Areas was made more difficult by the highly fragmented distribution of the remnants of this natural community. Those mesquite hummock areas included in the MSHCP Reserve System are those that are relatively unfragmented and free of disturbance. Available groundwater is essential to the long-term maintenance of this natural community; however, evaluating impacts to persistence of mesquite hummocks from groundwater depletion is difficult. The Conservation Areas will secure the hydrological regimes and intact watersheds that are Essential Ecological Processes for mesquite hummocks.

In the Coachella Valley, mesquite hummocks occupied about 8,300 acres in 1939 but were reduced to less than 1,000 acres by 1998 (Coachella Valley Mountains Conservancy, 2003). Most of the mesquite hummocks were present along the Banning and San Andreas Faults where groundwater levels historically have been within about 50 feet of land surface.

The occurrence of mesquite hummocks is limited within the Plan Area to locations with high groundwater in eight of the Conservation Areas: 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. The presence of mesquite hummocks within each of the Conservation Areas is shown in Table 10-8. The Planning Team identified and assessed the Conservation for this natural community in the following Conservation Areas:

1. ***Cabazon.*** This Conservation Area includes approximately 13 acres of mesquite hummocks. Conservation of 12 of the 13 acres of the mesquite hummocks natural community is ensured by the Plan. Mesquite hummocks occur south of Cabazon near the base of the San Jacinto Mountains. The primary means for achieving Conservation of the surrounding fluvial sand transport areas in this Conservation Area is through compliance with Riverside County General Plan and Area Plan policies.
2. ***Willow Hole.*** There are approximately 125 acres of mesquite hummocks mapped in this Conservation Area. The Plan will ensure that approximately 114 acres in this Conservation Area are conserved. The Monitoring and Management Program will assess the hydrological regimes that are essential to maintenance of mesquite hummocks.
3. ***Thousand Palms.*** There are approximately 58 acres of mesquite hummocks mapped in this Conservation Area, all of which will be conserved under the Plan. The Monitoring and Management Program will assess the hydrological regimes that are essential to maintenance of mesquite hummocks.
4. ***Indio Hills Palms.*** This Conservation Area includes approximately 3 acres of mesquite hummocks. At least 2 of these acres are protected under the Plan. The mesquite hummocks occur in small patches along the base of the Indio Hills.
5. ***East Indio Hills.*** There are approximately 43 acres of mesquite hummocks mapped in this Conservation Area. The Plan will ensure that approximately 39 of these acres are conserved. The mesquite hummocks are primarily south and east of the Indio Hills. At the present time, OHV activity is severe and has degraded much of this natural community.
6. ***Dos Palmas.*** This Conservation Area includes approximately 55 acres of mesquite hummocks. Of this total acreage, the Plan will ensure that approximately 52 acres are protected. Mesquite hummocks in this area are affected by leakage from the Coachella Canal. As mitigation for the lining of the canal, the Metropolitan Water District will plant and maintain 352 acres of mesquite.

7. ***Coachella Valley Stormwater Channel and Delta.*** There are approximately 74 acres of mesquite hummocks mapped in this Conservation Area. The Plan will ensure that approximately 67 of these acres are conserved. The mesquite hummocks within this Conservation Area are scattered around the north end of the Salton Sea. The intent in this Conservation Area was to include the largest and most contiguous stands of mesquite hummocks within this area.

8. ***Santa Rosa and San Jacinto Mountains.*** The total acreage of mesquite hummocks within this Conservation Area is 5 acres. The Plan will ensure Conservation of at least 4 of these acres as a result of a Conservation Objective for Palm Springs pocket mouse.

Conservation and Disturbance Levels. The MSHCP Reserve System would provide protection of mesquite hummocks in eight Conservation Areas identified by the SAC and the Planning Team: 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. In addition to conserving currently unprotected mesquite hummocks, the Plan will benefit this natural community by evaluating and maintaining groundwater levels that support this community. The important Essential Ecological Processes, including hydrological regimes, would be protected under the Plan.

Conservation of 348 acres, or 41%, of mesquite hummocks is focused on Conservation of those mesquite hummock areas that are still intact and not highly fragmented. The remaining mesquite hummock areas not included in the Conservation Areas are generally small, highly fragmented, and often isolated.

10.2.7.4 Natural Community Account: Background

Description. This community is composed of large clumps of low growing honey mesquite (*Prosopis glandulosa*) shrubs. The mesquite shrubs may form hummocks over sand dunes, such as at Willow Hole and the Thousand Palms Preserve. The hummocks also occur on level terrain, at the margins of palm oases or in the area south and east of Indio to the north end of the Salton Sea. These mesquite hummocks are typically associated with high soil moisture, often associated with fault areas or springs. This community occurs in the Plan Area at one location south of Cabazon, in the vicinity of Willow Hole, on the Thousand Palms Preserve, and along the southern base of the Indio Hills, associated with the San Andreas Fault. Mesquite hummocks also occur around the northern end of the Salton Sea and at Dos Palmas. Mesquite hummocks were formerly widespread from the dune areas of Indian Wells, La Quinta, and Indio south to the Salton Sea but are now restricted in this area to undeveloped lots amid urban or agricultural lands. Changes in soil moisture and water table declines may have reduced the occurrence of these hummocks. Unfortunately, remaining mesquite hummocks are highly fragmented and often senescent, perhaps due to lack of groundwater. Of the 945 acres in the Plan Area, only about 11% currently occur on public or private Existing Conservation Land.

Distribution within the Coachella Valley. Within the MSHCP Reserve System, mesquite hummocks occur in eight of the Conservation Areas:

1. Cabazon Conservation Area
2. Willow Hole Conservation Area
3. Thousands Palms Conservation Area
4. Indio Hills Palms Conservation Area
5. East Indio Hills Conservation Area
6. Dos Palmas Conservation Area
7. Coachella Valley Stormwater Channel and Delta Conservation Area
8. Santa Rosa and San Jacinto Mountains Conservation Area

Comparison with *Manual of California Vegetation*. Ultimately, the Plan will use the vegetation classification system in the MCV (Sawyer and Keeler-Wolf 1995). The mesquite hummocks natural community was developed by the Planning Team using the Holland (1986) numbering system. Mesquite hummocks would be a part of the following MCV series:

1. Mesquite series

Associated Covered Species. The Covered Species associated with this community are Coachella Valley round-tailed ground squirrel, Palm Springs pocket mouse, Le Conte's thrasher, and crissal thrasher. These hummocks may also be used during migration by riparian birds.

Essential Ecological Processes. The Essential Ecological Processes that are significant to the maintenance of mesquite hummocks include the hydrological regimes that relate to availability of groundwater. Protection of watersheds that contribute to this groundwater availability should also be considered.

Additional Background Information on Mesquite Hummocks. Information assembled for the EIR/EIS for this Plan (Terra Nova 2004) provides additional insight for this natural community. Mesquite hummocks are plant communities proposed for protection under the MSHCP. Mesquite hummocks have historically been found throughout the Coachella Valley. Mesquite communities have been impacted in the past several decades by the lowering of groundwater levels from pumpage associated with agriculture and urban development.

The most viable surviving mesquite hummock are currently found along the geological faulting associated with the San Andreas Fault Zone along the eastern portions of the Plan Area. Fault movement deposits clays that create barriers to the movement of groundwater. Up-gradient water pressure causes pooled groundwater to rise vertically along the fault. Mesquite is also well

equipped to tap groundwater with taproots that can exceed 140 feet. The mesquite communities proposed for long-term protection under the Plan and the groundwater regimes that sustain them are briefly discussed below.

Extensive areas of mesquite communities throughout the southwestern U.S. have been eliminated by lowering the water tables (Phillips and Comus 1999). Mesquite are tolerant of adverse conditions (Bainbridge and Virginia 2002) yet relatively moderate groundwater decreases will substantially stress or kill adult mesquite individuals (Stromberg et al. 1992). The greatest influence of severe water conditions in individual plants in the short-term (such as during a natural drought) is reduced photosynthesis and reduced or precluded carbohydrate translocation (Sosebee and Wan 1989). Most large floodplain mesquites die if the water table drops below 43 feet of the ground surface (Phillips and Comus 1999). Stromberg et al. (1993) indicated that when the water table occurred below 20 feet, continual and quantifiable reduction in mesquite stature resulted. No evidence could be found indicating an effective ability of mesquite individuals to adapt to groundwater artificially lowered to more than 49 feet of the ground surface (Stromberg et al. 1992, Phillips and Comus 1999, Nabhan and Holdsworth 1998, Judd et al. 1971, Stromberg 1993, Laity 2003, Sharifi et al. 1982, Bainbridge and Virginia 2002, Sosebee and Wan 1989).

Exceptional mesquite individuals are notable for extremely deep roots of up to 160 feet (Phillips 1963, Phillips and Comus 1999). Despite the often theoretically supposed adaptability to lower groundwater of existing adult mesquite plants based on extended deep roots, no empirical data actually exist to support this theory. Sosebee and Wan (1989) indicate that the deep taproot of honey mesquite plays as significant role in water uptake only during extended droughts, not for normal transpiration functioning of the plant. The mesquite communities proposed for long term protection under the Plan and the groundwater regimes that sustain them are briefly discussed below.

Mission Creek Subbasin & Associated Mesquite Communities: The Plan proposes to protect the mesquite hummocks located within and west of Willow Hole. This largely continuous community extends well west of Palm Drive and lies along the Banning Branch of the San Andreas Fault Zone in the western part of the valley south of Desert Hot Springs. The Mission Creek Subbasin is a well-defined water-bearing aquifer bounded on the south by the Banning Fault, on the north by the Mission Creek Fault, on the north by non-water bearing rock of the San Bernardino Mountains, and on the east by the Indio Hills. The Coachella Valley Water District (CVWD), the Mission Springs Water District (MSWD) and a few independent well owners ("Minimal Pumpers") extract water from the subbasin. Estimates of subbasin capacity, water in storage and annual water balance (recharge v. withdrawals) vary widely.

The subbasin is naturally recharged by surface and subsurface discharge, most of which is from Mission Creek, and Little and Big Morongo Creeks. Water depths below the ground surface, as determined by the U.S. Geological Survey in 1971, range from a maximum of 425 feet in the northwesterly portion, to flowing wells (water at ground surface) at a minimum in a narrow strip

along the Banning Fault.[1] A steady water level decline of approximately 0.5 to 1.5 feet per year has been observed since 1952.[2]

According to data collected at CVWD's Well No. 3407, located at Dillon Road and Little Morongo Drive, the subbasin water level has dropped from 760 feet above sea level in 1955 to 715 feet in 1998.[3] Alternatively, a private well located east of Mountain View Road and on the upgrade margin of Willow Hole had a water level at 5.7 feet below the surface in 2002; over the past decade the water level in this well has dropped from less than two feet below the surface, indicating that groundwater has remained at or near the surface in the eastern end of Willow Hole during a period of extended drought.[4]

Mission Creek Basin Water in Storage: Based upon several studies of the Mission Creek Subbasin[5], it is estimated that the total water in storage in 1955 was approximately 2,015,733 acre feet (AF) (in storage in first 1,000 feet below surface). By 1970, total water in storage in the subbasin was estimated to have declined to 1,967,733 AF, to 1,920,800 AF by 1978, and to 1,778,400 AF by 1997. Based upon pumpage in the subbasin between 1998 and 2002, the total water in storage in the subbasin in 2002 was estimated at 1,717,979 AF. The best available pumpage data is from 1978 to the present and estimates indicate water in storage in 1978 at 1,920,800 AF. Based upon this approach, total water in storage in the subbasin in 2002 was about 1,778,400 AF.

Mission Creek Recharge: The annual rate of recharge will vary but is estimated by the USGS to be about 5,000 AF. The overall gradient of subsurface flows is from northwest to southeast, with the low point of the basin being located along the Banning Fault and at Willow Hole, where groundwater is currently at or near the surface in specific locations. It is estimated that 2,000 to 5,360 AF per year flow across the Banning Fault and into the adjoining Garnet Hill Subbasin. In calculating annual recharge and outflow it is conservatively assumed that natural recharge roughly equals natural subbasin outflows.

The Mission Creek Subbasin lies within an area covered by a Water Management Agreement between the Desert Water Agency (DWA) and CVWD. Both agencies have been aware of the overdraft situation in the subbasin and have taken steps to increase groundwater recharge using Colorado River water being delivered via a turnout on the Metropolitan Water District Colorado River Aqueduct. Recently completed Mission Creek recharge ponds constructed in the northwest portion of the subbasin benefit all areas where extraction occurs and will occur in the

1 "Engineer's Report on Water Supply and Replenishment Assessment," Coachella Valley Water District, April 2000.
2 Ibid.
3 "Water Master Plan for Mission Springs Water District," ASL Consulting Engineers, August 2000.
4 Personal communication, Alan Harrell, Engineering Technician, Coachella Valley Water District. November 5, 2003.
5 "Basin Water Supply and Initial Groundwater Replenishment and Assessment for the Mission Creek Subbasin," Prepared by Krieger & Stewart, Inc. April 2003. Prepared for the Coachella Valley Water District.

future. In 2002, 4,733 AF of Colorado River water were delivered and recharged into the aquifer reducing the net overdraft for that year to about 4,346 AF.

The Mission Creek recharge facility is designed to recharge up to 25,000 AF of Colorado River water in any one year. Based upon current production, the Mission Creek Recharge Project would use about 6% of the available State Water (SWP) project exchange water or up to 3,700 AF per year of the current SWP entitlement.[6] It is anticipated that between 5,000 and 10,000 AF per year could be delivered to the spreading facility in non-drought years, and in wetter years, up to 15,000 AF may be spread.[7]

Current pumpage from the Mission Creek Subbasin is approximately 14,700 AF per year (MSWD 2004). The MSWD, which extracts approximately 58% of the water pumped from the subbasin, is expected to accelerate its pumping by approximately 7% per year between 1998 and 2005, and 2% per year between 2005 and 2010 (MSWD 2000). Similar increases in pumping are likely from CVWD, which currently extracts 31% of the water from the subbasin. If natural recharge to the subbasin is estimated to be 5000 AF per year, more than 9000 AF of water would need to be imported and recharged per year to offset current pumping (to retain status quo groundwater levels), and these imports would need to increase by 2.7 percent per year to keep track with the accelerating pumping in the subbasin. As of 2002, the estimated gross overdraft in the subbasin has been 127,000 AF since 1978 (CVWD 2003a).

DWA is assessing Mission Springs Water District a replenishment fee to help recover the costs of the groundwater recharge program.[8] Artificial recharge water being percolated into the subbasin will not reach the CVWD well field in the southeastern portion of the subbasin for several years but will in time increase water in storage in this area of the subbasin.

Mission Creek Subbasin Pumpage Trends: Both Mission Springs Water District (MSWD) and CVWD draw water from the Mission Creek Subbasin. MSWD is the larger of the two purveyors mining this aquifer, with pumpage having increased steadily since 1978, rising from 1,516 AF in that year to 7,055 AF in 1998[9]. While the District's boundaries lie north of the Banning Fault, a review of MSWD production records illustrates the trend in groundwater production.

The CVWD owns and operates production wells closest to the Banning Fault and the associated mesquite. CVWD Wells No. 3406 and 3518 are located west of Palm Drive and north of 18th Avenue and are representative of the effects of production pumpage on groundwater levels. These and other production wells are located west and north of the aforementioned area of the subbasin where water quality has been impacted by high levels of fluoride and total dissolved

6 "Water Master Plan for Mission Springs Water District," ASL Consulting Engineers, August 2000.
7 Ibid.
8 Woody Adams, Senior Service Planner, Desert Water Agency, letter to City of Desert Hot Springs, July 24, 2000.
9 MSWD Water Master Plan, prepared by ASL Consulting Engineers, May 2000

solids from spillage of non-potable water from the Desert Hot Springs Subbasin.

CVWD pumpage data show a steady increase in groundwater extraction for CVWD users in the Sky Valley area, which is underlain by the non-potable Desert Hot Springs Subbasin. CVWD pumpage in 1978 was 854 AF, rising to 2,302 AF by 1988, 2,757 AF in 1998, and jumping to 4,371 AF in 2002. During the period from 1974 to 2002, groundwater levels in the production wells decreased from 139.4 feet below ground surface to 178.6 feet by 2002, a 74 foot lowering of the water table. Other CVWD wells in the area show a 51.8 foot drop in water table levels between 1973 and 2002. It should be noted that groundwater levels are identified as those in the well, pumping from which creates a "cone of depression" in the water table. With distance from the well, depending on location and soils transmissivity, groundwater levels will be progressively less affected (higher).

Constraints to Pumpage in the Mission Creek Subbasin: In the vicinity of the Mission Creek Fault and in most of the southeastern portion of the subbasin there is an intrusion or spillage of groundwater from the Desert Hot Springs Subbasin into the Mission Creek Subbasin. This spillage is caused by an overflow across the Mission Creek Fault north of Willow Hole and has resulted in a plume of groundwater with high dissolved solids, including high levels of sulfate and fluoride, which has been determined to be non-potable. This intrusion extends from Willow Hole northwest to Palm Drive following the alignment of the Banning Fault. This intrusion of non-potable water has forced CVWD to develop its well field west of Palm Drive in Section 12, northwest of the high TDS plume.

Long-Term Impacts to Mesquite Along the Banning Fault. The mesquite hummocks located in the southeastern portion of the Mission Creek Subbasin are at the lower end of a large and unconfined aquifer. Historically and to a lesser spatial extent currently, groundwater in the southeastern portion of the subbasin flow to or near the surface, spills over the Banning Fault and leaks into the Garnet Hill Subbasin, indicating the continuing migration of up-gradient groundwater to this area. Considering the semi-flat gradient of groundwater in Mission Creek Subbasin (DWR 1964, DWR 2003), groundwater in the 1950s was likely at or near the surface along several linear feet of the Banning Fault. For example, from west of Palm Drive to several thousand feed to the east, groundwater was likely historically at or near the surface. Within this same area, groundwater likely currently continues at or near the surface for less than a thousand linear feet, in the low elevation area of the fault to the east of Palm Drive (MSWD 2004). Groundwater at or near the surface is likely similarly reduced in linear extent around Willow Hole.

Recharge of the subbasin to partially offset overdraft began in 2002 and in future years may be as much as 15,000 AF per year in extremely high rainfall years. The mesquite hummocks associated with the Banning Fault are also influenced and supported by reliable continued leakage of the non-potable Desert Hot Springs Subbasin into Willow Hole and lands lying along the Banning Fault as far west as Palm Drive. Conditions, which support the mesquite hummocks community in this area, are expected to remain in place for the indefinite future.

The mesquite hummocks associated with the Banning Fault are senescent and degraded along its western extent (between Mission Creek and Morongo Wash), likely due to artificially lowered groundwater levels in the subbasin. The mesquite hummocks farther to the east, (near Palm Drive) are currently less degraded and show substantially greater density of leafed out mesquite plants; these hummocks were historically and are currently closer to groundwater. Further reductions in groundwater in the subbasin would likely increase the extent of degradation that has already occurred in Willow Hole Conservation Area.

Desert Hot Springs Subbasin and Associated Mesquite Communities[10]**.** The Desert Hot Springs Subbasin is bounded by the Little San Bernardino Mountains on the northeast, the Indio Hills and Mission Creek fault on the southwest, and the Mecca Hills on the southeast. It is further divided into three subareas as follows: Miracle Hill Subarea, Sky Valley Subarea and the Fargo Canyon Subarea. It is estimated that between the high ground water elevations that occurred during the 1935-1936 season and a depth of 1,000 feet below the ground surface, the Desert Hot Springs Subbasin has a capacity for storing (and had in storage) about 4,100,000 AF of groundwater.

Although the subbasin is quite extensive in size, approximately 104 square miles, the land that overlies it is only sparsely developed. The coalescing alluvial fan deposits underlying the Dillon Road Piedmont Slope are the water-bearing materials of the Desert Hot Springs Subbasin. Water-bearing materials in the subbasin primarily consist of coarse-grained, poorly sorted alluvial fan deposits, which are principally of Ocotillo conglomerate estimated to be more than 700 feet thick. Recent fanglomerates cover most of the land surface, and recent alluvium in the subbasin ranges in thickness from a thin edge to more than 100 feet.

Groundwater in this subbasin is characterized by high concentrations of fluoride, total dissolved solids, sodium sulfates and other undesirable minerals, which have limited its use for agricultural and domestic water purposes.[11] The presence of high mineral concentrations is largely due to faulting along the margins of the subbasin. Faulting is associated with geothermal activity, which warms the earth's crust. As subsurface temperatures rise, minerals contained within the subbasin's sediments are more easily dissolved and mixed with groundwater, increasing the overall dissolved mineral content of the water. Groundwater pumped from the Miracle Hill subarea can reach up to 200°F and is the primary source of mineral spa waters in the City of Desert Hot Springs.

CVWD does not extract groundwater from the Desert Hot Springs Subbasin, given its high concentration of undesirable minerals. Instead, domestic water for the Sky Valley and Indio Hills communities is extracted by CVWD from the Mission Creek Subbasin to the west[12], as discussed

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10 "Engineer's Report on Water Supply and Replenishment Assessment," Coachella Valley Water District, April 2000.

11 Steve Bigley, Coachella Valley Water District, personal communication, March 13, 2001.

12 Ibid.

above. The poor quality of groundwater in the Desert Hot Springs Subbasin is expected to assure natural rates of recharge exceeding current and future pumpage. Available information and data on each of the three subareas comprising the Desert Hot Springs Subbasin is summarized below.

Miracle Hill Subarea: The portion of the Desert Hot Springs subbasin along the Mission Creek fault in which there is extensive development of hot-water wells is called the Miracle Hill subarea. It covers approximately 12 square miles and includes the northeastern portion of the community of Desert Hot Springs. A principal use of ground water in this area is to provide the hot mineral water available at several spas. The boundary separating the subarea from the Sky Valley subarea is a surface drainage divide. Ground water levels indicate that underflow across this boundary moves from Miracle Hill subarea southeastward into the Sky Valley subarea.

More than 130 water wells have been drilled in the Miracle Hill subarea. Approximately half of these are active and pump water for domestic use or for commercial spas. Depth to water ranges from 12 feet below ground surface near the Mission Creek fault to over 300 feet in the southeast portion of the subarea. Water level data in the Miracle Hill subarea suggest several barriers to ground water movement. The barriers appear to trend parallel to the Mission Creek Fault with which they are probably associated. Structural conditions within the subarea are complex and the barrier effects are not well understood. Movement of groundwater in the subarea is generally southeastward except within the narrow strip between the main Mission Creek Fault and the secondary parallel fault that follows the northeast flank of Miracle Hill.

The water temperatures in 34 wells of the Miracle Hill subarea were measured in the spring of 1961, and the values range from 82°F to 200°F. The average value was 118°F. Water temperatures measured in 16 wells along the southwest side of the Mission Creek fault in the Mission Creek subbasin range in value from 74°F to 86°F. This difference is probably a reflection of the barrier effect of the fault and suggests that ground water is heated on the northeast side of the fault with very little movement across the fault.

Sky Valley Subarea: The central portion of the Desert Hot Springs subbasin, in which ground water movement is toward Thousand Palms Canyon, is the Sky Valley subarea. The subarea extends 11 miles from the Miracle Hill subarea southeasterly to the trace of the Indio Hills fault and covers approximately 35 square miles. The trace of the Indio Hills fault is the boundary of the Sky Valley and Fargo Canyon subareas. The fault coincides with a ground water divide and is probably an effective barrier to ground water movement.

Groundwater and other hydrologic data in the Sky Valley subarea are sparse. Only 15 water wells were located during the course of the investigation and of these, 8 were active, pumping only small quantities of groundwater for domestic use. Movement of water within the subarea is southeasterly from the Miracle Hill subarea and southwesterly from the vicinity of Fan Canyon, converging on the Thousand Palms Canyon, where rising water along the fault is present throughout the year. The gradient of the water table is moderate. Groundwater is probably

unconfined in the greater part of the subarea.

Fargo Canyon Subarea: The portion of the Desert Hot Springs subbasin south and east of the Indio Hills fault is called the Fargo Canyon subarea. It covers approximately 57 square miles and extends 17 miles from the Sky Valley subarea to the southeast limit of the subbasin. The northwest half of the area is underlain by coarse alluvial fan deposits of "Recent" age. To the southeast, "Recent" deposits are confined to stream channels cut into the Ocotillo conglomerate.

Data on the occurrence of groundwater within the Fargo Canyon subarea is even less than that available for the Sky Valley subarea. Nine wells drilled in the Fargo Canyon subarea were located during the investigation, all in the vicinity of Dillon Road. Two of these wells were active, pumping water for domestic use and for irrigation of approximately 200 acres of young citrus trees.

Water levels measured in these wells during the spring of 1961 range from 717 feet to 17 feet. Although the data are not sufficient to determine the configuration of the water table, the measured levels along Dillon Road suggest that ground water movement in the northwest portion of the subarea moves southeasterly, and the groundwater is probably unconfined.

Impacts to Mesquite Communities: In the Plan Area, CVWD, Desert Water Agency (DWA), Mission Springs Water District, City of Indio, City of Coachella, and the Myoma Dunes Water District provide domestic water service. Each of these agencies owns and operates infrastructure improvements, such as wells and water storage reservoirs.

The routine maintenance and occasional repair of existing improvements, and the initial construction of new facilities, can result in low-impact site disturbances, such as periodic inspections and data collection efforts. More intense land disturbances, such as restoration of eroded earthen levees, road and other grading, fence installation, compaction of access roads, sand-blasting and painting, and restoration of failed structures and/or electrical components are also anticipated maintenance activities. Such efforts may require the use of heavy equipment and machinery, such as dump trucks, sand blasters, conveyor belts, skip loaders, and concrete trucks, which can disturb ground surfaces and generate intrusive vibrations and noise levels on surrounding lands.

The frequency and duration of such projects influences the level of impact on the surrounding environment. Other maintenance operations may include the removal of exotic plants, grasses, and other vegetation or debris that has collected or grown within stormwater channels and atop channel banks, and the protection of infrastructure from potentially damaging wildlife activity, such as rodents burrowing into channel banks. The construction and maintenance of such facilities will also contribute to a limited degree to some Habitat loss and/or fragmentation.

10.3 Natural Community Conservation Strategies: Desert Scrub Communities

This section contains a summary description, including natural community characteristics, typical species, and significant threats, for the three desert scrub communities proposed for coverage in the Plan. General Conservation measures, which are common to all these desert scrub types, are listed below.

1. This natural community may be subject to increased fire frequency as a result of invasive annual grasses and other non-native plant species. As part of the Management and Monitoring Program, establish a research element that addresses the impact of non-native species.

2. This natural community is adaptively managed, according to an approved Management and Monitoring Program, which would include management to prevent damage from OHV activity and other threats.

10.3.1 Sonoran Creosote Bush Scrub

10.3.1.1 Natural Community Conservation Goals and Objectives

Conserve and manage occurrences of this natural community within the MSHCP Reserve System according to the following criteria:

Goal 1: Conserve natural community occurrences representative of the range of environmental conditions within which the community is known to occur. Incorporate a range of environmental gradients (e.g. slope, elevation, aspect) and high Habitat diversity.

Objective 1. Through adherence to other Conservation Objectives (for another species, a natural community, Essential Ecological Process area, Biological Corridor, or Linkage area), conserve occurrences of this natural community within 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
- Santa Rosa and San Jacinto Mountains Conservation Area

Goal 2: Protect Essential Ecological Processes necessary to maintain this natural community.

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

Goal 3: Ensure Conservation of Habitat quality through protection, monitoring and Adaptive Management, and restoration where necessary, to contribute to maintenance of this community within Conservation Areas.

Objective 3. Implement biological monitoring and Adaptive Management actions to ensure Conservation of this natural community.

10.3.1.2 Threats, Limiting Factors, and Adaptive Management

Threats include invasive species, nitrogen deposition, OHVs, and edge effects. One of these threats with known impacts is the invasion of non-native plant species, including Saharan grass (*Schismus barbatus*) and Saharan mustard (*Brassica tournefortii*). The presence of these exotic annuals increases the fuel load and the continuity of fuels, which make this community much more susceptible to wildfires than was historically the case. Deposition of nitrogen from smog fallout can result in higher soil nitrogen levels that give exotic weeds a competitive advantage (Dr. Edith Allen, pers. comm.). Creosote scrub areas are not heavily used by OHV enthusiasts, but some areas have experienced a proliferation of OHV trails; this OHV activity can reduce native plant cover.

The following actions may be needed to ensure that this natural community is sustained if biological monitoring indicates that such actions are warranted. This list is not comprehensive but identifies some of the known or likely threats to Sonoran creosote bush scrub. In addition to conserving the Sonoran creosote bush scrub natural community, the Plan will integrate biological monitoring and management actions into the Management and Monitoring Programs for this natural community. The Monitoring Program will be designed to provide feedback so that

management activities can be adjusted to maximize natural community Conservation. More detailed and specific information on the biological monitoring and management actions described here and proposed for this natural community can be found in Section 8.0, MSHCP Reserve Management and Monitoring Program. Actions may include:

1. Control and manage activities that degrade Sonoran creosote bush scrub. In particular, control and manage the primary threats to this scrub community, including invasive plants that may increase fire frequency and edge effects.
2. Identify actions to reduce impacts from, and control where feasible, invasive species if it is determined from monitoring results that there are impacts to the creosote scrub community.
3. Implement monitoring to track changes due to human or natural causes. Significant variables may include live perennial shrub abundance and invasive weed abundance.

10.3.1.3 Natural Community Conservation Analysis

Conservation Area Reserve Design. Sonoran creosote bush scrub is the most widespread natural community in the Plan Area and can be found in nearly all the Conservation Areas. The proposed Conservation Areas in the MSHCP Reserve System include, to the extent possible, a relatively intact natural community, without significant fragmentation impacts, and the presence of intact Essential Ecological Processes necessary to maintain this community. To the extent they occur, contiguous stands of this natural community were selected when available. Also, to the extent possible, the Planning Team attempted to include a range of environmental gradients (e.g. slope, elevation, aspect) within which this natural community occurs. This natural community is conserved within the Plan Area by Conservation Objectives for Covered Species, other natural communities, Essential Ecological Processes, or Biological Corridors.

Sonoran creosote bush scrub occurs within the Plan Area in 20 Conservation Areas: Cabazon, Stubbe and Cottonwood Canyons, Snow Creek/Windy Point, Whitewater Canyon, Highway 111/I-10, Whitewater Floodplain, Upper Mission Creek/Big Morongo Canyon, Willow Hole, Long Canyon, Edom Hill, 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, and Santa Rosa and San Jacinto Mountains. The presence of Sonoran creosote bush scrub within each of the Conservation Areas is shown in Table 10-9. The Planning Team identified and assessed the sufficiency for this natural community in the following Conservation Areas:

Table 10-9: Summary of Natural Community within Conservation Areas: Sonoran Creosote Bush Scrub

CONSERVATION AREA	***Land within the Conservation Areas***				
	Total Acres of Natural Community in Conservation Area	***Total Acres Subject to Impacts[2]***	***Acres within Existing Conservation Lands***	***Remaining Acres to be Conserved***	***Total Acres to be Conserved in MSHCP Reserve System***
CABAZON	3,027	35	42	312 (2,638)[1]	354
STUBBE & COTTONWOOD CYN	1,562	129	273	1,160	1,433
SNOW CREEK/WINDY POINT	1,351	126	88	1,137	1,225
WHITEWATER CANYON	2,748	32	2,431	285	2,716
HIGHWAY 111/I-10	389	39	0	350	350
WHITEWATER FLOODPLAIN	1,556	126	299	1,131	1,430
UPPER MISSION CREEK/ BIG MORONGO CYN	5,369	100	4,370	899	5,269
WILLOW HOLE	24	2	0	22	22
LONG CANYON	99	N/A	90	(9)[1]	90
EDOM HILL	1,379	96	421	862	1,283
THOUSAND PALMS	14,754	396	10,791	3,567	14,358
WEST DECEPTION CANYON	1,467	3	0	23 (1,441)[1]	23
INDIO HILLS / JOSHUA TREE NP LINKAGE	8,374	788	499	7,087	7,586
INDIO HILLS PALMS	5,718	247	3,246	2,225	5,471
EAST INDIO HILLS	2,882	201	874	1,807	2,681
JOSHUA TREE NATIONAL PARK	70,498	761	62,891	6,846	69,737
DESERT TORTOISE AND LINKAGE	58,229	3,233	25,895	29,101	54,996
MECCA HILLS/ OROCOPIA MOUNTAINS	103,456	2,323	80,230	20,903	101,133
DOS PALMAS	12,177	624	5,939	5,614	11,553
SANTA ROSA & SAN JACINTO MOUNTAINS	44,230	2,372	23,243	18,615	41,858
TOTAL	**339,289**	**11,633**	**221,622**	**101,946 (4,088)**	**323,568**

[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.

1. ***Cabazon.*** There are approximately 3,027 acres of Sonoran creosote bush scrub mapped in this Conservation Area, of which the Plan will conserve approximately 354 acres. In this Conservation Area, 2,638 acres of Sonoran creosote bush scrub on mostly private land are not covered by a Conservation Objective, as they occur in the fluvial sand transport area; the only Conservation Objective here is for fluvial sand transport to be maintained.

2. ***Stubbe and Cottonwood Canyons.*** Sonoran creosote bush scrub occurs on approximately 1,562 acres within the Stubbe and Cottonwood Canyons Conservation Area. Approximately 1,433 of these acres will be conserved as a result of a specific Conservation Objective for one of the Covered Species.

3. ***Snow Creek/Windy Point.*** There are approximately 1,351 acres of Sonoran creosote bush scrub mapped in this Conservation Area. As a result of a specific Conservation Objective for one of the Covered Species approximately 1,225 acres of this natural community are conserved.

4. ***Whitewater Canyon.*** Sonoran creosote bush scrub occurs on approximately 2,748 acres within the Whitewater Canyon Conservation Area. At least 2,716 of these acres will be conserved as a result of a specific Conservation Objective for one of the Covered Species.

5. ***Highway 111/I-10.*** There are approximately 389 acres of Sonoran creosote bush scrub in this Conservation Area, of which the Plan will conserve approximately 350 acres.

6. ***Whitewater Floodplain***. There are approximately 1,556 acres of Sonoran creosote bush scrub mapped in this Conservation Area, of which the Plan will conserve approximately 1,430 acres. In addition, the entire Conservation Area is covered by a Conservation Objective to protect either the sand source or sand transport areas. The MSHCP Reserve System will conserve these sand transport and delivery systems.

7. ***Upper Mission Creek/Big Morongo Canyon*.** Sonoran creosote bush scrub occurs on approximately 5,369 acres within the Upper Mission Creek/Big Morongo Canyon Conservation Area. Approximately 5,269 of these acres will be conserved as a result of a specific Conservation Objective for one of the Covered Species.

8. ***Willow Hole.*** Sonoran creosote bush scrub occurs on approximately 24 acres within the Willow Hole Conservation Area. Approximately 22 of these acres will be conserved according to a specific Conservation Objective for one of the Covered Species.

9. ***Long Canyon.*** This Conservation Area does not have a specific Conservation Objective for natural communities. There are approximately 99 acres of Sonoran creosote bush scrub in this Conservation Area; 90 of these acres are within Existing Conservation Lands. The remaining 9 acres are within the fluvial sand transport area which does not have a specific Conservation Objective for Habitat or natural community Conservation. Because of existing land use patterns and associated edge effects in these areas, they would be unsuitable for Habitat protection through acquisition.

10. ***Edom Hill.*** There are approximately 1,379 acres of Sonoran creosote bush scrub mapped in this Conservation Area. A Conservation Objective for one of the Covered Species would conserve 1,283 acres of Sonoran creosote bush scrub in this Conservation Area.

11. ***Thousand Palms.*** Sonoran creosote bush scrub occurs on approximately 14,754 acres within the Thousand Palms Conservation Area. Approximately 14,358 of these acres will be conserved as a result of a specific Conservation Objective for one of the Covered Species.

12. ***West Deception Canyon.*** There are approximately 1,467 acres of Sonoran creosote bush scrub in this Conservation Area. All but 23 acres, approximately 1,441 acres, are in the fluvial sand transport area, which does not have a specific Conservation Objective for natural community Conservation. Because of existing land use patterns and associated edge effects in these areas, they would be unsuitable for Habitat protection through acquisition.

13. ***Indio Hills/Joshua Tree National Park Linkage.*** There are approximately 8,374 acres of Sonoran creosote bush scrub mapped in this Conservation Area. A Conservation Objective for one of the Covered Species would conserve approximately 7,586 acres of creosote bush scrub in this Conservation Area.

14. ***Indio Hills Palms.*** Sonoran creosote bush scrub occurs on approximately 5,718 acres within the Indio Hills Palms Conservation Area, of which the Plan will conserve approximately 5,471 acres. All but 30 of these acres will be conserved as a result of a specific Conservation Objective for one of the Covered Species; of these 30 acres, 13 acres are private and 17 acres are BLM Conservation Level 3.

15. ***East Indio Hills.*** There are approximately 2,882 acres of Sonoran creosote bush scrub mapped in this Conservation Area, of which the Plan will conserve approximately 2,681 acres. All but 33 of these acres will be conserved as a result of a specific Conservation Objective for one of the Covered Species; of these 33 acres, 32 acres are private and 1 acre is BLM Conservation Level 3.

16. ***Joshua Tree National Park.*** Sonoran creosote bush scrub occurs on approximately 70,498 acres within the Joshua Tree National Park Conservation Area, of which the Plan will conserve approximately 69,737 acres. All but 92 of these acres will be conserved as a result of a specific Conservation Objective for one of the Covered Species. However, all of these 92 acres are either Conservation Level 1 (67 acres) or Level 2 (25 acres) and owned by the National Park Service.

17. ***Desert Tortoise and Linkage.*** Sonoran creosote bush scrub occurs on approximately 58,229 acres within the Desert Tortoise and Linkage Conservation Area. At least 54,996 of these acres will be conserved as a result of a specific Conservation Objective for one of the Covered Species.

18. ***Mecca Hills/Orocopia Mountains.*** There are approximately 103,456 acres of Sonoran creosote bush scrub mapped in this Conservation Area, of which the Plan will conserve approximately 101,133 acres. All but approximately 234 of these acres will be conserved

as a result of a specific Conservation Objective for one of the Covered Species. Of these approximately 234 acres, 92 acres are private, and the rest are BLM, either Conservation Level 1 (104 acres) or Level 3 (38 acres).

19. ***Dos Palmas.*** Sonoran creosote bush scrub occurs on approximately 12,177 acres within the Dos Palmas Conservation Area. Approximately 11,553 of these acres will be conserved as a result of a specific Conservation Objective for one of the Covered Species. The remaining approximately 9,824 acres are not covered by a Conservation Objective; of these 9,824 acres, 4,478 acres are private, 2,521 acres are BLM Conservation Level 2, 1,631 acres are BLM Conservation Level 3, 233 acres are CNLM Conservation Level 2, and 623 acres are owned by the Bureau of Reclamation.

20. ***Santa Rosa and San Jacinto Mountains.*** There are approximately 44,230 acres of Sonoran creosote bush scrub mapped in this Conservation Area. All but approximately 4,359 of these acres will be conserved as a result of a specific Conservation Objective for one of the Covered Species; of these 4,359 acres, 2,076 acres are private, 93 acres are BLM Conservation Level 2, 590 acres are BLM Conservation Level 3, 107 acres are CDFG/WCB Conservation Level 1, and 1,491 acres are CDFG/WCB Conservation Level 2.

Conservation Levels. The MSHCP Reserve System would provide protection of Sonoran creosote bush scrub in 20 Conservation Areas: Cabazon, Stubbe and Cottonwood Canyons, Snow Creek/Windy Point, Whitewater Canyon, Highway 111/I-10, Whitewater Floodplain, Upper Mission Creek/Big Morongo Canyon, Willow Hole, 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, and Santa Rosa and San Jacinto Mountains Conservation Areas. In addition to conserving currently unprotected Habitat, the Plan benefits this natural community by addressing threats to this community, including invasive plants.

Conservation of 323,568 acres, or 80%, of Sonoran creosote bush scrub will ensure that this natural community is sustained within the Plan Area.

10.3.1.4 Natural Community Account: Background

Description. Sonoran creosote bush scrub is the most widespread vegetation type in the Colorado Desert. It is dominated by creosote bush (*Larrea tridentata*). It characterizes the vast intermountain bajadas, reaching greatest development on coarse, well-drained soil with a total salinity of less than 0.02%. Sonoran Creosote bush scrub occupies areas surrounding the Salton basin between the higher rocky hillsides and the desert saltbush community. The transition to desert saltbush occurs as the soil becomes heavier and the salt content increases to approximately 0.2%. The physiognomy of the Sonoran creosote bush scrub community is simple because of low species diversity and the broad spacing of the shrubs, 0.5 - 3 meters tall, usually with bare ground

between. The codominant species in the community is burrobush (*Ambrosia dumosa)*, a much shorter shrub varying from 20-60 cm. Many species of ephemeral herbs may flower in late winter/early spring if winter rains are sufficient. This is by far the dominant community in the Plan Area, and the most susceptible to impacts from Development. It is widespread on the valley floor and in the northeastern portion of the Plan Area. Of the 404,644 acres of Sonoran creosote bush scrub in the Plan Area, 55% of the community currently occurs on public or private Existing Conservation Land, much of this in the northeastern portion of the Plan Area.

Distribution within the Coachella Valley. Within the MSHCP Reserve System, Sonoran creosote bush scrub occurs in 20 of the Conservation Areas:

1. Cabazon Conservation Area
2. Stubbe and Cottonwood Canyons Conservation Area
3. Snow Creek/Windy Point Conservation Area
4. Whitewater Canyon Conservation Area
5. Highway 111/I-10 Conservation Area
6. Whitewater Floodplain Conservation Area
7. Upper Mission Creek/Big Morongo Canyon Conservation Area
8. Willow Hole Conservation Area
9. Long Canyon Conservation Area
10. Edom Hill Conservation Area
11. Thousand Palms Conservation Area
12. West Deception Canyon Conservation Area
13. Indio Hills/Joshua Tree National Park Linkage Conservation Area
14. Indio Hills Palms Conservation Area
15. East Indio Hills Conservation Area
16. Joshua Tree National Park Conservation Area
17. Desert Tortoise and Linkage Conservation Area
18. Mecca Hills/Orocopia Mountains Conservation Area
19. Dos Palmas Conservation Area
20. Santa Rosa and San Jacinto Mountains Conservation Area

Comparison with *Manual of California Vegetation*. Ultimately, the Plan will use the vegetation classification system in the MCV (Sawyer and Keeler-Wolf 1995). The natural community described by the Holland system as Sonoran creosote bush scrub would be represented by one or more of the following MCV series:

1. Big galleta series

2. Brittlebush series
3. Creosote bush series
4. Creosote bush - white bursage series
5. Teddy-bear cholla series
6. White bursage series

Associated Covered Species. Covered Species that are associated with portions of this community are: Peninsular bighorn sheep, Coachella Valley round-tailed ground squirrel, Palm Springs pocket mouse, desert tortoise, burrowing owl, Le Conte's thrasher, Coachella Valley giant sand-treader cricket, Coachella Valley milkvetch, triple-ribbed milkvetch, Mecca aster, and Orocopia sage.

Essential Ecological Processes. The processes that may be significant to the maintenance of this creosote scrub community are not well known. Large-scale ecological processes that affect Sonoran creosote bush scrub are those processes that threaten the integrity of this natural community, including invasion of exotic plants and nitrogen deposition from smog fallout. These processes that manifest as threats to the community are discussed in more detail in Section 8.0.

10.3.2 Sonoran Mixed Woody and Succulent Scrub

10.3.2.1 Natural Community Conservation Goals and Objectives

Conserve and manage occurrences of this natural community within the MSHCP Reserve System according to the following criteria:

Goal 1: Conserve natural community occurrences representative of the range of environmental conditions within which the community is known to occur. Incorporate a range of environmental gradients (e.g. slope, elevation, aspect) and high Habitat diversity.

Objective 1. Through adherence to other Conservation Objectives (for another species, a natural community, Essential Ecological Process area, Biological Corridor, or Linkage area), conserve occurrences of this natural community within the following Conservation Areas:

- Stubbe and Cottonwood Canyons Conservation Area
- Whitewater Canyon Conservation Area
- Whitewater Floodplain Conservation Area
- Upper Mission Creek/Big Morongo Canyon Conservation Area
- Mission Creek/Morongo Wash Conservation Area
- Willow Hole Conservation Area
- Edom Hill Conservation Area

- Thousand Palms Conservation Area
- Indio Hills/Joshua Tree National Park Linkage Conservation Area
- Joshua Tree National Park Conservation Area
- Desert Tortoise and Linkage Conservation Area
- Santa Rosa and San Jacinto Mountains Conservation Area

Goal 2: Protect Essential Ecological Processes necessary to maintain this natural community.

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

Goal 3: Ensure Conservation of Habitat quality through protection, monitoring and Adaptive Management, and restoration where necessary, to contribute to maintenance of this community within Conservation Areas.

Objective 3. Implement biological monitoring and Adaptive Management actions to ensure Conservation of this natural community.

10.3.2.2 Threats, Limiting Factors, and Adaptive Management

Threats to this natural community are much the same as those described for Sonoran creosote bush scrub. These threats include invasive species, nitrogen deposition, OHVs, and edge effects. One of these threats with known impacts is the invasion of non-native plant species, including Saharan grass (*Schismus barbatus*) and Saharan mustard (*Brassica tournefortii*). The presence of these exotic annuals increases the fuel load and the continuity of fuels, which make this community much more susceptible to wildfires than was historically the case. Deposition of nitrogen from smog fallout can result in higher soil nitrogen levels that give exotic plants a competitive advantage (Dr. Edith Allen, pers. comm.). These Sonoran mixed woody and succulent scrub areas are not heavily used by OHV enthusiasts, but some areas have experienced a proliferation of OHV trails; this OHV activity can reduce native plant cover and collapse burrows of Covered Species. Edge effects can include increased levels of predation by native species and domestic pets, and road mortality.

The following actions may be needed to ensure persistence of this natural community if biological monitoring indicates that such actions are warranted. This list is not comprehensive but identifies some of the known or likely threats to Sonoran mixed woody and succulent scrub. In addition to conserving the Sonoran mixed woody and succulent scrub natural community, the Plan will integrate biological monitoring and management actions into a Management and Monitoring Program for this natural community. The Monitoring Program will be designed to provide feedback so that management activities can be adjusted to maximize natural community Conservation. More detailed and specific information on the biological monitoring and

management actions described here and proposed for this natural community can be found in Section 8.0, MSHCP Reserve Management and Monitoring Program. Actions may include:

1. Control and manage activities that degrade Sonoran mixed woody and succulent scrub. In particular, control and manage the primary threats to this scrub community, including invasive plants that may increase fire frequency and edge effects.
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 this scrub community.
3. Develop appropriate management prescriptions to be incorporated into the MSHCP Reserve System management plan.
4. Implement monitoring to track, and ultimately distinguish between, changes due to human or natural causes. Significant variables may include live perennial shrub abundance and invasive exotic plant abundance.

10.3.2.3 Natural Community Conservation Analysis

Conservation Area Reserve Design. To conserve Sonoran mixed woody and succulent scrub within the Plan Area, the MSHCP Reserve System includes, to the extent possible, intact stands of this natural community, without significant fragmentation impacts, and the presence of intact Essential Ecological Processes necessary to maintain this community. To the extent they occur, contiguous stands of this natural community were selected when available. Also, to the extent possible, the Planning Team attempted to include a range of environmental gradients (e.g. slope, elevation, aspect) within which this natural community occurs. This natural community is conserved within the Plan Area by Conservation Objectives for Covered Species, other natural communities, Essential Ecological Processes, or Biological Corridors.

Sonoran mixed woody and succulent scrub occurs within the Plan Area in 13 Conservation Areas: Stubbe and Cottonwood Canyons, Whitewater Canyon, Whitewater Floodplain, Upper Mission Creek/Big Morongo Canyon, Mission Creek/Morongo Wash, Willow Hole, Long Canyon, Edom Hill, Thousand Palms, Indio Hills Palms, East Indio Hills, Desert Tortoise and Linkage, and Santa Rosa and San Jacinto Mountains. The presence of Sonoran mixed woody and succulent scrub within each of the Conservation Areas is shown in Table 10-10. The Planning Team identified and assessed the sufficiency for this natural community in the following Conservation Areas:

Table 10-10: Summary of Natural Community within Conservation Areas: Sonoran Mixed Woody and Succulent Scrub

CONSERVATION AREA	*Land within the Conservation Areas*				
	Total Acres of Natural Community in Conservation Area	*Total Acres Subject to Impacts*[2]	*Acres within Existing Conservation Lands*	*Remaining Acres to be Conserved*	*Total Acres to be Conserved in MSHCP Reserve System*
STUBBE & COTTONWOOD CYN	1,703	67	1,037	599	1,636
WHITEWATER CYN	955	63	327	565	892
WHITEWATER FLOODPLAIN	93	7	21	65	86
UPPER MISSION CREEK/BIG MORONGO CYN	7,527	522	2,306	4,699	7,005
WILLOW HOLE	3,327	275	575	2,477	3,052
LONG CANYON	689	N/A	11	(678)[1]	11
EDOM HILL	2,034	182	219	1,634	1,853
THOUSAND PALMS	5,515	354	1,973	3,188	5,161
INDIO HILLS PALMS	216	1	210	5	215
EAST INDIO HILLS	63	6	0	57	57
DESERT TORTOISE AND LINKAGE	129	13	0	116	116
SANTA ROSA/ SAN JACINTO MOUNTAINS	89,999	2,764	65,893	21,342	87,235
TOTAL	**112,250**	**4,254**	**72,572**	**34,746 (678)**[1]	**107,318**

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

1. ***Stubbe and Cottonwood Canyons.*** Sonoran mixed woody and succulent scrub occurs on approximately 1,703 acres within the Stubbe and Cottonwood Canyons Conservation Area. Approximately 1,636 of these acres will be conserved as a result of a specific Conservation Objective for one of the Covered Species.

2. ***Whitewater Canyon.*** Sonoran mixed woody and succulent scrub occurs on approximately 955 acres within the Whitewater Canyon Conservation Area. Approximately 892 of these acres will be conserved as a result of a specific Conservation Objective for one of the Covered Species.

3. ***Whitewater Floodplain.*** There are approximately 93 acres of Sonoran mixed woody and succulent scrub mapped in this Conservation Area. Approximately 86 acres of this natural community would be conserved through implementation of a Conservation Objective for one of the Covered Species. In addition, the entire Conservation Area is covered by a Conservation Objective to protect either the sand source or sand transport areas. The MSHCP Reserve System will conserve these sand transport and delivery systems.

4. ***Upper Mission Creek/Big Morongo Canyon*.** Sonoran mixed woody and succulent scrub occurs on approximately 7,527 acres within the Upper Mission Creek/Big Morongo Canyon Conservation Area. Approximately 7,005 of these acres will be conserved as a result of a specific Conservation Objective for one of the Covered Species.

5. ***Willow Hole.*** Sonoran mixed woody and succulent scrub occurs on approximately 3,327 acres within the Willow Hole Conservation Area. Approximately 3,052 of these acres will be conserved as a result of a specific Conservation Objective for one of the Covered Species.

6. ***Long Canyon.*** This Conservation Area does not have specific Conservation Objectives for natural communities. This Conservation Area includes approximately 689 acres of mapped Sonoran mixed woody and succulent scrub; 11 acres are within Existing Conservation Lands. The remaining 678 acres are within the fluvial sand transport area. Because of existing land use patterns and associated edge effects in this area it would be unsuitable for Habitat protection through acquisition.

7. ***Edom Hill*.** There are approximately 2,034 acres of Sonoran mixed woody and succulent scrub mapped in this Conservation Area. A Conservation Objective for one of the Covered Species would conserve approximately 1,853 acres of mixed woody and succulent scrub in this Conservation Area.

8. ***Thousand Palms.*** Sonoran mixed woody and succulent scrub occurs on approximately 5,515 acres within the Thousand Palms Conservation Area. Approximately 5,161 of these acres will be conserved as a result of a specific Conservation Objective for one of the Covered Species.

9. ***Indio Hills Palms.*** Sonoran mixed woody and succulent scrub occurs on approximately 216 acres within the Indio Hills Palms Conservation Area. At least 215 of these acres will be conserved as a result of a specific Conservation Objective for one of the Covered Species.

10. ***East Indio Hills.*** There are approximately 63 acres of Sonoran mixed woody and succulent scrub mapped in this Conservation Area. At least 57 of these acres will be conserved as a result of a specific Conservation Objective for one of the Covered Species.

11. ***Desert Tortoise and Linkage.*** Sonoran mixed woody and succulent scrub occurs on approximately 129 acres within the Desert Tortoise and Linkage Conservation Area. At least 116 of these acres will be conserved as a result of a specific Conservation Objective for one of the Covered Species.

12. ***Santa Rosa and San Jacinto Mountains.*** There are approximately 89,999 acres of Sonoran mixed woody and succulent scrub mapped in this Conservation Area. All but approximately 403 of these acres will be conserved as a result of a specific Conservation Objective for one of the Covered Species; of the 403 acres, 4 acres are private, 2 acres are BLM Conservation Level 1, 195 acres are BLM Conservation Level 2, 27 acres are BLM Conservation Level 3, 107 acres are CDFG/WCB Conservation Level 1, 12 acres are USFS Conservation Level 1, and 12 acres are USFS Conservation Level 2. Therefore, most of these acres are already in protected status.

Conservation Levels. The MSHCP Reserve System would provide protection of Sonoran mixed woody and succulent scrub in 12 of the 13 Conservation Areas: Stubbe and Cottonwood Canyons, Whitewater Canyon, Whitewater Floodplain, Upper Mission Creek/Big Morongo Canyon, Mission Creek/Morongo Wash, Willow Hole, Edom Hill, Thousand Palms, Indio Hills Palms, East Indio Hills, Desert Tortoise and Linkage, and Santa Rosa and San Jacinto Mountains Conservation Areas. In addition to conserving currently unprotected Habitat, the Plan benefits this natural community by addressing threats to this community, including invasive plants.

Conservation of 107,318 acres, or 80%, of Sonoran mixed woody and succulent scrub will ensure that this natural community is sustained and restored within the Plan Area.

10.3.2.4 Natural Community Account: Background

Description. This is the only Sonoran desert community in the Plan Area with substantial dominance of cacti and other stem succulents. It is similar to creosote bush scrub but more varied and usually with a higher plant density. In addition to creosote bush and other associated perennial shrubs, typical species include silver cholla (*Opuntia echinocarpa*), buckhorn cholla (*Opuntia acanthocarpa),* pencil cholla (*Opuntia ramosissima*), prickly pear (*Opuntia engelmannii*), beavertail cactus (*Opuntia basilaris*), barrel cactus (*Ferocactus acanthodes*), and ocotillo (*Fouquieria splendens*). This community occurs on alluvial fans and slopes of the Santa Rosa Mountains, in the Little San Bernardino Mountains, on the valley floor north of Interstate 10 to just east of the Thousand Palms Preserve. Covering 133,682 acres, it is the second most abundant community in the Plan Area. Currently, 54% of this community occurs on public or private Existing Conservation Land.

Distribution within the Coachella Valley. Within the MSHCP Reserve System, Sonoran mixed woody and succulent scrub occurs in 13 of the Conservation Areas:

1. Stubbe and Cottonwood Canyons Conservation Area
2. Whitewater Canyon Conservation Area
3. Whitewater Floodplain Conservation Area

4. Upper Mission Creek/Big Morongo Canyon Conservation Area
5. Mission Creek/Morongo Wash Conservation Area
6. Willow Hole Conservation Area
7. Long Canyon Conservation Area
8. Edom Hill Conservation Area
9. Thousand Palms Conservation Area
10. Indio Hills Palms Conservation Area
11. East Indio Hills Conservation Area
12. Desert Tortoise and Linkage Conservation Area
13. Santa Rosa and San Jacinto Mountains Conservation Area

Comparison with *Manual of California Vegetation*. Ultimately, the Plan will use the vegetation classification system in the MCV (Sawyer and Keeler-Wolf 1995). The natural community described by the Holland system as Sonoran mixed woody and succulent scrub would be represented by one or more of the following MCV series:

1. Creosote bush - white bursage series
2. Ocotillo series

Associated Covered Species. Covered Species that are associated with portions of this community are: Peninsular bighorn sheep, Coachella Valley round-tailed ground squirrel, Palm Springs pocket mouse, desert tortoise, burrowing owl, Le Conte's thrasher, Coachella Valley giant sand-treader cricket, Coachella Valley milkvetch, triple-ribbed milkvetch, Mecca aster, and Orocopia sage.

Essential Ecological Processes. The processes that may be significant to the maintenance of this scrub community are not well known. Large-scale ecological processes that affect both Sonoran creosote bush scrub and Sonoran mixed woody and succulent scrub are those processes that threaten the integrity of this natural community, including invasion of exotic plants and nitrogen deposition from smog fallout. These processes that manifest as threats to the community are discussed in more detail in Section 8.0.

10.3.3 Mojave Mixed Woody Scrub

10.3.3.1 Natural Community Conservation Goals and Objectives

Conserve and manage occurrences of this natural community within the MSHCP Reserve System according to the following criteria:

Goal 1: Conserve natural community occurrences representative of the range of environmental conditions within which the community is known to occur. Incorporate a range of environmental gradients (e.g. slope, elevation, aspect) and high Habitat diversity.

Objective 1. Through adherence to other Conservation Objectives (for another species, a natural community, Essential Ecological Process area, Biological Corridor, or Linkage area), conserve occurrences of this natural community within the following Conservation Areas:

- 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

Goal 2: Protect Essential Ecological Processes necessary to maintain this natural community.

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

Goal 3: Ensure Conservation of Habitat quality through protection, monitoring and Adaptive Management, and restoration where necessary, to contribute to maintenance of this community within Conservation Areas.

Objective 3. Implement biological monitoring and Adaptive Management actions to ensure Conservation of this natural community.

10.3.3.2 Threats, Limiting Factors, and Adaptive Management

Threats to this natural community are much the same as those described for Sonoran creosote bush scrub. These threats include invasive species, nitrogen deposition, OHVs, and edge effects. One of these threats with known impacts is the invasion of non-native plant species, including Saharan grass (*Schismus barbatus*) and Saharan mustard (*Brassica tournefortii*). The presence of these exotic annuals increases the fuel load and the continuity of fuels, which make this community much more susceptible to wildfires than was historically the case. Deposition of

nitrogen from smog fallout can result in higher soil nitrogen levels that give exotic plants a competitive advantage (Dr. Edith Allen, pers. comm.). These Mojave mixed woody scrub areas are not heavily used by OHV enthusiasts but some areas have experienced a proliferation of OHV trails; this OHV activity can reduce native plant cover and collapse burrows of Covered Species. Edge effects can include increased levels of predation by native species and domestic pets, and road mortality.

The following actions may be needed to ensure persistence of this natural community if biological monitoring indicates that such actions are warranted. This list is not comprehensive but identifies some of the known or likely threats to Mojave mixed woody scrub. In addition to conserving the Mojave mixed woody scrub natural community, the Plan will integrate biological monitoring and management actions into the Management and Monitoring Programs for this natural community. The Monitoring Program will be designed to provide feedback so that management activities can be adjusted to maximize natural community Conservation. More detailed and specific information on the biological monitoring and management actions described here and proposed for this natural community can be found in Section 8.0, MSHCP Reserve Management and Monitoring Program. Actions may include:

1. Control and manage activities that degrade Mojave mixed woody scrub. In particular, control and manage the primary threats to this scrub community, including invasive plants that may increase fire frequency and edge effects.
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 this scrub community.
3. Develop appropriate management prescriptions to be incorporated into the MSHCP Reserve System management plan.
4. Implement monitoring to track, and ultimately distinguish between, changes due to human or natural causes. Significant variables may include live perennial shrub abundance and invasive exotic plant abundance.

These measures are described in more detail in the Monitoring and Management Program in Section 8.0.

10.3.3.3 Natural Community Conservation Analysis

Conservation Area Reserve Design. To conserve Mojave mixed woody scrub within the Plan Area, the MSHCP Reserve System includes, to the extent possible, intact stands of this natural community, without significant fragmentation impacts, and the presence of intact Essential Ecological Processes necessary to maintain this community. To the extent they occur, contiguous stands of this natural community were selected when available. Also, to the extent possible, the Planning Team attempted to include a range of environmental gradients (e.g. slope, elevation,

aspect) within which this natural community occurs. This natural community is conserved within the Plan Area by Conservation Objectives for Covered Species, other natural communities, Essential Ecological Processes, or Biological Corridors.

Mojave mixed woody scrub occurs within the Plan Area in five Conservation Areas: Upper Mission Creek/Big Morongo Canyon, West Deception Canyon, Indio Hills/Joshua Tree National Park Linkage, Joshua Tree National Park, and Desert Tortoise and Linkage. The presence of Mojave mixed woody scrub within each of the Conservation Areas is shown in Table 10-11. The Planning Team identified and assessed the sufficiency for this natural community in the following Conservation Areas:

1. ***Upper Mission Creek/Big Morongo Canyon*****.** Mojave mixed woody scrub occurs on approximately 15,771 acres within the Upper Mission Creek/Big Morongo Canyon Conservation Area. Approximately 15,265 of these acres will be conserved as a result of a specific Conservation Objective for one of the Covered Species.

2. ***West Deception Canyon.*** This Conservation Area does not have specific Conservation Objectives for natural communities. This Conservation Area includes approximately 1,397 acres of mapped Mojave mixed woody scrub. A Conservation Objective for the sand source area would conserve approximately 1,160 acres of Mojave mixed woody scrub in this Conservation Area. The remaining approximately 110 acres are only covered by a Conservation Objective to maintain fluvial sand transport. Because of existing land use patterns and associated edge effects in this area it would be unsuitable for Habitat protection through acquisition.

3. ***Indio Hills/Joshua Tree National Park Linkage*****.** There are approximately 4,380 acres of Mojave mixed woody scrub mapped in this Conservation Area. A Conservation Objective for one of the Covered Species would conserve approximately 4,064 acres of Mojave mixed woody scrub in this Conservation Area.

4. ***Joshua Tree National Park.*** Mojave mixed woody scrub occurs on approximately 57,099 acres within the Joshua Tree National Park Conservation Area. Approximately 56,299 of these acres will be conserved as a result of a specific Conservation Objective for this natural community.
5. ***Desert Tortoise and Linkage.*** There are approximately 17,264 acres of Mojave mixed woody scrub within the Desert Tortoise and Linkage Conservation Area. At least 16,247 of these acres will be conserved as a result of a Conservation Objective for one of the Covered Species.

Conservation Levels. The MSHCP Reserve System would provide at least some protection of Mojave mixed woody scrub in five Conservation Areas: Upper Mission Creek/Big Morongo Canyon, West Deception Canyon, Indio Hills/Joshua Tree National Park Linkage,

Joshua Tree National Park, and Desert Tortoise and Linkage Conservation Areas. In addition to conserving currently unprotected Habitat, the Plan benefits this natural community by addressing threats to this community, including invasive plants.

Conservation of 93,035 acres, or 89%, of Mojave mixed woody scrub will ensure that this natural community is sustained and restored within the Plan Area.

Table 10-11: Summary of Natural Community within Conservation Areas: Mojave Mixed Woody Scrub

CONSERVATION AREA	***Land within the Conservation Areas***				
	Total Acres of Natural Community in Conservation Area	***Total Acres Subject to Impacts[2]***	***Acres within Existing Conservation Lands***	***Remaining Acres to be Conserved***	***Total Acres to be Conserved in MSHCP Reserve System***
UPPER MISSION CREEK/ BIG MORONGO CYN	15,771	506	10,711	4,554	15,265
WEST DECEPTION CANYON	1,397	127	132	1,028 (110) [1]	1,160
INDIO HILLS/ JOSHUA TREE NP	4,380	316	1,219	2,845	4,064
JOSHUA TREE NATIONAL PARK	57,099	800	49,104	7,195	56,299
DESERT TORTOISE AND LINKAGE	17,264	1,017	7,090	9,157	16,247
TOTAL	95,911	2,766	68,256	24,779 (110) [1]	93,035

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

10.3.3.4 Natural Community Account: Background

Description. Mojave mixed woody scrub is a complex scrub community, open enough to be passable, and usually characterized by Joshua Tree (*Yucca brevifolia herbertii)*, California buckwheat (*Eriogonum fasciculatum polifolium)*, and bladderpod (*Isomeris arborea)*. Most of the constituent species also occur in other nearby communities. The sites where this community occurs typically have very shallow, overly drained, often rolling to steep soils, usually derived from granitic parent materials. These sites have extremely low water holding capacity, mild alkalinity, and are not very saline. The typical elevation range is 2,000-5,000 feet. In the Plan Area, approximately 104,212 acres of this community occurs along the southern slopes of the Little San

Bernardino Mountains, where approximately 65% is protected within Joshua Tree National Park, Big Morongo ACEC, and the San Gorgonio Wilderness immediately west of Highway 62.

Distribution within the Coachella Valley. Within the MSHCP Reserve System, Mojave mixed woody scrub occurs in five of the Conservation Areas:

1. Upper Mission Creek/Big Morongo Canyon Conservation Area
2. West Deception Canyon Conservation Area
3. Indio Hills/Joshua Tree National Park Linkage Conservation Area
4. Joshua Tree National Park Conservation Area
5. Desert Tortoise and Linkage Conservation Area

Comparison with *Manual of California Vegetation*. Ultimately, the Plan will use the vegetation classification system in the MCV (Sawyer and Keeler-Wolf 1995). The natural community described by the Holland system as Mojave mixed woody scrub would be represented by the following MCV series:

1. Joshua tree series

Associated Covered Species. One Covered Species is associated with this natural community, the desert tortoise.

Essential Ecological Processes. The processes that may be significant to the maintenance of this scrub community are not well known. Large-scale ecological processes that affect Mojave mixed woody scrub are those processes that threaten the integrity of this natural community, including invasion of exotic weeds and nitrogen deposition from smog fallout. These processes that manifest as threats to the community are discussed in more detail in Section 8.0.

10.4 Alkali Scrub Communities

This section contains a summary description, including natural community characteristics, typical species, and significant threats, for the two alkali scrub communities proposed for coverage in the Plan. General Conservation measures, which are common to both of these communities, are listed below.

1. Protect unfragmented blocks of these natural communities to the Maximum Extent Feasible.

2. Reduce and control non-native plant species, in particular tamarisk, which is highly invasive in these communities and can replace desert saltbush scrub or desert sink scrub in suitable Habitat.

3. Portions of these natural communities west of the Salton Sea are on the Torres Martinez Indian Reservation and are not in the Plan Area. Coordination and cooperation with the Torrez Martinez will be pursued.

10.4.1 Desert Saltbush Scrub

10.4.1.1 Natural Community Conservation Goals and Objectives

Conserve and manage occurrences of this natural community within the MSHCP Reserve System according to the following criteria:

Goal 1: Conserve natural community occurrences representative of the range of environmental conditions within which the community is known to occur. Incorporate a range of environmental gradients (e.g. slope, elevation, aspect) and high Habitat diversity.

Objective 1. Through adherence to other Conservation Objectives (for another species, a natural community, Essential Ecological Process area, Biological Corridor, or Linkage area), conserve occurrences of this natural community within the following Conservation Areas

- East Indio Hills Conservation Area
- Dos Palmas Conservation Area
- Coachella Valley Stormwater Channel and Delta Conservation Area

Goal 2: Protect Essential Ecological Processes necessary to maintain this natural community.

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

Goal 3: Ensure Conservation of Habitat quality through protection, monitoring and Adaptive Management, and restoration where necessary, to contribute to maintenance of this community within Conservation Areas.

Objective 3. Implement biological monitoring and Adaptive Management actions to ensure Conservation of this natural community.

10.4.1.2 Threats, Limiting Factors, and Adaptive Management

Threats to this community include fragmentation; many of the intact occurrences occur in small patches surrounded by agriculture. Another threat is invasive plant species, particularly tamarisk, which often displaces desert saltbush scrub in the moist soils around the Salton Sea. Because tamarisk tolerates the alkaline soils to which the species in this natural community are adapted, it can and does become a dominant member of this community.

The following actions may be needed to ensure persistence of this natural community if biological monitoring indicates that such actions are warranted. This list is not comprehensive but identifies some of the known or likely threats to desert saltbush scrub. In addition to conserving the desert saltbush scrub natural community, the Plan will integrate biological monitoring and management actions into a Management and Monitoring Program for this natural community. The Monitoring Program will be designed to provide feedback so that management activities can be adjusted to maximize natural community Conservation. More detailed and specific information on the biological monitoring and management actions described here and proposed for this natural community can be found in Section 8.0, MSHCP Reserve Management and Monitoring Program. Actions may include:

1. Control and manage activities that degrade desert saltbush scrub. In particular, control and manage the primary threats to this scrub community, including invasive plants that can dominate this community, and fragmentation.
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 desert saltbush scrub community. Tamarisk is a known invasive species that may dominate this community.
3. Implement monitoring to track, and ultimately distinguish between, changes due to human or natural causes. Significant variables may include live perennial shrub abundance and invasive exotic plant abundance.

10.4.1.3 Natural Community Conservation Analysis

Conservation Area Reserve Design. To conserve desert saltbush scrub within the Plan Area, the MSHCP Reserve System includes, to the extent possible, intact stands of this natural community, without significant fragmentation impacts, and the presence of intact Essential Ecological Processes necessary to maintain this community. To the extent they occur, contiguous stands of this natural community were selected when available. Also, to the extent possible, the Planning Team attempted to include a range of environmental gradients (e.g. slope, elevation, aspect) within which this natural community occurs. The extant occurrences of desert saltbush scrub within the Plan Area are primarily in the Coachella Valley Stormwater Channel and Delta Conservation Area. Stands of this natural community occur mostly in fragmented patches surrounded by agriculture. To the extent possible, the MSHCP Reserve System includes the

largest, contiguous stands of desert saltbush scrub still extant in this area. This natural community is conserved within the Plan Area by specific Conservation Objectives in all three Conservation Areas where it occurs.

Desert saltbush scrub occurs within the Plan Area in three Conservation Areas: Willow Hole, East Indio Hills, and Coachella Valley Stormwater Channel and Delta. The presence of desert saltbush scrub within each of the Conservation Areas is shown in Table 10-12. The Planning Team identified and assessed Conservation for this natural community in the following Conservation Areas:

1. ***Willow Hole.*** Desert saltbush scrub occurs on approximately 169 acres within the Willow Hole Conservation Area, of which the Plan will conserve approximately 152 acres. The desert saltbush scrub occurs primarily along the margins of the mesquite hummock areas in nearly pure stands of several saltbush species.

2. ***East Indio Hills.*** There are approximately 8 acres of desert saltbush scrub mapped in this Conservation Area. Approximately 7 of these acres will be conserved under the Plan.

3. ***Coachella Valley Stormwater Channel & Delta.*** There are 713 acres of desert saltbush scrub within this Conservation Area; approximately 642 of these acres will be conserved under the Plan.

Table 10-12: Summary of Natural Community within Conservation Areas: Desert Saltbush Scrub

CONSERVATION AREA	*Land within the Conservation Areas*				
	Total Acres of Natural Community in Conservation Area	*Total Acres Subject to Impacts*[2]	*Acres within Existing Conservation Lands*	*Remaining Acres to be Conserved*	*Total Acres to be Conserved in MSHCP Reserve System*
WILLOW HOLE	169	17	0	152	152
EAST INDIO HILLS	8	1	0	7	7
CV STORMWATER CHANNEL & DELTA	713	71	0	642	642
TOTAL	**890**	**89**	**0**	**801**	**801**

Conservation Levels. The MSHCP Reserve System would provide protection of desert saltbush scrub in three Conservation Areas: Willow Hole, East Indio Hills, and Coachella Valley

Stormwater Channel and Delta Conservation Areas. It should be noted that several species of saltbush occur in smaller stands as a subset of Sonoran creosote bush scrub in other Conservation Areas, including Thousand Palms and Dos Palmas. These smaller stands will also be protected as a result of the Plan. In addition to conserving currently unprotected Habitat, the Plan benefits this natural community by addressing threats, including invasive plants such as tamarisk.

Conservation of 801 acres, or 15%, of desert saltbush scrub will occur within the Plan Area. The occurrences of this natural community outside the Conservation Areas are generally highly fragmented.

10.4.1.4 Natural Community Account: Background

Description. The desert saltbush scrub community can include various species of saltbush in a nearly uniform stand of shrubs, forming a more complete cover than in creosote bush scrub. This community occupies areas where fine-textured, poorly drained soils with high salinity and/or alkalinity occur, Habitats that are generally moist, with a sandy loam soil, and a total salinity in the range of 0.2 - 0.7%. Physiognomically, the community is often composed of a nearly uniform stand of shrubs about 1 meter tall forming a more complete cover than in creosote bush scrub. One or more species of *Atriplex* are dominant in this community, including allscale (*Atriplex polycarpa)* and four-winged saltbush (*Atriplex canescens* var. *linearis*). Screwbean mesquite (*Prosopis glandulosa* var. *torreyana*) is a common associate. Four-wing saltbush shows greater dominance in dryer, coarser soils and occurs throughout the desert saltbush scrub community. Screwbean mesquite reaches greater development in lower-elevation areas with a shallow water table or capillary fringe. Alkali goldenbush (*Isocoma acradenia)* is common in areas where *P. glandulosa* is dominant. Once common in the Plan Area, this community now occurs only in small patches in the Willow Hole area, the Thousand Palms Preserve, and in the higher salinity soils in the area around the northern portion of the Salton Sea. The total acreage in the Plan Area is 5,325, none of which currently occurs on public or private Existing Conservation Land.

Distribution within the Coachella Valley. Within the MSHCP Reserve System, desert saltbush scrub is mapped in three of the Conservation Areas:

1. Willow Hole Conservation Area
2. East Indio Hills Conservation Area
3. Coachella Valley Stormwater Channel and Delta Conservation Area

Comparison with *Manual of California Vegetation*. Ultimately, the Plan will use the vegetation classification system in the MCV (Sawyer and Keeler-Wolf 1995). The natural community described by the Holland system as desert saltbush scrub would compare with one or more of the following MCV series:

1. Allscale series
2. Desert holly series
3. Fourwing saltbush series
4. Mixed saltbush series
5. Spinescale series

Associated Covered Species. Covered Species that are associated with this community are: flat-tailed horned lizard, Le Conte's thrasher, and crissal thrasher. This community may be used during migration by riparian birds.

Essential Ecological Processes. The Essential Ecological Processes that are significant to the maintenance of desert saltbush scrub are not well known. Maintenance of the existing hydrological regimes is probably significant to this natural community as an important element of soil alkalinity or salinity. Some ecological processes that affect desert saltbush scrub are those processes that threaten the integrity of this natural community, including invasion of exotic plants, particularly tamarisk.

10.4.2 Desert Sink Scrub

10.4.2.1 Natural Community Conservation Goals and Objectives

Conserve and manage occurrences of this natural community within the MSHCP Reserve System according to the following criteria:

Goal 1: Conserve natural community occurrences representative of the range of environmental conditions within which the community is known to occur. Incorporate a range of environmental gradients (e.g. slope, elevation, aspect) and high Habitat diversity.

Objective 1. Ensure Conservation of this natural community within the following Conservation Areas:

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

Goal 2: Protect Essential Ecological Processes necessary to maintain this natural community.

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

Goal 3: Ensure Conservation of Habitat quality through protection, monitoring and Adaptive Management, and restoration where necessary, to contribute to maintenance of this community within Conservation Areas.

Objective 3. Implement biological monitoring and Adaptive Management actions to ensure Conservation of this natural community.

10.4.2.2 Threats, Limiting Factors, and Adaptive Management

Threats to this community include fragmentation and invasive plant species, particularly tamarisk. Most of the occurrences of desert sink scrub in the vicinity of the Whitewater River delta and the Salton Sea are fragmented. In this area, desert sink scrub occurs as scattered patches amidst agricultural Development. This fragmentation results in high edge effects. Another threat to this natural community is the invasive, non-native tamarisk or salt cedar. Because tamarisk tolerates the high soil salinity areas where desert sink scrub species occur, it invades this natural community if adequate soil moisture is available.

The following actions may be needed to ensure persistence of this natural community if biological monitoring indicates that such actions are warranted. This list is not comprehensive but identifies some of the known or likely threats to desert sink scrub. In addition to conserving the desert sink scrub natural community, the Plan will integrate biological monitoring and management actions into a Management and Monitoring Program for this natural community. The Monitoring Program will be designed to provide feedback so that management activities can be adjusted to maximize natural community Conservation. More detailed and specific information on the biological monitoring and management actions described here and proposed for this natural community can be found in Section 8.0, MSHCP Reserve Management and Monitoring Program. Actions may include:

1. Control and manage activities that degrade desert sink scrub. In particular, control and manage the primary threats to this scrub community, including invasive plants that dominate this community, and fragmentation.
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 desert sink scrub community. Tamarisk is a known invasive species that may dominate this community.
3. Implement monitoring to track, and ultimately distinguish between, changes due to human or natural causes. Significant variables may include live perennial shrub abundance and invasive exotic plant abundance.

10.4.2.3 Natural Community Conservation Analysis

Conservation Area Reserve Design. To conserve desert sink scrub within the Plan Area, the MSHCP Reserve System includes, to the extent possible, intact stands of this natural community, without significant fragmentation impacts, and the presence of intact Essential Ecological Processes necessary to maintain this community. To the extent they occur, contiguous stands of this natural community were selected when available. Also, to the extent possible, the Planning Team attempted to include a range of environmental gradients (e.g. slope, elevation, aspect) within which this natural community occurs. The extant occurrences of desert sink scrub within the Plan Area are in the Dos Palmas and Coachella Valley Stormwater Channel and Delta Conservation Areas. Stands of this natural community occur mostly in fragmented patches surrounded by agriculture. To the extent possible, the MSHCP Reserve System includes the

largest, contiguous stands of desert sink scrub still extant in this area. This natural community is conserved within the Plan Area by specific Conservation Objectives in each of the Conservation Areas where it occurs.

Desert sink scrub occurs within the Plan Area in two Conservation Areas: Dos Palmas and Coachella Valley Stormwater Channel and Delta. The presence of desert sink scrub within each of the Conservation Areas is shown in Table 10-13. The Planning Team identified and assessed Conservation for this natural community in the following Conservation Areas:

1. ***Dos Palmas.*** Desert sink scrub occurs on approximately 7,195 acres within the Dos Palmas Conservation Area, of which the Plan will conserve approximately 6,708 acres. Within the Dos Palmas Conservation Area this natural community occurs in areas where soil alkalinity is high and plants are widely spaced with large expanses of bare ground.

2. ***Coachella Valley Stormwater Channel & Delta.*** Desert sink scrub occurs on approximately 1,206 acres within the Coachella Valley Stormwater Channel & Delta Conservation Area, of which the Plan will conserve approximately 1,106 acres. Within the Coachella Valley Stormwater Channel & Delta Conservation Area this natural community occurs in areas where soil alkalinity is high, usually close to the Salton Sea.

Conservation Levels. The MSHCP Reserve System would provide protection of desert sink scrub in two Conservation Areas: Dos Palmas and Coachella Valley Stormwater Channel and Delta Conservation Areas. In addition to conserving currently unprotected Habitat, the Plan benefits this natural community by addressing threats to this community, including invasive plants such as tamarisk.

Conservation of 7,814 acres, or 82%, of desert sink scrub will ensure that this natural community is sustained within the Plan Area.

Table 10-13: Summary of Natural Community within Conservation Areas: Desert Sink Scrub

CONSERVATION AREA	*Land within the Conservation Areas*				
	Total Acres of Natural Community in Conservation Area	*Total Acres Subject to Impacts*[2]	*Acres within Existing Conservation Lands*	*Remaining Acres to be Conserved*	*Total Acres to be Conserved in MSHCP Reserve System*
DOS PALMAS	7,195	487	2,327	4,381	6,708
CV STORMWATER CHANNEL & DELTA	1,206	100	209	897	1,106
TOTAL	**8,401**	**587**	**2,536**	**5,278**	**7,814**

10.4.2.4 Natural Community Account: Background

Description. This community is similar to desert saltbush scrub, but plants are often more widely spaced and most species are succulent chenopods. Saltbush (*Atriplex* spp.) is a minor component. Pickleweed (*Salicornia virginica*), iodine bush (*Allenrolfea occidentalis*), and bush seepweed (*Suaeda moquinii)* are characteristic of this community. It occurs at lower elevations on poorly drained moist to wet soils with high alkalinity and/or salinity. Desert sink scrub appears to displace desert saltbush scrub in areas of a high water table and a salt crust at the surface. Some of the species, in particular iodine bush, can endure more alkaline or salty soils than most other desert plants (Jaeger 1969). In some areas, such as at Dos Palmas, the plant cover is extremely low and this natural community grades into alkaline flats devoid of vegetation. It is found in the vicinity of the Salton Sea, partially on Torres Martinez Reservation land and partially on private land, and in the Dos Palmas/Salt Creek area east of the Salton Sea. Of the 9,535 acres in the Plan Area, 27% currently occurs on public or private Existing Conservation Land.

Distribution within the Coachella Valley. Within the MSHCP Reserve System, desert sink scrub is mapped in three of the Conservation Areas:

1. Dos Palmas Conservation Area
2. Coachella Valley Stormwater Channel and Delta Conservation Area

Vegetation Characterization. Ultimately, the Plan will use the vegetation classification system in the MCV (Sawyer and Keeler-Wolf 1995). The natural community described by the Holland system as desert sink scrub would compare with one or more of the following MCV series:

1. Bush seepweed series
2. Fourwing saltbush series
3. Greasebush series
4. Iodine bush series
5. Mixed saltbush series

Associated Covered Species. The Covered Species associated with this community is the flat-tailed horned lizard in the Salt Creek area of the Dos Palmas Conservation Area. This community may be used during migration by riparian birds.

Essential Ecological Processes. The Essential Ecological Processes that are significant to the maintenance of desert sink scrub have not been described. Maintenance of the existing hydrological regimes is probably significant to this natural community as an important element of soil alkalinity or salinity. Some ecological processes that affect desert sink scrub are those processes that threaten the integrity of this natural community, including invasion of exotic plants, particularly tamarisk.

10.5 Chaparral Communities

This section contains a summary description, including natural community characteristics, typical species, and significant threats, for each of the four chaparral communities proposed for coverage in the Plan. General Conservation measures, which are common to all these chaparral types, are listed below.

1. As part of the Management and Monitoring Program, evaluate the need to manage fire to avoid senescence of vegetation due to fire suppression. Develop appropriate fire management prescriptions for chaparral natural communities. This may include the use of prescribed fire and/or standards for controlling wildfires to maintain or restore these communities.

2. Essential Ecological Processes, including fire regimes, are protected to ensure sustainability of the community. Please refer to the Section 4.3 subsections for specific goals for ecosystem processes.

10.5.1 Chamise Chaparral

10.5.1.1 Natural Community Conservation Goals and Objectives

Conserve and manage occurrences of chamise chaparral within the MSHCP Reserve System according to the following criteria:

Goal 1: Conserve natural community occurrences representative of the range of environmental conditions within which the community is known to occur. Incorporate a range of environmental gradients (e.g. slope, elevation, aspect) and high Habitat diversity.

Objective 1. Ensure Conservation of this natural community within the following Conservation Areas:

- Cabazon Conservation Area
- Stubbe and Cottonwood Canyons Conservation Area
- Whitewater Canyon Conservation Area

Goal 2: Protect Essential Ecological Processes necessary to maintain this natural community.

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

Goal 3: Ensure Conservation of Habitat quality through protection, monitoring and Adaptive Management, and restoration where necessary, to contribute to maintenance of this community within Conservation Areas.

Objective 3. Implement biological monitoring and Adaptive Management actions to ensure Conservation of this natural community.

10.5.1.2 Threats, Limiting Factors, and Adaptive Management

Threats to the chamise chaparral natural community are relatively few in that the occurrences of chamise chaparral are on the slopes of the San Bernardino Mountains in areas of no Development potential, including portions of the San Gorgonio Wilderness Area. However, increased fire frequency due to the spread of non-native plant species may affect this chaparral in the future.

The following actions may be needed to ensure persistence of this natural community if biological monitoring indicates that such actions are warranted. This list is not comprehensive but identifies some of the known or likely threats to chamise chaparral. In addition to conserving the chamise chaparral natural community, the Plan will integrate monitoring and management actions into a Management and Monitoring Program for this natural community. The Monitoring Program will be designed to provide feedback so that management activities can be adjusted to maximize natural community Conservation. More detailed and specific information on the biological monitoring and management actions described here and proposed for this natural community can be found in Section 8.0, MSHCP Reserve Management and Monitoring Program. Actions may include:

1. Control and manage activities that degrade chamise chaparral.

2. Identify actions to reduce impacts from, and control where feasible, invasive species if it is determined from monitoring results that there are impacts to the chamise chaparral natural community.

10.5.1.3 Natural Community Conservation Analysis

Conservation Area Configuration Issues. The areas of chamise chaparral within the Plan Area are in scattered patches on the slopes of the San Bernardino Mountains, in the vicinity of Millard, Stubbe and Cottonwood Canyons. Chamise chaparral occurs in intact stands in an area where there has been little or no disturbance. It occurs in a matrix with other chaparral types, including semi-desert chaparral and interior live oak chaparral.

The occurrence of chamise chaparral is limited within the Plan Area to three Conservation Areas, Cabazon, Stubbe and Cottonwood Canyons, and Whitewater Canyon. The presence of chamise chaparral within each of the Conservation Areas is shown in Table 10-14. The Planning Team identified and assessed Conservation for this natural community in the following Conservation Areas:

1. ***Cabazon.*** There are approximately 188 acres of chamise chaparral in this Conservation Area of which the Plan conserves approximately 163 acres.

2. ***Stubbe and Cottonwood Canyons.*** There are approximately 1,983 acres of chamise chaparral in this Conservation Area. The Plan will ensure Conservation of approximately 1,966 of these acres.

3. ***Whitewater Canyon.*** There are approximately 569 acres of chamise chaparral within this Conservation Area, of which approximately 553 acres will be conserved under the Plan.

Conservation Levels. The MSHCP Reserve System would provide protection of chamise chaparral in three Conservation Areas: Cabazon, Stubbe and Cottonwood Canyons, and Whitewater Canyon Conservation Areas. In addition to conserving currently unprotected Habitat, the Plan benefits this natural community by addressing threats to this community as they are identified through Adaptive Management.

Conservation of 2,688 acres, or 98%, of chamise chaparral will ensure that this natural community is sustained within the Plan Area.

Table 10-14: Summary of Natural Community within Conservation Areas: Chamise Chaparral

CONSERVATION AREA	***Land within the Conservation Areas***				
	Total Acres of Natural Community in Conservation Area	***Total Acres Subject to Impacts[2]***	***Acres within Existing Conservation Lands***	***Remaining Acres to be Conserved***	***Total Acres to be Conserved in MSHCP Reserve System***
CABAZON	188	19	0	163 (6)[1]	163
STUBBE & COTTONWOOD CYN	1,983	17	1,813	153	1,966
WHITEWATER CANYON	569	16	407	146	553
TOTAL	**2,740**	**52**	**2,220**	**462 (6)[1]**	**2,688**

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

10.5.1.4 Natural Community Account: Background

Description. Chamise chaparral is one of nine chaparral types in California. Chamise chaparral is a 1-to-3-meter-tall chaparral overwhelmingly dominated by chamise (*Adenostoma fasciculatum*). It is adapted to repeated fires by stump sprouting. Mature stands are densely interwoven with very little herbaceous understory or litter and a nearly continuous canopy. This is a common community on the western slopes of the San Jacinto and Santa Rosa Mountains, but is not prevalent in the Plan Area. Approximately 2,741 acres occurs in two areas, on the lower slopes of the San Bernardino Mountains west of Whitewater Canyon, and near the western edge of the Plan Area. The other occurrence stretches in a band from the Whitewater River to Stubbe Creek. The majority of this occurrence is on BLM land. Approximately 81% of the chamise chaparral occurs on public land. This natural community also occurs on the Morongo Indian Reservation, which is not part of the Plan Area.

Distribution within the Coachella Valley. Within the MSHCP Reserve System, chamise chaparral is mapped in three of the Conservation Areas:

1. Cabazon Conservation Area
2. Stubbe and Cottonwood Canyons Conservation Area
3. Whitewater Canyon Conservation Area

Comparison with *Manual of California Vegetation*. Ultimately, the Plan will use the vegetation classification system in the MCV (Sawyer and Keeler-Wolf 1995). The natural

community described by the Holland system as chamise chaparral would compare with one or more of the following MCV series:

1. Chamise series
2. Chamise - bigberry manzanita series
3. Chamise - black sage series
4. Chamise - cupleaf ceanothus series
5. Chamise - Eastwood manzanita series
6. Chamise - hoaryleaf ceanothus series
7. Chamise - mission-manzanita - woollyleaf ceanothus series
8. Chamise - wedgeleaf ceanothus series and Chamise - white sage series

Associated Covered Species. The Covered Species associated with this community is the desert tortoise in the area west of Whitewater Canyon. It is possible that gray vireo could be associated with this natural community.

Essential Ecological Processes. Maintenance of fire regimes is a relevant ecological process to ensure that this natural community is sustained.

10.5.2 Redshank Chaparral

10.5.2.1 Natural Community Conservation Goals and Objectives

Conserve and manage occurrences of this natural community within the MSHCP Reserve System according to the following criteria:

Goal 1: Conserve natural community occurrences representative of the range of environmental conditions within which the community is known to occur. Incorporate a range of environmental gradients (e.g. slope, elevation, aspect) and high Habitat diversity.

Objective 1. Ensure Conservation of this natural community within the following Conservation Area:

- Santa Rosa and San Jacinto Mountains Conservation Area

Goal 2: Protect Essential Ecological Processes necessary to maintain this natural community.

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

Goal 3: Ensure Conservation of Habitat quality through protection, monitoring and Adaptive Management, and restoration where necessary, to contribute to maintenance of this community within Conservation Areas.

Objective 3. Implement biological monitoring and Adaptive Management actions to ensure Conservation of this natural community.

10.5.2.2 Threats, Limiting Factors, and Adaptive Management

The redshank chaparral stands within the Santa Rosa and San Jacinto Mountains Conservation Area are relatively free of threats. There is some fragmentation from sparse, low-density residential Development in the vicinity of Pinyon Flat. This Development creates a potential for larger and more frequent wildfires resulting from human activities. Altered fire frequency and magnitude are stressors to this natural community.

The following actions may be needed to ensure persistence of this natural community if biological monitoring indicates that such actions are warranted. This list is not comprehensive but identifies some of the known or likely threats to redshank chaparral. In addition to conserving the redshank chaparral natural community, the Plan will integrate biological monitoring and management actions into a Management and Monitoring Program for this natural community. The Monitoring Program will be designed to provide feedback so that management activities can be adjusted to maximize natural community Conservation. More detailed and specific information on the biological monitoring and management actions described here and proposed for this natural community can be found in Section 8.0, MSHCP Reserve Management and Monitoring Program. Actions may include:

1. Control and manage activities that degrade redshank chaparral.
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 redshank chaparral community.
3. Coordinate with state and federal agencies on fire management efforts affecting this natural community.

10.5.2.3 Natural Community Conservation Analysis

Conservation Area Reserve Design. Redshank chaparral occurs in relatively contiguous stands along Highway 74 in the vicinity of Pinyon Flat and along an elevational gradient along the south-facing slopes of the Santa Rosa and San Jacinto Mountains. This natural community occurs in relatively intact stands, with very little fragmentation. All of the areas where this natural community occurs are included within the Santa Rosa and San Jacinto Mountains Conservation Area. The presence of redshank chaparral within this Conservation Areas is shown in Table 10-

15. The Planning Team identified and assessed Conservation for this natural community in the following Conservation Area:

1. ***Santa Rosa and San Jacinto Mountains.*** There are approximately 12,514 acres of redshank chaparral mapped in this Conservation Area. The Plan will ensure Conservation of approximately 12,261 of these acres. Very limited low-density residential Development occurs within the stands of redshank chaparral along Highway 74. Highway 74 and the Santa Rosa peak road bisect a portion of the redshank chaparral. Most of the stands of redshank chaparral are intact and undisturbed.

Conservation and Disturbance Levels. The MSHCP Reserve System would provide protection of redshank chaparral in the only Conservation Area where it occurs, the Santa Rosa and San Jacinto Mountains Conservation Area. In addition to conserving currently unprotected Habitat, the Plan benefits this natural community by addressing threats to this community as they are identified through Adaptive Management.

Conservation of 12,261 acres, or 92%, of redshank chaparral will ensure that this natural community is sustained and restored within the Plan Area.

Table 10-15: Summary of Natural Community within Conservation Areas: Redshank Chaparral

CONSERVATION AREA	*Land within the Conservation Areas*				
	Total Acres of Natural Community in Conservation Area	*Total Acres Subject to Impacts*[2]	*Acres within Existing Conservation Lands*	*Remaining Acres to be Conserved*	*Total Acres to be Conserved in MSHCP Reserve System*
SANTA ROSA & SAN JACINTO MOUNTAINS	12,514	253	9,987	2,274	12,261
TOTAL	**12,514**	**253**	**9,987**	**2,274**	**12,261**

10.5.2.4 Natural Community Account: Background

Description. Redshank chaparral is similar to chamise chaparral, but it is typically taller, 2 to 4 meters, and somewhat more open, often forming nearly pure stands of redshank (*Adenostoma sparsifolium*). Redshank itself is an open shrub or small tree with multiple branches from the base covered with rust-red, shaggy bark. Redshank chaparral is often adjacent to and may intergrade with chamise chaparral. Redshank chaparral is found in only four locations in Southern California and Baja California. Its center of distribution is in the San Jacinto and Santa Rosa

Mountains and the interior valleys of Riverside and San Diego Counties. Major stands occur in the south Laguna Mountains of San Diego County, the mountain plateaus of northern Baja California, the western Santa Monica Mountains in Los Angeles County, and the western Cuyama Valley of Santa Barbara and San Luis Obispo Counties. It ranges in elevation from 600 to 1,800 meters, with both coastal and desert exposures on granitic soils. Davis et al. (1995) listed redshank chaparral as a natural community considered to be at risk; this ranking is perhaps because this natural community is not widely distributed in California and occurs in areas of increasing pressure from urbanization. In the Plan Area, about 13,282 acres of redshank chaparral occur just above chamise chaparral in the Santa Rosa Mountains. Approximately 75% of it currently occurs on public land or Private Conservation Land. Occurrences in the Santa Rosa and San Jacinto Mountains Conservation Area are protected with the designation of the Santa Rosa and San Jacinto Mountains National Monument.

Distribution within the Coachella Valley. Within the MSHCP Reserve System, redshank chaparral is mapped in one of the Conservation Areas:

1. Santa Rosa and San Jacinto Mountains Conservation Area

Comparison with *Manual of California Vegetation*. Ultimately, the Plan will use the vegetation classification system in the MCV (Sawyer and Keeler-Wolf 1995). The natural community described by the Holland system as redshank chaparral would compare with one or more of the following MCV series:

1. Red shank series
2. Red shank birchleaf and red shank - chamise series

Associated Covered Species. The Covered Species associated with this community is the gray vireo.

Essential Ecological Processes. Fire regimes are an important ecological process for this community.

10.5.3 Interior Live Oak Chaparral

10.5.3.1 Natural Community Conservation Goals and Objectives

Conserve and manage occurrences of this natural community within the MSHCP Reserve System according to the following criteria:

Goal 1: Conserve natural community occurrences representative of the range of environmental conditions within which the community is known to occur. Incorporate a range of environmental gradients (e.g. slope, elevation, aspect) and high Habitat diversity.

Objective 1. Ensure Conservation of this natural community within the following Conservation Areas:

- Cabazon Conservation Area
- Stubbe and Cottonwood Canyons Conservation Area
- Whitewater Canyon Conservation Area
- Santa Rosa and San Jacinto Mountains Conservation Area

Goal 2: Protect Essential Ecological Processes necessary to maintain this natural community.

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

Goal 3: Ensure Conservation of Habitat quality through protection, monitoring and Adaptive Management, and restoration where necessary, to contribute to maintenance of this community within Conservation Areas.

Objective 3. Implement biological monitoring and Adaptive Management actions to ensure long-term persistence of this natural community.

10.5.3.2 Threats, Limiting Factors, and Adaptive Management

Immediate threats to this natural community are not apparent. The stands of interior live oak chaparral occur in remote areas where disturbance is minimal, including USFS and BLM lands that are protected within the Santa Rosa and San Jacinto Mountains National Monument. An understanding of the natural fire regime and the need for fire management would be beneficial.

The following actions may be needed to ensure that this natural community is sustained if biological monitoring indicates that such actions are warranted. This list is not comprehensive but identifies some of the known or likely threats to interior live oak chaparral. In addition to conserving the interior live oak chaparral natural community, the Plan will integrate biological monitoring and management actions into a Management and Monitoring Program for this natural community. The Monitoring Program will be designed to provide feedback so that management activities can be adjusted to maximize natural community Conservation. More detailed and specific information on the biological monitoring and management actions described here and proposed for this natural community can be found in Section 8.0, MSHCP Reserve Management and Monitoring Program. Actions may include:

1. Control and manage activities that degrade interior live oak chaparral.
2. Identify actions to reduce impacts from, and control where feasible, invasive species if it is determined from monitoring results that there are impacts to the interior live oak chaparral natural community.

10.5.3.3 Natural Community Conservation Analysis

Conservation Area Reserve Design. The interior live oak chaparral natural community occurs in relatively intact stands, with virtually no fragmentation, and with natural processes intact.

The occurrence of interior live oak chaparral is limited within the Plan Area to three Conservation Areas, Cabazon, Whitewater Canyon, and Santa Rosa and San Jacinto Mountains. The presence of this natural community within each of the Conservation Areas is shown in Table 10-16. The Planning Team identified and assessed the Conservation for this natural community in the following Conservation Areas:

1. ***Cabazon.*** There are approximately 4,691 acres of interior live oak chaparral in this Conservation Area of which the Plan conserves approximately 4,678 acres.

2. ***Stubbe & Cottonwood Canyons.*** There are approximately 1,220 acres of interior live oak chaparral within this Conservation Area; all 1,220 acres are within Existing Conservation Lands and will be conserved under the Plan.

3. ***Whitewater Canyon.*** There are approximately 24 acres of interior live oak chaparral within this Conservation Area; all 24 acres are within Existing Conservation Lands and will be conserved under the Plan.

4. ***Santa Rosa and San Jacinto Mountains.*** There are approximately 2,738 acres of interior live oak chaparral mapped in this Conservation Area. The Plan will ensure Conservation of approximately 2,660 of these acres. These stands are essentially intact and undisturbed.

Conservation and Disturbance Levels. The MSHCP Reserve System would provide protection of interior live oak chaparral in four Conservation Areas identified by the SAC and the Planning Team: Cabazon, Stubbe and Cottonwood Canyons, Whitewater Canyon, and Santa Rosa and San Jacinto Mountains Conservation Areas. In addition to conserving currently unprotected Habitat, the Plan benefits this natural community by addressing threats to this community as they are identified through Adaptive Management.

Conservation of 8,582 acres of interior live oak chaparral will ensure that this natural community is sustained within the Plan Area.

Table 10-16: Summary of Natural Community within Conservation Areas: Interior Live Oak Chaparral

CONSERVATION AREA	*Land within the Conservation Areas*				
	Total Acres of Natural Community in Conservation Area	*Total Acres Subject to Impacts*[2]	*Acres within Existing Conservation Lands*	*Remaining Acres to be Conserved*	*Total Acres to be Conserved in MSHCP Reserve System*
CABAZON	4,691	13	4,562	116	4,678
STUBBE & COTTONWOOD CANYONS	1,220	0	1,220	0	1,220
WHITEWATER CANYON	24	0	24	0	24
SANTA ROSA & SAN JACINTO MOUNTAINS	2,738	78	1,954	706	2,660
TOTAL	**8,673**	**91**	**7,760**	**822**	**8,582**

10.5.3.4 Natural Community Account: Background

Description. The interior live oak chaparral community occurs as a dense, tall (to seven meters (20 feet)) chaparral dominated by interior live oak (*Quercus wislizenii*) and scrub oak (*Quercus berberidifolia*) with several other sclerophylls also in the canopy. Other associated species include chaparral whitethorn (*Ceanothus leucodermis*), birchleaf mountain mahogany (*Cercocarpus betuloides*), coffeeberry (*Rhamnus californica*), and hollyleaf redberry (*Rhamnus ilicifolia*). This chaparral is fairly mesic and occurs in valley and foothills. In Southern California, stands are believed to be the result of frequent sprouting after fire (White and Sawyer 1995). This community recovers rapidly after fire (Holland 1986). There is typically very little understory due to the persistent leaf litter and dense canopy of these stands. Approximately 38% of the approximately 20,574 acres in the Plan Area is protected on Existing Conservation Lands.

Distribution within the Coachella Valley. Within the MSHCP Reserve System, interior live oak chaparral is mapped in four of the Conservation Areas:

1. Cabazon Conservation Area
2. Stubbe and Cottonwood Canyons Conservation Area
3. Whitewater Canyon Conservation Area
4. Santa Rosa and San Jacinto Mountains Conservation Area

Comparison with *Manual of California Vegetation*. Ultimately, the Plan will use the vegetation classification system in the MCV (Sawyer and Keeler-Wolf 1995). The natural community described by the Holland system as interior live oak chaparral would compare with one or more of the following MCV series:

1. Canyon live oak scrub series
2. Interior live oak scrub series
3. Interior live oak - canyon live oak shrub series
4. Interior live oak - chaparral whitethorn shrub series and interior live oak - scrub oak shrub series

Associated Covered Species. The Covered Species associated with this community is the gray vireo.

Essential Ecological Processes. Fire regimes are an important ecological process for this community.

10.5.4 Semi-Desert Chaparral

10.5.4.1 Natural Community Conservation Goals and Objectives

Conserve and manage occurrences of this natural community within the MSHCP Reserve System according to the following criteria:

Goal 1: Conserve natural community occurrences representative of the range of environmental conditions within which the community is known to occur. Incorporate a range of environmental gradients (e.g. slope, elevation, aspect) and high Habitat diversity.

Objective 1. Ensure Conservation of this natural community within the following Conservation Areas:

- Cabazon
- Stubbe and Cottonwood Canyons
- Snow Creek/Windy Point
- Whitewater Canyon
- Santa Rosa and San Jacinto Mountains Conservation Area

Goal 2: Protect Essential Ecological Processes, which may include hydrological regimes, necessary to maintain this natural community.

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

Goal 3: Ensure Conservation of Habitat quality through protection, monitoring and Adaptive Management, and restoration where necessary, to contribute to maintenance of this community within Conservation Areas.

Objective 3. Implement biological monitoring and Adaptive Management actions to ensure Conservation of this natural community.

10.5.4.2 Threats, Limiting Factors, and Adaptive Management

Threats to this community are few; however, increased fire frequency due to the spread of non-native plant species may affect this chaparral community.

The following actions may be needed to ensure that this natural community is sustained if biological monitoring indicates that such actions are warranted. This list is not comprehensive but identifies some of the known or likely threats to semi-desert chaparral. In addition to conserving the semi-desert chaparral natural community, the Plan will integrate biological monitoring and management actions into a Management and Monitoring Program for this natural community. Monitoring Programs will be designed to provide feedback so that management activities can be adjusted to maximize natural community Conservation. More detailed and specific information on the biological monitoring and management actions described here and proposed for this natural community can be found in Section 8.0, MSHCP Reserve Management and Monitoring Program. Actions may include:

1. Control and manage activities that degrade semi-desert chaparral.
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 semi-desert chaparral community.

10.5.4.3 Natural Community Conservation Analysis

Conservation Area Configuration Issues. Semi-desert chaparral occurs in relatively intact stands, with very little fragmentation. Semi-desert chaparral occurs within the Plan Area in five Conservation Areas, Cabazon, Stubbe and Cottonwood Canyons, Snow Creek/Windy Point, Whitewater Canyon, and the Santa Rosa and San Jacinto Mountains. The presence of this natural community within each of the Conservation Areas is shown in Table 10-17. The Planning Team identified and assessed the Conservation for this natural community in the following Conservation Areas:

1. ***Cabazon.*** There are approximately 26 acres of semi-desert chaparral in this Conservation Area. All of these acres are within the fluvial sand transport area where the only Conservation Objective is to maintain fluvial sand transport.

2. ***Stubbe and Cottonwood Canyon***. There are approximately 9 acres of this natural community within this Conservation Area. The Plan will ensure Conservation of all 9 of these acres which are already within Existing Conservation Lands.

3. ***Snow Creek/Windy Point.*** There are approximately 6 acres of this natural community within this Conservation Area. The Plan will ensure Conservation of at least 5 of these acres.

4. ***Whitewater Canyon.*** There are approximately 4,927 acres of semi-desert chaparral mapped in this Conservation Area. The Plan will ensure Conservation of approximately 4,908 of these acres.

5. ***Santa Rosa and San Jacinto Mountains.*** There are approximately 17,602 acres of semi-desert chaparral mapped in this Conservation Area. The Plan will ensure Conservation of approximately 17,318 of these acres.

Conservation and Disturbance Levels. The MSHCP Reserve System would provide protection of semi-desert chaparral in five Conservation Areas: Cabazon, Stubbe and Cottonwood Canyons, Snow Creek/Windy Point, Whitewater Canyon, and Santa Rosa and San Jacinto Mountains Conservation Areas. In addition to conserving currently unprotected Habitat, the Plan benefits this natural community by addressing threats to this community as they are identified through Adaptive Management.

Conservation of 22,229 acres, or 98%, of semi-desert chaparral will ensure that this natural community is sustained and restored within the Plan Area

Table 10-17: Summary of Natural Community within Conservation Areas: Semi-Desert Chaparral

CONSERVATION AREA	*Land within the Conservation Areas*				
	Total Acres of Natural Community in Conservation Area	*Total Acres Subject to Impacts*[2]	*Acres within Existing Conservation Lands*	*Remaining Acres to be Conserved*	*Total Acres to be Conserved in MSHCP Reserve System*
CABAZON	26	N/A	0	(26)[1]	0
STUBBE & COTTONWOOD CANYONS	9	0	9	0	9
SNOW CREEK/ WINDY POINT	6	1	1	4	5
WHITEWATER CANYON	4,927	19	4,739	169	4,908
SANTA ROSA & SAN JACINTO MTNS.	17,602	284	14,654	2,664	17,318
TOTAL	**22,570**	**304**	**19,403**	**2,837 (26)[1]**	**22,240**

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

10.5.4.4 Natural Community Account: Background

Description., The semi-desert Chaparral community consists mainly of woody evergreen shrubs between 1.5 and 3 meters (approximately 4.5 and 9 feet) in height, and is somewhat more open than most chaparrals. Some of the dominant plant species include California juniper (*Juniperus californica*), California buckwheat, and O*puntia* cactus species. Other associated species include manzanita (*Arctostaphylos* spp.), *Ceanothus* species, sugar bush (*Rhus ovata*), and scrub oak. This community tends to occur on rockier soils or recently burned sites. Semi-desert chaparral is less fire-prone than other chaparrals because of the lower fuel loads. This community is distributed from the inner Coast Ranges from San Benito County to Kern County, extending into northern Ventura and Santa Barbara counties, and on the interior slopes of the Transverse and Peninsular Ranges. It is most common between 2,000-5,000 feet elevation. Approximately 22,572 acres of this community occur in the Plan Area, in the San Jacinto, Santa Rosa and Little San Bernardino Mountains. Approximately 86% of it currently occurs on public or private Existing Conservation Land.

Distribution within the Coachella Valley. Within the MSHCP Reserve System, semi-desert chaparral is mapped in five of the Conservation Areas:

1. Cabazon Conservation Area.
2. Stubbe and Cottonwood Canyons Conservation Area
3. Snow Creek/Windy Point Conservation Area
4. Whitewater Canyon Conservation Area
5. Santa Rosa and San Jacinto Mountains Conservation Area

Comparison with *Manual of California Vegetation*. Ultimately, the Plan will use the vegetation classification system in the MCV (Sawyer and Keeler-Wolf 1995). The natural community described by the Holland system as semi-desert chaparral would compare with one or more of the following MCV series:

1. Birchleaf mountain-mahogany - California buckwheat series
2. Cupleaf ceanothus - fremontia - oak series

Associated Covered Species. The Covered Species associated with this community are Peninsular bighorn sheep, gray vireo, and, possibly, triple-ribbed milkvetch.

10.6 Marsh Communities

This section contains a summary description, including natural community characteristics, typical species, and significant threats, for the two marsh communities proposed for coverage in the Plan. General Conservation measures, which are common to these marsh types, are listed below.

1. Ecological processes, including water availability, are protected to ensure sustainability of the community. Please refer to the Section 4.3 subsections for specific goals for ecosystem processes.
2. To the extent activities are under Plan authority, maintain water levels, water quality and proper functioning condition of ponds, springs, and other wetlands.
3. Control of non-native plants, particularly tamarisk, is implemented.
4. As part of the Management and Monitoring Program, complete hydrologic studies for the Salt Creek area and Whitewater Delta to determine if the water sources for marsh areas are adequately protected or if additional water sources may be needed.
5. This natural community is adaptively managed, according to an approved Management and Monitoring Program.
6. Marsh communities shall be subject to a no net loss objective such that Disturbance of a given number of acres may occur, but an equal number of acres would be replaced to ensure that no net loss of that marsh community occurs.

10.6.1 Cismontane Alkali Marsh

10.6.1.1 Natural Community Conservation Goals and Objectives

Conserve and manage occurrences of this natural community within the MSHCP Reserve System according to the following criteria:

Goal 1: Conserve natural community occurrences representative of the range of environmental conditions within which the community is known to occur. Incorporate a range of environmental gradients (e.g. slope, elevation, aspect) and high Habitat diversity.

Objective 1. Ensure Conservation of this natural community within the following Conservation Area:

- Dos Palmas Conservation Area

Goal 2: Protect Essential Ecological Processes, which may include hydrological regimes, necessary to maintain this natural community.

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

Goal 3: Ensure Conservation of Habitat quality through protection, monitoring and Adaptive Management, and restoration where necessary, to contribute to maintenance of this community within Conservation Areas.

Objective 3. Implement biological monitoring and Adaptive Management actions to ensure Conservation of this natural community.

10.6.1.2 Threats, Limiting Factors, and Adaptive Management

Threats to this community include changes in the availability of water and competition from invasive plants, particularly tamarisk. The wetlands at Dos Palmas are partially enhanced by leakage along sections of the Coachella Canal. Soon, to provide additional water to the Los Angeles region, the canal will be lined, and the majority of this leakage will be stopped. The impacts to the wetlands from lining the canal are difficult to predict, but most likely will result in reduced wetland Habitat. Mitigation measures associated with the canal lining will be directed at ameliorating the impacts.

The following actions may be needed to ensure the persistence of this natural community if biological monitoring indicates that such actions are warranted. This list is not comprehensive but identifies some of the known or likely threats to cismontane alkali marsh. In addition to

conserving the cismontane alkali marsh natural community, the Plan will integrate biological monitoring and management actions into a Management and Monitoring Program for this natural community. The Monitoring Program will be designed to provide feedback so that management activities can be adjusted to maximize natural community Conservation. More detailed and specific information on the biological monitoring and management actions described here and proposed for this natural community can be found in Section 8.0, MSHCP Reserve Management and Monitoring Program. Actions may include:

1. Control and manage activities that degrade cismontane alkali marsh.
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 cismontane alkali marsh community.

10.6.1.3 Natural Community Conservation Analysis

Conservation Area Configuration Issues. The cismontane alkali marsh natural community is very limited in occurrence within the Plan Area. It occurs in one contiguous stand in the Dos Palmas Conservation Area, within the Dos Palmas Preserve/ACEC. The entire stand of this natural community is included within the Conservation Area. It is a relatively intact stand with no fragmentation.

The occurrence of cismontane alkali marsh is limited within the Plan Area to one Conservation Area, Dos Palmas. The presence of cismontane alkali marsh within this Conservation Areas is shown in Table 10-18. The Planning Team identified and assessed Conservation for this natural community in the following Conservation Areas:

1. ***Dos Palmas.*** There are approximately 321 acres of cismontane alkali marsh mapped in this Conservation Area. The Plan will ensure Conservation of approximately 321 of these acres. The Plan will also ensure Conservation of the watershed for Salt Creek, where this marsh community occurs.

Conservation and Disturbance Levels. The MSHCP Reserve System would provide protection of cismontane alkali marsh in one Conservation Area: Dos Palmas Conservation Area. In addition to conserving currently unprotected Habitat, the Plan benefits this natural community by securing the hydrological regimes that maintain this marsh and by addressing threats to this community as they are identified through Adaptive Management.

Conservation of at least 321 acres, or 93%, of cismontane alkali marsh will ensure that this natural community is sustained and restored within the Plan Area.

Table 10-18: Summary of Natural Community within Conservation Areas: Cismontane Alkali Marsh

CONSERVATION AREA	*Land within the Conservation Areas*				
	Total Acres of Natural Community in Conservation Area	*Total Acres Subject to Impacts*[2]	*Acres within Existing Conservation Lands*	*Remaining Acres to be Conserved*	*Total Acres to be Conserved in MSHCP Reserve System*
DOS PALMAS	321	(23)[1]	93	228	321
TOTAL	**321**	**(23)[1]**	**93**	**228**	**321**

[1] Disturbance of no more than twenty-three acres may occur, but it would be replaced to ensure that the no net loss occurs and the Conservation Objective is achieved

10.6.1.4 Natural Community Account: Background

Description. This community is dominated by perennial, emergent, herbaceous monocots to 2 meters (approximately 6 feet) tall; cover is often complete and dense. Dominant species include cattail (*Typha latifolia, T. domingensis*), alkali bulrush (*Scirpus americanus*), and saw-grass (*Cladium californicum*); iodine bush (*Allenrolfea occidentalis*) is also associated with these marshes (BLM 1996). This marsh Habitat occurs where standing water or saturated soil is present throughout most or all of the year. High evaporation and low input of freshwater render the marsh alkaline. This natural community occurs in the Dos Palmas area, where about 29% of it is within public or private Existing Conservation Land. It is important Habitat for the Yuma clapper rail and the California black rail.

Distribution within the Coachella Valley. Within the MSHCP Reserve System, cismontane alkali marsh is mapped in one of the Conservation Areas:

1. Dos Palmas Conservation Area

Comparison with *Manual of California Vegetation*. Ultimately, the Plan will use the vegetation classification system in the MCV (Sawyer and Keeler-Wolf 1995). The natural community described by the Holland system as cismontane alkali marsh would compare with one or more of the following MCV series:

1. Bulrush series
2. Bulrush - cattail series
3. Cattail series and Ditch-grass series

Associated Covered Species. The Covered Species associated with this community are the Yuma clapper rail and the California black rail.

Essential Ecological Processes. Maintenance of the watershed and existing hydrological regimes are important to the long-term persistence of cismontane alkali marshes.

10.6.2 Coastal and Valley Freshwater Marsh

10.6.2.1 Natural Community Conservation Goals and Objectives

Conserve and manage occurrences of this natural community within the MSHCP Reserve System according to the following criteria:

Goal 1: Conserve natural community occurrences representative of the range of environmental conditions within which the community is known to occur. Incorporate a range of environmental gradients (e.g. slope, elevation, aspect) and high Habitat diversity.

Objective 1a. Ensure Conservation of this natural community within the following Conservation Area:

- Coachella Valley Stormwater Channel and Delta Conservation Area

Objective 1b. Ensure that CVWD establishes 66 acres of permanent Habitat for California black rail and Yuma clapper rail in this area to replace the Habitat that is periodically altered by flood control and drain maintenance activities. See Section 4.3.21.

Goal 2: Protect Essential Ecological Processes, which may include hydrological regimes, necessary to maintain this natural community.

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

Goal 3: Ensure Conservation of Habitat quality through protection, monitoring and Adaptive Management, and restoration where necessary, to contribute to maintenance of this community within Conservation Areas.

Objective 3. Implement biological monitoring and Adaptive Management actions to ensure Conservation of this natural community.

10.6.2.2 Threats, Limiting Factors, and Adaptive Management

The primary threats to this community include changes in water availability, water quality, and the infestation of exotic species of plants and fish. The level of the Salton Sea is maintained by agricultural runoff, and by the highly polluted New and Alamo Rivers. The most immediate issue with the Salton Sea is the increasing salinity. Current efforts to stabilize and/or reduce salinity will have unknown effects on water levels, and the results on the marsh Habitat are far from assured. This natural community is also threatened by disturbance from periodic drain and flood control channel maintenance activities. Mitigation measures to address this threat are provided for by the Plan.

The following actions may be needed to ensure persistence of this natural community if biological monitoring indicates that such actions are warranted. This list is not comprehensive but identifies some of the known or likely threats to coastal and valley freshwater marsh. In addition to conserving the coastal and valley freshwater marsh natural community, the Plan will integrate biological monitoring and management actions into the Management and Monitoring Programs for this natural community. The Monitoring Program will be designed to provide feedback so that management activities can be adjusted to maximize natural community Conservation. More detailed and specific information on the biological monitoring and management actions described here and proposed for this natural community can be found in Section 8.0, MSHCP Reserve Management and Monitoring Program. Actions may include:

1. Control and manage activities that degrade coastal and valley freshwater marsh. In particular, control and manage the primary threats to this marsh community, including fragmentation and changes in water availability.
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 coastal and valley freshwater marsh community.

10.6.2.3 Natural Community Conservation Analysis

Conservation Area Reserve Design. The coastal and valley freshwater marsh natural community is very limited in occurrence within the Plan Area. It occurs in one contiguous stand in the Coachella Valley Stormwater Channel and Delta Conservation Area, at the mouth of the Whitewater River where it enters the Salton Sea. The entire stand of this natural community is included within the Conservation Area. It is a relatively intact stand with no fragmentation.

The occurrence of coastal and valley freshwater marsh is limited within the Plan Area to one Conservation Area, the Coachella Valley Stormwater and Delta Conservation Area. The presence of this natural community within this Conservation Areas is shown in Table 10-19.

The Planning Team identified and assessed Conservation for this natural community in the following Conservation Areas:

1. ***Coachella Valley Stormwater Channel and Delta.*** There are approximately 61 acres of coastal and valley freshwater marsh mapped in this Conservation Area. The Plan will ensure Conservation of approximately 55 of these acres.

Conservation and Disturbance Levels. The MSHCP Reserve System would provide protection of coastal and valley freshwater marsh in one Conservation Area: Coachella Valley Stormwater Channel and Delta Conservation Area. In addition to conserving currently unprotected Habitat, the Plan benefits this natural community by securing the hydrological regimes that maintain this marsh and by addressing threats to this community as they are identified through Adaptive Management.

Conservation of at least 55 acres, or 71%, of coastal and valley freshwater marsh will ensure that this natural community is sustained and restored within the Plan Area.

Table 10-19: Summary of Natural Community within Conservation Areas: Coastal and Valley Freshwater Marsh

CONSERVATION AREA	*Land within the Conservation Areas*				
	Total Acres of Natural Community in Conservation Area	*Total Acres Subject to Impacts*[2]	*Acres within Existing Conservation Lands*	*Remaining Acres to be Conserved*	*Total Acres to be Conserved in MSHCP Reserve System*
CV STORMWATER CHANNEL & DELTA	61	(6)[1]	4	51	55
TOTAL	**61**	**(6)**[1]	**4**	**51**	**55**

[1] Disturbance of no more than six acres may occur, but it would be replaced to ensure that no net loss occurs and the Conservation Objective is achieved.

10.6.2.4 Natural Community Account: Background

Description. This community is dominated by perennial, emergent monocots, including cattail, bulrush, tules (*Scirpus* spp.), and rushes (*Juncus* spp.), often forming completely closed canopies. Sites lack significant currents and are permanently flooded with fresh water rather than brackish water. About 61 acres occurs in one location at the mouth of the Coachella Valley Stormwater Channel at the Salton Sea, where only 4% of it is currently protected. Small stands of freshwater marsh also occur at Dos Palmas, on the edge of some of the palm oases (e.g. Andreas

Oasis) and along the margins of the recently restored man-made ponds (BLM 1996); these stands are small and are not mapped on the Natural Communities Map. Threats to this community include reduction in the availability of fresh water resulting from diversions along the Coachella Valley Stormwater channel at the mouth of the Salton Sea. This community is also subject to invasion from tamarisk. There is some uncertainty as to the long-term status of the current occurrence of this community. The Salton Sea restoration project may result in the lowering of the sea's level, which could impact the current wetlands. CVWD will create new marsh Habitat to compensate for impacts to marsh Habitat from maintenance activities in the irrigation drains and in the Coachella Valley Stormwater channel.

Distribution within the Coachella Valley. Within the MSHCP Reserve System, coastal and valley freshwater marsh is mapped in one of the Conservation Areas:

1. Coachella Valley Stormwater Channel and Delta

Comparison with *Manual of California Vegetation*. Ultimately, the Plan will use the vegetation classification system in the MCV (Sawyer and Keeler-Wolf 1995). The natural community described by the Holland system as coastal and valley freshwater marsh would compare with one or more of the following MCV series:

1. Bulrush
2. Bulrush - cattail series
3. Cattail series
4. Duckweed series
5. Mosquito fern series
6. Pondweeds with floating leaves series
7. Pondweeds with submerged leaves series
8. Quillwort series

Associated Covered Species. The Covered Species associated with this community are the Yuma clapper rail and the California black rail.

Essential Ecological Processes. Availability of perennial fresh water and hydrological regimes must be maintained to ensure that this natural community is sustained.

10.7 Riparian and Desert Fan Palm Communities

This section contains a summary description, including natural community characteristics, typical species, and significant threats, for each of the four riparian communities and the desert fan palm oasis community proposed for coverage in the Plan. Riparian communities are considered to

be at great risk throughout Southern California (Bowler 1990, Davis et al. 1996). General Conservation measures, which are common to all these riparian types, are listed below.

1. Ecological processes, including flooding regimes and water table continuity, are protected to ensure sustainability of the community. Please refer to the Section 4.3 subsections for specific goals for ecosystem processes.
2. To the extent activities are under Plan authority, maintain water levels, water quality and proper functioning condition of springs, streams, and other natural water sources that support these natural communities.
3. Riparian Habitat along the Whitewater River channel from Indio south that is currently subject to periodic removal during maintenance of the Channel to maintain flood capacity will be replaced by the establishment of permanent riparian Habitat as a result of an agreement, and/or Plan participation, with the CVWD.
4. Remove and control invasive non-native plants, including tamarisk and arundo (very limited in occurrence).As part of the Management and Monitoring Program, complete hydrologic studies for the Salt Creek area and Whitewater Delta to determine if the water sources for marsh areas are adequately protected or if additional water sources may be needed.
5. This natural community is adaptively managed, according to an approved Management and Monitoring Program.
6. Riparian communities shall be subject to a no net loss objective such that Disturbance of a given number of acres may occur, but an equal number of acres would be replaced to ensure that no net loss of that riparian community occurs.

10.7.1 Southern Arroyo Willow Riparian Forest

10.7.1.1 Natural Community Conservation Goals and Objectives

Conserve and manage occurrences of this natural community within the MSHCP Reserve System according to the following criteria:

Goal 1: Conserve natural community occurrences representative of the range of environmental conditions within which the community is known to occur. Incorporate a range of environmental gradients (e.g. slope, elevation, aspect) and high Habitat diversity.

Objective 1. Ensure Conservation of this natural community within the following Conservation Areas:

- Cabazon Conservation Area
- Santa Rosa and San Jacinto Mountains Conservation Area

Goal 2: Protect Essential Ecological Processes, which may include hydrological regimes, necessary to maintain this natural community.

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

Goal 3: Ensure Conservation of Habitat quality through protection, monitoring and Adaptive Management, and restoration where necessary, to contribute to maintenance of this community within Conservation Areas.

Objective 3a. Implement biological monitoring and Adaptive Management actions to ensure Conservation of this natural community.

10.7.1.2 Threats, Limiting Factors, and Adaptive Management

Threats to the southern arroyo willow riparian forest include invasive plants such as tamarisk and arundo, degradation of water quality (e.g. infusion of nitrates, nitrites), and alteration of hydrological regimes.

The following actions may be needed to ensure persistence of this natural community if biological monitoring indicates that such actions are warranted. This list is not comprehensive but identifies some of the known or likely threats to southern arroyo willow riparian forest. In addition to conserving the southern arroyo willow riparian forest natural community, the Plan will integrate a Monitoring and Management Program for this natural community. Monitoring Programs will be designed to provide feedback so that management activities can be adjusted to maximize natural community Conservation. More detailed and specific information on the biological monitoring and management actions described here and proposed for this natural community can be found in Section 8.0, MSHCP Reserve Management and Monitoring Program. Actions may include:

1. Control and manage activities that degrade southern arroyo willow riparian forest. In particular, control and manage the primary threats to this scrub community, including invasive plants that dominate this community, and fragmentation.
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 southern arroyo willow riparian forest community.
3. Implement monitoring to track, and ultimately distinguish between, changes due to human or natural causes. Significant variables may include live perennial shrub abundance and invasive exotic plant abundance.

10.7.1.3 Natural Community Conservation Analysis

Conservation Area Reserve Design. The southern arroyo willow riparian forest natural community occurs in two Conservation Areas, Cabazon Conservation Area and Santa Rosa and San Jacinto Mountains Conservation Area. Where it occurs, southern arroyo willow riparian forest occurs in essentially linear stands along the streams in Snow and Wood Canyons. The nature of its distribution tends to create the potential for high edge effects due to the linear Habitat. However, in the locations where it occurs, this natural community is surrounded by other protected Habitats, which reduce the potential for edge effects.

The occurrence of southern arroyo willow riparian forest is limited within the Plan Area to two Conservation Areas, Cabazon and Santa Rosa and San Jacinto Mountains. The presence of this natural community within the Conservation Areas is shown in Table 10-20. The Planning Team identified and assessed Conservation for this natural community in the following Conservation Areas:

1. ***Cabazon.*** There are approximately 78 acres of southern arroyo willow riparian forest mapped in this Conservation Area. The Plan will ensure Conservation of all 78 of these acres. The Plan will also ensure Conservation of the watershed for Wood Canyon, where this riparian forest community occurs.

2. ***Santa Rosa and San Jacinto Mountains.*** There are approximately 32 acres of southern arroyo willow riparian forest mapped in this Conservation Area. The Plan will ensure Conservation and no net loss of this natural community. The Plan will also ensure Conservation of the watershed for Snow Creek, where this riparian forest community occurs.

Conservation and Disturbance Levels. The MSHCP Reserve System would provide protection of southern arroyo willow riparian forest in two Conservation Areas: Cabazon and Santa Rosa and San Jacinto Mountains Conservation Areas. In addition to conserving currently unprotected Habitat, the Plan benefits this natural community by securing the hydrological regimes that maintain this riparian Habitat and by addressing threats to this community as they are identified through Adaptive Management.

Conservation of at least 110 acres, or 94%, of southern arroyo willow riparian forest will ensure that this natural community is sustained and restored within the Plan Area. The Plan will ensure no net loss such that any disturbance that may occur would require the Habitat to be replaced.

Table 10-20: Summary of Natural Community within Conservation Areas: Southern Arroyo Willow Riparian Forest

CONSERVATION AREA	*Land within the Conservation Areas*				
	Total Acres of Natural Community in Conservation Area	*Total Acres Subject to Impacts*[2]	*Acres within Existing Conservation Lands*	*Remaining Acres to be Conserved*	*Total Acres to be Conserved in MSHCP Reserve System*
CABAZON	78	0	78	0	78
SANTA ROSA & SAN JACINTO MTNS.	32	(2)[1]	17	15	32
TOTAL	**110**	**(2)**[1]	**95**	**15**	**110**

[1] Disturbance of no more than two acres may occur, but it would be replaced to ensure that the no net loss occurs and the Conservation Objective is achieved.

10.7.1.4 Natural Community Account: Background

Description. This community consists of streamside vegetation dominated by arroyo willow (*Salix lasiolepis*), often forming dense thickets. This community is characterized by a continuous canopy up to 10 meters (34 feet), with typically sparse to non-existent shrub and herb layer (Sawyer and Keeler-Wolf 1995). These riparian forests are seasonally flooded, but water is present year-round. In the Plan Area, this community occurs in the northwest portion of the Plan Area, south of Fingal, near Snow Canyon, southeast of Snow Canyon, and in Wood Canyon. The total acreage of this community in the Plan Area is 117 acres, of which about 81% currently occurs on public or private Existing Conservation Land.

Distribution within the Coachella Valley. Within the MSHCP Reserve System, southern arroyo willow riparian forest is mapped in two of the Conservation Areas:

1. Cabazon Conservation Area
2. Santa Rosa and San Jacinto Mountains Conservation Area

Comparison with *Manual of California Vegetation*. Ultimately, the Plan will use the vegetation classification system in the MCV (Sawyer and Keeler-Wolf 1995). The natural community described by the Holland system as southern arroyo willow riparian forest would compare with one or more of the following MCV series:

1. Arroyo willow series
2. Mixed willow series

Associated Covered Species. The Covered Species associated with this community are least Bell's vireo, Peninsular bighorn sheep, yellow warbler, yellow-breasted chat, southwestern willow flycatcher, and summer tanager.

Essential Ecological Processes. This natural community is dependent on the existing hydrological regime, which allows water to be present to maintain the riparian vegetation. Conservation of the watershed for the areas where southern arroyo willow riparian forest is present is essential in order for this natural community to be sustained.

10.7.2 Sonoran Cottonwood-Willow Riparian Forest

10.7.2.1 Natural Community Conservation Goals and Objectives

Conserve and manage occurrences of this natural community within the MSHCP Reserve System according to the following criteria:

Goal 1: Conserve natural community occurrences representative of the range of environmental conditions within which the community is known to occur. Incorporate a range of environmental gradients (e.g. slope, elevation, aspect) and high Habitat diversity.

Objective 1. Ensure Conservation of this natural community within the following Conservation Areas:

- Stubbe and Cottonwood Canyons Conservation Area
- Whitewater Canyon Conservation Area
- Upper Mission Creek/Big Morongo Canyon Conservation Area
- Thousand Palms Conservation Area
- Coachella Valley Stormwater Channel and Delta Conservation Area
- Santa Rosa and San Jacinto Mountains Conservation Area

Goal 2: Protect Essential Ecological Processes, which may include hydrological regimes, necessary to maintain this natural community.

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

Goal 3: Ensure Conservation of Habitat quality through protection, monitoring and Adaptive Management, and restoration where necessary, to contribute to maintenance of this community within Conservation Areas.

Objective 3a. Implement biological monitoring and Adaptive Management actions to ensure Conservation of this natural community.

Objective 3b. CVWD will establish permanent riparian Habitat including at least 44 acres of Sonoran cottonwood-willow riparian forest in these Conservation Areas 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. Before the Habitat is established, a plan detailing the location, water supply, and monitoring and management responsibilities, including funding, shall be reviewed and approved by CDFG and USFWS.

10.7.2.2 Threats, Limiting Factors, and Adaptive Management

Like other riparian forest and woodlands, threats to Sonoran cottonwood-willow riparian forest include invasive plants such as tamarisk and arundo, degradation of water quality (e.g. infusion of nitrates, nitrites), and alteration of hydrological regimes.

The following actions may be needed to ensure persistence of this natural community if biological monitoring indicates that such actions are warranted. This list is not comprehensive but identifies some of the known or likely threats to Sonoran cottonwood-willow riparian forest. In addition to conserving the Sonoran cottonwood-willow riparian forest natural community, the Plan will integrate biological monitoring and management actions into a Management and Monitoring Program for this natural community. The Monitoring Program will be designed to provide feedback so that management activities can be adjusted to maximize natural community Conservation. More detailed and specific information on the biological monitoring and management actions described here and proposed for this natural community can be found in Section 8.0, MSHCP Reserve Management and Monitoring Program. Actions may include:

1. Control and manage activities that degrade Sonoran cottonwood-willow riparian forest. In particular, control and manage the primary threats to this forest community, including invasive plants that dominate this community, and fragmentation.
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 Sonoran cottonwood-willow riparian forest community.
3. Implement monitoring to track, and ultimately distinguish between, changes due to human or natural causes. Significant variables may include live perennial shrub abundance and invasive exotic plant abundance.
4. Monitor groundwater level relative to maintenance of the Sonoran cottonwood-willow riparian forest natural community in the Thousand Palms Conservation Area as part of the Management and Monitoring Program. See Section 6.7.3 on Changed Circumstances for additional information.

10.7.2.3 Natural Community Conservation Analysis

Conservation Area Reserve Design. Where it occurs, Sonoran cottonwood-willow riparian forest occurs in essentially linear stands along streams. This nature of its distribution tends to create the potential for high edge effects due to the linear Habitat. However, in the locations where it occurs, this natural community is surrounded by other protected Habitats, which reduce the potential for edge effects.

The Sonoran cottonwood-willow riparian forest occurs within the Plan Area in six Conservation Areas, Stubbe and Cottonwood Canyons, Whitewater Canyon, Upper Mission Creek/Big Morongo Canyon, Thousand Palms, Coachella Valley Stormwater Channel and Delta, and the Santa Rosa and San Jacinto Mountains Conservation Areas. The presence of this natural community within these Conservation Areas is shown in Table 10-21. The Planning Team identified and assessed Conservation for this natural community in the following Conservation Areas:

1. ***Stubbe and Cottonwood Canyons.*** There are approximately 267 acres of Sonoran cottonwood-willow riparian forest mapped in this Conservation Area. The Plan will ensure Conservation of approximately 267 of these acres, through Habitat Conservation or replacement. The Plan will also ensure Conservation of the watershed for Stubbe and Cottonwood Canyons, where this riparian forest community occurs.

2. ***Whitewater Canyon.*** There are approximately 166 acres of Sonoran cottonwood-willow riparian forest mapped in this Conservation Area. The Plan will ensure Conservation of approximately 166 of these acres, through Habitat Conservation or replacement. The Plan will also ensure Conservation of the watershed for Whitewater Canyon.

Table 10-21: Summary of Natural Community within Conservation Areas: Sonoran Cottonwood-Willow Riparian Forest

CONSERVATION AREA	***Land within the Conservation Areas***				
	Total Acres of Natural Community in Conservation Area	***Total Acres Subject to Impacts[2]***	***Acres within Existing Conservation Lands***	***Remaining Acres to be Conserved***	***Total Acres to be Conserved in MSHCP Reserve System***
STUBBE & COTTONWOOD CANYONS	267	(3)[1]	242	25	267
WHITEWATER CANYON	166	(11)[1]	59	107	166
UPPER MISSION CREEK/ BIG MORONGO CANYON	100	(8)[1]	16	84	100
THOUSAND PALMS	4	0[1]	4	0	4
CV STORMWATER CHANNEL & DELTA	8	0[1]	0	8	8
SANTA ROSA & SAN JACINTO MTNS.	58	0[1]	0	58	58
TOTAL	**603**	**(22)-[1]**	**321**	**282**	**603**

[1] Disturbance of no more than twenty two acres may occur, but it would be replaced to ensure that no net loss occurs and the Conservation Objective is achieved

3. ***Upper Mission Creek/Big Morongo Canyon.*** There are approximately 100 acres of Sonoran cottonwood-willow riparian forest mapped in this Conservation Area. The Plan will ensure Conservation of approximately 100 of these acres, through Habitat Conservation or replacement. The Plan will also ensure Conservation of the watershed for Mission Creek where this riparian Habitat occurs.

4. ***Thousand Palms.*** There are approximately 4 acres of Sonoran cottonwood-willow riparian forest mapped in this Conservation Area. The Plan will ensure Conservation of all 4 of these acres which are within Existing Conservation Lands. The Plan will also ensure Conservation of the hydrological regimes in Thousand Palms Canyon.

5. ***Coachella Valley Stormwater Channel and Delta.*** There are approximately 8 acres of Sonoran cottonwood-willow riparian forest mapped in this Conservation Area. The Plan will ensure Conservation of approximately 8 of these acres, through Habitat Conservation or replacement. The Plan will also require that CVWD establish permanent riparian Habitat

in this area to replace the Habitat that is periodically altered by flood control maintenance activities.

6. ***Santa Rosa and San Jacinto Mountains.*** There are approximately 58 acres of Sonoran cottonwood-willow riparian forest mapped. The Plan will ensure Conservation of approximately 58 of these acres in this Conservation Area, through Habitat Conservation or replacement. The Plan will also ensure Conservation of the hydrological regimes that maintain this riparian forest.

Conservation and Disturbance Levels. The MSHCP Reserve System would provide protection of Sonoran cottonwood-willow riparian forest in six Conservation Areas: Stubbe and Cottonwood Canyons Conservation Area, Whitewater Canyon Conservation Area, Upper Mission Creek/Big Morongo Canyon Conservation Area, Thousand Palms Conservation Area, Coachella Valley Stormwater Channel and Delta Conservation Area, and Santa Rosa and San Jacinto Mountains Conservation Area. In addition to conserving currently unprotected Habitat, the Plan benefits this natural community by securing the hydrological regimes that maintain this riparian Habitat and by addressing threats to this community as they are identified through Adaptive Management.

Conservation of at least 603 acres, or 95%, of Sonoran cottonwood-willow riparian forest will ensure that this natural community is sustained and restored within the Plan Area. The Plan will ensure no net loss such that any disturbance that may occur would require the Habitat to be replaced.

10.7.2.4 Natural Community Account: Background

Description. This community consists of a winter-deciduous, broad-leaved streamside forest to about 60 feet tall, dominated by Fremont cottonwood (*Populus fremontii*) with dense understories of willow (*Salix*) species. The site characteristics include deep, well-watered, loamy alluvial soils along the near-channel floodplains of perennial desert rivers. In the Plan Area, it occurs in Stubbe, Cottonwood, Whitewater, Mission, Big Morongo, and Chino Canyons, in Dry Morongo Creek, in scattered locations in the Whitewater River channel east of Monroe Avenue, and on the Thousand Palms Preserve. The total acreage of this community in the Plan Area is 636 acres, of which about 50% currently occurs on public land or Private Conservation Land.

Distribution within the Coachella Valley. Within the MSHCP Reserve System, Sonoran cottonwood-willow riparian forest is mapped in six of the Conservation Areas:

1. Stubbe and Cottonwood Canyons Conservation Area
2. Whitewater Canyon Conservation Area
3. Upper Mission Creek/Big Morongo Canyon Conservation Area
4. Thousand Palms Conservation Area

5. Coachella Valley Stormwater Channel and Delta Conservation Area
6. Santa Rosa and San Jacinto Mountains Conservation Area

Comparison with *Manual of California Vegetation*. Ultimately, the Plan will use the vegetation classification system in the MCV (Sawyer and Keeler-Wolf 1995). The natural community described by the Holland system as Sonoran cottonwood-willow riparian forest would compare with one or more of the following MCV series:

1. Narrow leaf willow series
2. Arroyo willow series
3. Fremont cottonwood series
4. Mixed willow series

Associated Covered Species. The Covered Species associated with this community are least Bell's vireo, Peninsular bighorn sheep, yellow warbler, yellow-breasted chat, southwestern willow flycatcher, and summer tanager.

Essential Ecological Processes. This natural community is dependent on hydrological regimes to ensure that riparian vegetation continues to receive the water it requires. In locations where this riparian forest occurs in canyons, surrounding watersheds should be conserved. In the Coachella Valley Stormwater Channel, water from agricultural runoff, flooding from rainfall, and other sources supports this vegetation.

10.7.3 Southern Sycamore-Alder Riparian Forest

10.7.3.1 Natural Community Conservation Goals and Objectives

Conserve and manage occurrences of this natural community within the MSHCP Reserve System according to the following criteria:

Goal 1: Conserve natural community occurrences representative of the range of environmental conditions within which the community is known to occur. Incorporate a range of environmental gradients (e.g. slope, elevation, aspect) and high Habitat diversity.

Objective 1. Ensure Conservation of this natural community within the following Conservation Areas:

- Cabazon Conservation Area
- Upper Mission Creek/Big Morongo Canyon Conservation Area
- Santa Rosa and San Jacinto Mountains Conservation Area

Goal 2: Protect Essential Ecological Processes, which may include hydrological regimes, necessary to maintain this natural community.

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

Goal 3: Ensure Conservation of Habitat quality through protection, monitoring and Adaptive Management, and restoration where necessary, to contribute to maintenance of this community within Conservation Areas.

Objective 3. Implement biological monitoring and Adaptive Management actions to ensure Conservation of this natural community.

10.7.3.2 Threats, Limiting Factors, and Adaptive Management

Threats to this community include invasive plants such as tamarisk and arundo, degradation of water quality (e.g. infusion of nitrates, nitrites), and alteration of hydrological regimes.

The following actions may be needed to ensure persistence of this natural community if biological monitoring indicates that such actions are warranted. This list is not comprehensive but identifies some of the known or likely threats to southern sycamore-alder riparian woodland. In addition to conserving the southern sycamore-alder riparian woodland natural community, the Plan will integrate biological monitoring and management actions into a Management and Monitoring Program for this natural community. The Monitoring Program will be designed to provide feedback so that management activities can be adjusted to maximize natural community Conservation. More detailed and specific information on the biological monitoring and management actions described here and proposed for this natural community can be found in Section 8.0, MSHCP Reserve Management and Monitoring Program. Actions may include:

1. Control and manage activities that degrade southern sycamore-alder riparian woodland. In particular, control and manage the primary threats to this riparian community, including invasive plants such as tamarisk that may dominate this community, and fragmentation.
2. Identify actions to reduce impacts from invasive species if it is determined from monitoring results that there are impacts to the southern sycamore-alder riparian woodland community.
3. Implement monitoring to track, and ultimately distinguish between, changes due to human or natural causes. Significant variables may include live perennial shrub abundance and invasive exotic plant abundance.
4. Monitor groundwater level relative to maintenance of the southern sycamore-alder riparian woodland natural communities as part of the Management and Monitoring Program. See Section 6.7.3 on Changed Circumstances for additional information.

10.7.3.3 Natural Community Conservation Analysis

Conservation Area Reserve Design. Where it occurs, southern sycamore- alder riparian forest occurs in essentially linear stands along streams. Compared to the other riparian vegetation types, it tends to occur at higher elevations in more mountainous areas. The locations where it occurs in this natural community are surrounded by other protected Habitats, which reduce the potential for edge effects.

The southern sycamore-alder riparian forest occurs within the Plan Area in three Conservation Areas, Cabazon Conservation Area, Upper Mission Creek/Big Morongo Canyon Conservation Area, and Santa Rosa and San Jacinto Mountains Conservation Area. The presence of this natural community within these Conservation Areas is shown in Table 10-22. The Planning Team identified and assessed Conservation for this natural community in the following Conservation Areas:

1. ***Cabazon.*** There are approximately 9 acres of southern sycamore-alder riparian forest mapped in this Conservation Area. The Plan will ensure Conservation of approximately 9 of these acres, through Habitat Conservation or replacement. The Plan will also ensure Conservation of the watershed where this riparian forest community occurs.

2. ***Upper Mission Creek/Big Morongo Canyon.*** There are approximately 104 acres of southern sycamore-alder riparian forest mapped in this Conservation Area. The Plan will ensure Conservation of approximately 104 of these acres, through Habitat Conservation or replacement. The Plan will also ensure Conservation of the watershed for Mission Creek where this riparian Habitat occurs.

3. ***Santa Rosa and San Jacinto Mountains.*** Southern sycamore-alder riparian forest occurs on approximately 548 acres in this Conservation Area. The Plan will ensure Conservation of approximately 548 of these acres, through Habitat Conservation or replacement. The Plan will also ensure Conservation of the hydrological regimes that maintain this riparian forest.

Conservation and Disturbance Levels. The MSHCP Reserve System would provide protection of Southern sycamore-alder riparian woodland in three Conservation Areas: Cabazon, Upper Mission Creek/Big Morongo Canyon, and the Santa Rosa and San Jacinto Mountains Conservation Areas. In addition to conserving currently unprotected Habitat, the Plan benefits this natural community by securing the hydrological regimes that maintain this riparian Habitat and by addressing threats to this community as they are identified through Adaptive Management.

Conservation of at least 661 acres, or 99%, of southern sycamore-alder riparian forest will ensure that this natural community is sustained and restored within the Plan Area. The Plan will

ensure no net loss such that any disturbance that may occur would require the Habitat to be replaced.

Table 10-22: Summary of Natural Community within Conservation Areas: Southern Sycamore-Alder Riparian Woodland

CONSERVATION AREA	*Land within the Conservation Areas*				
	Total Acres of Natural Community in Conservation Area	*Total Acres Subject to Impacts*[2]	*Acres within Existing Conservation Lands*	*Remaining Acres to be Conserved*	*Total Acres to be Conserved in MSHCP Reserve System*
CABAZON	9	(1)[1]	0	9	9
UPPER MISSION CREEK/ BIG MORONGO CANYON	104	0[1]	91	13	104
SANTA ROSA & SAN JACINTO MTNS.	548	(14)[1]	407	141	548
TOTAL	**661**	**(15)[1]**	**498**	**163**	**661**

[1] Disturbance of no more than fifteen acres may occur, but it would be replaced to ensure that no net loss occurs and the Conservation Objective is achieved

10.7.3.4 Natural Community Account: Background

Description. This community consists of a tall, open, broad-leaved, winter-deciduous streamside woodland dominated by sycamore (*Platanus racemosa*), and, often, white alder (*Alnus rhombifolia*). Stands seldom form closed canopy forests. In the Plan Area there are 669 acres of this community, located in various canyons in the San Jacinto and San Bernardino Mountains: Snow Creek, Millard Canyon, Lion Canyon, Mission Creek, and near Blaisdell Canyon. This community occurs along rocky streambeds subject to occasional high intensity flooding. *Alnus* increases in abundance on more perennial streams, while *Platanus* appears to tolerate more intermittent streams. In the Plan Area, approximately 74% currently occurs on Existing public or private Conservation Land. Occurrences in Tahquitz, Andreas, Murray, and Tachevah Canyons, and on the west fork of Palm Canyon are part of the Agua Caliente Indian Reservation and are not subject to this Plan. The Agua Caliente are preparing a separate MSHCP.

Distribution within the Coachella Valley. Within the MSHCP Reserve System, southern sycamore-alder riparian woodland is mapped in three of the Conservation Areas:

1. Cabazon Conservation Area
2. Upper Mission Creek/Big Morongo Canyon
3. Santa Rosa and San Jacinto Mountains Conservation Area

Comparison with *Manual of California Vegetation*. Ultimately, the Plan will use the vegetation classification system in the MCV (Sawyer and Keeler-Wolf 1995). The natural community described by the Holland system as southern sycamore-alder riparian woodland would compare with one or more of the following MCV series:

1. California sycamore series
2. White alder series

Associated Covered Species. The Covered Species associated with this community are least Bell's vireo, Peninsular bighorn sheep, yellow warbler, yellow-breasted chat, southwestern willow flycatcher, summer tanager, and triple-ribbed milkvetch (in the Mission Creek area).

Essential Ecological Processes. Hydrological regimes and the continued availability of perennial water are essential for southern sycamore-alder riparian forest to be maintained.

10.7.4 Arrowweed Scrub

10.7.4.1 Natural Community Conservation Goals and Objectives

Conserve and manage occurrences of this natural community within the MSHCP Reserve System according to the following criteria:

Goal 1: Conserve natural community occurrences representative of the range of environmental conditions within which the community is known to occur. Incorporate a range of environmental gradients (e.g. slope, elevation, aspect) and high Habitat diversity.

Objective 1. Ensure Conservation of this natural community within the following Conservation Area:

- Dos Palmas Conservation Area

Goal 2: Protect Essential Ecological Processes, which may include hydrological regimes, necessary to maintain this natural community.

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

Goal 3: Ensure Conservation of Habitat quality through protection, monitoring and Adaptive Management, and restoration where necessary, to contribute to maintenance of this community within Conservation Areas.

Objective 3. Implement biological monitoring and Adaptive Management actions to ensure Conservation of this natural community.

10.7.4.2 Threats, Limiting Factors, and Adaptive Management

Threats to arrowweed scrub include competition with invasive tamarisk; in areas around the Salton Sea, tamarisk has replaced arrowweed in suitable Habitat. Other threats include changes in the hydrological regime that could alter the availability of water in the soil.

The following actions may be needed to ensure persistence of this natural community if biological monitoring indicates that such actions are warranted. This list is not comprehensive but identifies some of the known or likely threats to arrowweed scrub. In addition to conserving the arrowweed scrub natural community, the Plan will integrate biological monitoring and management actions into a Management and Monitoring Program for this natural community. The Monitoring Program will be designed to provide feedback so that management activities can be adjusted to maximize natural community Conservation. More detailed and specific information on the biological monitoring and management actions described here and proposed for this natural community can be found in Section 8.0, MSHCP Reserve Management and Monitoring Program. Actions may include:

1. Control and manage activities that degrade arrowweed scrub.
2. Identify actions to reduce impacts from invasive species if it is determined from monitoring results that there are impacts to the arrowweed scrub natural community.
3. Implement monitoring to track, and ultimately distinguish between, changes due to human or natural causes.
4. Restore and enhance degraded arrowweed scrub as necessary according to results from biological monitoring.

10.7.4.3 Natural Community Conservation Analysis

Conservation Area Configuration Issues. Arrowweed scrub occurs in a patchwork of vegetation types in the Dos Palmas Preserve/ACEC, often associated with desert fan palm oasis

woodland. All of the mapped areas of arrowweed scrub were included within this Conservation Area by the Planning Team. In the locations where it occurs, this natural community is surrounded by other protected Habitats, which reduce the potential for edge effects.

Arrowweed scrub occurs within the Plan Area in one Conservation Area, Dos Palmas Conservation Area. The presence of this natural community within this Conservation Area is shown in Table 10-23. The Planning Team identified and assessed Conservation for this natural community in the following Conservation Area:

1. ***Dos Palmas.*** There are approximately 277 acres of arrowweed scrub mapped in this Conservation Area. The Plan will ensure Conservation of approximately 277, including 13 acres subject to impacts under a no net loss conservation objective; this objective provides that "Disturbance of no more than 13 acres may occur, but it would be replaced to ensure that no net loss occurs." The Plan will also ensure Conservation of the hydrological regimes that support this natural community.

Conservation and Disturbance Levels. The MSHCP Reserve System would provide protection of arrowweed scrub in one Conservation Area: Dos Palmas Conservation Area. In addition to conserving currently unprotected Habitat, the Plan benefits this natural community, which occurs in high soil moisture areas, by securing the hydrological regimes that maintain this community. The Plan will also address threats to this community as they are identified through Adaptive Management.

Conservation of at least 277 acres, or 100%, of arrowweed scrub will ensure that this natural community is sustained and restored within the Plan Area.

Table 10-23: Summary of Natural Community within Conservation Areas: Arrowweed Scrub

CONSERVATION AREA	*Land within the Conservation Areas*				
	Total Acres of Natural Community in Conservation Area	*Total Acres Subject to Impacts*[2]	*Acres within Existing Conservation Lands*	*Remaining Acres to be Conserved*	*Total Acres to be Conserved in MSHCP Reserve System*
DOS PALMAS	277	(13)[1]	143	134	277
TOTAL	**277**	**(13)[1]**	**143**	**134**	**277**

[1] Disturbance of no more than thirteen acres may occur, but it would be replaced to ensure that no net loss occurs and the Conservation Objective is achieved

10.7.4.4 Natural Community Account: Background

Description. This community is composed of moderate to dense streamside thickets dominated by arrowweed (*Pluchea sericea*). Cattail (*Typha* spp.), tule (*Scirpus* spp.), rushes (*Juncus* spp.), and saltgrass (*Distichlis spicata*) may occur as scattered individuals, especially around the margins. Saltgrass is a common ground cover. Arrowweed scrub replaces willow and cottonwood riparian forests in areas where soils are more saline or alkaline. This natural community occurs from the Santa Inez River in Santa Barbara County east to the Amargosa River in Death Valley, in the Antelope Valley, the Mojave River, around the Salton Sea, and along the lower Colorado River (Holland 1986). Approximately 277 acres of this community occur in the Plan Area, predominantly at the Dos Palmas Preserve/ACEC; 52% currently occurs on Existing public or private Conservation Land.

Distribution within the Coachella Valley. Within the MSHCP Reserve System, arrowweed scrub is mapped in one of the Conservation Areas:

1. Dos Palmas Conservation Area

Comparison with *Manual of California Vegetation*. Ultimately, the Plan will use the vegetation classification system in the MCV (Sawyer and Keeler-Wolf 1995). The natural community described by the Holland system as arrowweed scrub would compare with one or more of the following MCV series:

1. Arrow weed series

Associated Covered Species. The Covered Species associated with this community are the yellow-breasted chat and crissal thrasher. This community may be used during migration by riparian birds.

Ecological Processes. The arrowweed scrub natural community is dependent on high available soil moisture. It does not appear to require standing water but occurs on the margins of wetland areas. The hydrological regimes that support the growth of arrowweed are essential for this natural community to be sustained. Invasive exotic species, in particular tamarisk, have altered the natural composition of arrowweed scrub in some areas.

10.7.5 Desert Fan Palm Oasis Woodland

10.7.5.1 Natural Community Conservation Goals and Objectives

Conserve and manage occurrences of this natural community within the MSHCP Reserve System according to the following criteria:

Goal 1: Conserve natural community occurrences representative of the range of environmental conditions within which the community is known to occur. Incorporate a range of environmental gradients (e.g. slope, elevation, aspect) and high Habitat diversity.

Objective 1. Ensure Conservation of this natural community 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

Goal 2: Protect Essential Ecological Processes, which may include hydrological regimes, necessary to maintain this natural community.

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

Goal 3: Ensure Conservation of Habitat quality through protection, monitoring and Adaptive Management, and restoration where necessary, to contribute to maintenance of this community within Conservation Areas.

Objective 3. Implement biological monitoring and Adaptive Management actions to ensure Conservation of this natural community.

10.7.5.2 Threats, Limiting Factors, and Adaptive Management

A provision in the Plan provides for monitoring groundwater levels relative to maintenance of the desert fan palm oasis woodland natural community in the Thousand Palms Conservation Area as part of the Monitoring and Management Program. See Section 6.7.3 on Changed Circumstances for additional information.

The following actions may be needed to ensure persistence of this natural community if biological monitoring indicates that such actions are warranted. This list is not comprehensive but identifies some of the known or likely threats to desert fan palm oasis woodland. In addition to conserving the desert fan palm oasis woodland natural community, the Plan will integrate biological monitoring and management actions into a Management and Monitoring Program for this natural community. The Monitoring Program will be designed to provide feedback so that management activities can be adjusted to maximize natural community Conservation. More detailed and specific information on the biological monitoring and management actions described here and proposed for this natural community can be found in Section 8.0, MSHCP Reserve Management and Monitoring Program. Actions may include:

1. Control and manage activities that degrade desert fan palm oasis woodland. In particular, control and manage the primary threats to this community, including invasive plants such as tamarisk that may dominate this community, and edge effects.
2. Identify actions to reduce impacts from invasive species if it is determined from monitoring results that there are impacts to desert fan palm oasis woodland community.
3. Implement monitoring to track, and ultimately distinguish between, changes due to human or natural causes. Significant variables may include live perennial shrub/tree abundance and invasive exotic plant abundance.
4. Monitor groundwater level relative to maintenance of the desert fan palm oasis woodland natural communities as part of the Monitoring and Management Program. See Section 6.7.3 on Changed Circumstances for additional information.

10.7.5.3 Natural Community Conservation Analysis

Conservation Area Configuration Issues. Desert fan palm oasis woodlands occur in discrete patches associated with springs or water sources that are perennial. The woodlands occur on valley floor locations associated with the San Andreas Fault or other fault activity, and in canyons of the San Jacinto, Santa Rosa and Little San Bernardino Mountains. Most of the palm oases are located in areas where Development impacts are reduced, either because the oases occur in isolated canyons or are surrounded by protected land.

The desert fan palm oasis woodland occurs within the Plan Area in eight 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, and Santa Rosa and San Jacinto Mountains Conservation Area. The presence of this natural community within these Conservation Areas is shown in Table 10-24. The Planning Team identified and assessed Conservation for this natural community in the following Conservation Areas:

1. ***Whitewater Canyon.*** There is approximately 1 acre of desert fan palm oasis woodland, which is already conserved within Existing Conservation Lands. The palm oasis in Whitewater Canyon is located on the east slope of the canyon. The Plan will also ensure Conservation of the watershed for Whitewater Canyon.

2. ***Willow Hole.*** There is approximately 1 acre of desert fan palm oasis woodland mapped in this Conservation Area. This palm oasis is already conserved within Existing Conservation Lands. The oasis at Willow Hole is dependent on ground water associated with the San Andreas Fault.

3. ***Thousand Palms.*** There are approximately 137 acres of desert fan palm oasis woodland, including some of the largest stands in the Plan Area. The Plan will ensure Conservation of all 137 of these acres which occur within the Thousand Palms Preserve. The Plan will also ensure Conservation of the hydrological regimes in Thousand Palms Canyon.
4. ***Indio Hills Palms.*** There are approximately 93 acres of desert fan palm oasis woodland mapped in this Conservation Area, in scattered oases at the base of the Indio Hills. The Plan will ensure Conservation of at least 88 of these acres. The Plan will also secure the watershed for these palm oases by conserving the surrounding land in the Indio Hills.

5. ***Joshua Tree National Park.*** There are approximately 5 acres of desert fan palm oasis woodland mapped in this Conservation Area, in an oasis in Cottonwood Canyon. The Plan will ensure Conservation of all 5 of these acres which are within Joshua Tree National Park. The Plan will also ensure Conservation of the watershed, which is already protected in Joshua Tree National Park.

6. ***Mecca Hills/Orocopia Mountains.*** There is approximately 1 acre of desert fan palm oasis woodland mapped in this Conservation Area, in several remote canyons, including Hidden Palms Oasis. The palm oases within this Conservation Area are already conserved within the Mecca Hills Wilderness Area.

7. ***Dos Palmas.*** There are approximately 125 acres of desert fan palm oasis woodland mapped in this Conservation Area; several large palm oases are associated with springs resulting from fault activity in this area. The Plan will ensure Conservation of approximately 119 of these acres. The Plan will also ensure Conservation of the hydrological regime, including the springs that support these oases.

8. ***Santa Rosa and San Jacinto Mountains.*** There are approximately 956 acres of desert fan palm oasis woodland mapped in this Conservation Area, in scattered canyons throughout these mountains. The Plan will ensure Conservation of approximately 880 of these acres. The Plan will also ensure Conservation of the hydrological regimes that maintain these palm oases.

Conservation and Disturbance Levels. The MSHCP Reserve System would provide protection of desert fan palm oasis woodland in eight 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. In addition to conserving currently unprotected Habitat, the Plan benefits this natural community by securing the hydrological regimes that maintain this riparian Habitat and by addressing threats to this community as they are identified through Adaptive Management.

Conservation of 1,232 acres, or 94%, of desert fan palm oasis woodland will ensure that this natural community is sustained and restored within the Plan Area.

Table 10-24: Summary of Natural Community within Conservation Areas: Desert Fan Palm Oasis Woodland

CONSERVATION AREA	*Land within the Conservation Areas*				
	Total Acres of Natural Community in Conservation Area	*Total Acres Subject to Impacts*[2]	*Acres within Existing Conservation Lands*	*Remaining Acres to be Conserved*	*Total Acres to be Conserved in MSHCP Reserve System*
WHITEWATER CANYON	1	0	1	0	1
WILLOW HOLE	1	0	1	0	1
THOUSAND PALMS	137	0	137	0	137
INDIO HILLS PALMS	93	5	46	42	88
JOSHUA TREE NATIONAL PARK	5	0	5	0	5
MECCA HILLS/ OROCOPIA MTNS.	1	0	1	0	1
DOS PALMAS	125	6	69	50	119
SANTA ROSA & SAN JACINTO MTNS.	934	54	400	480	880
TOTAL	**1,297**	**65**	**660**	**572**	**1,232**

10.7.5.4 Natural Community Account: Background

Description. This community is composed of open to dense groves dominated by fan palm (*Washingtonia filifera*) to 75 - 100 feet tall. The understory is sparse, especially in alkaline areas or in dense groves, where the ground is mulched by fallen fronds. *Washingtonia* is a relict species, and this community is restricted to areas with available water in and around the Salton Basin and south into Baja California. Washes along the San Andreas Fault are the site of emergence of underground water and, therefore, the location of many oases. Other oases are present in washes and on hillsides, where exposed strata or other geological structures produce permanent water. Of the 1,309 acres of this community in the Plan Area, 50% currently occurs on Existing public or private Conservation Land.

Distribution within the Coachella Valley. Within the MSHCP Reserve System, desert fan palm oasis woodland is mapped in eight of the Conservation Areas:

1. Whitewater Canyon Conservation Area
2. Willow Hole Conservation Area

3. Thousand Palms Conservation Area
4. Indio Hills Palms Conservation Area
5. Joshua Tree National Park Conservation Area
6. Mecca Hills/Orocopia Mountains Conservation Area
7. Dos Palmas Conservation Area
8. Santa Rosa and San Jacinto Mountains Conservation Area

Comparison with *Manual of California Vegetation*. Ultimately, the Plan will use the vegetation classification system in the MCV (Sawyer and Keeler-Wolf 1995). The natural community described by the Holland system as desert fan palm oasis woodland would compare with one or more of the following MCV series:

1. Fan palm series

Associated Covered Species. The Covered Species associated with this community are southern yellow bat and riparian bird species, which use the community in migration: least Bell's vireo, yellow warbler, yellow-breasted chat, southwestern willow flycatcher, and summer tanager. Peninsular bighorn sheep may also visit these oases where they occur within the Santa Rosa and San Jacinto Mountains.

Essential Ecological Processes. Hydrological regimes that maintain these oases are essential for this natural community. The oases occur where springs or streams provide perennial water. Most of the springs are associated with earthquake faults in the canyons of the Indio Hills and in the Santa Rosa and San Jacinto Mountains.

10.8 Mesquite Bosque and Desert Dry Wash Woodland Communities

This section contains a summary description, including natural community characteristics, typical species, and significant threats, for desert dry wash woodland and mesquite bosque. General Conservation measures, which are common to these dry wash community types, are listed below.

1. Ecological processes, including flooding regimes, are protected to ensure sustainability of the community. Please refer to the Section 4.3 subsections for specific goals for ecosystem processes.
2. Potential changes, including proposed Development, are evaluated based on the impacts to the watershed, or drainage basin, for dry wash communities.
3. Reduce and control the spread of non-native tamarisk and other invasive species.

10.8.1 Mesquite Bosque

10.8.1.1 Natural Community Conservation Goals and Objectives

Conserve and manage occurrences of this natural community within the MSHCP Reserve System according to the following criteria:

Goal 1: Conserve natural community occurrences representative of the range of environmental conditions within which the community is known to occur. Incorporate a range of environmental gradients (e.g. slope, elevation, aspect) and high Habitat diversity.

Objective 1. Ensure Conservation of this natural community within the following Conservation Areas:

- Dos Palmas Conservation Area

Goal 2: Protect Essential Ecological Processes, which may include hydrological regimes, necessary to maintain this natural community.

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

Goal 3: Ensure Conservation of Habitat quality through protection, monitoring and Adaptive Management, and restoration where necessary, to contribute to maintenance of this community within Conservation Areas.

Objective 3. Implement biological monitoring and Adaptive Management actions to ensure Conservation of this natural community.

10.8.1.2 Threats, Limiting Factors, and Adaptive Management

This community is threatened by the invasion of exotic tamarisk, which competes for water and dominates the open "woodland" character of the mesquite bosque. This community is probably dependent on a relatively high water table. Loss of the natural water within the Dos Palmas basin through groundwater pumping and/or stream diversions is a likely threat to the mesquite bosque.

The following actions may be needed to ensure that this natural community is sustained if biological monitoring indicates that such actions are warranted. This list is not comprehensive but identifies some of the known or likely threats to mesquite bosque. In addition to conserving the mesquite bosque natural community, the Plan will integrate biological monitoring and management actions into a Management and Monitoring Program for this natural community. The

Monitoring Program will be designed to provide feedback so that management activities can be adjusted to maximize natural community Conservation. More detailed and specific information on the biological monitoring and management actions described here and proposed for this natural community can be found in Section 8.0, MSHCP Reserve Management and Monitoring Program. Actions may include:

1. Control and manage activities that degrade mesquite bosque. In particular, control and manage the primary threats to this community, including invasive plants such as tamarisk that may dominate this community, and edge effects.
2. Identify actions to reduce impacts from invasive species other than tamarisk if it is determined from monitoring results that there are impacts to mesquite bosque community.
3. Implement monitoring to track, and ultimately distinguish between, changes due to human or natural causes. Significant variables may include live perennial shrub/tree abundance and invasive exotic plant abundance.
4. Monitor groundwater level relative to maintenance of the mesquite bosque natural communities as part of the Management and Monitoring Program. See Section 6.7.3 on Changed Circumstances for additional information.
5. Implement monitoring to track the recruitment of young mesquite bosque plants into the mesquite bosque natural community in the Conservation Areas identified in Goal 1 (Section 10.2.7.1) and where recruitment is not occurring at a level needed to meet the Conservation Area's acreage goal, implement adaptive management measures to achieve a recruitment level needed to sustain the mesquite bosque natural community.

10.8.1.3 Natural Community Conservation Analysis

Conservation Area Reserve Design. Mesquite bosque occurs only in the Dos Palmas Preserve/ACEC. This occurrence of mesquite bosque includes open, park-like stands of screwbean mesquite. Tamarisk is a serious invasive plant in this community. All of the available area where this natural community occurs was included in this Conservation Area. Although impacted by tamarisk, the mesquite bosque areas consist of intact stands with only minor disturbance from power line roads and railroad tracks.

The mesquite bosque occurs within the Plan Area in one Conservation Area, Dos Palmas Conservation Area. The presence of this natural community within this Conservation Areas is shown in Table 10-25. The Planning Team identified and assessed Conservation for this natural community in the following Conservation Area:

1. ***Dos Palmas.*** There are approximately 482 acres of mesquite bosque mapped in this Conservation Area. The Plan will ensure Conservation of approximately 446 of these acres. The Plan will also ensure Conservation of the hydrological regimes that support this natural

community. The mesquite bosque is associated with the Salt Creek wash area and appears to depend on relatively high soil moisture.

Conservation and Disturbance Levels. The MSHCP Reserve System would provide protection of mesquite bosque in one Conservation Area: Dos Palmas Conservation Area. In addition to conserving currently unprotected Habitat, the Plan benefits this natural community by securing the hydrological regimes that maintain this riparian Habitat and by addressing threats to this community as they are identified through Adaptive Management.

Conservation of 446 acres, or 93%, of mesquite bosque will ensure that this natural community is sustained and restored within the Plan Area.

Table 10-25: Summary of Natural Community within Conservation Mesquite Bosque

	Land within the Conservation Areas				
CONSERVATION AREA	***Total Acres of Natural Community in Conservation Area***	***Total Acres Subject to Impacts[2]***	***Acres within Existing Conservation Lands***	***Remaining Acres to be Conserved***	***Total Acres to be Conserved in MSHCP Reserve System***
DOS PALMAS	482	36	127	319	446
TOTAL	**482**	**36**	**127**	**319**	**446**

[1] Pursuant to the avoidance, minimization and mitigation measures in Section 4.4, mesquite bosque will be avoided to the maximum extent feasible.

10.8.1.4 Natural Community Account: Background

Description. This community is an open to fairly dense, drought-deciduous streamside thorn forest dominated by screwbean mesquite (*Prosopis pubescens*) with open, park-like interiors maintained by frequent flooding or fire. It occurs in dry washes. The understory is sparse but may include various species of saltbush (*Atriplex* spp.), iodine bush, and saltgrass (BLM 1996). This community is found only in the Dos Palmas area. Of the 482 acres there, about 26% are within Existing public or private Conservation Land.

Distribution within the Coachella Valley. Within the MSHCP Reserve System, mesquite bosque is mapped in one of the Conservation Areas:

1. Dos Palmas Conservation Area

Comparison with *Manual of California Vegetation*. Ultimately, the Plan will use the vegetation classification system in the MCV (Sawyer and Keeler-Wolf 1995). The natural

community described by the Holland system as mesquite bosque would compare with one or more of the following MCV series:

1. Mesquite series

Associated Covered Species. The Covered Species associated with this community is the crissal thrasher. This community may be used by riparian bird species during migration.

10.8.2 Desert Dry Wash Woodland

10.8.2.1 Natural Community Conservation Goals and Objectives

Conserve and manage occurrences of this natural community within the MSHCP Reserve System according to the following criteria:

Goal 1: Conserve natural community occurrences representative of the range of environmental conditions within which the community is known to occur. Incorporate a range of environmental gradients (e.g. slope, elevation, aspect) and high Habitat diversity.

Objective 1. Ensure Conservation of this natural community within the following Conservation Areas:

- Stubbe and Cottonwood Canyons Conservation Area
- Upper Mission Creek/Big Morongo Canyon 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
- Santa Rosa and San Jacinto Mountains Conservation Area

Goal 2: Protect Essential Ecological Processes, which may include hydrological regimes, necessary to maintain this natural community.

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

Goal 3: Ensure Conservation of Habitat quality through protection, monitoring and Adaptive Management, and restoration where necessary, to contribute to maintenance of this community within Conservation Areas.

Objective 3. Implement biological monitoring and Adaptive Management actions to ensure Conservation of this natural community.

10.8.2.2 Threats, Limiting Factors, and Adaptive Management

Threats to desert dry wash woodland include fragmentation, changes to the hydrological regime, particularly in terms of flooding patterns, and disturbance from excessive vehicle traffic. Washes are popular routes for OHV travel and this natural community can be impacted where heavy use of this kind occurs. Roads without adequate culverts or drainage ways can result in interruption of flooding regimes that are important to maintenance of desert dry wash woodlands.

The Plan includes a provision to monitor groundwater level relative to maintenance of the desert dry wash woodland community in the Thousand Palms Conservation Area as part of the Monitoring and Management Program. See Section 6.7.3 on Changed Circumstances for additional information.

The following actions may be needed to ensure that desert dry wash woodlands are sustained if biological monitoring indicates that such actions are warranted. This list is not comprehensive but identifies some of the known or likely threats to desert dry wash woodland. In addition to conserving the desert dry wash woodland natural community, the Plan will integrate biological monitoring and Adaptive Management actions into a Management and Monitoring Program for this natural community. Monitoring Programs will be designed to provide feedback so that management activities can be adjusted to maximize natural community Conservation. More detailed and specific information on the biological monitoring and management actions described here and proposed for this natural community can be found in Section 8.0, MSHCP Reserve Management and Monitoring Program. Actions may include:

1. Control and manage activities that degrade desert dry wash woodland. In particular, control and manage the primary threats to this community, including OHV use and alteration of hydrological regimes.
2. Identify actions to reduce impacts from, and control where feasible, invasive species if it is determined from monitoring results that there are impacts to the desert dry wash woodland natural community.
3. Implement monitoring to track, and ultimately distinguish between, changes due to human or natural causes. Significant variables may include live perennial shrub/tree abundance and invasive exotic plants abundance.

10.8.2.3 Natural Community Conservation Analysis

Conservation Area Reserve Design. Desert dry wash woodlands were once widespread on alluvial fans emanating from the Santa Rosa and San Jacinto Mountains where the communities of the Coachella Valley occur today. Extant stands of relatively undisturbed woodlands can still be found in the relatively undisturbed wash areas of the San Bernardino Mountains (Stubbe Canyon and Mission Creek), in the vicinity of the Thousand Palms Preserve and on alluvial fans emanating from the Indio Hills, in the eastern portion of the Plan Area, and along alluvial fans at the east end of the Santa Rosa Mountains. The Planning Team attempted to include all large contiguous stands of desert dry wash woodland that remain in the Plan Area. Because of their somewhat liner distribution, along washes, this natural community can be subject to edge effects.

The desert dry wash woodland natural community occurs within the Plan Area in nine Conservation Areas: Stubbe and Cottonwood Canyons Conservation Area, Upper Mission Creek/Big Morongo Canyon 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, and Santa Rosa and San Jacinto Mountains Conservation Area. The presence of this natural community within these Conservation Areas is shown in Table 10-26. The Planning Team identified and assessed Conservation for this natural community in the following Conservation Areas:

1. ***Stubbe and Cottonwood Canyons.*** There are approximately 289 acres of desert dry wash woodland in this Conservation Area, of which the Plan will ensure Conservation of approximately 263 of these acres. Sparse desert dry wash woodland occurs in Stubbe Canyon from the canyon mouth to near the Interstate 10 freeway. In Cottonwood Canyon it occurs only along a portion from the mouth of Cottonwood Canyon to the channelized portion of this wash. The Plan will also ensure Conservation of the watershed for both of these canyons.

2. ***Upper Mission Creek/Big Morongo Canyon.*** There are approximately 280 acres of desert dry wash woodland mapped in this Conservation Area. The Plan will ensure Conservation of approximately 263 of these acres. The desert dry wash woodland occurs along Mission Creek on both sides of Highway 62 and along Big Morongo Canyon, mostly south of Indian Avenue. The watershed for these drainages will also be conserved as part of the Plan.

3. ***Thousand Palms.*** There are approximately 748 acres of desert dry wash woodland within the Thousand Palms Conservation Area. The Plan will ensure Conservation of approximately 744 of these acres. The Plan will also ensure Conservation of the hydrological regimes in Thousand Palms Canyon.

4. ***Indio Hills Palms.*** There are approximately 79 acres of desert dry wash woodland mapped in this Conservation Area in limited areas along the alluvial fans south of the Indio Hills.

The Plan will ensure Conservation of approximately 75 of these acres. The Plan will also secure the watershed for these washes by conserving the surrounding land in the Indio Hills.

5. ***Joshua Tree National Park.*** There are approximately 2,195 acres of desert dry wash woodland mapped in this Conservation Area. The Plan will ensure Conservation of approximately 2,182 of these acres. The Plan will also ensure Conservation of the watersheds for these washes, which are already protected in Joshua Tree National Park.

6. ***Desert Tortoise and Linkage.*** There are approximately 13,564 acres of desert dry wash woodland mapped in this Conservation Area, including some large areas from Pinkham and Cottonwood Canyons south to the Mecca Hills. The Plan will ensure Conservation of approximately 12,800 of these acres. The ability for floodwaters to continue to pass under Interstate 10 is essential to the maintenance of desert dry wash woodland in this Conservation Area.

7. ***Mecca Hills/Orocopia Mountains.*** There are approximately 9,409 acres of desert dry wash woodland mapped in this Conservation Area, including extensive stands in Box Canyon and the alluvial fans south of Box Canyon. The Plan will ensure Conservation of approximately 8,999 of these acres. Most of the desert dry wash woodland is already protected in the Mecca Hills and Orocopia Mountains Wilderness Areas.

8. ***Dos Palmas.*** There are approximately 1,856 acres of desert dry wash woodland mapped in this Conservation Area. The Plan will ensure Conservation of approximately 1,773 of these acres. The Plan will also ensure Conservation of the hydrological regime, including potential for flooding, in that most of these desert dry wash woodlands are associated with washes emanating from the Orocopia Mountains Wilderness.

9. ***Santa Rosa and San Jacinto Mountains.*** There are approximately 3,958 acres of desert dry wash woodland mapped in this Conservation Area, primarily at the east end of the Santa Rosa Mountains. The Plan will ensure Conservation of approximately 3,635 of these acres. The Plan will also ensure Conservation of the hydrological regimes that maintain these dry wash woodlands.

Conservation and Disturbance Levels. The MSHCP Reserve System would provide protection of desert dry wash woodland in nine 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. In addition to conserving currently unprotected Habitat, the Plan benefits this natural community by securing the hydrological regimes that maintain this

riparian Habitat and by addressing threats to this community as they are identified through Adaptive Management.

Conservation of at least 30,734 acres, or 76%, of desert dry wash woodland will ensure that this natural community is sustained and restored within the Plan area.

Table 10-26: Summary of Natural Community within Conservation Areas: Desert Dry Wash Woodland

CONSERVATION AREA	***Land within the Conservation Areas***				
	Total Acres of Natural Community in Conservation Area	***Total Acres Subject to Impacts[2]***	***Acres within Existing Conservation Lands***	***Remaining Acres to be Conserved***	***Total Acres to be Conserved in MSHCP Reserve System***
STUBBE & COTTONWOOD CANYONS	289	26	34	229	263
UPPER MISSION CREEK/ BIG MORONGO CANYON	280	17	112	151	263
THOUSAND PALMS	748	4	710	34	744
INDIO HILLS PALMS	79	4	42	33	75
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 MTNS.	9,317	318	6,138	2,861	8,999
DOS PALMAS	1,856	83	1,027	746	1,773
SANTA ROSA & SAN JACINTO MTNS.	3,958	323	2,157	1,478	3,635
TOTAL	**32,286**	**1,552**	**18,203**	**12,531**	**30,734**

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10.8.2.4 Natural Community Account: Background

Description. The desert dry wash woodland community is an open to dense, drought-deciduous, microphyllous thorn scrub woodland to 30 - 60 feet tall, dominated by any of several members of the bean family including palo verde (*Cercidium floridum*), ironwood (*Olneya tesota*), and smoketree (*Psorothamnus spinosus*). Associated species include desert lavender (*Hyptis emoryi*), cheesebush (*Hymenoclea salsola*), catclaw acacia (*Acacia greggii*), and desert willow (*Chilopsis linearis*) (Baldwin and Martens 2002). It occurs in washes subject to intermittent flooding, but without perennial water. These washes are associated with canyon mouths and alluvial fans in the Santa Rosa, San Bernardino, Little San Bernardino, Cottonwood, Eagle, and Orocopia Mountains, and the Mecca Hills The margins of arroyos in the Colorado Desert support a relatively dense growth of trees. It occurs in washes associated with canyon mouths and alluvial fans in the Santa Rosa, Little San Bernardino, Cottonwood, Eagle, and Orocopia Mountains, and the Mecca Hills. There are some 40,549 acres of desert dry wash woodland in the Plan Area; 45% currently occurs on public or private Existing Conservation Land

Distribution within the Coachella Valley. Within the MSHCP Reserve System, desert dry wash woodland is mapped in nine of the Conservation Areas:

1. Stubbe and Cottonwood Canyons Conservation Area
2. Upper Mission Creek/Big Morongo Canyon Conservation Area
3. Thousand Palms Conservation Area
4. Indio Hills Palms Conservation Area
5. Joshua Tree National Park Conservation Area
6. Desert Tortoise and Linkage Conservation Area
7. Mecca Hills/Orocopia Mountains Conservation Area
8. Dos Palmas Conservation Area
9. Santa Rosa and San Jacinto Mountains Conservation Area

Comparison with *Manual of California Vegetation*. Ultimately, the Plan will use the vegetation classification system in the MCV (Sawyer and Keeler-Wolf 1995). The natural community described by the Holland system as desert dry wash woodland would compare with one or more of the following MCV series:

1. Blue palo verde - ironwood - smoke tree series

Associated Covered Species. Covered Species associated with this community are Palm Springs pocket mouse, desert tortoise, Le Conte's thrasher, triple-ribbed milkvetch (in Mission Creek and Dry Morongo Creek), Mecca aster, little San Bernardino Mountains linanthus (in Mission Creek and Dry Morongo Creek), and Orocopia sage. This natural community may be used during migration by riparian birds. Peninsular bighorn sheep may also use these areas where they occur adjacent to their mountainous Habitat.

Essential Ecological Processes. Maintenance of the watershed and hydrological regimes that support the washes where this natural community occurs are essential. The potential for flooding to continue to occur along these washes is also necessary.

10.9 Pinyon and Juniper Woodland Communities

This section contains a summary description, including natural community characteristics, typical species, and significant threats, for each of the two pinyon and juniper woodland communities proposed for coverage in the Plan. General Conservation measures, which are common to all both of these communities, are listed below.

1. Through the Monitoring and Management Programs, develop appropriate management prescriptions for pinyon-juniper woodland natural communities. This may include the use of prescribed fire and/or standards for controlling wildfires to maintain or restore these communities.

10.9.1 Mojavean Pinyon-Juniper Woodland

10.9.1.1 Natural Community Conservation Goals and Objectives

Conserve and manage occurrences of this natural community within the MSHCP Reserve System according to the following criteria:

Goal 1: Conserve natural community occurrences representative of the range of environmental conditions within which the community is known to occur. Incorporate a range of environmental gradients (e.g. slope, elevation, aspect) and high Habitat diversity.

Objective 1. Ensure Conservation of this natural community within the following Conservation Areas:

- Upper Mission Creek/Big Morongo Canyon Conservation Area
- Joshua Tree National Park Conservation Area

Goal 2: Protect Essential Ecological Processes necessary to maintain this natural community.

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

Goal 3: Ensure Conservation of Habitat quality through protection, monitoring and Adaptive Management, and restoration where necessary, to contribute to maintenance of this community within Conservation Areas.

Objective 3. Implement biological monitoring and Adaptive Management actions to ensure Conservation of this natural community.

10.9.1.2 Threats, Limiting Factors, and Adaptive Management

Threats to this natural community in the Plan Area would include changes to the fire regime and, perhaps, invasive non-native grasses and forbs.

The following actions may be needed to ensure persistence of this natural community if biological monitoring indicates that such actions are warranted. This list is not comprehensive but identifies some of the known or likely threats to Mojavean pinyon-juniper woodland. In addition to conserving the Mojavean pinyon-juniper woodland natural community, the Plan will integrate biological monitoring and management actions into the Management and Monitoring Programs for this natural community. The Monitoring Program will be designed to provide feedback so that management activities can be adjusted to maximize natural community Conservation. More detailed and specific information on the biological monitoring and management actions described here and proposed for this natural community can be found in Section 8.0, MSHCP Reserve Management and Monitoring Program. Actions may include:

1. Control and manage activities that degrade Mojavean pinyon-juniper woodland.
2. Identify actions to reduce impacts from invasive species if it is determined from monitoring results that there are impacts to Mojavean pinyon-juniper woodland community.

10.9.1.3 Natural Community Conservation Analysis

Conservation Area Reserve Design. The Conservation Areas in the MSHCP Reserve System include occurrences of this natural community judged by the Planning Team to be likely to be sustained long-term. This determination was based on the presence of a relatively intact natural community, the absence of fragmentation impacts, and the presence of intact Essential Ecological Processes necessary to maintain this community.

The occurrence of Mojavean pinyon-juniper woodland is limited within the Plan Area to two Conservation Areas, Upper Mission Creek/Big Morongo Canyon Conservation Area and Joshua Tree National Park Conservation Area. The presence of this natural community within each of the Conservation Areas is shown in Table 10-27. The Planning Team identified and assessed Conservation for this natural community in the following Conservation Area:

1. ***Upper Mission Creek/Big Morongo Canyon.*** There are approximately 13 acres of Mojavean pinyon-juniper woodland mapped in this Conservation Area. The Plan will ensure Conservation of all 13 of these acres which are within Existing Conservation Lands.

2. ***Joshua Tree National Park.*** There are approximately 30,653 acres of Mojavean pinyon-juniper woodland mapped in this Conservation Area. The Plan will ensure Conservation of approximately 30,519 acres of this pinyon-juniper woodland.

Conservation and Disturbance Levels. The MSHCP Reserve System would provide protection of Mojavean pinyon-juniper woodland in two Conservation Areas, Upper Mission Creek/Big Morongo Canyon Conservation Area and Joshua Tree National Park Conservation Area. In addition to conserving currently unprotected Habitat, the Plan benefits this natural community by addressing threats to this community as they are identified through Adaptive Management.

Conservation of 30,532 acres, or 99%, of Mojavean pinyon-juniper woodland will ensure that this natural community is sustained and restored within the Plan Area.

Table 10-27: Summary of Natural Community within Conservation Areas: Mojavean Pinyon-Juniper Woodland

CONSERVATION AREA	*Land within the Conservation Areas*				
	Total Acres of Natural Community in Conservation Area	*Total Acres Subject to Impacts*[2]	*Acres within Existing Conservation Lands*	*Remaining Acres to be Conserved*	*Total Acres to be Conserved in MSHCP Reserve System*
UPPER MISSION CREEK/ BIG MORONGO CANYON	13	0	13	0	13
JOSHUA TREE NATIONAL PARK	30,653	134	29,311	1,208	30,519
TOTAL	**30,666**	**134**	**29,324**	**1,208**	**30,532**

10.9.1.4 Natural Community Account: Background

Description. Mojavean pinyon-juniper woodland is an open woodland dominated by pinyon pine (*Pinus monophylla*) and California juniper (*Juniperus californica*), with an open shrubby understory of species commonly found in adjacent non-forested stands. Understories are more diverse in shrubs than most pinyon-juniper types, and may actually exceed tree cover. Dominant shrubs include big sagebrush (*Artemisia tridentata*), desert scrub oak (*Quercus turbinella*), Mojave yucca (*Yucca schidigera*), and birchleaf mountain mahogany (*Cercocarpus betuloides*). This community typically occurs between 4,000 and 8,000 feet in elevation in desert mountain ranges. It often intergrades with Mojavean juniper woodland and scrub. In the Plan Area, approximately 30,666 acres occur in the Little San Bernardino Mountains, 96% of which is within Joshua Tree National Park.

Distribution within the Coachella Valley. Within the MSHCP Reserve System, Mojavean pinyon-juniper woodland is mapped in two of the Conservation Areas:

1. Upper Mission Creek/Big Morongo Canyon Conservation Area
2. Joshua Tree National Park Conservation Area

Comparison with *Manual of California Vegetation*. Ultimately, the Plan will use the vegetation classification system in the MCV (Sawyer and Keeler-Wolf 1995). The natural

community described by the Holland system as Mojavean pinyon-juniper woodland would compare with one or more of the following MCV series:

1. California juniper series and Single-leaf pinyon series

Associated Covered Species. The Covered Species associated with this community is the gray vireo.

Essential Ecological Processes. Consideration should be given to fire regimes in this natural community as the Management Program is developed.

10.9.2 Peninsular Juniper Woodland and Scrub

10.9.2.1 Natural Community Conservation Goals and Objectives

Conserve and manage occurrences of this natural community within the MSHCP Reserve System according to the following criteria:

Goal 1: Conserve natural community occurrences representative of the range of environmental conditions within which the community is known to occur. Incorporate a range of environmental gradients (e.g. slope, elevation, aspect) and high Habitat diversity.

Objective 1. Ensure Conservation of this natural community within the following Conservation Area:

- Santa Rosa and San Jacinto Mountains Conservation Area

Goal 2: Protect Essential Ecological Processes necessary to maintain this natural community.

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

Goal 3: Ensure Conservation of Habitat quality through protection, monitoring and Adaptive Management, and restoration where necessary, to contribute to maintenance of this community within Conservation Areas.

Objective 3. Implement biological monitoring and Adaptive Management actions to ensure Conservation of this natural community.

10.9.2.2 Threats, Limiting Factors, and Adaptive Management

Threats to this community include invasive non-native grasses and other annuals that may create continuous fuels that can carry a fire. Fire is not a typical ecosystem process in this peninsular juniper woodland and scrub community so increased fuels may alter the fire frequency. The stands of Peninsular juniper woodland and scrub are also subject to some fragmentation by low density residential Development in the Pinyon Flat and Pinyon Crest areas. Highway 74 also bisects the otherwise contiguous stand of this natural community.

The following actions may be needed to ensure persistence of peninsular juniper woodland and scrub if biological monitoring indicates that such actions are warranted. This list is not comprehensive but identifies some of the known or likely threats to peninsular juniper woodland and scrub. In addition to conserving the peninsular juniper woodland and scrub natural community, the Plan will integrate biological monitoring and management actions into the Management and Monitoring Programs for this natural community. The Monitoring Program will be designed to provide feedback so that management activities can be adjusted to maximize natural community Conservation. More detailed and specific information on the biological monitoring and management actions described here and proposed for this natural community can be found in Section 8.0, MSHCP Reserve Management and Monitoring Program. Actions may include:

1. Control and manage activities that degrade peninsular juniper woodland and scrub.
2. Identify actions to reduce impacts from invasive species if it is determined from monitoring results that there are impacts to peninsular juniper woodland and scrub community.

10.9.2.3 Natural Community Conservation Analysis

Conservation Area Reserve Design. The Conservation Areas in the MSHCP Reserve System include occurrences of this natural community judged by the Planning Team to be likely to be sustained long-term. This determination was based on the presence of a relatively intact natural community, the absence of fragmentation impacts, and the presence of intact Essential Ecological Processes necessary to maintain this community.

The occurrence of peninsular juniper woodland and scrub is limited within the Plan Area to one Conservation Area, the Santa Rosa and San Jacinto Mountains Conservation Area. The presence of peninsular juniper woodland and scrub within each of the Conservation Areas is shown in Table 10-28. The Planning Team identified and assessed Conservation for this natural community in the following Conservation Area:

Table 10-28: Summary of Natural Community within Conservation Areas: Peninsular Juniper Woodland & Scrub

CONSERVATION AREA	*Land within the Conservation Areas*				
	Total Acres of Natural Community in Conservation Area	*Total Acres Subject to Impacts*[2]	*Acres within Existing Conservation Lands*	*Remaining Acres to be Conserved*	*Total Acres to be Conserved in MSHCP Reserve System*
SANTA ROSA & SAN JACINTO MTNS.	37,229	771	30,382	6,076	36,458
TOTAL	**37,229**	**771**	**30,382**	**6,076**	**36,458**

1. ***Santa Rosa and San Jacinto Mountains.*** There are approximately 37,229 acres of peninsular juniper woodland and scrub mapped in this Conservation Area. The Plan will ensure Conservation of approximately 36,458 acres of this Peninsular juniper woodland and scrub.

Conservation and Disturbance Levels. The MSHCP Reserve System would provide protection of peninsular juniper woodland and scrub in one Conservation Area, Santa Rosa and San Jacinto Mountains Conservation Area. In addition to conserving currently unprotected Habitat, the Plan benefits this natural community by addressing threats to this community as they are identified through Adaptive Management.

Conservation of 36,458 acres, or 97%, of peninsular juniper woodland and scrub will ensure that this natural community is sustained and restored within the Plan Area.

10.9.2.4 Natural Community Account: Background

Description. This is somewhat dense woodland dominated by California juniper and associated pinyon pine. Litter layers are restricted to directly beneath tree driplines. Other species include desert scrub oak, Mojave yucca, beargrass (*Nolina parryi*), four-leaf pinyon pine (*Pinus quadrifolia*), and big sagebrush. In the Plan Area, this community occurs on the desert slopes of the San Jacinto and Santa Rosa Mountains at elevations between 3,500 and 5,500 feet. Fire is not a typical element in this community as fuel loads are usually insufficient to carry a fire. Juniper and pinyon do not tolerate fire well and fires may result in a type conversion to semi-desert chaparral. There are approximately 37,544 acres of peninsular juniper woodland and scrub, of which 81% currently occurs on Existing public or private Conservation Land.

Distribution within the Coachella Valley. Within the MSHCP Reserve System, Peninsular juniper woodland and scrub is mapped in one of the Conservation Areas:

1. Santa Rosa and San Jacinto Mountains Conservation Area

Comparison with *Manual of California Vegetation*. Ultimately, the Plan will use the vegetation classification system in the MCV (Sawyer and Keeler-Wolf 1995). The natural community described by the Holland system as peninsular juniper woodland and scrub would compare with one or more of the following MCV series:

1. California juniper series
2. Parry pinyon series

Associated Covered Species. The Covered Species associated with this community are the desert tortoise, gray vireo, and the peninsular bighorn sheep.

Essential Ecological Processes. Consideration should be given to fire regimes in this natural community as the Management Program is developed.