Imperial Irrigation District
Water Conservation and Transfer Project

Habitat Conservation Plan

Final Environmental Impact Report/ Environmental Impact Statement

Volume 2

Prepared for

Imperial Irrigation District

U.S. Bureau of Reclamation

Prepared by

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CHAPTER 1

Introduction

This Habitat Conservation Plan (HCP) was prepared in support of the Imperial Irrigation District's (IID's) application for Incidental Take Permits (ITPs) in conformance with Section 10 of the Federal Endangered Species Act of 1973 (FESA) and 2081(b) of the California Endangered Species Act (CESA). Through this HCP, IID is committing to certain management actions that will minimize and mitigate the impacts of any take of covered species that may occur as a result of IID's implementation of the IID / San Diego County Water Authority (SDCWA) Transfer Agreement and Quantification Settlement Agreement (QSA), and continuation of its operation and maintenance (O&M) activities.

1.1 Background

The IID was formed under California law to deliver water for irrigation and domestic purposes. IID delivers water from the Colorado River to agricultural and domestic water users within the boundaries of its service area. This service area covers about 500,000 acres in Imperial Valley. Irrigated agriculture is the primary economic enterprise within IID's service area and the primary use of water delivered by IID.

The Imperial Valley is part of the Colorado Desert and is located in the Salton Trough in Imperial County in Southeastern California. The Salton Sea is located in the northern portion of Imperial Valley, with portions of the Sea in both Imperial and Riverside counties. The Salton Sea serves as a drainage repository for agricultural and urban runoff from the Imperial, Coachella, and Mexicali Valleys.

IID's diversion of Colorado River water is based upon water rights obtained pursuant to state law, which were perfected in the early 1900s. IID's diversions from the Colorado River also are accomplished pursuant to a 1932 water delivery contract with the U.S. Bureau of Reclamation (Reclamation) under the Boulder Canyon Project Act of December 21, 1928 (45 Stat. 1057, as amended, 43 U.S.C. § 617 et seq.). IID's senior water rights are part of California's apportionment of Colorado River water under the 1922 Colorado River Compact, the Boulder Canyon Project Act, and the U.S. Supreme Court decree in Arizona v. California, 373 U.S. 546 (1963).

IID diverts water from the Colorado River at Imperial Dam, located about 18 miles northeast of Yuma, Arizona. Water diverted at Imperial Dam first enters desilting basins, where sediment settles out of the water. IID operates both Imperial Dam and the desilting basins pursuant to a contract with Reclamation. From the desilting basins, the water enters the All American Canal (AAC). The 84-mile-long AAC runs in a westerly direction and conveys water to three main canals within IID's service area. These three canals (East Highline, Central Main, and Westside Main) generally run northerly and deliver water to lateral canal systems and subsequently to farm turnouts. IID owns and operates the canal and turnout system.

After the water is applied to farm fields for irrigation purposes, all unused water is collected in drains. Water may enter the drains as field runoff (tailwater) or through tile drains (tilewater). Tile drains collect salinized subsurface leach flow and convey it to the drains. The drains transport water directly to the Salton Sea or to the New or Alamo Rivers that discharge to the Salton Sea. IID maintains the network of drains. With no outlet, the Salton Sea is a terminal sink for drain water from Imperial Valley.

1.1.1 IID/SDCWA Water Conservation and Transfer Agreement

In mid-1995, IID and SDCWA began discussions regarding a water conservation and transfer agreement. As a result of these discussions, on April 29, 1998, IID and SDCWA executed an Agreement for Transfer of Conserved Water (IID / SDCWA Transfer Agreement; IID and SDCWA 1998. The IID / SDCWA Transfer Agreement is a long-term transaction between IID and SDCWA involving the voluntary conservation by IID of up to 300 KAFY (300 thousand acre-feet per year) and the subsequent transfer of all or a portion of the conserved water to SDCWA. The transferred, conserved water is intended for use within SDCWA's service area in San Diego County, California. Under certain circumstances, up to 100 KAFY of the water conserved by IID may be transferred to the Coachella Valley Water District (CVWD), the Metropolitan Water District of Southern California (MWD), or both.

The conserved water will consist of Colorado River water that otherwise would be diverted by IID at Imperial Dam for use within IID's service area in Imperial County, California. For conserved water transferred to SDCWA or MWD, IID's annual diversions of Colorado River water at Imperial Dam will be reduced by the amount of the conserved water, and this amount will be diverted at MWD's Whitsett Intake at Lake Havasu on the Colorado River for delivery through MWD's Colorado River Aqueduct. The Colorado River Aqueduct operated by MWD provides the only existing facilities for conveyance of conserved water from the Colorado River to SDCWA's service area. For conserved water transferred to CVWD, IID's annual diversions of Colorado River water at Imperial Dam will also be reduced by the amount of the conserved water; however, the amount CVWD will divert at Imperial Dam will increase by this same amount. This amount will be diverted into the Coachella Canal from the AAC.

Conservation methods employed to effect the IID / SDCWA Water Conservation and Transfer Agreement may consist of: (1) on-farm measures implemented by landowners and tenants within IID's service area; and / or (2) system-based measures implemented by IID and affecting its distribution and drainage facilities. The IID / SDCWA Transfer Agreement anticipates that on-farm conservation measures will be the principal means of conserving water for transfer to SDCWA and requires on-farm conservation of at least 130 KAFY, unless SDCWA and IID agree on a lower amount. On-farm conservation requires the voluntary cooperation of landowners and tenants within IID's service area. On-farm conservation measures will be developed and managed under contracts between IID and landowners that elect to participate. If a sufficient number of landowners participate to meet the minimum conserved water (130 KAFY unless otherwise agreed) amount from on-farm conservation described above, then IID may elect to transfer additional conserved water using system-based conservation measures, on-farm measures, or a combination of these measures.

The IID/SDCWA Transfer Agreement is described in greater detail in the IID Water Conservation and Transfer Project Environmental Impact Report/Environmental Impact Statement (EIR/EIS) (IID 2001).

1.1.2 California's Colorado River Water Use Plan

The Colorado River Compact of 1922 quantified the allocation of Colorado River water among the seven states that comprise the Colorado River Basin. The compact allocates approximately 7.5 MAFY (7.5 million acre-feet per year) to the four Upper Basin states—Colorado, Utah, Wyoming, and New Mexico—and 7.5 MAFY to the three Lower Basin states—California, Nevada, and Arizona. Rapidly growing metropolitan areas and vast irrigated acreage have contributed to a history of contentious relations among the Lower Basin states and individual users in the states, as well as between the Upper and Lower Basins. Because of acrimonious and litigious relations among the Lower Basin states, they have not self-apportioned Colorado River supplies in the same manner as the Upper Basin states. As a result, the Secretary of the Interior (Secretary) acts as water master (typically through actions of Reclamation) for the Lower Colorado River (LCR; Arizona v. California, 1964). The decree of the court set California's apportionment at 4.4 MAF (plus 50 percent of any surplus water); Arizona at 2.8 MAF (plus 46 percent of any surplus); and Nevada at 300 KAF (and 4 percent of any surplus). Recent California diversions have been up to 800 KAF above its normal year (i.e., non-surplus) allocation. California's efforts to reduce its use to 4.4 MAFY were the subject of negotiations among the states and the Secretary.

California recently published the Draft California Water Use Plan (Water Use Plan), formerly known as the "4.4 Plan," in which the steps necessary to comply with the court decree were outlined. The Water Use Plan is a programmatic effort intended to reduce California's use of the Colorado River to comply with its Lower Basin entitlement. The Water Use Plan provides California's Colorado River water users with a framework by which programs, projects, and other activities will be cooperatively implemented to allow California to satisfy its annual water supply needs within its annual normal-year apportionment of Colorado River water. The Water Use Plan will require operational changes in the Colorado River to allow water wheeling and other actions necessary to transfer water among users.

The Water Use Plan identifies a suite of actions that will reduce total Colorado River water use in the state. Finalization of the Water Use Plan will require the four major linchpins:

- Cooperative water conservation and transfers from agricultural to urban use
- Further quantification of the third priority of the Seven-Party Agreement, which established the priority of use for California's 4.4 MAF among the seven major water users: Palo Verde Irrigation District, IID, CVWD, MWD, City of San Diego, City of Los Angeles, and the County of San Diego
- Improved reservoir management and operations
- Water storage and conjunctive use programs

The IID / SDCWA Water Conservation and Transfer project is an example of the first linchpin.

1.1.3 Quantification Settlement Agreement

Subsequent to execution of the IID / SDCWA Transfer Agreement, a settlement agreement was negotiated by and among IID, CVWD, and MWD, with the participation of the State of California and the Department of the Interior (DOI). The proposed terms of the settlement agreement are incorporated in a draft QSA, which was released for public review in December 2000. (A copy of the draft QSA and a Summary of the QSA are available for review at the IID Headquarters in Imperial.) The QSA is intended to settle, for a period of up to 75 years, long-standing disputes among IID, MWD, and CVWD regarding the priority, use and transfer of Colorado River water by establishing a consensual sharing of Colorado River water among these agencies. The QSA facilitates a number of component agreements and actions which, when implemented, will enhance the certainty and reliability of Colorado River water supplies available to the signatory agencies and will assist these agencies in meeting their water demands within California's normal-year apportionment of Colorado River water. The QSA thus implements the goals and programs of the Water Use Plan.

In addition to establishing water budgets for IID, MWD, and CVWD, the QSA sets forth the approved parameters of various water transfers and exchanges, including the conservation by IID of up to 300 KAFY for transfer to SDCWA, CVWD, and / or MWD. The QSA allocates the water to be conserved by the AAC and Coachella Canal lining projects. The QSA also incorporates a consensual limit by IID on its total Priority 3 diversions of Colorado River water at 3.1 MAFY. IID's limit is further reduced by the amounts IID conserves and transfers to others under the QSA, by the amount to be conserved by the AAC lining project, and by any Priority 3 water made available by IID to holders of miscellaneous present perfected Colorado River water rights (PPRs) and Indian reserved rights, resulting in a net Priority 3 diversion of approximately 2.61 to 2.70 MAFY for use within the IID service area. The QSA also includes a consensual cap on CVWD's Priority 3 diversions at 330 KAFY, reduced by the amount to be conserved by the Coachella Canal lining project and by any Priority 3 water made available by CVWD for holders of miscellaneous PPRs and Indian reserved rights. A Program EIR is being prepared by IID, MWD, CVWD, and SDCWA, as joint lead agencies, to identify and assess the environmental impacts of the QSA program.

The Secretary of DOI, in its role as water master for the LCR, must implement the terms of the QSA by delivering Colorado River water in accordance with its terms. The actions required of the Secretary are set forth in a proposed Implementation Agreement (IA), which is intended to be effective concurrently with the QSA. As a condition precedent to implementation of the QSA, certain other federal actions are required, including the adoption of Interim Surplus Criteria and the adoption of an Inadvertent Overrun Program to facilitate the payback of inadvertent exceedances by IID or CVWD of their respective Priority 3 diversion caps. Reclamation has prepared a final EIS for the proposed Interim Surplus Criteria, and a Record of Decision (ROD) was signed in January 2001. Reclamation is preparing an EIS pursuant to National Environmental Policy Act (NEPA) to assess the environmental impacts of the IA and related federal actions.

If the QSA is finally approved and implemented, it would change the project described in the IID/SDCWA Transfer Agreement in certain respects. The QSA would limit the amount of conserved water transferable to SDCWA to a maximum of 200 KAFY, and would provide for CVWD's option to acquire up to 100 KAFY of water conserved by IID, in lieu of transfer of this increment of conserved water to SDCWA. The QSA also provides for MWD's option to acquire any portion of the 100 KAFY of conserved water available to, but not acquired by, CVWD. Under both the QSA and the IID/SDCWA Transfer Agreement, the conserved water transferred by IID to SDCWA, CVWD, and/or MWD retains the priority of IID's senior water rights. However, IID retains ownership of its water rights.

The EIR/EIS for the IID Water Conservation and Transfer Project addresses the environmental impacts of IID's consensual limit on its Priority 3 diversions and the conservation by IID of up to 300 KAFY for transfer pursuant to the IID/SDCWA Water Transfer Agreement and/or the QSA. This HCP is intended to support the issuance of ITPs for that project within the covered area (i.e., Imperial Valley, the Salton Sea, and the area of the AAC).

1.2 Purpose and Need for the HCP

The purpose and need for the HCP stem from IID’s requirement for long-term regulatory certainty in committing to the IID/SDCWA Transfer Agreement and the QSA. Both the IID/SDCWA Transfer Agreement and the QSA establish long-term water supply arrangements designed to assist California in meeting its Colorado River entitlement of 4.4 MAFY. The IID/SDCWA Transfer Agreement continues in effect for an initial term of 45 years after transfers have commenced and provides for an optional renewal term of 30 additional years. A substantial term is required by SDCWA, so that it can rely upon the IID conserved water as a key element of its future water supply plans. To implement the transfer, SDCWA must enter into a long-term agreement with the MWD to provide for acceptance of the conserved water at the new point of diversion and conveyance through MWD’s Colorado River aqueduct. Similarly, the QSA establishes water budgets for a period of up to 75 years, including long-term obligations on the part of IID to limit its overall Colorado River water diversions and to generate conserved water for transfer to SDCWA, CVWD, and/or MWD. Long-term, no-surprises assurances regarding the FESA and CESA compliance measures and costs are needed by IID to commit to the long-term obligations set forth in the IID/SDCWA Transfer Agreement and the QSA.

Whether the IID/SDCWA Transfer Agreement becomes a reality depends largely on whether the IID and its participating farmers can conclude that the benefits of implementing the IID/SDCWA Transfer Agreement project are balanced by the risks and costs to be borne by the IID and farmers. The conservation of up to 300 KAF of water within the IID service area will require changes in current farming practices and substantial capital investments in water conservation equipment and technologies.

Of the initial 200 KAF anticipated to be conserved for transfer to SDCWA, 130 KAF is projected to come from on-farm conservation programs adopted by farmers in the Imperial Valley. The on-farm conservation programs are voluntary. Farmers will enter into agreements with IID ranging from 1 to 75 years, committing to the implementation of conservation measures. These measures, in turn, will require the farmers to make capital investments in various types of water conservation equipment and facilities. In many cases, farmers will be required to obtain financing and pay for construction costs and implement and maintain conservation measures. The farmers will be unable to obtain financing if they can not estimate the direct and indirect costs of implementing the water conservation programs.

As such, farmers may be unwilling to enter into binding agreements to undertake significant costs and risks associated with implementing on-farm conservation measures unless they can determine the total costs of the measures and the additional associated cost of complying with the FESA and CESA. The greater the cost of the mitigation program the fewer funds available for IID to compensate farmers for water conservation measures. In the absence of this certainty, IID and farmers within IID's service area will be at risk and the costs of implementing the water conservation measures could increase substantially in the future to address additional costs associated with: (1) the listing of new species as endangered or threatened; (2) the designation of critical habitat for listed species; and (3) the imposition of additional mitigation obligations on IID in the event of changed or unforeseen circumstances. The IID seeks incidental take authorization and no surprises assurances to provide certainty and predictability regarding the habitat conservation measures that IID will be required to implement during the term of the IID/SDCWA Water Conservation and Transfer Agreement and QSA to comply with the state and federal endangered species acts.

The effect of the QSA is to establish obligations and incentives for the long-term conservation by IID of a substantial amount of Colorado River water. The agencies proposing to acquire conserved water from IID need to rely upon the long-term availability of the conserved water for water supply planning purposes. As a result, the QSA allows only very limited flexibility to modify or terminate IID's obligations. Therefore, IID must have certainty regarding the scope, feasibility, and cost of implementing the water conservation and transfer program, including the required environmental mitigation measures, on a long-term basis, prior to committing to implement the QSA. This HCP is intended to establish a definitive program, which will set forth the obligations of IID, and limitations on those obligations, to provide certainty regarding IID's ability to implement the program.

With respect to biological resources, the purpose of the HCP is to minimize and mitigate the effects of implementing the water conservation and transfer programs on covered species. The HCP consists of a combination of measures to minimize the effects of implementing the water conservation and transfer programs as well as measures that will ensure habitat availability for covered species over the term of the HCP. The commitments to create habitat under the HCP will provide a net benefit to covered species by improving habitat availability and quality.

1.3 Relationship to Other Endangered Species Act Approvals

Implementation of the IID Water Conservation and Transfer Project requires changes in water management that could potentially influence habitats and species over a broad geographic area. In addition to the potential effects in areas (i.e., AAC, Imperial Valley, and the Salton Sea) covered by this HCP, potential effects on listed species could occur along the LCR between Parker and Imperial dams, in the Coachella Valley, in San Diego County and potentially in MWD's Service Area. To achieve compliance with the FESA and CESA, several regulatory approval processes in addition to this HCP will be required. Reclamation's changed operation in the Colorado River between Parker and Imperial dams, including implementation of the Interim Surplus Criteria and the change in the point of diversion required for the water transfer projects and the AAC and Coachella Canal lining projects pursuant to the QSA, is a federal action that is addressed through a Section 7 consultation. The Biological Opinion was issued by the USFWS on January 12, 2001, and provides incidental take authorization for federally listed species potentially affected by this change in operation. Coverage under CESA for state-listed species potentially affected by the change in the point of diversion on the Colorado River is expected to be obtained through a Section 2081 permit issued by CDFG for the benefit of IID, SDCWA, and MWD. It is anticipated that long-term coverage for state and federally listed species as well as selected unlisted species in the affected reach of the LCR will be provided by the LCR Multi-Species Conservation Plan.

Potential effects on state and federally listed species in the Coachella Valley resulting from use of conserved water transferred from IID will be addressed through separate FESA and CESA processes. Incidental take coverage as necessary for this element of the project will be obtained by CVWD through a regional HCP process or a process specific to the use of the transferred water.

Delivery of conserved water to San Diego County and MWD's Service Area is not anticipated to result in the take of any state or federally listed species. SDCWA has indicated that the conserved water transferred by IID will replace water that it otherwise would acquire from MWD, its primary supplier. Similarly, if water is transferred to MWD, the water would replace other historic supplies. The transferred water will retain IID's high-level Priority 3 status and thus will provide better protection from impacts of drought and increased reliability compared to SDCWA's existing supply. As such, the transfer of water from IID will not result in an increased water supply for SDCWA, although it will increase the reliability of water in the SDCWA service area. No additional FESA / CESA compliance actions are anticipated.

1.4 Area Covered by the HCP

IID conveys and delivers water diverted from the LCR at Imperial Dam to customers in the Imperial Valley in IID's service area via the AAC. The HCP area includes all lands comprising the approximately 500,000 acres of IID's service area (including canal rights-of-way), the Salton Sea, lands owned by IID outside of its service area that are currently submerged by the Salton Sea, and IID's rights-of-way along the AAC downstream from the point of diversion at Imperial Dam. In addition, the HCP covers any take of covered species using the Salton Sea that could occur as a result of IID's activities. Figure 1.4-1 shows the HCP area.

1.5 Species Covered by the HCP

The IID prepared this HCP in support of an application for ITPs from the USFWS and CDFG to cover federally and state listed species and certain unlisted species that are present or potentially present in IID's service area, the Salton Sea, or along the AAC. The HCP covers 96 fish, wildlife, and plant species with the potential to occur in the HCP area. These species and their current federal and state status are shown in Table 1.5-1.

1.6 Term of the HCP

IID is applying for ITPs for 75 years (2002 through 2077). This HCP was prepared in support of IID's applications, and will be in effect for the full 75-year term of the ITPs.

The IID / SDCWA Transfer Agreement continues in effect for an initial term of 45 years with an optional renewal term of 30 additional years. The QSA remains in effect for a period of up to 75 years. Long-term assurances regarding FESA and CESA compliance measures and costs are needed by the parties to commit to the obligations required under the IID / SDCWA Transfer Agreement and the QSA. For this reason, IID is seeking coverage under this HCP for a 75-year term.

1.7 Activities Covered by the HCP

The activities covered by this HCP include the following:

- Water conservation and irrigation and drainage of lands to which IID delivers water
- Water conservation activities undertaken by IID
- Activities of IID in connection with the diversion, conveyance, and delivery of Colorado River water to users within IID's service area
- Activities of IID in connection with the collection of unused irrigation or drainage waters within its service area and conveyance to the Salton Sea

The covered activities specifically include all conservation and mitigation measures, whether undertaken by IID or by farmers, tenants, or landowners, in connection with either the conservation and transfer of up to 300 KAFY of Colorado River water pursuant to the IID / SDCWA Transfer Agreement and / or the QSA; or compliance with the cap on IID's annual diversions of Colorado River water established by the QSA.

1.7.1 Overview of Covered Activities

IID is an irrigation district, a limited purpose public agency, formed under the laws of the State of California. IID holds rights to take water from the Colorado River and deliver it to water users in Imperial County. To do so, IID diverts water from the Colorado River at Imperial Dam. After being desilted, this water is conveyed through the AAC to three main canals (Figure 1.7-1). The water is then diverted from the main canals into lateral canals. While a small number of farms take water directly from the AAC or main canals, most take water from lateral canals. Water is diverted out of the lateral canals and into farm fields by turnouts. Most farmers then use flood irrigation techniques after the water flows through the turnout.

The majority of water delivered to a field is absorbed and stored in the soil for use by the crops. The remaining water evaporates or leaves the field in the form of either tailwater or tilewater. Tailwater is surface runoff; tilewater is water that has leached through the soil and has been collected by drain pipes (called tile) installed underneath the field. The brackish tail and tile water are discharged into drains maintained by IID.

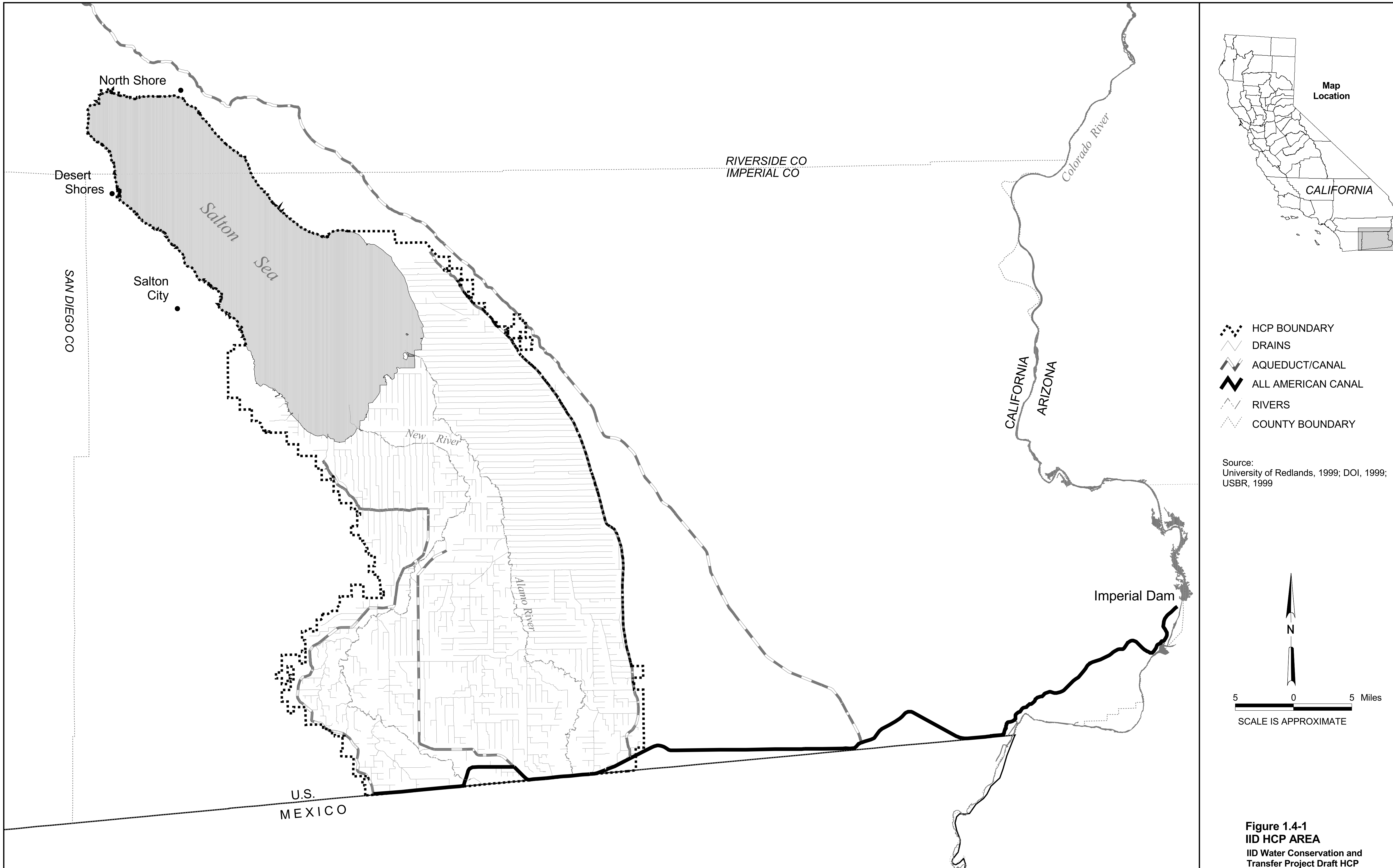

Figure 1.4-1
IID HCP AREA
IID Water Conservation and Transfer Project Draft HCP

TABLE 1.5-1
Species Covered by the IID HCP

Common Name	Scientific Name	Federal Status	State Status
Invertebrates			
Cheeseweed moth lacewing	*Oliarces clara*	S	-
Andrew's dune scarab beetle	*Pseudocatalpa andrewsi*	S	-
Fish			
Desert pupfish	*Cyprinodon macularius*	E	E
Razorback sucker	*Xyrauchen texanus*	E	E/FP
Amphibians and Reptiles			
Colorado River toad	*Bufo alvarius*	-	CSC
Desert tortoise	*Gopherus agassizi*	T	T
Banded gila monster	*Helodema suspectum cinctum*	-	CSC
Flat-tailed horned lizard	*Phrynosoma mcalli*	PT	CSC
Lowland leopard frog	*Rana yavapaiensis*	S	-
Western chuckwalla	*Sauromalus obesus obesus*	S	-
Couch's spadefoot toad	*Scaphiopus couchii*	-	CSC
Colorado desert fringed-toed lizard	*Uma notata notata*	S	CSC
Birds			
Cooper's hawk	*Accipiter cooperii*	-	CSC
Sharp-shinned hawk	*Accipiter striatus*	-	CSC
Tricolored blackbird	*Agelaius tricolor*	S	CSC
Golden eagle	*Aquila chrysaetos*	-	CSC/FP
Short-eared owl	*Asio flammeus*	-	CSC
Long-eared owl	*Asio otus*	-	CSC
Burrowing owl	*Athene cunicularia*	S	CSC
Aleutian Canada goose	*Branta canadensis leucopareia*	DM	-
Ferruginous hawk	*Buteo regalis*	S	CSC
Swainson's hawk	*Buteo swainsoni*	-	T
Western snowy plover	*Charadrius alexandrinus nivosus*	-	CSC
Mountain plover	*Charadrius montanus*	PT	CSC
Vaux's swift	*Chaetura vauxi*	-	CSC
Black tern	*Chlidonias niger*	S	-
Northern harrier	*Circus cyaneus*	-	CSC
Western yellow-billed cuckoo	*Coccyzus americanus*	-	E
Gilded flicker	*Colaptes chrysoides*	-	E
Black swift	*Cypseloides niger*	-	CSC
Fulvous whistling-duck	*Dendrocygna bicolor*	S	CSC
Yellow warbler	*Dendroica petechia*	-	CSC
Reddish egret	*Egretta rufescens*	S	-
White-tailed kite	*Elanus leucurus*	-	FP
Southwestern willow flycatcher	*Empidonax trailii extimus*	E	E
Merlin	*Falco columbarius*	-	CSC
Prairie falcon	*Falco mexicanus*	-	CSC

TABLE 1.5-1
Species Covered by the IID HCP

Common Name	Scientific Name	Federal Status	State Status
Peregrine falcon	*Falco peregrinus*	DM	E/FP
Greater sandhill crane	*Grus canadensis tadiba*	-	T/FP
Bald eagle	*Haliaeetus leucocephalus*	T	E/FP
Yellow-breasted chat	*Icteria virens*	-	CSC
Least bittern	*Ixobrychus exilis*	S	CSC
Loggerhead shrike	*Lanius ludovicianus*	S	-
Laughing gull	*Larus atricilla*	-	CSC
California black rail	*Laterallus jamaicensis coturniculus*	S	T/FP
Long-billed curlew	*Numenius americanus*	-	CSC
Osprey	*Pandion haliaetus*	-	CSC
Black skimmer	*Rhynchops niger*	-	CSC
Bank swallow	*Riparia riparia*	-	T
Gila woodpecker	*Melanerpes uropygialis*	-	E
Elf owl	*Micrathene whitneyi*	-	E
Wood stork	*Mycteria americana*	-	CSC
Brown-crested flycatcher	*Myiarchus tyrannulus*	-	CSC
Harris' hawk	*Parabuteo unicinctus*	-	CSC
Large-billed savannah sparrow	*Passerculus sandwichensis rostratus*	S	-
American white pelican	*Pelecanus erythrorhynchos*	-	CSC
Brown pelican	*Pelecanus occidentalis*	E	E/FP
Double-crested cormorant	*Phalacrocorax auritus*	-	CSC
Summer tanager	*Piranga rubra*	-	CSC
White-faced ibis	*Plegadis chihi*	S	CSC
Purple martin	*Progne subis*	-	CSC
Vermilion flycatcher	*Pyrocephalus rubinus*	-	CSC
Yuma clapper rail	*Rallus longirostris yumanesis*	E	T/FP
California least tern	*Sterna antillarum browni*	E	E/FP
Elegant tern	*Sterna elegans*	S	-
Van Rossem's gull-billed tern	*Sterna nilotica vanrossemi*	S	CSC
Crissal thrasher	*Toxostoma crissale*	-	CSC
LeConte's thrasher	*Toxostoma lecontei*	-	CSC
Arizona Bell's vireo	*Vireo bellii arizonae*	-	E
Least Bell's vireo	*Vireo bellii pusillus*	E	E
Mammals			
Pallid bat	*Antrozous pallidus*	-	CSC
Mexican long-tongued bat	*Choeronycteris mexicana*	S	CSC
Pale western big-eared bat	*Corynorhinus townsendii pallescens*	-	CSC
Spotted bat	*Euderma maculatum*	S	CSC
Western mastiff bat	*Eumops perotis californicus*	S	CSC
California leaf-nosed bat	*Macrotus californicus*	S	CSC
Western small-footed myotis	*Myotis ciliolabrum*	S	-

TABLE 1.5-1
Species Covered by the IID HCP

Common Name	Scientific Name	Federal Status	State Status
Occult little brown bat	*Myotis lucifugus occultus*	S	CSC
Southwestern cave myotis	*Myotis velifer brevis*	S	CSC
Yuma myotis	*Myotis yumanensis yumanensis*	S	CSC
Pocketed free-tailed bat	*Nyctinomops femorosaccus*	-	CSC
Big free-tailed bat	*Nyctinomops macrotis*	-	CSC
Nelson's bighorn sheep	*Ovis canadensis nelsoni*	BLMSS	
Jacumba little pocket mouse	*Perognathus longimembris internationalis*	S	CSC
Yuma Hispid cotton rat	*Sigmodon hispidus eremicus*	S	CSC
Colorado River hispid cotton rat	*Sigmodon arizonae plenus*	-	CSC
Plants			
Peirson's milk-vetch	*Astragalus magdalenae* var. *peirsonii*	T	E
Flat-seeded spurge	*Chamaesyce platysperma*	S	-
Wiggin's croton	*Croton wigginsii*	-	R
Foxtail cactus	*Escobaria vivipara* var. *alversonii*	S	-
Algodones Dunes sunflower	*Helianthus niveus* ssp. *tephrodes*	S	E
Munz's cactus	*Opuntia munzii*	S	
Giant Spanish needle	*Palafoxia arida* var. *gigantea*	S	-
Sand food	*Pholisma sonorae*	S	-
Orocopia sage	*Salvia greatae*	S	-
Orcutt's aster	*Xylorhiza orcuttii*	S	-

Status Codes:
BLMSS: Bureau of Land Management Sensitive Species
CSC: California Species of Special Concern
DM: Delisted – monitored
E: Endangered
FP: Fully protected
PT: Proposed threatened
R: Rare
S: Federal Species of Concern
T: Threatened

The drains carry three kinds of water: tailwater and tilewater discharged from farm fields, and operational discharge. Three kinds of water make up operational discharge: carriage water, lateral fluctuations, and change order. Carriage water is the extra volume of water needed in the laterals to deliver a specific volume of water to a turnout. Because open channel gravity flow water delivery is not exact, additional water is required to ensure deliveries are made in the amounts ordered. Lateral fluctuations are caused by delivery operations and maintenance activities. Laterals may need to be emptied for maintenance activities; the water that was in the lateral at the time must be removed and is discharged into a drain. Finally, a reduction or change by a farmer in his delivery order may not be timed exactly to efficiently implement the change by IID, resulting in extra water being delivered to a lateral or onto a field and then discharged into a drain.

Drains discharge water into one of three locations: the New River, Alamo River, or Salton Sea. Both the New and Alamo Rivers discharge to the Salton Sea. The Alamo River flows in

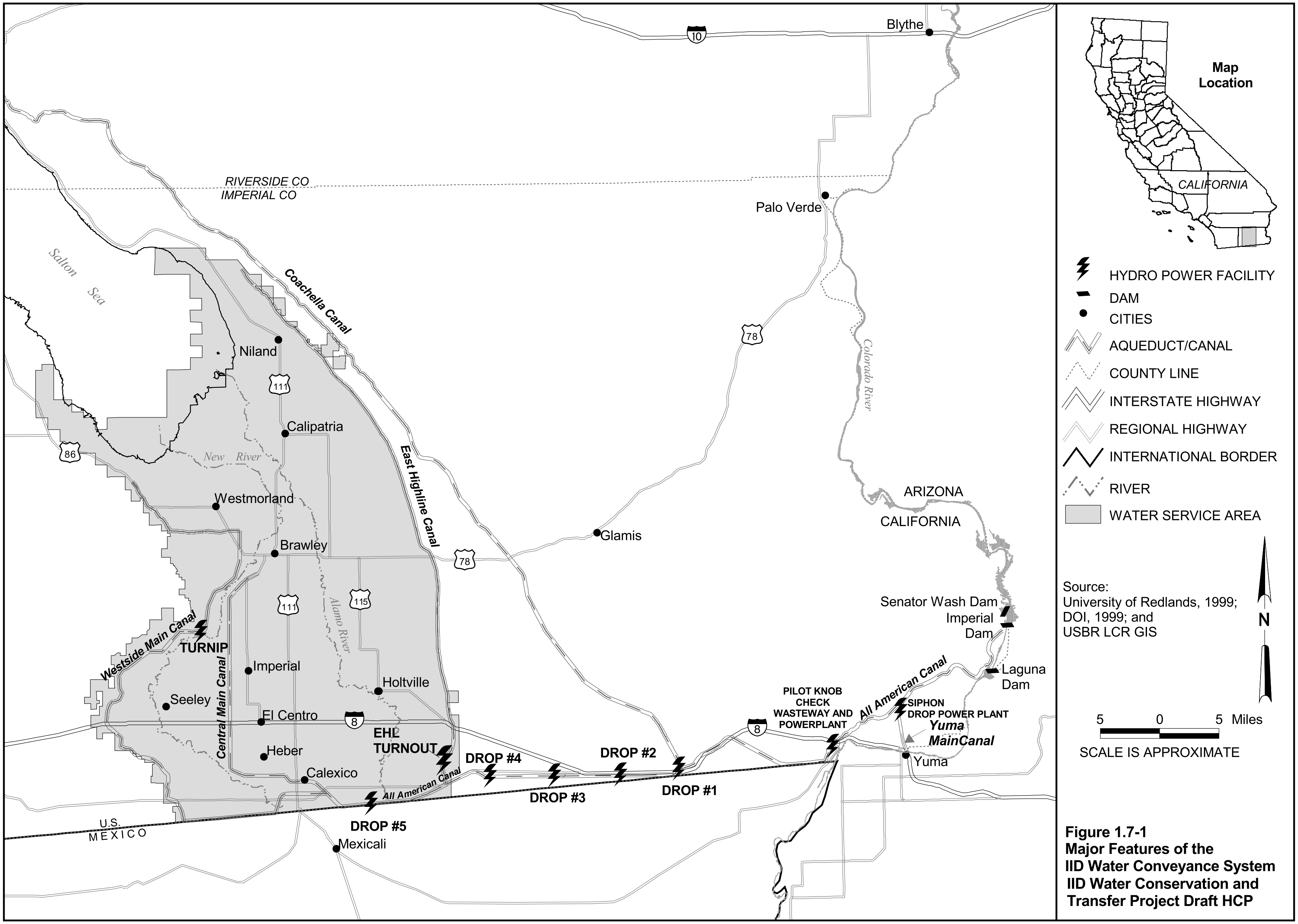

Figure 1.7-1
Major Features of the
IID Water Conveyance System
IID Water Conservation and
Transfer Project Draft HCP

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a natural desert dry wash drainage channel, while the New River flows in a channel carved by the Colorado River to the Salton Sea. When the Colorado River flooded its banks in 1906, it flowed north and created the Salton Sea. The New River originates south of the International Boundary in the Mexicali Valley and conveys treated and untreated municipal and industrial wastewater, in addition to agricultural drainage from irrigated areas south of the border.

1.7.2 Water Use and Conservation Activities

As described in Section 1.1.1 of this chapter, IID will implement a water conservation program to generate up to 300 KAFY of conserved water for transfer to SDCWA, CVWD, and MWD. In addition, conservation measures or other water use activities also may be implemented by IID, farmers or landowners to comply with the annual cap on IID's Priority 3 diversions of Colorado River water established by the QSA. All water conservation and use activities by IID, farmers, tenants, and landowners and the effects of those activities are covered by this HCP.

Implementation of water conservation measures and transfer of the water to SDCWA, CVWD, and MWD would occur gradually. The IID/SDCWA Transfer Agreement and the QSA specify the quantities of water to be transferred and the ramp-up schedule for the transfer. The IID/SDCWA Water Conservation and Transfer Agreement requires a ramp-up of the conservation and transfer of water to SDCWA in increments of 20 KAFY. The QSA also specifies the amount and timing of transfers to CVWD and MWD. Based on the schedules in these agreements, a total conservation and transfer of 130 KAFY would be reached about six to seven years after initiation of the conservation and transfer program. About 10 years after initiation of the conservation and transfer program, 200 KAFY of water would be transferred with 300 KAFY of conservation and transfer achieved 24 years after the start of the water conservation and transfer programs.

Water conservation will be accomplished through a combination of on-farm and system-based conservation measures. On-farm measures consist of actions taken by individual farmers or landowners to conserve water under voluntary water conservation agreements with IID. System-based conservation measures consist of actions that would be undertaken by IID to conserve water. The exact mix of conservation methods that would be employed is anticipated to vary over the term of the HCP. The following describes the suite of conservation methods that could be implemented to conserve water.

1.7.2.1 On-farm Water Use and Conservation Activities

To commit to implementing the IID Water Conservation and Transfer Project, IID and participating farmers within the IID service area must be able to conclude that the benefits of the project justify the risks and costs to be assumed by IID and farmers. The conservation of 200 to 300 KAF of water within the IID service area will require changes in current farming practices and substantial capital investments in water conservation equipment and technologies. Thus, covered activities include irrigation practices by farmers and landowners otherwise required by the QSA and water conservation measures undertaken by farmers participating in the water conservation program.

Of the 130 to 200 KAF to be conserved for transfer to SDCWA pursuant to the IID/SDCWA Water Transfer Agreement, at least 130 KAFY is anticipated to come from on-farm conservation programs adopted by farmers in the Imperial Valley. The on-farm conservation programs are voluntary. Farmers will enter into agreements with IID, committing to the implementation of conservation measures. These measures, in turn, will require the farmers to make capital investments in various types of water conservation equipment and facilities. In many cases, farmers will be required to obtain financing for construction costs to implement and maintain conservation measures. The farmers' ability to obtain financing will depend on the estimate of the direct and indirect costs of implementing the water conservation measures.

As such, farmers and lending institutions may be unwilling to enter into binding agreements to undertake significant costs and risks associated with implementing on-farm conservation measures unless they can determine the total costs of the measures and the associated additional cost of complying with the FESA and CESA. In the absence of this certainty, IID and farmers within IID's service area will be at risk that the costs of implementing the water conservation measures will increase substantially in the future. Therefore, incidental take authorization for water use and conservation activities is critical.

Farmers also need incidental take authorization to remove water conservation practices. Farmers may install water conservation measures and participate in the program for a period of time and subsequently stop participating in the program and remove water conservation measures. For example, a farmer could install a tailwater pond and participate in the water conservation program for a period of years but convert the tailwater pond back to agricultural production at a later date. To participate in the water conservation program, farmers need the assurance that they can stop implementing and remove water conservation measures on their property and that future use of their property for agricultural purposes would not be impaired because of participation in the water conservation program. Thus, if covered species use tailwater ponds or other water conservation features, farmers need incidental take authorization to remove the features or otherwise cease using a water conservation method.

Many farmers own their own land within the IID service area. Some lease their land from third parties and others lease their land from IID. This HCP covers water use activities on land in the IID service area irrespective of who owns the land and who conducts the activities. Water use activities include all activities associated with moving water from IID's conveyance system to farm fields, irrigating crops, and draining water from fields into the IID drainage system.

As part of the conservation program described in Section 1.1.1, a portion of the conserved water will be generated by on-farm conservation measures implemented by individual farmers, tenants, and landowners. Participation in the program by farmers will be voluntary and will vary during the term of the permit, probably from year to year. The amount of water conserved and the on-farm conservation techniques used will be at the discretion of the individual farmer. The options for conserving water that are available to farmers generally fall into the following categories:

- Installation of structural or facility improvements, or conversion to irrigation systems that increase efficiency and reduce water losses
- Irrigation management
- Land use practices

Compliance with the cap on IID's Priority 3 diversions of Colorado River water (see Chapter 1.1.3: Quantification Settlement Agreement) could result in conservation by farmers and landowners over the term of the permit. Compliance with the cap also may necessitate water conservation measures to pay back inadvertent overruns. IID does not anticipate rationing water to ensure as a means to comply with the cap or generate water to pay back inadvertent overruns. It is more likely that IID would fallow land it owns for short periods to achieve compliance with these requirements. Implementation and cessation of water conservation practices by individual farmers, tenants, landowners, and IID within the IID service area are covered under this HCP.

Installation of Structures/Facilities and Conversion of Irrigation Systems

On-farm water conservation can be achieved through various techniques using existing technology. On-farm conservation measures may include the following:

- Tailwater return systems
- Cascading tailwater systems
- Level basins
- Shorten furrows and border strip improvements
- Narrow border strips
- Cutbacks
- Laser leveling
- Multi-slope
- Drip irrigation

The techniques for achieving water conservation would be at the discretion of the individual farmer. It is expected that some combination of the techniques listed would be employed. These water conservation techniques are briefly described in Table 1.7-1 and depicted in Figure 1.7-2. Additional information is provided in Chapter 2 of the IID Water Conservation and Transfer EIR/EIS.

In addition, farmers have and continue to experiment with new and/or developing irrigation technology. Additionally, evolving crop technology often requires farmers to grow crops with varying methods to improve production. The activities associated with the installation and conversion of irrigation systems from one technology to another is covered under this HCP.

Irrigation Management

Certain farmers may be able to conserve water and cultivate the same acreage through better irrigation management without constructing facilities or changing irrigation methods. Irrigation management refers to controlling the timing and amount of each irrigation application to provide adequate crop water for maximum yield and to achieve adequate soil leaching. Irrigation management on-farm will continue to evolve as the science of crop/soil water develops and understanding of the farmers to put that knowledge to practical use increases. As greater demands are put on agricultural areas to conserve more water in California, IID expects that irrigation water management will become a more important tool for farmers to conserve water.

TABLE 1.7-1
On-Farm Water Conservation Techniques

Conservation Technique	Brief Description
Tailwater return or pump back systems	Pumps surface irrigation tailwater back to the head ditch reducing both the delivery requirement and the volume of water discharged to the drains.
Cascading tailwater	Allows the tailwater to cascade by gravity to the head ditch of a lower field adjacent to the tailwater ditch. This can be accomplished by placing drainpipes with drop box inlets through the embankment between the fields just upstream of each head ditch check.
Level basins	Dividing a field into basins and flooding each basin at a relatively high flow rate.
Shorten furrows and border strip improvements	The distribution uniformity of furrow and border strip irrigation can be improved by shortening the length of irrigation runs, particularly in soils with higher infiltration rates.
Narrow border strips	Narrowing the width of border strips can improve distribution uniformity both along the length of fields by improving the advance time, and across the width of fields by increasing the depth of flow.
Cutback	Irrigation is initiated with a high flow rate to advance the water down the field as quickly as possible without causing erosion. When the water reaches a predetermined distance down the field, the flow is reduced to minimize tailwater.
Multi-slope	Distribution uniformity can be improved for furrow and border strip irrigation by varying the slope of the field with the head of the field having a greater slope than the end of the field.
Drip irrigation	Water is run through pipes (with holes in them) either buried or lying slightly above the ground next to the crop. Water slowly drips onto the crop roots and stems. Water can be directed only to the plants that need it, cutting back on tailwater runoff.

Land Use Practices

Fallowing could be used to meet water conservation objectives by reducing IID's requirement to deliver irrigation water in the service area. Fallowing can be described as the reduction or cessation of certain farmland operations for a specified or indefinite period of time. For the purposes of this HCP, fallowing is defined as:

- Long-term land retirement (greater than 1 year), whereby crop production ceases indefinitely or during the term of the water conservation and transfer agreements. A cover crop may be maintained during the period of inactivity or the land is returned to natural vegetation.
- Rotational fallowing, whereby crop production ceases for one calendar year. No water is applied, and no cover crop is grown.
- Single crop fallowing, whereby multiple crops are reduced to a single crop rotation on an annual or longer term basis.

The IID/SDWCWA Transfer Agreement provides that at least 130 KAFY of conserved water must be generated by on-farm conservation measures and fallowing is not an acceptable

Laser Leveling

USDA NRCS Practice Code 466

Multi-Slope

USDA NRCS Practice Code 464

Drip Irrigation

USDA NRCS Practice Code 441

Figure 1.7-2a
On-Farm Conservation Measures
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Tailwater Return or Pump Back System

USDA NRCS Practice Code 447

Shorten Furrow or
Border Strips,
Narrow Border Strips

USDA NRCS Practice Code 388

Figure 1.7-2b
On-Farm Conservation Measures
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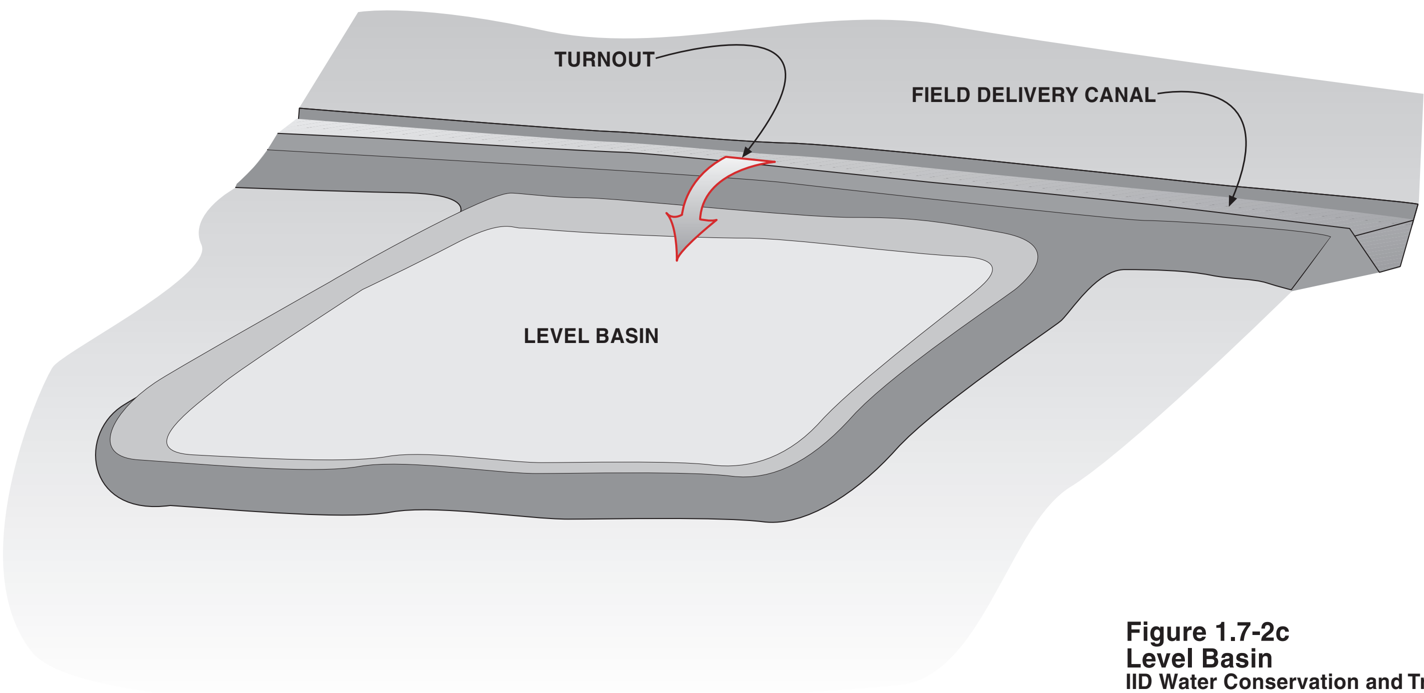

Figure 1.7-2c
Level Basin
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method of on-farm water conservation under landowner contracts. IID's Board of Directors has also adopted Resolution No. 5-96 stating that IID will not support fallowing programs for purposes of transferring water. However, there is no prohibition of fallowing under the terms of the QSA. Fallowing may be considered a potentially viable method to achieve water conservation to meet IID's obligations under the QSA to produce conserved water for transfer, to comply with the limit on total water diversions by IID and/or to comply with the Inadvertent Overrun Policy (which generally requires IID to make up in subsequent years for inadvertent overruns of the 3.1 MAF cap on annual diversions from the Colorado River). Therefore, this HCP covers take of covered species that could result from the fallowing described above for water conservation purposes by IID or farmers and landowners. In addition, the HCP covers take of covered species associated with returning fallowed land into agricultural production.

1.7.2.2 System-based Water Conservation Activities

As part of the water conservation and transfer programs, IID will implement operational and structural improvements to conserve water and enhance water delivery and drainage system capabilities and service. The specific improvements to be undertaken are uncertain at this time; however, the types of improvements that IID could pursue include the following:

- Additional lining of canals and laterals
- Replacement of existing canal linings as normal maintenance
- Automation of flow control structures
- Installation of check gates in the laterals that are automated or manually operated
- Installation of nonleak gates
- Installation of additional lateral interceptors
- Installation of additional pipelines
- Installation of additional reservoirs, including small, mid-lateral reservoirs to provide temporary water storage
- Development of water reclamation systems
- Installation of pump or gravity-operated seepage recovery systems

Additional information on system-based conservation measures is provided in the IID Water Conservation and Transfer EIR/EIS. All water conservation practices implemented by IID and within IID's canal and drainage systems are covered under this HCP.

Canal Lining and Piping

Canal lining consists of lining canals with concrete or using pipelines to reduce seepage. About 537 miles of canals are currently unlined. Canal lining is currently contemplated for three canal sections in the IID service area totaling about 1.74 miles (Figure 1.7-3; Table 1.7-2). To line a canal, the existing canal is filled in and then trenched to form a trapezoidal channel. Concrete is then installed on the banks and bottom of the channel using a lining float. Construction activities can be conducted within the canal's right-of-way and

TABLE 1.7-2
Canals Currently Anticipated to Be Lined to Conserve Water and Area Temporarily Disturbed to Line Canals

Canal	Length (miles)	Acreage Affected
Rose Lateral 9	0.25	2.12
Ash Lateral 43	0.49	4.16
N Lateral	1.00	8.48
Total	**1.74**	**14.76**

affects an area about 70 feet wide centered on the canal. The canal rights-of-way consist of either roads, embankments or other disturbed ground. Table 1.7-2 shows the current anticipated acreage that would be affected under proposed canal lining. About one week is required to line a mile of canal. For the canal lining anticipated thus far, this work would be completed within two weeks. In addition, although no additional canals are planned or anticipated, IID may need to construct new canals over the term of the permit and line those as well. The exact location, size, and length of future canals are uncertain at this time; however, any new canals would be within IID's current water service area. To cover the potential for canal lining beyond that amount presently anticipated, IID is seeking coverage for lining the remaining laterals (up to 320 miles) over the term of the HCP. If IID lined these additional laterals, up to 2,700 acres could be temporarily disturbed. The temporarily disturbed area would be within IID's rights-of-way and would consist of previously disturbed areas such as roads and embankments.

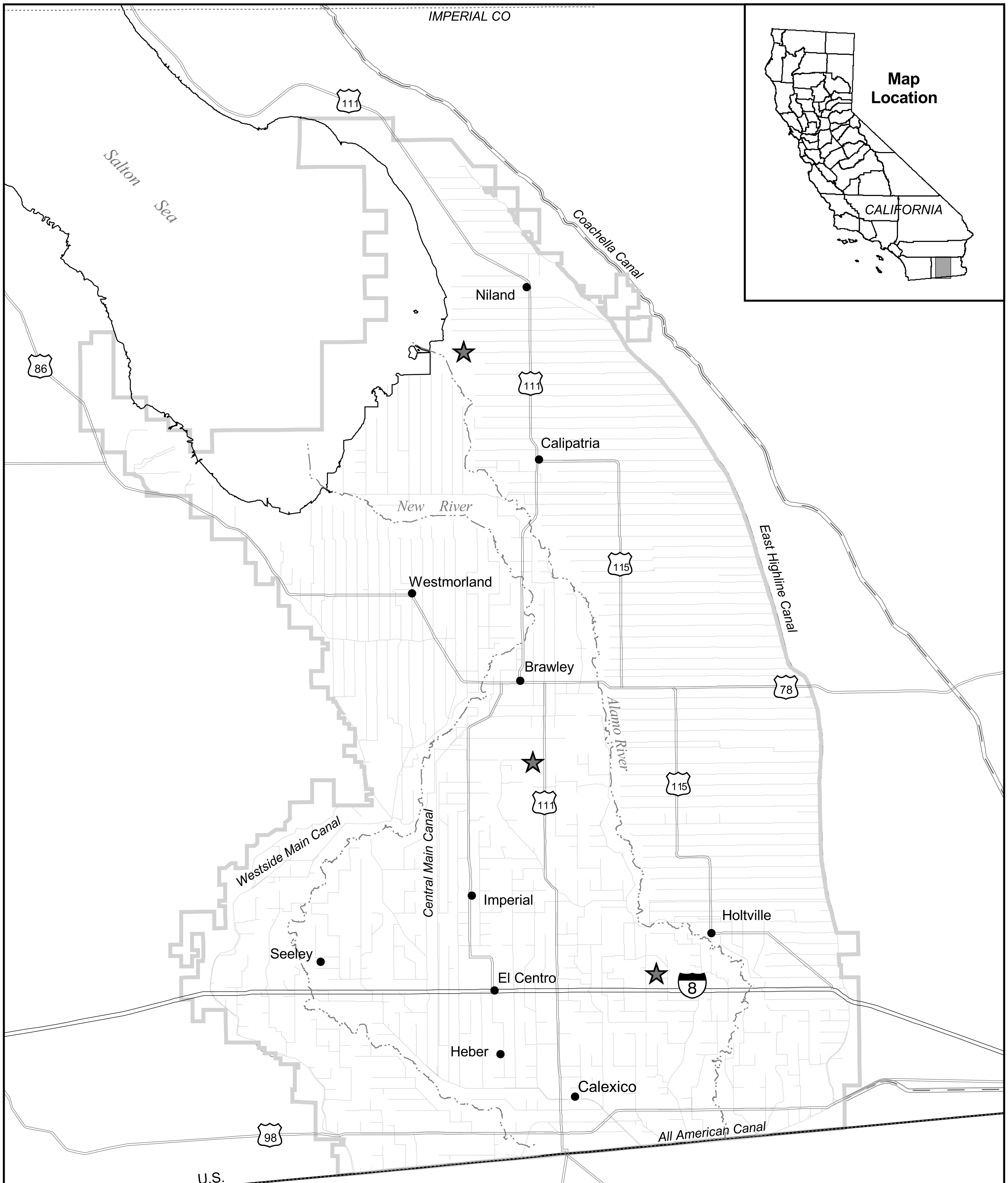
Lateral Interceptors

A lateral interceptor system consists of new canals and reservoirs that collect operational spills from lateral canals. Lateral interceptors are lined canals or pipelines that generally run perpendicular to lateral canals at their terminus. The lateral interceptors capture operational spill water, unused water resulting from canal fluctuations, and return water from farmer delivery reductions or changes. The interceptors convey this captured water to regulating reservoirs where the water can be stored and reused in another canal serving another delivery system as needed. IID currently has four systems in operation and potentially could enlarge that to 16 additional systems under the water conservation and transfer programs (Figure 1.7-4; Table 1.7-3).

Installation of a lateral interceptor requires constructing and lining a canal, installing pipelines and constructing a minimum 40-surface-acre reservoir (Figure 1.7-5). An approximately 70-foot-wide area centered on the new interceptor would be affected by the construction. The affected area of the reservoir site would be only slightly larger than the reservoir itself. Table 1.7-3 shows the acreage potentially affected by each of the interceptors. The total acreage potentially affected by construction of lateral interceptors could be about 1,480 acres (i.e., about 840 acres of canals and 640 acres of reservoir).

Reservoirs

Two types of reservoirs can facilitate water conservation: (1) operational reservoirs (includes mid-lateral reservoirs) and (2) interceptor reservoirs. Operational reservoirs are generally placed in locations to take advantage of delivery system supply and demand needs and in some cases include locations of historical canal spills. These reservoirs are used to regulate canal flows in order to match or optimize demand flows to supply flows. Conservation is



PROPOSED CONVEYANCE LINING
AQUEDUCT/CANAL
COUNTY LINE
INTERSTATE HIGHWAY
REGIONAL HIGHWAY
RIVER
IID WATER SERVICE AREA
CITIES

N

Source:
University of Redlands, 1999; DOI, 1999; US Filter, 2000

5 0 5 Miles
SCALE IS APPROXIMATE

Figure 1.7-3
Proposed Conveyance Lining Locations in the IID Water Service Area

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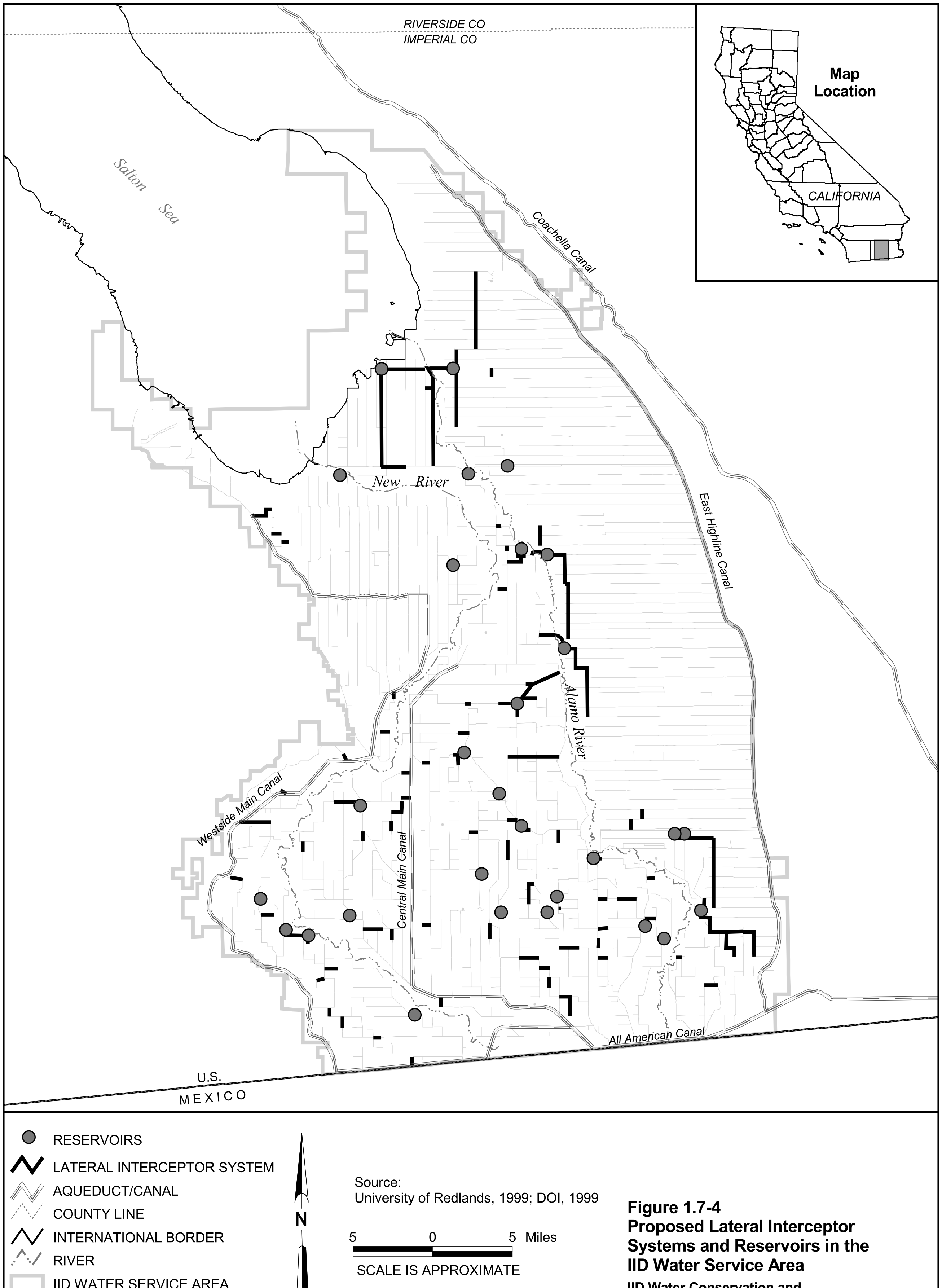

Source:
University of Redlands, 1999; DOI, 1999

Figure 1.7-4
Proposed Lateral Interceptor Systems and Reservoirs in the IID Water Service Area

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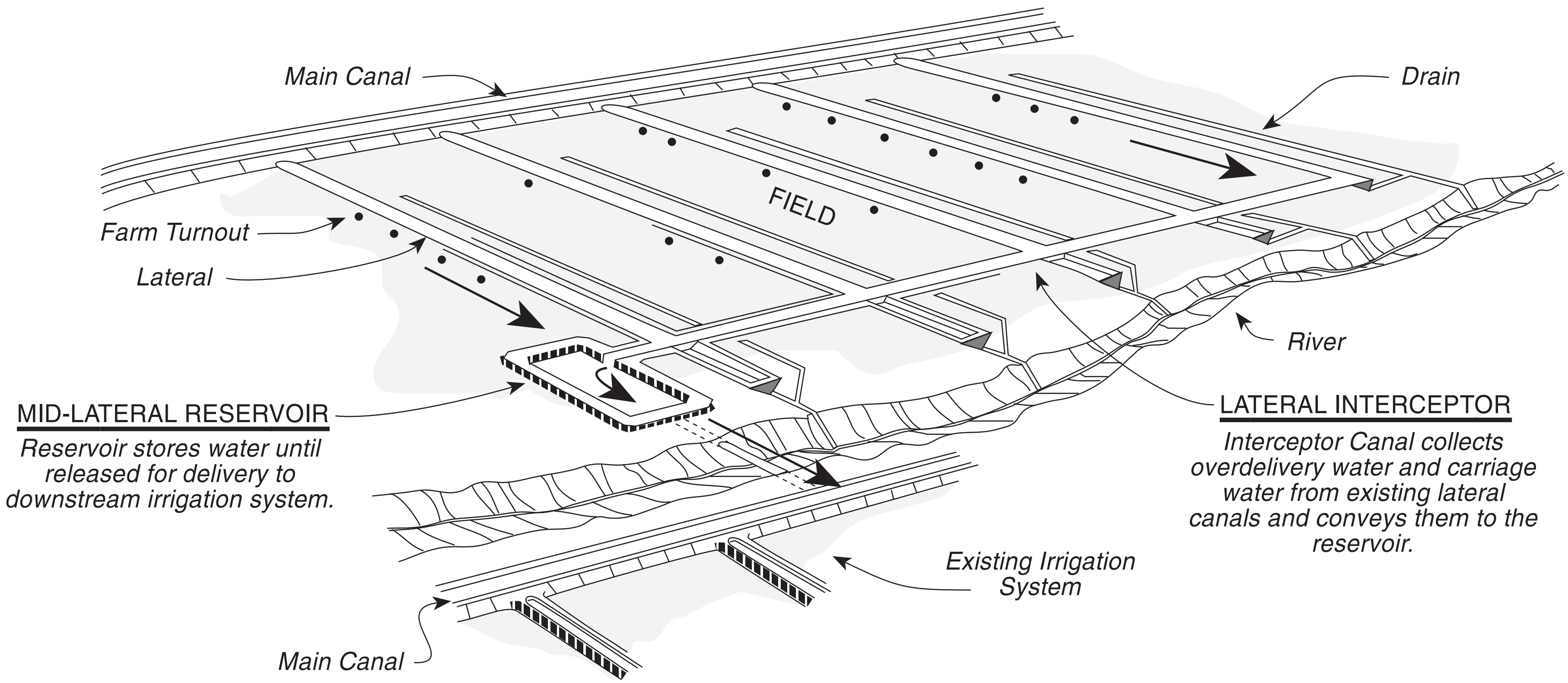

Figure 1.7-5
Conceptual Lateral Interceptor System and Mid-Lateral Reservoir
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TABLE 1.7-3
Proposed Lateral Interceptors and Acreage Affected by Construction

Interceptor	Type	Length (miles)	Acreage Affected
Acacia	Canal	8.62	73.12
Ash	Canal	4.55	38.57
	Pipe	1.00	8.52
Elder	Canal	7.61	64.60
Fern	Canal	1.14	9.64
	Pipe	2.18	18.48
Holt	Canal	5.76	48.85
	Pipe	1.02	8.68
Niland	Canal	9.28	78.74
	Pipe	6.53	55.44
Orient-Oleander	Canal	4.17	35.35
	Pipe	1.52	12.86
Orita-Munyon	Canal	4.92	41.78
	Pipe	0.76	6.43
Peach	Canal	6.63	56.24
Redwood	Canal	8.52	72.31
	Pipe	2.01	17.03
Rockwood	Canal	1.00	8.52
	Pipe	0.50	4.26
Thistle	Pipe	0.80	6.75
Tri-City	Canal	5.00	42.42
	Pipe	0.50	4.26
Tri-Ex	Pipe	2.30	19.52
Vail	Canal	3.03	25.71
	Pipe	5.02	42.58
Wistaria	Canal	1.99	16.87
	Pipe	2.65	22.50
Total		**99.02**	**840.02**

achieved by reducing operational spills as a result of this mismatch of flows by storing excess supply water and then releasing this water in times of shortage demand needs.

Interceptor reservoirs enhance lateral interceptor system operations. They are typically placed at the end of the lateral interceptor canals to store intercepted flows (operational discharges) for reregulation rather than losing these flows to the drainage system. These stored flows are then later released for use in other delivery system canals as demand is required. These reservoirs would contain automated inlet and outlet structures that would enable the maintenance of the desired water flow. IID currently does not have any reservoirs in design, but anticipates constructing up to 100 reservoirs during the 75-year permit term. These reservoirs would be 1 to 10 acres in size, with a capacity ranging from about 5 to 30 AF. Construction of these reservoirs could encompass up to 1,000 acres.

In addition to reservoirs constructed and operated by IID, many farmers in the Imperial Valley likely will construct small regulating reservoirs to facilitate the conservation of water. These 1 to 2-acre reservoirs would be constructed at the upper end of agricultural fields and are used to better regulate irrigation water applied to fields and to settle suspended solids prior to introduction into drip irrigation systems. These reservoirs would contain water only during irrigation operations and would remain dry during the remainder of the year. IID anticipates that these reservoirs could be used on up to 50 percent of the agricultural land in its service area. A single reservoir services about 80 acres of land. Up to about 5,900 acres of agricultural land could be converted to regulating reservoirs. This acreage is in addition to the 640 acres of agricultural land that could be converted to reservoirs in association with installation of lateral interceptors.

Seepage Recovery Systems

To conserve water, IID could install seepage recovery systems adjacent to the East Highline Canal. Existing and proposed locations of seepage recovery systems are shown in Figure 1.7-6. Surface and subsurface recovery systems conserve water by collecting canal leakage in sumps along a canal and pumping the water back into the same canal (Figure 1.7-7).

In a surface drain recovery system, seepage is captured and conveyed through open channels to a concrete sump. From there, it is pumped back into the canal. Construction required to install a surface recovery system is minimal. For a surface recovery system, a small check structure would be constructed in the existing parallel drain to pond water to a depth of about 3 feet. A pump station would return water to the East Highline Canal. These systems are proposed where there is an existing drain that collects seepage and directs the water to the drainage system.

In a subsurface recovery system, canal seepage flows are collected in a perforated pipe that then directs the water to a concrete sump. From there it is pumped back into a canal (Figure 1.7-7). Subsurface systems are proposed in areas lacking an existing parallel open drain. To install these systems, a trench is excavated and a pipe is laid in place. The pipeline outlets to a collection well consisting of an 8-foot-diameter vertical pipe from which the water is pumped back to the delivery canal. Construction disturbs an area about 70 feet wide along the pipeline. Table 1.7-4 shows the area that would be affected by construction of subsurface recovery systems. Following completion of the system, a right-of-way of about 70 feet along the pipeline is maintained free of deep-rooted vegetation.

1.7.3 Operation and Maintenance Activities

The primary purpose of this HCP is to provide the FESA and CESA compliance and incidental take authorization required to implement IID's water conservation obligations under the IID/SDCWA Transfer Agreement and the QSA. The water conservation programs will be an integral part of IID's ongoing operation. To implement the conservation program on a long-term basis, IID needs certainty regarding its ability to operate and maintain its irrigation and drainage system. For this reason, the covered activities include the range of IID's normal activities as well as water conservation-related activities. IID's normal activities consist of O&M activities associated with the diversion, measurement, conveyance, and delivery of Colorado River water to customers within the IID service area and the collection, removal, measurement, and transport of drainage waters to the Salton Sea. These activities are described below.

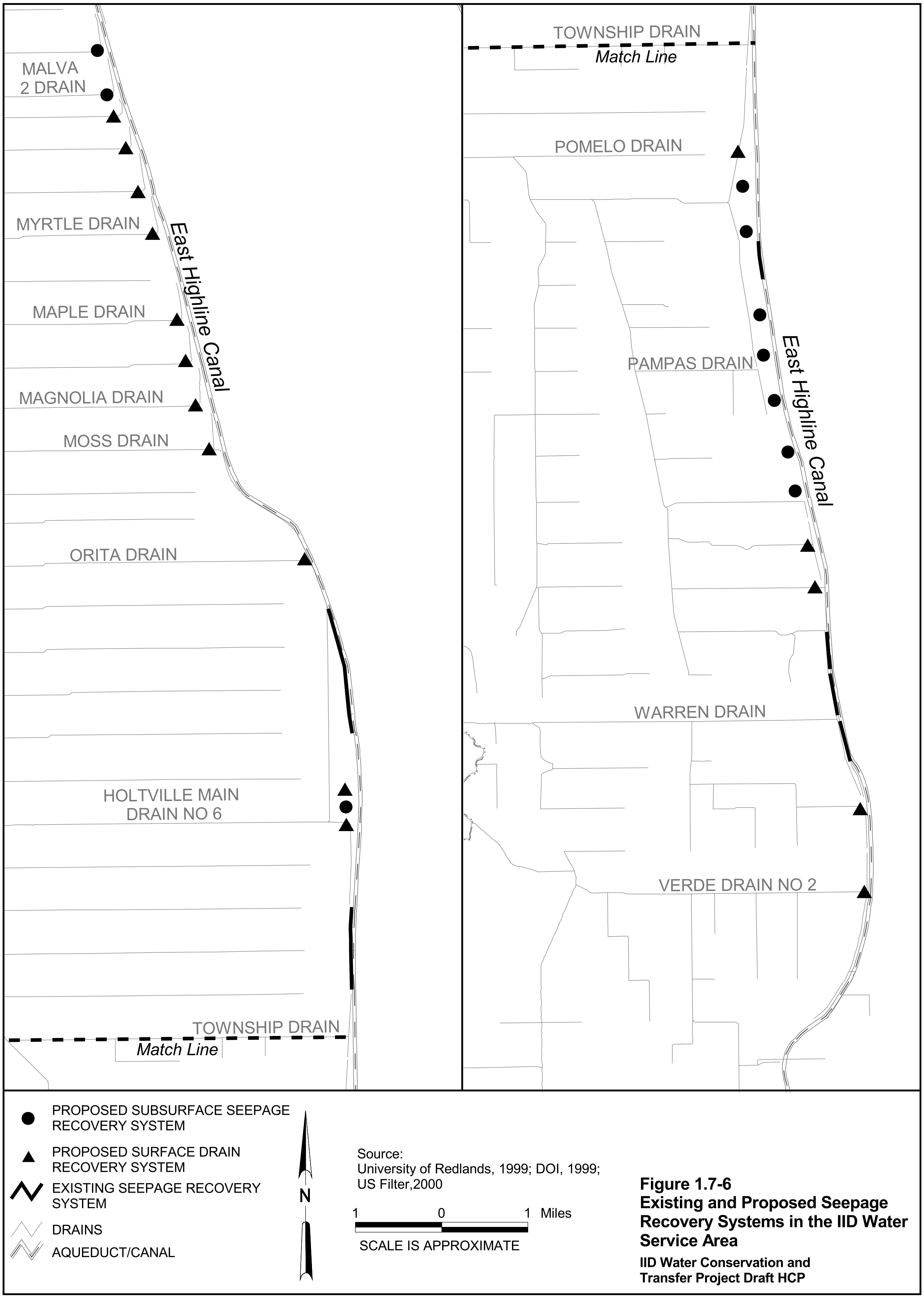

Figure 1.7-6
Existing and Proposed Seepage Recovery Systems in the IID Water Service Area

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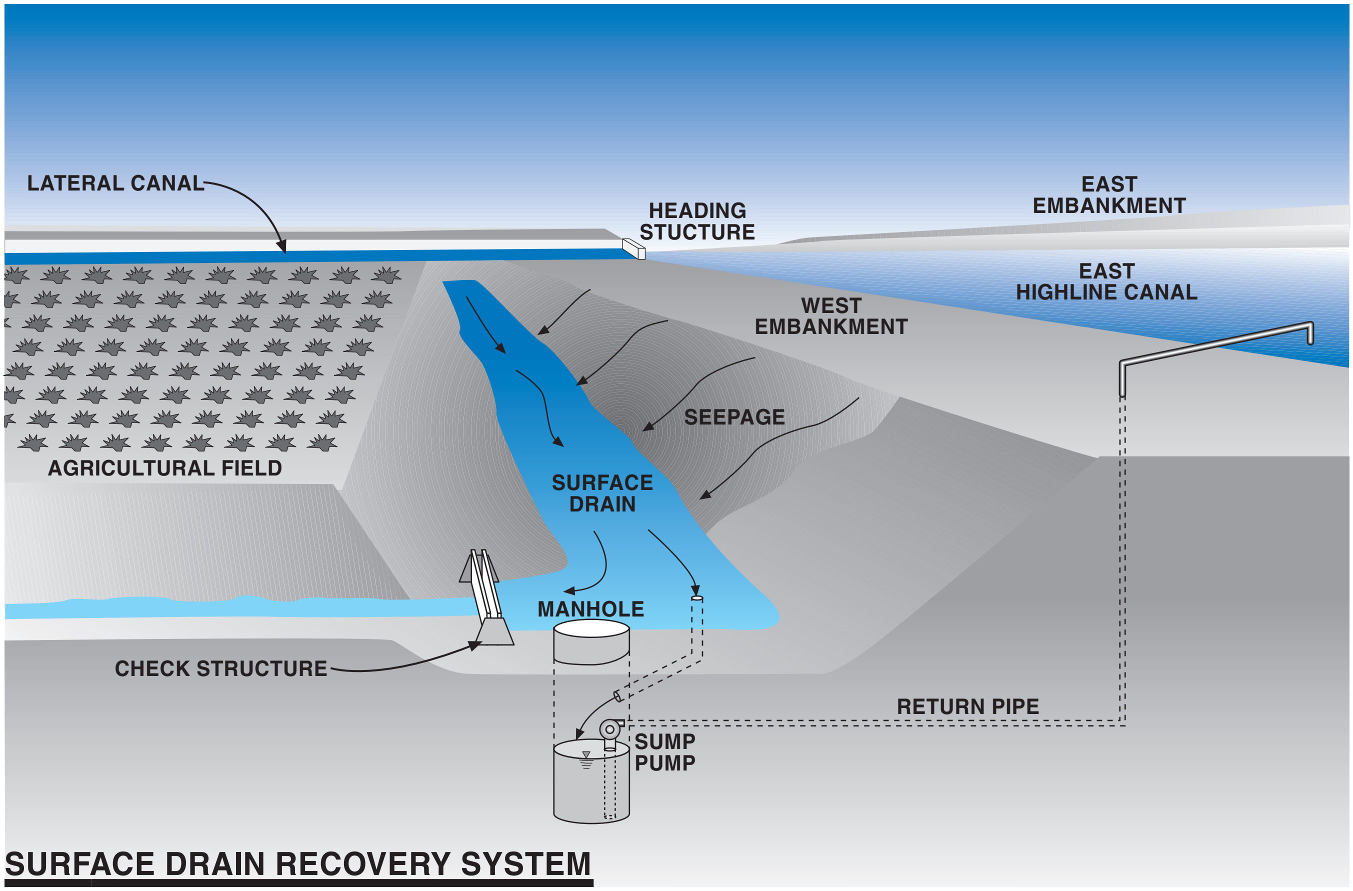

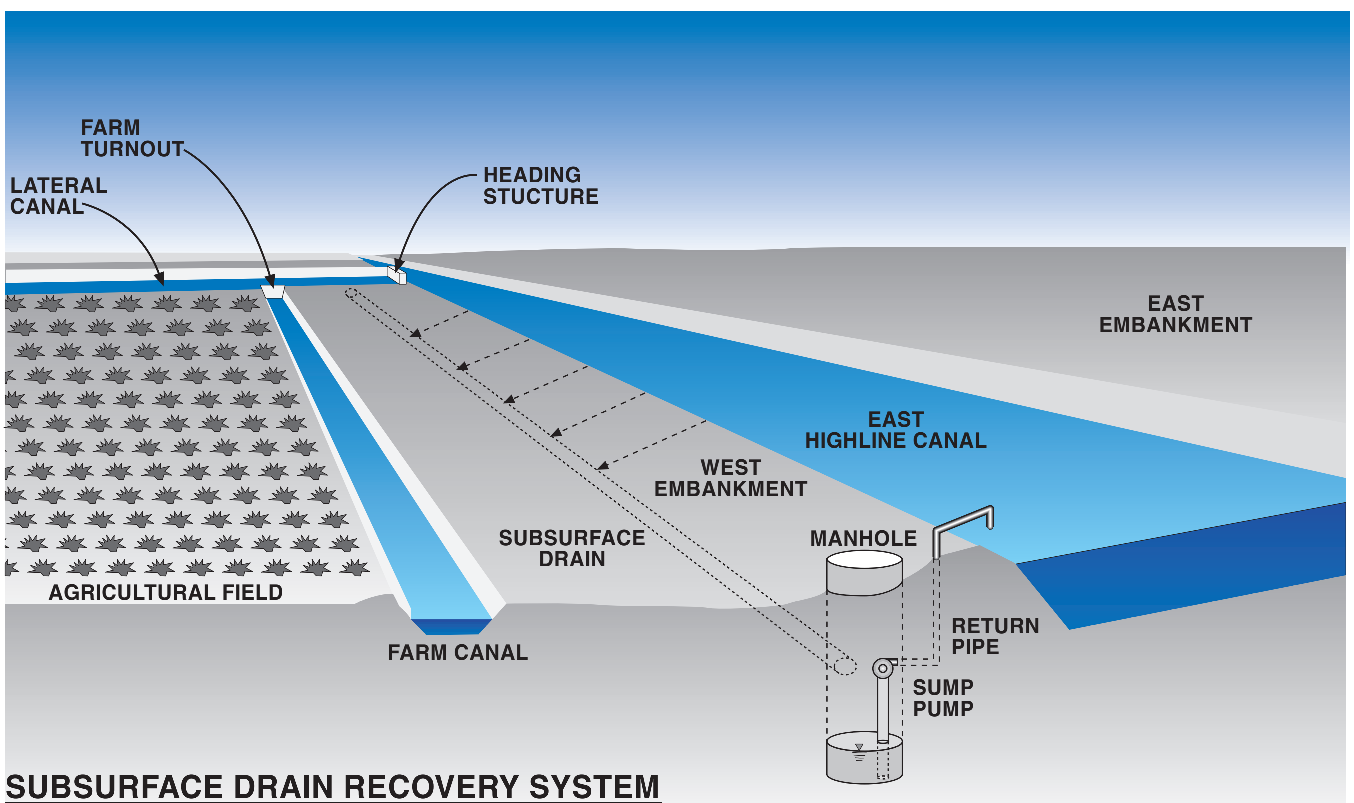

Figure 1.7-7
Conceptual Seepage Recovery Systems
IID Water Conservation and Transfer Project Draft HCP

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TABLE 1.7-4
Proposed Seepage Collectors and Acreage Potentially Affected by Construction

Seepage Collector	Type	Length (miles)	Acreage Affected
EHL 14	Surface	0.19	<0.1
Holtville No.3	Surface	0.59	<0.1
Holtville No.6	Surface	0.51	<0.1
Holtville Main	Surface	0.55	<0.1
Magnolia	Surface	0.42	<0.1
Malva	Surface	0.19	<0.1
Maple	Surface	0.35	<0.1
Mesquite	Surface	0.42	<0.1
Moss	Surface	0.42	<0.1
Mulberry	Surface	0.26	<0.1
Munyon	Surface	0.42	<0.1
Myrtle	Surface	0.37	<0.1
Orita	Surface	0.42	<0.1
Oxalis Lateral	Surface	1.19	<0.1
Verde No.2 & 2-D	Surface	1.58	<0.1
Warren No.2	Surface	0.44	<0.1
Total Open Systems		**8.3**	**<1.6**
EHL 16 Lateral	Subsurface	0.48	4.1
Malva 2	Subsurface	0.48	4.1
Mayflower	Subsurface	0.48	4.1
Orchid	Subsurface	0.48	4.1
Palm	Subsurface	0.48	4.1
Pampas	Subsurface	0.48	4.1
Peach	Subsurface	0.48	4.1
Plum	Subsurface	0.48	4.1
Pomelo	Subsurface	0.48	4.1
Rositas Canal	Subsurface	0.48	4.1
Total Subsurface Systems		**4.8**	**41.0**
Total All Systems		**13.2**	**42.6**

1.7.3.1 Conveyance System Operation

Covered activities associated with the operation of the conveyance system encompass the following:

- Conveyance, measurement, and delivery of water through the entire AAC system beginning where water is diverted at Imperial Dam on the LCR to the Westside Main Canal turnout, located at the southwestern corner of the Imperial Valley
- Conveyance, measurement, and delivery of water to customers through the main and lateral canal system within the IID service area
- Canal operational activities involving the filling, draining, and movement of water through the canal system to accommodate maintenance and customer needs

IID delivers Colorado River water to lands within the Imperial Valley for agricultural, domestic, industrial, and other beneficial uses. Water is diverted from the Colorado River at Imperial Dam and is conveyed by gravity flow to Imperial Valley via the 82-mile-long AAC (Figure 1.7-1). The Coachella Canal branches off from the AAC about 37 miles west of Imperial Dam. The O&M activities associated with the Coachella Canal, which is operated by CVWD, are not covered by this HCP.

Three primary main canals (i.e., East Highline, Central Main, and Westside Main) branch off the AAC as it moves across the southern portion of the Imperial Valley. These main canals are owned and operated by IID and supply water to numerous lateral canals located throughout the irrigated service area of IID. The lateral canals carry water from the main canals to farm fields; turnouts are used on the canals and laterals to deliver water to individual farm fields. Canal segments may be dewatered between irrigation deliveries for maintenance purposes or to reduce moss and algal growth, which interferes with water deliveries.

In total, IID operates and maintains 1,667 miles of canals to deliver water to irrigated farmland in the Imperial Valley. Of the 1,667 miles of canals, 1,114 miles are concrete-lined, about 537 miles are unlined earthen canals, and the remaining 16 miles of the conveyance system are pipelined (cited from IID’s Memorandum dated October 4, 2000) (Figure 1.7-8). IID currently does not anticipate constructing any new canals. However, occasionally a portion of a canal needs to be rerouted. On average, 0.25 miles of canal may be rerouted annually. Construction required to reroute a canal is the same as that required to install a lateral interceptor canal. Thus, about 2 acres could be disturbed each year to reroute canals for a total of 150 acres over the term of the permit.

1.7.3.2 Drainage System Operation

Covered activities associated with the operation of the drainage system include collection, conveyance, measurement, and discharge of drainage water through IID’s main and lateral drain system to the rivers and the Salton Sea; and drain operational activities associated with the filling, draining, and movement of drain water through the main and lateral drain system to accommodate maintenance and customer needs.

IID is obliged, as stated in its rules and regulations covering drainage, to provide a drain outlet for every 160 acres of farmland within its service area. To do so, IID operates a

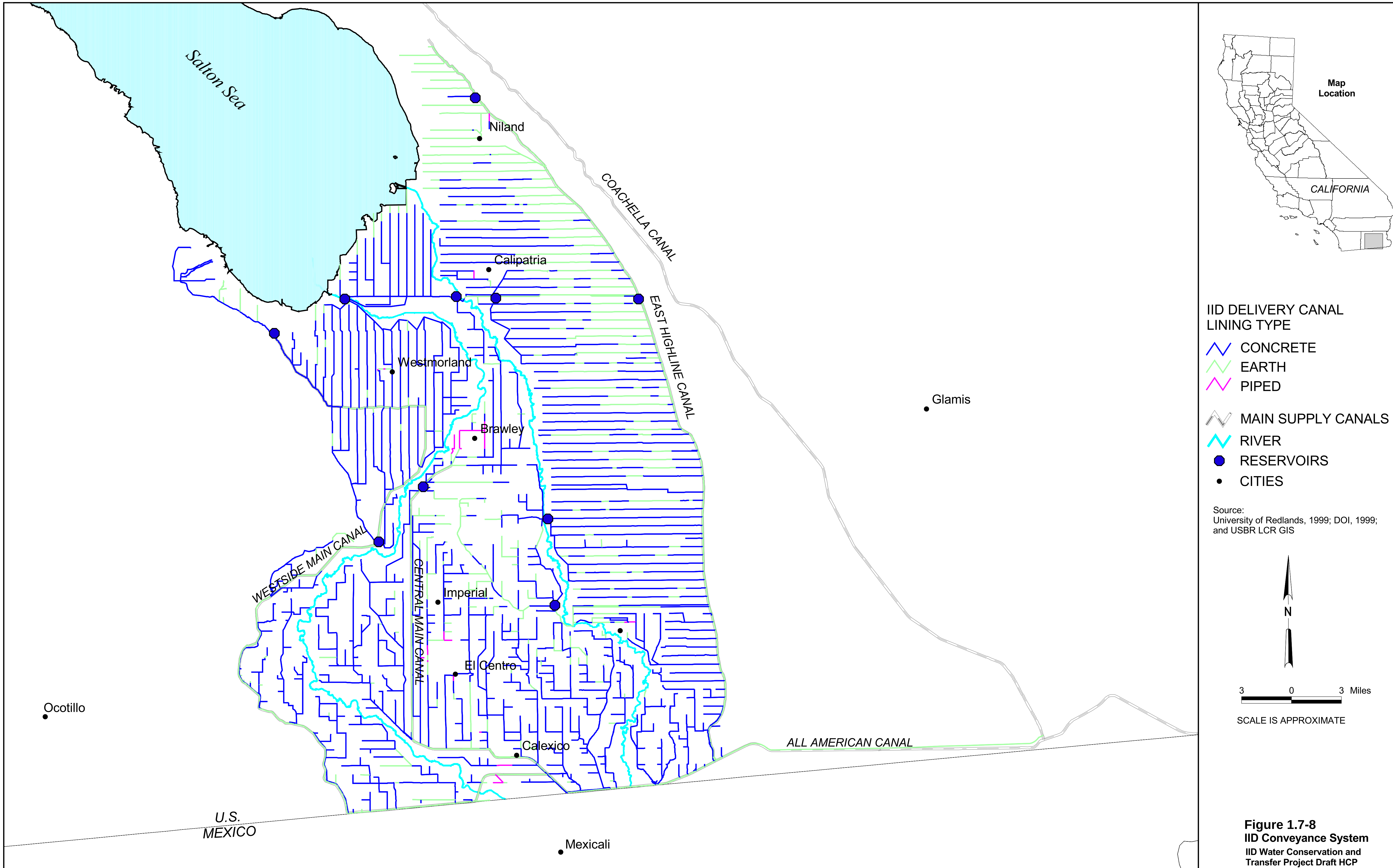


Figure 1.7-8
IID Conveyance System
IID Water Conservation and Transfer Project Draft HCP

complex drainage system within its service area consisting of 1,456 miles (cited from IID's Memorandum dated October 4, 2000) of open and closed (pipeline) drains and associated features, surface and subsurface drainage pumps, subsurface drains and associated collection pipelines, and water recovery systems. The IID drainage system is shown in Figure 1.7-8. Like the canal system, the drain system is composed of main and lateral drains.

Periodically, IID reroutes and constructs new drains. On average, about 2 miles of drains are rerouted or constructed within a 10-year period. Construction of a new drain entails trenching to a depth of about 7 feet and creating the roadways adjacent to the drain. The new drain and associated roadways fill the right-of-way for the drain. The right-of-way on lateral drains is 80 feet and on main drains is 120 feet. Drains to be rerouted or constructed primarily would be lateral drains. Construction of 2 miles of lateral drains would result in ground disturbance encompassing about 10 acres over a 10-year period. If the newly constructed drains were main drains, about 15 acres would be disturbed over a 10-year period. From 75 to 112 acres could be disturbed over the 75 year permit term.

On-farm irrigation water that percolates through the soil is collected by subsurface tile drains and, to a lesser extent, by surface drains. The open drains (mostly the lateral drains) collect tailwater and tilewater from area farms as well as operational discharge water emanating from IID's delivery system. Tailwater is irrigation water that runs off the lower end of the fields and is discharged into the drains. Tilewater is subsurface drainage water generated primarily through leaching operations performed by farmers. Currently, more than 35,000 miles of subsurface drainage tile have been installed by Imperial Valley farmers. Outlets for drainage tile into drains can occur at intervals as close as 660 feet, but are generally at quarter- to half-mile intervals, or tilewater is collected in sumps from which it is pumped to the nearest outlet, which is a drain, a river, or the Salton Sea. IID estimates that there are in excess of 14,000 outlets of tile drains into the IID drainage system from its customers. Most drain water discharges are into IID's surface drain system, although some discharge directly to the New or Alamo Rivers or the Salton Sea.

1.7.3.3 Maintenance Activities

Maintenance activities required for the conveyance and drainage systems include keeping existing irrigation, drainage, and related facilities in good repair and working condition, so that all parts of these facilities can fulfill the intended purpose for which they were originally designed. Minor improvements undertaken during the normal process of performing these activities also are included. Covered maintenance activities include the following activities relating to the irrigation and drainage system and associated facilities:

- Inspection activities
- Canal maintenance
- Right-of-way maintenance
- Seepage maintenance
- Structure maintenance
- Pipeline maintenance
- Reservoir maintenance
- Sediment removal from canals and drains
- Operation and maintenance of the desilting basins
- Mechanical, chemical, and biological weed control maintenance

- New and Alamo River maintenance
- Salton Sea dike maintenance
- Gravel and rock quarrying

Each of these activities is described below.

Inspection Activities

IID continuously inspects its canal and drainage system from access roads adjacent to the facilities to determine where and when maintenance is required.

Canal Maintenance

About 1,114 miles of the IID's conveyance system consist of concrete-lined channels. Concrete-lined canals, including the AAC when lined in the future, require periodic inspection and repair. The concrete-lined canals are segmented with contraction joints to resemble a series of concrete panels. The joints between the panels often are sealed with tar or another waterproof mastic. Repair consists of periodic concrete panel replacement or resealing joints. To replace concrete panels, the existing panels are removed and new concrete poured to create the panels. All activities are restricted to IID's right-of-way on the canal.

Portions of the concrete lining are replaced on an as needed basis. Thus, the frequency, magnitude, and location of this activity are highly variable. To replace or repair canal lining, the canal must be dewatered. IID attempts to dewater each canal every 2 months for about 3 days. However, on average, canals are typically dewatered every 3 to 4 months. Canal lining and repair are conducted during these periods. The amount of canal lining can vary from one or two panels covering several feet to one-half mile. IID anticipates that the concrete lining on currently lined canals will require replacement up to two times over the next 75 years.

Along the AAC, IID maintains and operates three existing seepage recovery systems. Two of these systems are located at Drop 4 and one is at Drop 3. The seepage recovery systems at Drop 4 are pumped, while the system at Drop 3 is a gravity system. About every 10 years, IID needs to clean vegetation out of these systems.

The preferred alternative for the AAC Lining Project is to construct a new canal parallel to the existing AAC from one mile west of Pilot Knob to Drop 3 (Reclamation and IID 1994). When completed, IID will operate and maintain the new canal section in the same manner as the existing canal. In the EIS/EIR for the AAC Lining Project, it was assumed that the old canal section would be retained and maintained for emergency use. The specific operation and maintenance activities required to maintain the canal for emergency use will be developed during project design. The Biological Opinion for the AAC Lining Project describes expected management of the abandoned section as follows.

> *"The abandoned sections of the existing canal would be managed by IID as an emergency channel in the event of damage to the parallel canal or other catastrophic event. To accomplish this, a management plan for the old canal would be prepared during the project design phase in coordination with the BLM and other agencies. The plan would include the specific action needed to maintain the abandoned sections for the specified purpose of an emergency use channel. The plan would include actions needed to keep the abandoned canal prism and*

> *maintenance roads free of vegetation. Vegetation control may involve regular disking and the use of legally approved chemical herbicides."*

The HCP covers management of the abandoned section in a manner consistent with the management assumed in the EIS/EIR and Biological Opinion for the AAC Lining Project.

Right-of-Way Maintenance

Canals are generally constructed on a 50- to 70-foot-wide rights-of-way, while the right-of-way for drains is generally 80 to 120 feet wide, depending on whether it is a main or lateral facility. The rights-of-way for canals and drains consist of the drain or canal, roadways on both sides of the channel and the associated embankments. The right-of-way on piped sections of the conveyance and drainage systems are typically narrower, about 40 feet. Conveyance pipelines are used through developed areas and are typically covered by roads, parks, and other uses consisting of open space facilities. The rights-of-way of drainage pipelines are typically farmed.

Right-of-way maintenance involves maintaining the canal, drain, and siphons associated with the right-of-way clear of deep-rooted vegetation, debris, and trash, and maintaining the accessibility to facilities and the use of the roadways associated with the channels. This maintenance refers to that portion of the right-of-way outside the canal or drain prism; canal and drain maintenance within the prism is addressed separately. Right-of-way maintenance encompasses maintaining the roads and associated embankments in good repair and controlling vegetation. Vegetation control is described in more detail below. Debris and trash in the canals and drains are removed as needed.

The embankments of drains and canals require periodic maintenance. During sediment removal activities, silt is removed and deposited on the adjacent embankment and roadway. The embankments and associated roadways are later graded and groomed to blend the material into the embankment for the purpose of maintaining a surface that can accommodate vehicle traffic and equipment access. Grading also smoothes the embankment surface and removes rills that develop during rain storms, thus reducing the potential for erosion. IID maintains and operates five graders for maintaining embankments. The graders operate every day except when it rains and each grader can cover 3 miles per day. Thus, about 15 miles can be graded per day. Drain embankments are graded and groomed in association with drain maintenance activities that occur once every 5 years on average. The embankments of the main canals (e.g., East Highline, Westside Main, Central Main, and the AAC) are typically graded and groomed several times a year. The remaining canal embankments are graded and groomed once a year on average.

Other embankment maintenance activities include regular watering of the banks and roadways along the AAC, main and lateral canals, and drains with a water truck to minimize dust generation. Several segments of the main canals, including the AAC, are surrounded by chain link fencing. This fencing requires periodic repair and replacement and is considered part of right-of-way maintenance.

To maintain the canal and drain embankments, both within and outside the canal and drain prism, erosion problems need to be corrected. Erosion maintenance on the outside of the canal or drain occurs infrequently. Damage to the embankments from erosion is generally corrected during the embankment maintenance activities described above. Occasional intense storms can cause localized areas of erosion requiring immediate corrective actions;

these are addressed as part of the emergency response activities. Erosion maintenance activities are limited to the rights-of-way of the canals or drains.

Along the portion of the AAC that traverses the Algodones Dunes, IID annually knocks down portions of the sand dunes, creating a flatter slope that allows sand to blow across the canal. In conducting this flattening, a dozer drags an I-beam back and forth across the peaks of the dunes to level them. The area where this activity is conducted begins at the Coachella Turnout (Sta. 1907+20) and extends to about Sidewinder Road at Pilot Knob (Sta. 1243+65), a distance of 12.56 miles. The area actually disturbed is about 50 to 75 feet wide yielding a total acreage disturbed of 76 to 114 acres. This operation begins in July every year and lasts about 6 weeks. In conjunction with flattening the dunes, the roadways along the AAC are cleared of accumulated sand. After the roads are opened up, they are immediately treated with herbicides for vegetation control. IID has been conducting these activities since the construction of the AAC in about 1945.

Erosion also can occur within drains or unlined canals. The erosion results from meandering channels of water from irrigation flow or drain water or stormwater runoff. Vegetation or sandbars can cause a change in water direction within a canal or drain and an associated erosion problem if not corrected by removal. Regular drain and canal maintenance activities (i.e., sediment removal and vegetation control) minimize the occurrence of erosion problems, and most erosion problems are corrected during regular maintenance. However, storm waters can result in embankment damage or loss that may necessitate the hauling and placement of fill material. This condition is addressed as part of the emergency response activities.

Right-of-way maintenance also consists of activities required for the maintenance and operation of power transmission facilities within the HCP area. These activities include regular inspection of facilities, clearing the power line rights-of-way, and repairing and replacing equipment as necessary. The power system within the HCP area is composed of nearly 3,000 miles of distribution and transmission lines and about 50 substations. The transmission and distribution lines exist in canal and drain rights-of-way and right-of-way maintenance for the drains and canals covers right-of-way maintenance for the transmission lines.

Additional transmission lines could be developed as a result of efforts to implement water conservation measures. For example, tailwater pumpback facilities constructed by individual farmers could encourage the extension of power transmission lines to operate the pumps. Currently, tailwater pumps typically are operated by diesel engines. IID anticipates that the relatively high cost associated with extending transmission lines will continue to discourage this practice in the Imperial Valley and that the installation of transmission lines to serve pumpback facilities will be infrequent. Further, any extension of transmission lines likely will occur in farmland along existing canal or drain rights-of-way.

Seepage Maintenance

Gophers or vegetation can cause leaks in the canal banks, although this occurs infrequently. Leaks also can be caused by earthquakes or seal breakage on a canal from cleaning. Activities to correct seepage problems are similar in each case. The embankment is cored, clay is mixed with the existing material, and the mixture is re-compacted. Seepage maintenance activities are focused on unlined canals and limited to the canal’s right-of-way.

On average, seepage maintenance activities are conducted on 5 to 10 miles of canal a year. Over the term of the permit, seepage maintenance activities could be conducted on all of the unlined canals (537 miles) at least once.

Structure Maintenance

In addition to the canals, about 20,000 structures within the canals and drains are required to convey water throughout the IID service area. These structures include, but are not limited to, delivery gates, checks, headings, turnouts, moss pipes, weep pipes, drainage sumps, irrigation pumps, numerous types of bridges, lifting devices, and flow measurement devices. O&M activities required for these structures include inspection, adjustments, and periodic or emergency repairs and replacement. IID estimates that about 200 structures need to be replaced each year, but historically fewer structures have been replaced. In the future, 300 structures could require replacement each year as the infrastructure ages. Activities associated with the repair and replacement of structures are conducted within the rights-of-way. Ground disturbance to replace structures on laterals is generally limited to a 75-by-75-foot area. On main canals, any ground disturbance generally occurs within a 150-by-150-foot area. If all of the structures are replaced during the term of the permit up to 2,970 acres could be temporarily disturbed.

There are 25 sites in and around cities and towns in the Imperial Valley that currently have trash screens on irrigation and drainage channel facilities. The screens typically exist at road siphons and pipeline entrances. The purpose of the screens is primarily for safety, but they also result in an accumulation of trash. These trash screens require frequent cleaning of debris to prevent water backup and inundation of tile lines in drains and possible minor flooding on adjacent properties where canals are involved.

Pipeline Maintenance

Portions of the conveyance (Figure 1.7-8) and drainage systems are contained in pipelines. Maintenance activities consist of maintaining the pipeline right-of-way and around the manholes that provide access to the pipelines clear of deep-rooted vegetation. Vegetation also is maintained at a height that allows visual access. Drain pipelines primarily occur in farm fields while conveyance system pipelines occur through developed areas. Thus, little vegetation control is necessary. In addition, the pipelines are periodically inspected, repaired, and replaced as necessary. Any activities are generally limited to the 40-foot-wide right-of-way of the pipeline. It is anticipated that all pipelines will be replaced once during the 75-year permit term.

Reservoir Maintenance

The IID conveyance system contains 10 regulating reservoirs (Figure 1.7-8). Regulating reservoirs capture spills from a water delivery/conveyance facility and are used to match delivery flows with demand flows. The same types of maintenance activities required for canals are conducted at reservoirs. Vegetation is controlled around the reservoir using chemical methods. Infrequently riprap needs to be replaced or amended to maintain the structural integrity of the embankments. Also, the concrete lining of the reservoirs occasionally but infrequently requires repair or replacement. The reservoir embankments are graded, groomed, and stabilized, as necessary in the same manner as described under Right-of-Way Maintenance. Embankment maintenance along reservoirs occurs about once every 5 years. On very rare occasions (e.g., once every 25 years), a reservoir may be drained and the sediment removed. Sediment from the reservoir is deposited and graded along canals. Chain link fencing surrounds the reservoirs and requires periodic repair and replacement. Automated reservoirs with control houses require frequent visitation by maintenance personnel to ensure proper operation.

Sediment Removal from Canals and Drains

The greatest single maintenance expense for IID is the removal of sediment from its canal and drainage systems, with the drainage system receiving the most attention. This is a mechanical process that requires the use of hydraulic excavators or small backhoes to remove the material. Dredged spoil is deposited along the side of the canal or drain, where it is allowed to dry before being groomed into the embankment by a dozer or grader. Drains are cleaned on an as-needed basis, depending on the extent of vegetative growth or sediment accumulation. Drains with the flattest bottom slope accumulate sediment most rapidly, and may require cleaning annually. Other drain segments may not require cleaning for periods of 10 years or more. On average, IID cleans approximately 300 miles of drains annually, but the amount varies from year to year. The drain embankments and road surface along the drain are re-contoured, graded, and groomed in association with drain cleaning or in emergency situations (e.g., bank sloughing during a storm) as described under Right-of-Way Maintenance.

Operation and Maintenance of the Desilting Basins

Colorado River water diverted at Imperial Dam immediately passes into one of three desilting basins used to remove silt and to clarify the water. Each of the desilting basins is 540 feet wide by 770 feet long and is equipped with 72 scrapers designed to remove 70,000 tons of silt per day. Silt removed at the facility is returned to the Colorado River downstream of Imperial Dam. Periodic maintenance of desilting basins requires dewatering of individual basins to performed repairs and routine maintenance.

Weed Control Maintenance

As noted above, maintenance of the canals, drains and various structures typically involves vegetation control. IID uses mechanical, chemical, and biological methods to control vegetation. To a lesser extent, IID occasionally uses controlled burning as a means to improve visibility of the drain channel during drain maintenance, improve the performance of herbicides, and to remove accumulations of dried plant material that impede the flow of water through the drain. These methods and their application to IID’s facilities are described below.

Mechanical methods of vegetation control are used in canals. Canals accumulate moss and algae that must be removed periodically because it impedes water flow within the channel and at structures. In concrete-lined canal sections, moss carts and chains are pulled along the canal to remove algae and moss that develop on the bottom and sides of the canal. A backhoe follows and removes the vegetation collected by the moss cart. Moss carts are used for concrete-lined laterals while chaining is used to clear moss and algae from main canals and unlined lateral canals. If very thick moss and algae has developed in unlined canals, disking may be necessary to remove the vegetation. Use of a moss cart requires dewatering the canal. Thus, vegetation removal with a moss cart occurs in conjunction with the regular dewatering for most canals. Chaining does not require dewatering. Vegetation is removed from all canals at least once a year. However, about 10 to 15 percent of the canals accumulate large amounts of moss and algae and require cleaning as frequently as every two weeks.

Mechanical and chemical methods are used to control vegetation in the drain and canal rights-of-way and around IID's other facilities such as hydroelectric facilities, drop structures on the New and Alamo rivers. Chaining, discoing, and side scraping (moss cart) are used to control vegetation on embankments and around other facilities. An excavator is used to remove vegetation from the drains. Vegetation removal in the drains occurs in association with sediment removal activities described above. In removing vegetation from the drains, an excavator is operated from the top of the bank where it is used to scrape vegetation from the side and bottom of the channel. Along drains, extensive vegetation can develop on top of the drain banks and access roads, requiring a bulldozer to grade and gain access to the drain prior to maintenance.

Biological control methods are used for aquatic weeds, such as hydrilla, sago pondweed, and Eurasian watermilfoil. Grass carp feed on these plants and triploid sterile grass carp are raised at IID hatchery facilities and stocked in the canals for the purpose of controlling aquatic vegetation. The use of grass carp reduces the frequency of the other control methods. Fish hatchery O&M activities are described in Section 1.7.4.1, Fish Hatchery Operations and Maintenance.

Chemical methods also are used to control vegetation in the drains, canals, and on the drain and canal banks. Take of covered species from changes in the amount or composition of vegetation resulting from herbicide use is covered by this HCP, but any take of covered species resulting from toxicological effects of herbicide use is not covered by this HCP. Chemical control methods are carried out by third parties under contract with the District and by its own staff. On a monthly basis, the District's Pest Control Advisor instructs the contractor on where to conduct control activities and advises on the chemicals to use. Within the general area identified by the District's Pest Control Advisor, the applicator has the discretion to decide where to work, which is generally influenced by the extent of weed growth and local wind conditions.

The chemicals currently used to control vegetation are Roundup®, Direx®, and Rodeo®. Rodeo® is applied where contact with water may occur; Direx® is used for woody plants, particularly salt cedar. Direx® is not used in applications where contact with water could occur. Chemical control of vegetation on the banks of the canal is supplemented with mechanical removal, as necessary. Vegetation is sprayed during March through August, and occasionally into September. All herbicide applications are carried out under a permit from the Imperial County Agricultural Commissioner and are subject to its conditions. The chemicals are applied in accordance with label instructions. About 565 miles of outer drain embankments are sprayed with a mixture of Roundup® and Direx® a year. About 1,430 miles of the outside banks of canals and drains are treated with Roundup® a year and about 980 miles of canals and drains are treated with Rodeo®. Rodeo® is the only chemical control used on drains and canals on the state and federal refuges.

In addition to the weed control measures described, IID occasionally uses controlled burning as a method for controlling unwanted vegetation in the drains. Drain burning, which has been used on a limited basis by IID since the turn of the century, is performed to improve visibility of the drain channel, improve the effectiveness of herbicides, and to remove accumulations of plant material from the drains. IID obtains an annual burn permit from the Agricultural Commissioner and only burns on designated burn days.

During the mechanical removal of sediment, it is necessary for excavator operators to have visual contact with the bottom of the drain. Visual contact allows the operator to avoid excavations that remove too little or too much material from the drain. Under excavations (removal of too little sediment) are corrected by conducting an additional sweep of the excavator arm and removing more material from the site. This results in a duplication of effort and contributes to inefficient use of labor and equipment time. Over excavations (removal of too much sediment) result in a series of deep and shallow areas within the flow path of the drain. These undulations in the channel create disruptions in the flow that create or accelerate erosion processes within the channel. The uneven channel bed and disrupted flow encourages the channel to meander, which contributes to drain bank erosion. In addition, poor visibility increases the potential for the operator to inadvertently pull material directly from the banks. This results in a long-term instability of the channel and can cause erosion and bank failure problems that can take years to correct in some drains.

Controlled burning in the drains also is used to improve the effectiveness of herbicide applications. Tall, old, and established vegetation requires a heavier single application of herbicide or a greater number of lighter applications than young vegetation to achieve the desired level of control. Controlled burning in the drain removes decadent vegetation and encourages sprouting and regrowth. Herbicides applied on the young growth are assimilated into the plant more effectively and provide better control at lower application rates.

In addition to improving visibility and increasing the performance of herbicides, IID uses controlled burning in certain circumstances to remove accumulations of dried plant material that impede the flow of drain water. This practice occurs primarily in dense stands of *Phragmites* where plants on the drain bank collapse and accumulate in the channel.

IID uses controlled burning as a drain vegetation control practice on a limited basis and only under conditions where alternative techniques are not as effective. Currently, IID uses controlled burning on approximately 0.5 to 1.0 miles of drains per year (up to 75 miles over the term of the permit).

New and Alamo River Maintenance

In addition to the constructed drain system, the New and Alamo Rivers carry drain water to the Salton Sea. The District has no legal authority to regulate activities in these rivers. To control erosion of the river, the District constructed and maintains 20 drop structures on the rivers most of which are on the Alamo River. Maintenance activities for the drop structures consist of weed control on the banks around the structures. Mechanical and chemical control methods are used to treat about 0.5 acres every year (0.25 acre on each bank), affecting 10 acres a year. IID also conducts bank protection measures as necessary along the rivers. Bank protection activities focus on specific bank failures or areas of erosion. Typically an area about 100 feet wide and 500 feet long (i.e., about 1 acre) is disturbed in conducting bank protection activities.

IID periodically dredges the New and Alamo River channels from the United States Geological Survey gaging stations on each river to the rivers' outlets at the Salton Sea. Six to eight feet of dredge material typically are removed from the river channel during this operation. The dredge spoils are pushed into deeper water in the Salton Sea creating a submerged river channel. Through this process, the channels of the New and Alamo Rivers have been extended about 1.75 and 2.5 miles into the Salton Sea, respectively. By moving the spoils into increasingly deeper water in the Salton Sea, the rate at which the channel fills with sediment and requires dredging is reduced. IID retains the vegetation on the riverbanks to minimize erosion; however, it is necessary to lay the vegetation (mostly *Phragmites*) over on the banks with the dredging equipment in order to gain access. Dredging of the rivers' mouths occurs about once every four years. More frequently, areas around the gaging stations on the rivers are dredged. The area dredged extends from about 200 feet upstream of the gage to about 500 feet downstream of the gage. This dredging occurs about every two years on the New River and annually on the Alamo River. This dredging is currently conducted in the late summer or fall to avoid impacts to Yuma clapper rails.

Salton Sea Dike Maintenance

IID maintains about 20 miles of dikes along portions of the southern end of the Salton Sea to prevent inundation of lands as the Salton Sea rose. Most of the maintenance required for the dikes consists of pulling riprap that has shifted down back into place on the dike bank. This activity is conducted along the dikes at least once a year and sometimes three or four times a year in certain locations. Other maintenance activities include repairing sections damaged in storms, filling in and replacing riprap, and grading and grooming the embankments and road surfaces on the embankments. These activities are either conducted from the road surface along the dike or from the water immediately adjacent to the dike.

Gravel and Rock Quarrying

IID owns and operates two small rock and gravel mining operations to support its maintenance activities. The two quarries, Red Hill and Pumice Island, are located on the south shore of the Salton Sea. The quarries are barren and do not support vegetation. Each quarry occupies approximately 160 acres and was acquired by IID in the late 1930s from the Southern Pacific Railroad Company. They have been operated as quarries since that time. IID quarries rock and gravel from these areas on an as-needed basis for riprap and road construction and surfacing throughout IID's service area as part of maintenance and for emergency repairs.

1.7.4 Miscellaneous IID Activities

IID also conducts activities that do not fall within the categories previously described. These activities include the following:

- Fish hatchery O&M
- Recreational facilities
- Use of IID land
- Hydroelectric power generation facilities
- Emergency response activities
- HCP and project EIR/EIS mitigation measures

1.7.4.1 Fish Hatchery Operations and Maintenance

As described earlier, grass carp are stocked in the canal and drain systems to control aquatic weeds. The District operates a hatchery in El Centro and grow-out facilities in Niland to produce grass carp. On average the hatchery produces 20,000 stockable grass carp per year. As of January 1998, more than 200,000 fish had been stocked into the canal system. The District's goal is to stock 20,000 to 25,000 fish a year.

The hatchery operates under a Memorandum of Understanding (MOU) with the California Department of Fish and Game (CDFG). Under this MOU, the hatchery must meet specific requirements, including maintaining a security chain linked fence around the facilities, maintaining high/low water level alarms, and maintaining bird netting over the ponds and filtering of discharge water to minimize the potential for fish to escape. The MOU also prohibits stocking of grass carp in drains that support desert pupfish because of the potential for introducing parasites or diseases, direct competition, and interference behavior.

O&M activities include cleaning and disinfecting the ponds and pipelines, controlling weed growth around the ponds, flushing the ponds and pipelines, spawning the fish, transporting fry to grow-out ponds, and rearing and stocking the fish. Sterile triploid grass carp are produced for release to prevent establishment of a breeding population in the canals. Before release, every fish produced is given a blood test to confirm that it is triploid, and therefore sterile. Diploid grass carp, which are fertile, are destroyed after spawning.

1.7.4.2 Recreational Facilities

Five of the 10 regulating reservoirs and the canal system within IID's service area are open to recreational use. Fishing and bird watching are the primary recreational uses supported by the reservoirs. IID does not conduct any activities specifically to support recreation at the reservoirs and canals.

The District owns and maintains recreational facilities at Fig Lagoon, an approximately 80-acre pond created by IID. Maintenance activities at Fig Lagoon include dredging at the mouth of the drain inlet to the lagoon from Fig Drain. About every 60 days an area 30 feet wide, 4 feet deep and 600 feet long is dredged to maintain water flow from Fig Drain into the lagoon. Developed facilities at Fig Lagoon currently consist of several picnic tables, an information kiosk, and a latrine. The area is used for fishing, bird watching, and picnicking.

In addition to Fig Lagoon, IID owns and operates three recreational vehicle (RV) parks at Salton Sea Beach, Corvina Beach, and Bombay Beach. IID dredges at these RV parks about every 60 days to maintain boat access to the Salton Sea. IID also conducts dredging at the Red Hill Marina on request although the District does not own the marina. IID dredges at Red Hill Marina about every other year.

No additional recreational facilities are planned at this time, but could be pursued by IID during the permit term. Any additional recreational facilities developed by IID and covered by this HCP would be restricted to features developed to support fishing, wildlife viewing, picnicking, walking/jogging, bicycling and related activities at IID facilities. New recreational facilities covered by this HCP would consist of small scale features such as:

- Picnic tables
- Bike paths
- Walking/jogging paths
- Restrooms
- Information kiosks

Recreational facilities would be associated with IID's water conveyance and drainage facilities and would be located within the rights-of-way of these facilities. Construction of recreational facilities is a covered activity under this HCP, but take that could result from use of the facilities by third parties is not covered.

1.7.4.3 Use of IID Land by Lessees

The IID currently owns approximately 118,000 acres of land within the HCP/Salton Sea area. Approximately 6,600 acres are located in the irrigated portion of the service area and are not contiguous to the Salton Sea. The Salton Sea currently inundates about 105,000 acres and another 6,100 acres are contiguous to and surround the Salton Sea. IID leases its farmable lands to farmers engaged in the production of agricultural products and to federal and state wildlife agencies for wildlife management. IID seeks coverage under this HCP for whatever incidental take may be attributed to it as the lessor of the land. IID is not seeking coverage for activities conducted by lessees on IID land, except those activities directly related to the water conservation program described elsewhere in this HCP.

The acreages of land leased for these uses are shown in Table 1.7-5.

1.7.4.4 Use of IID Land by IID

For the term of the permit, IID may convert land that it owns to a new use. Except for land currently leased to the USFWS for management as wildlife habitat, any incidental take of covered species resulting from changed land uses or land management activities will be covered as long as the new use is a covered activity. Land uses that constitute covered activities are:

TABLE 1.7-5
Types of Leases and Approximate Acreages of Lands Leased by IID to Third Parties in the HCP Area

Type of Lease	Approximate Acreage
Agricultural	1,167
Recreational areas/facilities	7,278
Duck club	371
Wildlife management	4,857
Geothermal[a]	29,325
Archeological excavation	100
Telecommunication facilities	8 facilities
Other (e.g., storage sites, plants, dumps)	1,347

[a] Subsurface lease

- Installation and implementation of water conservation measures, including fallowing
- Installation and operation of conveyance and drainage facilities
- Creation and management of fish or wildlife habitat
- Construction and operation of a fish hatchery
- Implementation of any other environmental mitigation associated with the IID Water Conservation and Transfer project, this HCP, or the QSA

Incidental take of covered species that could result if IID land that is currently leased to the USFWS for management as wildlife habitat is converted to another land use is not covered by this HCP.

1.7.4.5 Hydroelectric Power Generation Facilities

IID operates eight hydroelectric generation facilities on the canal system. Six of these facilities are located on the AAC, one on the Westside Main Canal, and one on the East Highline Canal (Figure 1.7-1). These hydroelectric generation facilities are situated on the canals and occupy a relatively small area. Maintenance activities include vegetation control on the facility grounds, removing debris from the trash racks upstream of the facilities, and occasional stabilization of the canal banks immediately downstream of the facilities.

1.7.4.6 Emergency Response

Emergency activities are actions that IID must take immediately and unpredictably to repair or prevent damage to its facilities in order to prevent property damage or protect human health and safety. Emergencies are situations under which IID cannot follow the normal procedures detailed under each of the conservation strategies (Chapter 3) to correct or prevent damage to property or risk to human health or safety. Emergency activities are most frequently required to respond to storm events or natural disaster (e.g., earthquakes) that result in damage to IID facilities (e.g., canal wash out, plugged siphon) and interrupt the distribution or collection of water. Actions required by IID in emergency situations will vary depending on the specific circumstances but typically include removing debris, hauling fill material, removing sediment, moving large amounts of earth, dewatering a canal section, repairing embankments, replacing/repairing damaged structures, and replacing rip rap.

1.7.4.7 HCP and Environmental Mitigation Measures

Any incidental take of covered species that results from activities associated with the implementation of the mitigation measures and monitoring program associated with the HCP, the EIR/EIS for the IID Water Conservation and Transfer project, the Program EIR for the QSA, and any other environmental assessment related to the covered activities are covered under this HCP. These covered activities include management of habitat that is restored, created or acquired in implementing the HCP as well as monitoring activities as described in Chapter 3: Habitat Conservation Plan Components and Effects on Covered Species and Chapter 4: Monitoring and Adaptive Management. Mitigation, management and monitoring activities implemented by qualified third parties on behalf of IID for these purposes also are covered.

1.8 Regulatory Context

1.8.1 Federal Endangered Species Act

The FESA, as amended, is administered by the Secretaries of the Interior and Commerce through the U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service[1] (NMFS), respectively. Species listed as endangered or threatened under the FESA are provided protection from federal actions that would jeopardize the species' continued existence or destroy or adversely modify critical habitat for the species.

Under Section 4 of the FESA, the USFWS must designate critical habitat for federally listed species, concurrent with listing that species, to the maximum extent prudent and determinable. The FESA requires designation of critical habitat for listed species to be based on those physical or biological features that are essential for the conservation of the species and according to the best scientific and commercial data available. As defined in the FESA, conservation means the use of all methods and procedures that are necessary to bring any listed species to the point at which the measures provided pursuant to the FESA are no

[1] No species under the jurisdiction of NMFS are covered by this HCP.

longer needed. Critical habitat is protected under Section 7 of the FESA with regard to actions carried out, authorized, or funded by a federal agency. Federal agencies must ensure that their actions are not likely to result in the destruction or adverse modification of critical habitat.

Section 9 of the FESA and accompanying federal regulations prohibit the taking of fish and wildlife species listed as threatened or endangered by nonfederal agencies and private companies and individuals. As defined in the FESA, taking means “to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect or to attempt to engage in such conduct.” By regulation, the USFWS has defined harm as an act, “which actually kills or injures,” listed wildlife; harm may include “significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering.”

Section 9 of the FESA also offers limited protection for federally listed plants. Under Section 9, it is unlawful for any person, “subject to the jurisdiction of the United States,” to “remove and reduce to possession, . . .maliciously damage . . . or destroy,” any such plant species from areas under federal jurisdiction (such as national forests and park lands). It also is unlawful under Section 9 for any such person to “remove, cut, dig up, or damage or destroy any such species” on any other area “in knowing violation of any law or regulation of any State or in the course of any violation of a State criminal trespass law.” Under Section 9 of the FESA, therefore, plants are protected from these types of takings on private lands to the extent these species are protected under state law.

In recognition that take cannot always be avoided, Section 10(a) of the FESA includes provisions that allow for takings by nonfederal entities that are incidental to, but not the purpose of, otherwise lawful activities. Similar provisions are found in Section 7 for actions by federal agencies. Under Section 10(a), the USFWS is authorized to issue ITPs. Applicants for such permits must submit habitat conservation plans that specify the following:

- Impact(s) that will likely result from the taking
- Measures the applicant will take to minimize and mitigate the impacts
- Source of funding available to implement the measures
- Alternatives to the taking and the reason the alternatives were not chosen
- Any other measures considered by the Secretary of the Interior (i.e., USFWS) as necessary or appropriate for minimizing or mitigating the impacts of the taking

Upon review of a completed application and HCP, the USFWS must find all of the following before an ITP can be issued:

- Taking will be incidental to an otherwise lawful activity.
- Applicant will, to the maximum extent practicable, minimize and mitigate the impacts of the taking.
- Applicant will ensure that adequate funding for the conservation plan and procedures to deal with unforeseen circumstances will be provided.
- Taking will not appreciably reduce the likelihood of the survival and recovery of the species in the wild.

- Applicant will ensure that other measures (if any) required by the approving agency will be met.
- Approving agency is assured that the conservation plan will be implemented.

Because issuance of an ITP is a federal action, the USFWS must comply with the consultation requirements of Section 7 of the FESA, the public review provisions of the FESA, and the environmental analysis and public review requirements of the NEPA, as amended.

Although phrased in terms of criteria for issuance of an ITP, Section 10(a)(1)(B) also was intended by Congress to authorize the USFWS to approve HCPs for unlisted as well as listed species. Moreover, if an HCP treats an unlisted species as if it were already listed, additional mitigation will not be required within the area covered by the HCP upon the listing of that species. As stated by the Conference Committee when Section 10 was added to the FESA in 1982:

> "*The committee intends that the Secretary [of the Interior] may utilize this provision to approve conservation plans which provide long-term commitments regarding the conservation of listed as well as unlisted species and long-term assurances to the proponent of the conservation plan that the terms of the plan will be adhered to and that further mitigation requirements will only be imposed in accordance with the terms of the plan. In the event that an unlisted species addressed in an approved conservation plan is subsequently listed pursuant to the Act, no further mitigation requirements should be imposed if the conservation plan addressed the conservation of the species and its habitat as if the species were listed pursuant to the Act (House of Representatives Conference Report No. 97-835, 97th Congress, 2d Session, p. 30).*"

The No Surprises policy adopted by the U.S. Department of the Interior provides that landowners who have habitat for listed species on their property and agree to an HCP under the FESA will not be subject to later demands for more land, water or financial commitment if the HCP is adhered to, even if the needs of the species change over time (63 Fed. Reg. 8859).

1.8.2 Bald Eagle and Golden Eagle Protection Act

The Bald Eagle and Golden Eagle Protection Act (BEPA) explicitly protects the bald eagle and golden eagle and imposes its own prohibition on any taking of these species. As defined in the BEPA, take means to pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, or molest or disturb. Current USFWS policy is not to refer the incidental take of bald eagles for prosecution under the Bald Eagle and Golden Eagle Protection Act (USFWS 1996). For golden eagles, the ITP would serve as a Special Purpose Permit should golden eagles become listed in the future (USFWS 1996).

1.8.3 Migratory Bird Treaty Act

The Migratory Bird Treaty Act makes it unlawful to pursue, hunt, capture, kill, or possess or attempt to do the same to any migratory bird or part, nest, or egg of such bird listed in wildlife protection treaties between the U.S. and Great Britain, United Mexican States, Japan, and the Union of Soviet States. As with the FESA, the act also authorizes the

Secretary of the Interior to issue permits for take. The procedures for securing such permits are found in Title 50 of the *Code of Federal Regulations (CFR)*, together with a list of the migratory birds covered by the act. The USFWS has determined that an ITP issued under Section 10 of the FESA also constitutes a Special Purpose Permit under *50 CFR* 21.27 for migratory birds that are listed under the FESA. For unlisted migratory bird species, the ITP would serve as a Special Purpose Permit should a covered species become listed in the future. The USFWS has determined that take of listed migratory bird species allowed under an ITP will not be in violation of the Migratory Bird Treaty Act of 1918 (USFWS 1996).

1.8.4 National Environmental Policy Act

NEPA, as amended, requires the analysis and full public disclosure of the potential environmental impacts of a proposed federal action. The issuance of an ITP under Section 10(a) by the USFWS constitutes a federal action that requires NEPA compliance. The EIR/EIS for the IID Water Conservation and Transfer Project addresses the effects of issuance of an ITP to IID and fulfills the NEPA requirements associated with this federal action.

1.8.5 Salton Sea Restoration Project

Congress passed Public Law (PL) 102-575 in 1992. The law directs the Secretary of the Interior to "conduct a research project for the development of a method or combination of methods to reduce and control salinity, provide endangered species habitat, enhance fisheries, and protect human recreational values in the area of the Salton Sea." The Salton Sea Reclamation Act of 1998 ([PL 105-372), developed in response to these conditions, directs the Secretary to do the following:

> *"…complete all studies, including, but not limited to environmental and other reviews, of the feasibility and benefit-cost of various options that permit the continued use of the Salton Sea as a reservoir for irrigation drainage and: (i) reduce and stabilize the overall salinity of the Salton Sea; (ii) stabilize the surface elevation of the Salton Sea; (iii) reclaim, in the long term, healthy fish and wildlife resources and their habitats; and (iv) enhance the potential for recreational uses and economic development of the Salton Sea."*

The purpose and need for the Salton Sea Restoration Project is to maintain and restore ecological and socioeconomic values of the Salton Sea to the local and regional human community and to the biological resources dependent upon the Sea. These requirements are reflected in the directives of PL 105-372. The project is intended to have ecological, recreational, and economic benefits.

Prior to implementing the NEPA/California Environmental Quality Act (CEQA) process, the Salton Sea Authority and the Bureau of Reclamation, working jointly with stakeholders and members of the public, developed five goal statements. The goal statements are consistent with the direction contained in PL 105-372, address the underlying purpose and need for the project, and provide guidance for developing project alternatives. The five goals of the Salton Sea Restoration Project are:

1. Maintain the Sea as a repository of agricultural drainage

2. Provide a safe, productive environment at the Sea for resident and migratory birds and endangered species
3. Restore recreational uses at the Sea
4. Maintain a viable sport fishery at the Sea
5. Enhance the Sea to provide economic development opportunities

To implement the directive provided in PL 105-372, the Salton Sea Authority, as the lead California agency under CEQA, and Reclamation, as the lead Federal agency under NEPA, released a Draft EIS/EIR in January 2000, that evaluated alternative methods of restoring the Salton Sea. A revised Draft EIS/EIR that includes different alternatives and revised modeling and impact analysis is now being prepared.

1.8.6 California Endangered Species Act

The CESA is part of the California Fish and Game Code (Code). As a guide to state agencies, Section 2053 of the Code states that,

> *" . . . it is the policy of the state that state agencies should not approve projects as proposed which would jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of habitat essential to the continued existence of those species, if there are reasonable and prudent alternatives consistent with conserving the species or its habitat which would prevent jeopardy."*

The CESA also states, however, that such reasonable and prudent measures must at the same time maintain the project purpose to the greatest extent possible.

Section 2080 of the CESA prohibits import, export, take, possession, purchase, or sale of listed plant and animal species except as otherwise provided in other provisions of the CESA or the Code. The state restrictions under CESA on take differ from those under the FESA in how take is defined. For CESA, take is defined to mean, "hunt, pursue, catch, capture, or kill or attempt the same." Noticeably absent from this definition are certain types of takings prohibited under Section 9 of the FESA (i.e., to harm or harass a listed species). Accordingly, Section 2080 of CESA prohibits the take of listed species except as otherwise provided under CESA or the Code, including the Native Plant Protection Act. Take of state-listed species may be authorized under CESA Section 2081. As specifically regards plants, Section 2080 of CESA prohibits the take of listed species except as otherwise provided under CESA or the Code, including the Native Plant Protection Act (commencing with Section 1900 of the Code).

Under Section 2081(b), CDFG may authorize, by permit, the take of state-listed endangered species, threatened species, and candidate species if all of the following conditions are met:

(a) The take is incidental to an otherwise lawful activity.

(b) The impacts of the authorized take are minimized and fully mitigated. The measures required to meet this obligation must be roughly proportional in extent to the impact of the authorized taking on the species. Where various measures are available to meet this obligation, the measures required shall maintain the applicant's objectives to the greatest extent possible. All required measures shall be capable of successful implementation.

(c) The permit is consistent with any regulations adopted pursuant to Sections 2112 and 2114 of the Code.

(d) The applicant must ensure adequate funding to implement the minimization and mitigation measures, and for monitoring compliance with, and effectiveness of, those measures.

(e) The permit will not jeopardize the continued existence of the species.

CDFG will make this determination based on the best scientific and other information that is reasonably available, and shall include consideration of the species' capability to survive and reproduce, and any adverse impacts of the taking on those abilities in light of known population trends; known threats to the species; and reasonably foreseeable impacts on the species from other related projects and activities.

IID is seeking incidental take authorization under Section 2081 for take of state listed and unlisted species (Table 1.5-1) that could occur as a result of O&M activities and activities associated with the water conservation and transfers in the Imperial Valley, Salton Sea and along the AAC. In addition, IID is seeking authorization under Section 2081 for incidental take of state-listed species that inhabit the LCR and could be affected by the change in the point of diversion of water conserved by IID and transferred to SDCWA or MWD. Appendix F contains the information and analyses necessary for CDFG to issue the ITP.

1.8.7 California Environmental Quality Act

Similar to NEPA, the CEQA requires state agencies empowered to make discretionary permitting decisions to evaluate the environmental effects of a proposed project. Issuance of a 2081(b) permit constitutes a state action requiring compliance with CEQA. The EIR/EIS for the IID Water Conservation and Transfer project addresses the effects of issuance of a 2081(b) permit to IID and fulfills the CEQA requirements associated with this state action.

1.8.8 California Native Plant Protection Act

The California Native Plant Protection Act (NPPA) includes measures to preserve, protect, and enhance rare and endangered native plants in addition to those provided under CESA. The definitions of rare and endangered in the NPPA differ from those in the CESA, but the list of protected native plants encompasses federal and state ESA candidate, threatened, and endangered species. The act also includes its own restrictions on take, stating that, “[n]o person shall import into this state, or take, possess, or sell within this state,” any rare or endangered native plant, except as provided in the NPPA. The exception is where landowners have been notified of the presence of protected plants by CDFG; they are required to notify CDFG at least 10 days in advance of changing land uses to allow CDFG an opportunity to salvage the plants.

1.8.9 California Fully Protected Species Statutes

Several proposed covered species are subject to the provisions of the fully protected species statutes in the Code. The fully protected species statute prohibits the “take” (as defined in the Code) of fully protected species and does not currently include a mechanism for authorizing take of fully protected species. The fully protected species in the HCP area are listed in Table 1.5-1.

CHAPTER 2

Existing Conditions in the HCP Area

2.1 Location and Regional Setting

Imperial Irrigation District (IID) is located in the Imperial Valley in the southeast corner of California, east of Los Angeles and San Diego. Imperial Valley lies within the Salton Trough (Cahuilla Basin), an area of very flat terrain. The Salton Trough encompasses a large portion of the Colorado Desert (a subdivision of the Sonoran Desert, extending through portions of Mexico and Southern Arizona) with much of the area below sea level.

2.2 Physical Environment

2.2.1 Climate

The Imperial Valley is one of the most arid regions in the United States. The climate of the Habitat Conservation Plan (HCP) area is that typical of desert regions, with hot, dry summers and high winds, with occasional thunderstorms and sandstorms. Summer air temperatures typically are above 100° Fahrenheit (F) and can reach 120°F. Winter temperatures generally are mild, usually averaging above 40°F, but frost may occur occasionally.

The prevailing winds in Imperial Valley are from the west. Average wind speeds range from 4 to 7 miles per hour. However, at the Salton Sea, the winds are predominantly from the east in the northern portions of the sea, while in the southern portions of the sea, westerly winds predominate similar to the rest of the Imperial Valley.

The rain fall can occur from November through March, but because the area is in the rainshadow of the Peninsular Ranges, it receives little precipitation. The 85-year average annual rainfall is 2.93 inches. June is the driest month; precipitation in June has only occurred three times during the period of record. Precipitation in the form of snowfall was recorded only once.

2.2.2 Topography

The Salton Trough is a basin and the most dominant landform in Imperial County. Approximately 130 miles long and 70 miles wide, the Salton Trough is a seismically active rift valley, and encompasses the Imperial Valley, the Mexicali Valley, and the Gulf of California in Mexico in the south and the Coachella Valley in the north (Reclamation and SSA 2000). The Salton Sea is in the northern portion of the Salton Trough.

As discussed above, the basin topography is relatively flat with little topographic relief. The Sand Hills are an area of windblown sand deposits that form a 40-mile-long by 5-mile-wide belt of sand dunes extending along the east side of the Coachella Canal from the Mexican border northward. Within the Coachella and Imperial Valleys, an old lake shoreline (Lake Cahuilla) has been identified by the presence of lacustrine deposits. The Imperial Formation, which is marine in origin, underlies the sequence of sedimentary layers within the basin. The Imperial Formation is underlain by igneous and metamorphic basement rocks (Reclamation and SSA 2000).

In the dry climate of Imperial County, the soils of Imperial County, unless they are irrigated, have no potential for farming (County of Imperial 1997). Lacustrine basin soils in the Imperial Valley formed on nearly level old lake beds in the area of ancient Lake Cahuilla. These soils generally consist of silty clays, silty clay loams, and clay loams and are deep, highly calcareous, and usually contain gypsum and soluble salts. The central irrigated area served by the IID generally has fine-textured silts and is primarily used for cropland. Continued agricultural use of soils within IID required installation of subsurface tile drains to carry away water and salts that would otherwise build up in the soils and prevent crop growth. Tile drains discharge this flow to surface drains (IID 1994). Sandy soils, typical of the deserts in the southwest U.S., are predominant in higher elevations, such as the East and West Mesas, and generally are used for recreation and desert wildlife habitat. The irrigated portion of Imperial Valley generally is flat and has low levels of natural erosion.

The Imperial Valley is located within one of the most tectonically active regions in the United States, and therefore is subject to potentially destructive and devastating earthquakes. Additionally, the Imperial Valley is susceptible to other geologic hazards including liquefaction and flooding.

2.2.3 Hydrology and Water Quality of the Imperial Valley

Surface water within the Imperial Valley comes primarily from two sources: the Colorado River and inflow across the International Boundary from Mexico via the New River. Agricultural production served by IID is almost entirely dependent on surface water that is diverted from the Colorado River and into the IID distribution system. After application to farm fields for irrigation purposes, the water is collected in drains. The drains transport water directly to the Salton Sea or to the New or Alamo Rivers that discharge to the Salton Sea. With no outlet, the Salton Sea is a terminal sink for drain water from Imperial Valley.

2.2.3.1 Water Quality

Irrigation Delivery Water

The IID water distribution system begins at the Colorado River where water is diverted at the Imperial Dam and conveyed by gravity through the All American Canal (AAC). The AAC discharges water to three major distribution canals in the IID service area—the East Highline, Central Main, and Westside Main Canals. These three canals serve as the main arteries of a system consisting of approximately 1,667 miles of canals and laterals that distribute irrigation water within IID's service area.

About 4.4 million acre-feet per year (MAFY) of water per year is diverted into the AAC at Imperial Dam. Of this total, flow measurements (collected from 1986 to 1999 at Drop No. 1, just before the AAC enters the IID Service Area) show that Colorado River irrigation deliveries generally range from approximately 2.4 MAFY to more than 3.2 MAFY. The average annual delivery of irrigation water during the same period is approximately 2.8 MAFY. The remaining balance of diverted water is discharged into the Yuma Main Canal, the Gila Gravity Main Canal, returned to the Colorado River for Mexico's use via Pilot Knob, diverted into the Coachella Canal or is lost to spillage, evaporation or seepage.

Colorado River diversions account for approximately 90.5 percent of all water flowing through IID. The remaining water components flowing through IID include: flow from the New River across the International Boundary at approximately 5 percent, rainfall at approximately 4 percent, net groundwater discharge to the irrigation system of less than 1 percent, and flow from the Alamo River across the International Boundary at less than 0.1 percent.

The delivery of Colorado River water to IID is driven by user demand. This demand is not constant throughout the year, but varies because of a combination of influences such as changes in climate and local rainfall conditions, crop cycles, and government crop programs. Demand is typically highest in April and remains fairly high until August when it starts to decline.

Colorado River water imported by IID is either used consumptively, or is collected in surface drains or rivers. Consumptive use includes transpiration by crops and evaporation directly from soil or water surfaces. Approximately 66 percent of the water that is delivered for on-farm use is used for crop production and leaching and roughly 3 percent is lost to evaporation. The remaining water delivered for on-farm use discharges into the IID drainage system as surface runoff or is lost to shallow groundwater.

Drainage Water

The IID drainage system includes a network of surface and subsurface drains. Water entering the drainage system can originate from the following sources:

- Operational discharge (i.e., water that has traveled through portions of the IID water conveyance system and was not applied to land). The main components of operational discharge are canal seepage and canal and lateral spillage. Canal and lateral spillage refers to unused water that is discharged from the delivery system to the surface drains or river systems.
- On-farm tailwater runoff (i.e., surface water runoff occurring at the end of an irrigated field)
- On-farm leaching (i.e., water passing the crop root zone that normally enters a tile drain; also referred to as tilewater)
- Stormwater runoff
- Groundwater

Water collected by the tile drainage systems either flows by gravity or is pumped to surface drains, which discharge to the Salton Sea either directly or via the New and Alamo Rivers. With the exception of drainage water that is returned to the fields as irrigation water or flow lost to shallow and deep groundwater aquifers (through deep percolation that is not captured by the tile drains), all flow collected by the IID drainage system is ultimately conveyed to the Salton Sea.

Water applied to the fields in IID serves two purposes: to replenish moisture in the crop root zone and to leach accumulated salts from the soils. According to a recent study by IID, approximately 15 percent of the water applied to IID fields runs off as tailwater. Except in those fields with tailwater recovery systems, this water is no longer available for on-farm use and is discharged into either surface drains or rivers. Approximately 16 percent of irrigation water delivered to fields is used for the leaching of salts accumulated in the soils. This water percolates to the tile drainage system where it is collected and conveyed to the IID surface drains.

Collectively, tilewater and tailwater drainage accounts for roughly 67 percent (34 and 33 percent, respectively) of all of the IID drainage discharged to the Salton Sea either directly or via the New and Alamo Rivers. The Alamo River receives approximately 61 percent of the discharge from the IID drainage system, and the New River receives roughly 29 percent of the District's drainage. The remaining 10 percent is discharged from the drainage system directly to the Salton Sea. Total IID discharge to the Salton Sea has averaged about 1.16 MAFY during 1986 to 1999. Figure 2.2-1 shows the annual variability of IID's total surface discharge to the Salton Sea during 1986 to 1999.

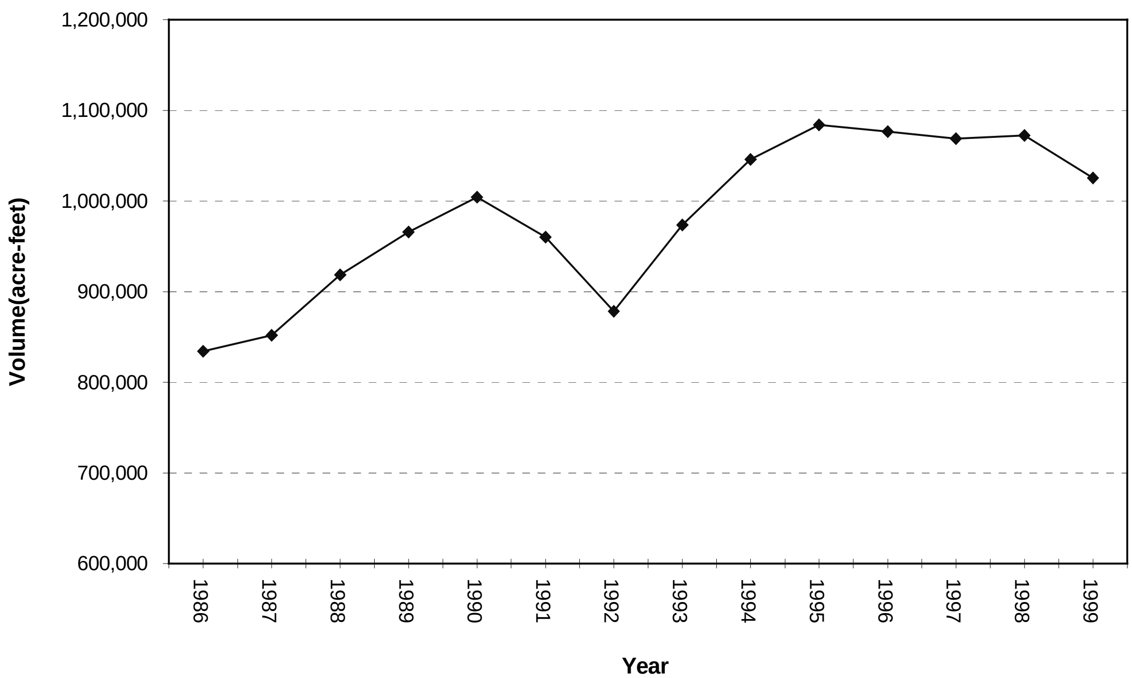


FIGURE 2.2-1
Total Farm Drainage from IID Discharging into the Salton Sea (1986-1999)

Alamo River

The Alamo River enters IID from Mexico. Currently, there is no flow in the Alamo River coming from Mexico across the International Boundary because of the installation of a dam at the boundary in 1996 by Mexico. However, the previous 5-year average annual flow volume at the US/Mexico border was less than 2 thousand acre-feet per year (KAFY). The Alamo River receives drainage from about 58 percent of the IID area and accounts for about 61 percent of IID's drainage discharge. Outflow from the Alamo River to the Salton Sea is estimated at about 605 KAFY, with about 168 KAF from rainfall; municipal, industrial, and operational discharge; and seepage, 211 KAF from tailwater, and 223 KAF from tilewater.

New River

The New River also enters IID from Mexico, but, unlike the Alamo, the New River serves as an open conduit for untreated municipal sewage, heavy metals, and agricultural drainage waters high in pesticide residues from northern Mexico. The average annual flow volume of the New River at the International Boundary during the period 1987 to 1998 was about 165 KAFY, which comprised approximately one-third of the total flow of the New River at its discharge to the Salton Sea. Therefore, the New River is a significant source of pollutant loading into the Salton Sea. Water demand and discharges in Mexico might affect annual flows, and flow volumes at the boundary have changed dramatically during the period of record. Gage data shows flow in the New River at an average annual low of 41 KAFY from the period 1950 to 1957, increasing to an average of 110 KAFY during the period 1958 to 1978. Flows across the boundary increased again to an annual average of 150 KAFY during the period 1979 to 1982, and then again from 1983 to 1988 to values higher than 250 KAFY. The discharge from Mexico leveled back to approximately 100 KAFY for the period 1987 to 1999.

The New River receives approximately 29 percent of the drainage from IID, and including input from Mexico, accounts for about 39 percent of the total discharge from the IID water service area to the Salton Sea. The average annual flow from the New River to the Salton Sea is made up of approximately 81 KAFY from rainfall, municipal and industrial effluent, IID operational discharge, and canal seepage; 102 KAFY from tailwater; and 108 KAFY from on-farm tile drainage, for a total of 291 KAFY, with the remainder of the flow coming from Mexico and net river losses.

2.2.3.2 Water Quality

Water quality in the HCP area is determined by the quality of water diverted from the Colorado River, the water quality of water in the New River as it crosses the International Boundary, and agricultural practices. The following sections summarize water quality information for:

- Irrigation delivery water
- Drainage water
- Alamo River water
- New River water

Additional information on water quality conditions in the HCP area is provided in Section 3.2 of the environmental impact report/environmental impact statement (EIR/EIS).

Table 2.2-1 summarizes water quality data for irrigation delivery water, drainage water, New River, and Alamo River water. Information from two data sets is summarized: (1) “Recent” water quality data, and (2) “Long-term” water quality data. The “Recent” water quality data consists of data obtained during a coordinated monitoring effort at the following locations:

- AAC
- Surface drains that discharge to the Alamo River
  - South Central Drain
  - Holtville Main Drain

TABLE 2.2-1
Long-Term[a] and Recent[b] Mean Flows and Concentrations for Water Quality Parameters in IID's Service Area

	Colorado River Irrigation Delivery in AAC		New River							Alamo River						
	Long-Term[a]	Recent[b]	Long-Term[a]			Recent[b]				Long-Term[a]			Recent[b]			
Parameter	**AAC**	**AAC**	**Mexico Border**	**Surface Drains**	**Outlet to Salton Sea**	**Border**	**Greeson**	**Trifolium 12**	**Outlet to Salton Sea**	**Mexico Border**	**Surface Drains**	**Outlet to Salton Sea**	**Border**	**South Central**	**Holtville Main**	**Outlet to Salton Sea**
Daily mean flow (cfs)	3,934	—	250	—	622	—	—	—	—	—	—	843	—	—	—	—
Instantaneous flow (cfs)	—	—	193	—	—	—	—	—	—	2	—	—	—	—	—	—
TDS (mg/L)	771	773	3,894	2,116	2,997	2,676	2,033	2,143	2,743	3,191	2,375	2,458	—	2,269	2,347	2,318
TSS (mg/L)	86	11	117	193	313	52	188	189	241	360	318	479	—	329	175	300
Se (µg/L)	2.5	2.12	3.0	7.4	7.1	ND	5.24	6.03	4.09	5.9	7.9	7.7	—	8.77	5.63	7.53
NO3 (mg/L)	0.28	0.4	0.84	7.49	4.37	0.5	4.2	13.0	4.3	1.87	8.14	7.81	—	9.9	8.3	6.4
Total phosphorus (mg/L)	0.05	0.13	1.42	0.78	0.81	2.00	0.77	0.37	1.26	0.47	0.84	0.63	—	0.74	0.61	0.75
Total P in sediment (mg/kg)	—	—	535	1,300	1,600	—	—	—	—	—	—	1,100	—	—	—	—
DDT (µg/L)	0.001	—	0.088	0.013	0.016	—	—	—	—	0.011	0.020	0.016	—	—	—	—
DDT in sediment (µg/kg)	—	—	0.1	2.6	11.0	—	—	—	—	0.1	14.6	0.1	—	—	—	—
DDD (µg/L)	0.001	—	0.046	0.010	0.017	—	—	—	—	0.011	0.017	0.011	—	—	—	—
DDD in sediment (µg/kg)	—	—	—	5.4	—	—	—	—	—	—	6.3	—	—	—	—	—
DDE (µg/L)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
DDE in sediment (µg/kg)	—	—	9.8	44.1	9.8	—	—	—	—	18.0	15.7	30.0	—	—	—	—
Toxaphene (µg/L)	0.001	—	0.272	0.946	0.013	—	—	—	—	0.100	0.995	0.014	—	—	—	—

TABLE 2.2-1
Long-Term[a] and Recent[b] Mean Flows and Concentrations for Water Quality Parameters in IID's Service Area

	Colorado River Irrigation Delivery in AAC		New River							Alamo River						
	Long-Term[a]	Recent[b]	Long-Term[a]			Recent[b]				Long-Term[a]			Recent[b]			
Parameter	**AAC**	**AAC**	**Mexico Border**	**Surface Drains**	**Outlet to Salton Sea**	**Border**	**Greeson**	**Trifolium 12**	**Outlet to Salton Sea**	**Mexico Border**	**Surface Drains**	**Outlet to Salton Sea**	**Border**	**South Central**	**Holtville Main**	**Outlet to Salton Sea**
Toxaphene in sediment (µg/kg)	—	—	10.0	9.5	18.3	—	—	—	—	5.0	26.6	2.5	—	—	—	—
Diazinon (µg/L)	—	—	—	0.025	—	—	—	—	—	—	—	0.025	—	—	—	—
Chlorpyrifos (µg/L)	—	—	—	0.025	—	—	—	—	—	—	—	0.025	—	—	—	—
Dacthal (µg/L)	0.007	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Boron (µg/L)	170	143	1,600	804	1,172	—	456	584	905	1,798	683	695	—	438	609	558

[a] Long-Term data collected from 1970 to 1999 and compiled from various sources (see text for greater explanation).
[b] Recent data collected by the Colorado River Basin Regional Water Quality Control Board from 1996 through 1999.

NOTES
— = Data Not Available
ND = Not Detected
cfs = cubic feet per second
mg/L = milligrams per liter
µg/L = micrograms per liter
µg/kg = micrograms per kilogram

- Surface drains that discharge to the New River
  - Greeson Drain
  - Trifolium 12 Drain
- New River at the International Boundary
- New River at the outlet to the Salton Sea
- Alamo River at the outlet to the Salton Sea

The water quality information contained in this data set was collected and compiled by the Colorado River Basin Regional Water Quality Control Board from 1996 through 1999. The information represents the most current water quality data available. The data were collected from each of the sampling locations listed above during the same time period.

The "long-term" water quality data set includes data collected during numerous monitoring events from sites located throughout the IID service area. This database was compiled for modeling purposes and was obtained from various sources, including the U.S. Environmental Protection Agency's Storage and Retrieval Environmental Data System, U.S. Geological Service's Water Quality Network, Colorado River Basin Regional Water Quality Control Board, and published and unpublished papers and documents. These sources contained water quality data collected within Imperial County over many years. However, for the modeling associated with the water conservation and transfer programs, the data were limited to those collected between 1970 and 1999.

Although the long-term water quality data set contained many samples, the data tended to be collected sporadically in time and at readily accessible sites. Thus, even though the time period for sample collection ranges from 1970 to 1999, the samples were not collected at all sites, nor were they collected on a regular basis. Further, the numbers of analyses for any one constituent ranged from very few to several hundred. Because of the lack of good temporal coverage, the data were grouped by month through the entire study period. The data were then grouped spatially and assigned to distinct geographic locations to quantify the flow and constituent concentrations from each of the various sources that flow into and discharge out of the IID service area. As a result, the data are reported as mean concentrations of the cumulative flows at the following locations:

- IID irrigation delivery water at the AAC
- Alamo River drainage basin
  - Alamo River at the International Boundary
  - IID surface drain discharge to the Alamo River
  - Alamo River at the Salton Sea
- New River drainage basin
  - New River at the International Boundary
  - IID surface drain discharge to the New River
- New River at the Salton Sea

Surface water that is diverted from the Colorado River is the only water available to IID for agricultural use with the exception of rainfall and minor contributions from groundwater sources. The chemical characteristics of the water entering the IID agricultural area change little between the source at the Colorado River and the points where the water enters the delivery systems of the individual fields.

Recent water quality data (1996 to 1999) collected from the AAC shows the following:

- Concentrations for selenium range from 1.94 to 2.42 micrograms per liter (µg/L), and concentrations for boron range from 110 to 190 µg/L. Mean concentrations for selenium and boron are 2.12 and 142.5 µg/L, respectively.
- The concentration of nitrate as nitrogen ranges from non-detectable (at 0.2 milligrams per liter [mg/L]) to 0.40 mg/L. Phosphorous concentrations range from 0.05 to 0.21 mg/L, and the mean concentration of phosphorus is 0.13 mg/L.
- Mean concentrations for selenium and boron during the period 1970 through 1999 are similar to the concentrations shown in the recent data.

Water quality data for total dissolved solids (TDS) show that the annual mean concentration for the period 1970 through 1999 is 771 mg/L. Mean concentrations in the irrigation delivery water were highest during the late 1970s and early 1980s, with concentrations more than 850 mg/L. Starting in 1983, TDS concentrations in the influent decreased to a low of about 525 mg/L in 1986. The major factor contributing to this fluctuation was the unusually high flows carried by the Colorado River during the mid-1980s. Since 1986, TDS concentrations in the irrigation delivery water have gradually increased. Recent data from the 1996 to 1999 period show that TDS concentrations range from 720 to 820 mg/L, and the average concentration for TDS during this period is 772.5 mg/L.

Long-term mean concentrations for the organochlorine insecticides dichloro-diphenyl-tricloroethane (DDT), dichloro-diphenyl-diclhloroethane (DDD), and toxaphene in IID irrigation delivery water are all at or below detection limits of 0.001 µg/L. The long-term mean concentration for organochlorine herbicide Dacthal is 0.007 µg/L.

Drainage Water

Water entering the drainage system primarily comes from three sources: operational discharge, tailwater, and tilewater. Analysis of water discharging to the drainage system indicates the following:

- Operational discharge is considered to have the best water quality because it is not applied to the land and, thus, it should be similar in quality to water entering the IID service area directly from the Colorado River.
- Tailwater is considered the next best in terms of quality. However, tailwater accumulates certain amounts of sediment and solutes (including agricultural chemicals such as fertilizers and pesticides) from the soil as it flows across the cultivated fields.
- Tilewater is generally considered the poorest of the water sources because dissolved salts and other constituents tend to concentrate in the water as it percolates through the root zone and is collected in the subsurface drainage collection system.

Water quality data has been recently (1996 to 1999) collected for four drains in the HCP area: South Central, Holtville Main, Greeson, and Trifolium 12. South Central and Holtville Main drain to the Alamo River while Greeson and Trifolium 12 discharge to the New River. In addition to these drains, sporadic information is available for a few other drains in the HCP area. Water quality of drain water is discussed separately for each drainage basin.

Alamo River Basin

Recent water quality data for South Central and Holtville Main drain show the following.

- Selenium concentrations in the South Central drain at its outlet range from 5.43 to 11.30 µg/L, and the mean concentration is 8.77 µg/L. Selenium concentrations in the Holtville Main drain range from 4.30 to 10.0 µg/L, and the mean concentration is 5.63 µg/L.
- Boron concentrations in the South Central drain range from 260 to 650 µg/L, and the mean concentration is 438 µg/L. Boron concentrations in the Holtville Main drain range from 330 to 740 µg/L, and the mean concentration is 609 µg/L.
- TDS concentrations in the South Central drain range from 1,510 to 3,000 mg/L, and the mean concentration is 2,269 mg/L. TDS concentrations in the Holtville Main drain range from 1,990 to 3,120 mg/L, and the mean concentration is 2,347 mg/L.
- Mean concentrations for total suspended solids (TSS), nitrate as nitrogen, and phosphorous in the South Central drain are 329, 9.9, and 0.7 mg/L, respectively. Mean concentrations of these constituents in the Holtville Main drain are 175, 8.3, and 0.6 mg/L, respectively.

The recent data set for the South Central and Holtville Main drains is useful for comparing water quality trends and values in these drains. However, data from these two drains may not be representative of the entire Alamo River drainage system.

Long-term mean concentrations for selenium, boron, and TDS in surface drains in the Alamo River drainage basin are 7.9 µg/L, 683 µg/L, and 2,375 mg/L, respectively (Table 2.2.1). Long-term mean concentrations for DDT, DDD, and toxaphene in surface drains in the Alamo River drainage basin are 0.02, 0.017, and 0.99 µg/L, respectively.

New River Basin Drains

Based on the recent water quality data set, the range (minimum and maximum) and mean concentration values for selenium, boron, TDS, TSS, nitrate as nitrogen, and phosphorus in the Greeson and Trifolium 12 drains are discussed below.

- Selenium concentrations in the Greeson drain range from 3.58 to 6.76 µg/L, and the mean concentration is 5.24 µg/L. Selenium concentrations in the Trifolium 12 drain range from 3.01 to 15.0 µg/L, and the mean concentration is 6.03 µg/L.
- Boron concentrations in the Greeson drain range from 240 to 680 µg/L, and the mean concentration is 456 µg/L. Boron concentrations in the Trifolium 12 drain range from 250 to 1,000 µg/L, and the mean concentration is 584 µg/L.
- TDS concentrations in the Greeson drain range from 1,490 to 2,840 mg/L, and the mean concentration is 2,033 mg/L. TDS concentrations in the Trifolium 12 drain range from 1,260 to 4,380 mg/L, and the mean concentration is 2,143 mg/L.

- Mean concentrations for TSS, nitrate as nitrogen, and phosphorous in the Greeson drain are 188, 4.2, and 0.8 mg/L, respectively. Mean concentrations of these constituents in the Trifolium 12 drain are 189, 13.0, and 0.4 mg/L, respectively.

The recent data set for the Greeson and Trifolium drains is useful for comparing water quality trends and values in these drains. However, data from these two drains may not be representative of the entire New River drainage system.

Long-term mean concentrations for selenium, boron, and TDS in surface drains in the New River drainage basin are 7.4 µg/L, 804 µg/L, and 2,116 mg/L, respectively. Long-term mean concentrations for DDT, DDD, toxaphene, diazinon, and chloropyrifos in surface drains in the New River drainage basin are 0.013, 0.010, 0.95, 0.025, and 0.025 µg/L, respectively. Concentration values for dichlorophenyl-dichloroethene (DDE) and Dacthal in drain discharge to the New River are unavailable for the long-term period. Overall, the long-term constituent concentration values in the New River drains are similar to the long-term concentration values observed in the Alamo River drains.

Flow at the International Boundary with Mexico is less than 1 percent of the Alamo River's discharge to the Salton Sea. As such, water quality and quantity at the Alamo River outlet are almost totally a function of drainage from IID. Based on the recent water quality data set, the range (minimum and maximum) and mean concentration values for selenium, boron, and TDS at the International Boundary are as follows.

- Selenium concentrations range from 3.0 to 10 µg/L, and the mean concentration is 5.9 µg/L.
- Boron concentrations range from 660 to 3,000 µg/L, and the mean concentration is 1,798 µg/L.
- TDS concentrations range from 1,866 to 4,260 mg/L, and the mean concentration is 3,191 mg/L.

Recent water quality data for the Alamo River at its outlet to Salton Sea show the following.

- Selenium concentrations range from 5.5 to 13.0 µg/L, and the mean concentration is 7.53 µg/L.
- Boron concentrations range from 320 to 800 µg/L, and the mean concentration is 558 µg/L.
- TDS concentrations range from 1,920 to 3,300 mg/L, and mean concentration is 2,318 mg/L.
- Mean concentrations for TSS, nitrate as nitrogen, and phosphorous in the Alamo River at the outlet to the Salton Sea are 300, 6.4, and 0.8 mg/L, respectively.

These concentrations are similar to the concentration values found in drains that discharge to the Alamo River.

Long-term mean concentrations for DDT, DDD, toxaphene, diazinon, and chloropyrifos in the Alamo River at the outlet to the Salton Sea are 0.016, 0.011, 0.014, 0.025, and 0.025 µg/L, respectively.

New River

The New River also enters IID from Mexico, but unlike the Alamo, the New River serves as an open conduit for untreated sewage, heavy metals, and pesticide residues from northern Mexico. Recent water quality data for the New River at the International Boundary show the following.

- Selenium was not detected, and boron was not analyzed in water quality samples collected at the International Boundary.
- TDS concentrations range from 1,970 to 3,480 mg/L, and the mean concentration is 2,676 mg/L.
- Mean concentrations for TSS, nitrate as nitrogen, and phosphorous at the International Boundary are 52.2, 0.5, and 2 mg/L, respectively.

Long-term mean concentrations for selenium, boron, and TDS in the New River at the International Boundary are 3 µg/L, 1,600 µg/L, and 3,894 mg/L, respectively. Long-term mean concentrations for TSS, nitrate as nitrogen, and phosphorous at the International Boundary are similar to the concentrations seen in the recent data. Long-term mean concentrations for DDT, DDD, and toxaphene are 0.088, 0.046, and 0.27 µg/L, respectively.

Recent water quality data (1996 to 1999) for the New River at its outlet with the Salton Sea generally show the following:

- Selenium concentrations range from 2.93 to 11.0 µg/L, and the mean concentration is 4.09 µg/L.
- Boron concentrations range from 530 to 1,200 µg/L, and the mean concentration is 905 µg/L.
- TDS concentrations range from 2,320 to 3,740 mg/L, and mean concentration is 2,743 mg/L.
- Mean concentrations for TSS, nitrate as nitrogen, and phosphorous measured in samples collected from the New River outlet to the Salton Sea are 241 mg/L, 4.3 mg/L, and 1.3 mg/L, respectively.

Long-term mean concentrations for selenium, boron, and TDS in the New River outlet to the Salton Sea are 7.1µg/L, 1,172 µg/L, and 2,997 mg/L, respectively. Long-term mean concentrations for DDT, DDD, and toxaphene are 0.016, 0.017, and 0.013 µg/L.

2.3 Biological Environment

2.3.1 Overview of the Biological Environment

The HCP area lies within the California Desert. Before European settlement, the area consisted of native desert vegetation and associated wildlife. Periodically, the Colorado River changed course and flowed northward into the Salton Trough forming a temporary, inland sea. These former seas persisted as long as water entered from the Colorado River, but evaporated when the river returned to its previous course. Thus, despite the periodic occurrence of a lake within the Salton Trough, the HCP area consisted predominantly of a desert ecosystem.

The Salton Sea represents the remnants of the most recent occurrence of flooding by the Colorado River when in 1905 the river breached an irrigation control structure and flowed into the Salton Trough. Initially, the surface elevation of the Salton Sea reached –197 feet mean sea level (msl), but evaporation reduced its elevation to –248 msl by 1920 (USFWS 1999a). By this time, agricultural production had increased in both the Imperial and Coachella Valleys and the Salton Sea was receiving drainage water. In 1924 and 1928, presidential orders withdrew all federal lands below –220 msl "for the purpose of creating a reservoir in the Salton Sea for storage of waste and seepage water from irrigated land in Imperial Valley." Since its formation in 1905, the Salton Sea has been sustained by irrigation return flows from the Imperial and Coachella Valleys.

The availability of a reliable water supply effected by construction of Hoover and Imperial Dams and the AAC, allowed the Imperial Valley to be brought into intensive cultivation. To support agricultural production in the valley, an extensive network of canals and drains was constructed to convey water from the Colorado River to farmers in the valley and subsequently to transport drainage water from the farms to the Salton Sea. The importation of water from the Colorado River and subsequent cultivation of the Imperial Valley radically altered the Salton Trough from its native desert condition. The availability of water in the drains and canals supported the development of mesic (marsh-associated) vegetation and in some locations patches of marsh-like habitats (e.g., along the Salton Sea and seepage from canals). These mesic habitats, in addition to the productive agricultural fields, attracted, and currently support numerous species of wildlife that would be absent or present in low numbers in the native desert habitat. Today, small areas of native desert habitat persist in the HCP area, but mainly the HCP area supports habitats created and maintained by water imported to Imperial Valley for agricultural production.

2.3.2 Wildlife Habitat

2.3.2.1 Drain Habitat

Wet area habitats within the HCP area are collectively referred to as "drain habitat." Drain habitat in the HCP area occurs in association with the drainage system, conveyance system, in managed marshes on the state and federal refuges and on private duck clubs, and as unmanaged vegetation adjacent to the Salton Sea.

Drainage System

Currently, IID operates and maintains 1,456 miles (cited from IID Memorandum, dated October 4, 2000) of agricultural drains (Figure 2.3-1). These drains typically are unlined, dirt channels with 65 miles of the drainage network in buried pipes. Main drain channels have an average depth of 8-11 feet with a typical side-slope embankment ratio of 1:1. Lateral ditches have an average depth of 7 feet, with a typical side-slope embankment ratio of 1:1. Some drainage channels are steep-sided with sloughing embankments from years of erosion prior to stabilization; others are sloped more gradually. Water flow in drains is determined by the collective irrigation practices on fields adjacent to the drains. Drains contain flows when irrigation occurs and storms may add to flows in the drains. Peak flows occur during storms and during the months of April and May.

Vegetation in the drains is limited to the embankment slope or sediments directly within the drain channel and typically consists of invasive species such as saltgrass, salt bush, bermuda

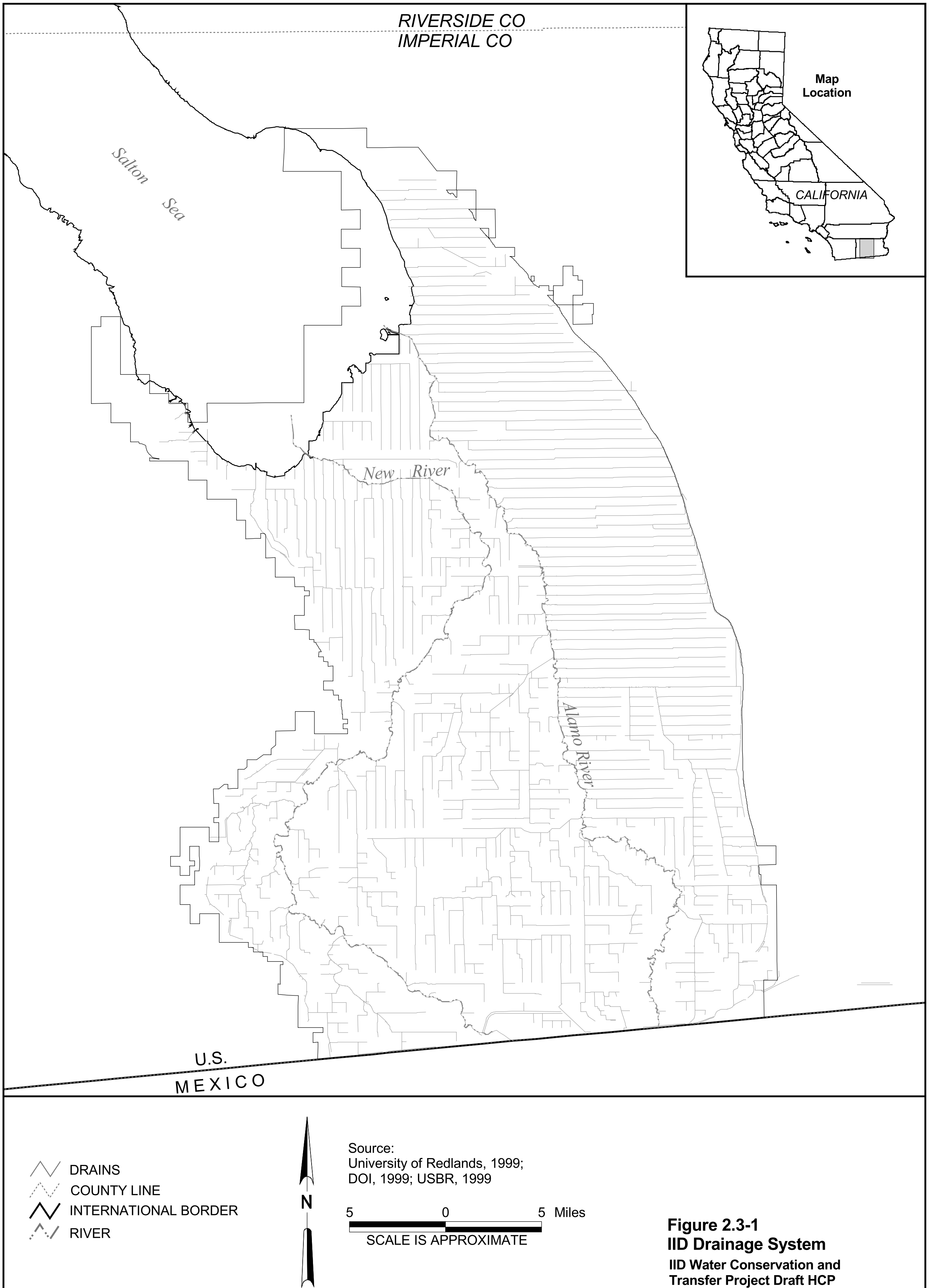


Figure 2.3-1
IID Drainage System
IID Water Conservation and Transfer Project Draft HCP

grass, common reed, and salt cedar. Vegetation adjacent to the edge of the water typically is restricted to a narrow strip from 3- to 15-feet wide, with more drought-tolerant vegetation on drain embankments. Some drain banks are devoid of vegetation with only a narrow band of saltgrass or bermuda grass adjacent to the edge of the water. Cattail, bulrushes, rushes, and sedges, occur in drain channels, typically in sparse, isolated patches. More extensive stands of cattail/bulrush vegetation may persist where maintenance activities are infrequent. In addition, stands of common reed and cattails can occur at the mouths of drains where they empty into rivers or the Salton Sea. Table 2.3-1 lists typical plant species occurring in irrigation drains in the Imperial Valley.

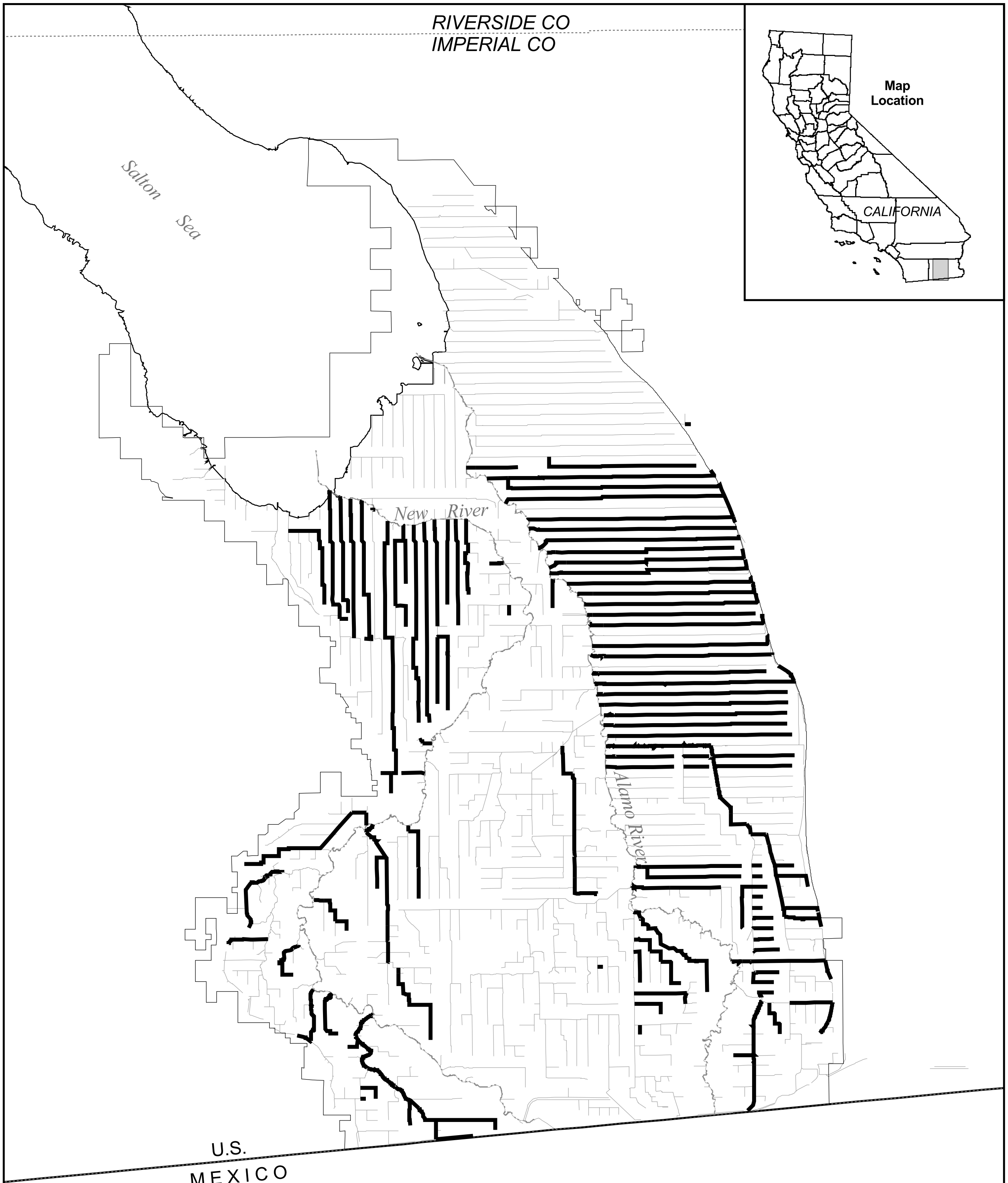
TABLE 2.3-1
Typical Plant Species Occurring in Drains in Imperial Valley

Adenophyllum porophylloides (false odora)	*Leptochloa uninerva* (Mexican sprangletop)
Allenrolfea occidentalis (iodine bush)	*Malvella leprosa* (alkali mallow)
Aristida oligantha (prairie three awn)	*Paspalum dilatatum* (dallisgrass)
Atriplex sp. (saltbush)	*Phragmites communis* (common reed)
Baccharis emoryi (Emory's baccharis)	*Polygonum aviculare* (prostrate knotweed)
Bassia hyssopifolia (five-hook bassia)	*Polygonum* sp. (knotweed)
Carex sp. (sedge)	*Polygonum* sp. (beard grass)
Chamaesyce melanadenia (prostrate spurge)	*Prosopis* sp. (mesquite)
Croton californicus (croton)	*Psilostrophe cooperi* (paper-daisy)
Cryptantha sp. (popcorn flower)	*Rumex crispus* (curly dock)
Cynodon dactylon (desert tea)	*Salsola tragus* (Russian thistle)
Eriogonum sp. (buckwheat)	*Scirpus* sp. (bulrush)
Heliotropium curassavicum (alkali heliotrope)	*Sesbania exaltata* (Colorado river hemp)
Juncus sp. (rush)	*Suaeda moquinii* (sea-blite)
Lactuca serriola (prickly lettuce)	*Tamarix* sp. (salt cedar)
Larrea tridentata (creosote bush)	*Typha* sp. (cattail)
Leptochloa fascicularis (bearded sprangletop)	

Sources: IID 1994; Reclamation and SSA 2000.

Maintenance activities associated with the drains include ensuring the gravity flow of tilewater into the drains, maintaining conveyance capacity and efficiency, and maintaining structural integrity of the drains. Vegetation is cleared from drains primarily via mechanical means; occasionally vegetation is controlled by prescribed burns or by chemical and biological control methods. Drains are cleaned on an as-needed basis, depending on the extent of sediment and vegetation accumulation. Drains with the lowest gradient accumulate sediment more rapidly and may require cleaning annually. Other drain segments may not require cleaning for periods of 10 years or more. Maintenance activities limit the extent of vegetation supported in the drains.

As part of the development of an EIR for IID's Modified East Lowline and Trifoloium Interceptors, and Completion Projects (IID 1994), drains were surveyed in areas potentially affected by the projects (Figure 2.3-2). In all, about 506 miles of drain were surveyed. For each drain, the general vegetation characteristics were described with particular emphasis



DRAINS SURVEYED
OTHER DRAINS
COUNTY LINE
INTERNATIONAL BORDER
RIVER

N

Source:
University of Redlands, 1999;
DOI, 1999; USBR, 1999

5 0 5 Miles
SCALE IS APPROXIMATE

Figure 2.3-2
Drains Surveyed for the Modified Trifolium Interceptor, East Lowline, and Completion Projects
IID Water Conservation and Transfer Project Draft HCP

given to patches of cattail or bulrush vegetation. Although no quantitative data were collected, the surveys allow a qualitative assessment of the habitat conditions supported by the drains. Descriptions of the habitat conditions of the drains surveyed for the Lowline and Trifolium Interceptor, and Completion Projects project are provided in Table 2.3-2.

TABLE 2.3-2
Habitat Along Drains in the Imperial Valley

Drain	Habitat Description
Mulberry	The upstream reach of the Mulberry Drain along Rutherford Road is characterized by a narrow, deep channel, lined with rabbits-foot grass, saltgrass, and patches of bulrush. The banks of the drain are largely vegetated along the reach upstream from the drop structure near the Alamo River, although some of the vegetation was killed by herbicide. A drop structure is located about 150 feet upstream from the confluence with the Alamo River. A few scattered salt cedars and salt bushes are found on the banks of the drain channel in a highly disturbed area of mostly barren ground. The drain drops more than 10 feet to the river level. Erosion and bank slumping contribute to the barren banks in this area.
Malva II	The upper parts of the Malva II Drain are very steep-sided and exhibit bank sloughing and little vegetation. Drain bank slopes in the lower reach of the drain west of Park Road are dominated by stands of common reed and bands of bermuda grass or saltgrass. The common reed has been largely killed by herbicide application. A drain channel nears the Alamo River, there are two drop structures with a total drop of about 10 feet upstream from the discharge to the Alamo River. There are several small stands of cattails in the lower reach near the confluence.
Mayflower	The Mayflower Drain has saltgrass as the dominant cover along the steeply cut banks upstream of the first drop structure. Between the drop structure and the Alamo River, the banks of Mayflower Drain have thick stands of common reed and patches of saltgrass. The lower reach of this drain passes through a remnant band of creosote bush scrub before entering a salt cedar stand near the Alamo River. This drain is filled with a dense stand of cattails.
Marigold	The banks of the Marigold Drain are highly disturbed in the lower reach. Debris and grading of the banks have removed most of the vegetation near the Alamo River. Farther upstream are thin banks of saltgrass and dense patches of common reed occur along the banks. The drain passes through agricultural lands or barren ground near the river.
Standard	Upstream from the Alamo River, the Standard Drain forms a narrow channel that parallels the perimeter road of the recently graded basins of the Upper Ramer Lank unit of the State Wildlife Management Area. A 4-foot drop structure is located at the point where the drain passes under the Southern Pacific Railroad tracks. The banks are either barren or have a saltgrass and bermuda grass cover along most of the channel. The banks' slopes are either steeply cut or shallow. Scattered stands of common reed are found on the banks. Further upstream, salt and bermuda grass form the dominant cover along the narrow channel.
Narcissus	Near the State Imperial Wildlife Management Area headquarters, the operational discharge of the Narcissus lateral enters the drain. The banks of this drain are densely vegetated with common reed, saltgrass, and several date and fan palms near the refuge buildings. The Narcissus Drain parallels the access road around the perimeter of Lower Ramer Lake. The drain is mostly a shallow cut, less than 3 feet deep and is adjacent to remnants stands of creosote bush scrub. Near the drain are scattered stands of iodine bush. The lower portion of the drain has a thin strand of curly dock mixed with the saltgrass along the channel. Two drop structures are located near the confluence with the Alamo River. On the Alamo River floodplain, the drain passes through a thick stand of salt cedar that forms the riparian zone.

TABLE 2.3-2
Habitat Along Drains in the Imperial Valley

Drain	Habitat Description
Nettle	Near the confluence with the Alamo River, the banks of the Nettle Drain are generally covered by stands of common reed and saltgrass. The drain cuts deeply to the river, with the upper slopes largely barren and the lower half of the slope covered by salt and bermuda grasses. There are scattered stands of salt bush and common reed along the banks. The lateral operational discharge enters the drain near the railroad tracks.
Nutmeg	A thin stand of saltgrass and scattered stands of common reed are found along most of this drainage channel. The common reed stands have been sprayed with herbicide.
Nectarine	Nectarine Drain is characterized by largely barren bank slopes or patches of salt or bermuda grass for most of its length. Along the lower reach near the Alamo River, the drain has scattered common reed stands and enters the river in a shallow trough. In the Alamo River floodplain, the drain passes through salt cedar thickets, but is largely an open channel.
B Drain	B Drain is lined with stand of common reed and saltgrass along the reach from the proposed interceptor to the junction of B Drain and C Drain. The drain is generally narrow and steeply cut.
C Drain	Vegetation along C Drain is mostly saltgrass and stands of common reed. Some sections appear to be dead from herbicide spray. The extent of the saltgrass on the bank slopes along most of this drain has been controlled by herbicide.
D Drain	The drainage channel has recently been dredged in the section along State Highway 115 (Eddins Road) west of Calipatria. Dredge spoil along the canal embankment contains common reed and saltgrass. The D Drain flows parallel to Highway 115 to the confluence with the Alamo River; west of Brandt Road, D Drain is a pipeline to the Alamo River. The drain passes through a thin stand of salt cedar near the highway bridge.
Spruce No. 4	Spruce No. 4 is characterized by broad and gently sloped banks with patches of bermuda grass. Drain banks are largely devoid of vegetation along the reach upstream from the drop structure near the new River. A drop structure is located about 150 feet upstream from the confluence with the New River in an area of barren cliff banks. The drain drops more than 20 feet to the river level where there are stands of salt cedar forming the New River riparian corridor. Erosion and bank slumping contribute to the barren banks.
Spruce No. 5	Spruce No. 5 is dominated by common reed stands in the lower reach near the New River. Although it is deeply cut near the end of the drain, the upper stream reaches are broad and open and dominated by a salt and bermuda grass cover with a few salt bushes near the top of the slope.
Pinner	Saltgrass is the dominant cover along the banks upstream from the drop structure. Between the drop structure and the New River, the banks of Pinner Drain have debris and rubble piles or are largely barren. No common reed is present, but new stands of salt cedar are becoming established.
Tamarack	A cover of salt and bermuda grasses forms the dominant cover along the bank of this drain near the New River. There are only a few stand of common reed or salt cedar and even fewer salt bush clumps. The channel is only about 3 feet wide along most of the drain.
Timothy	Upstream from the New River, this drain forms a narrow channel. A drop structure is located 200 feet upstream from the confluence. The banks are either barren or have a saltgrass bermuda grass cover along most of the channel. The banks are steep with stands of common reed and some salt bush. Farther upstream, salt and bermuda grasses form a dominant cover on the slope.

TABLE 2.3-2
Habitat Along Drains in the Imperial Valley

Drain	Habitat Description
Trifolium No. 2	The banks of this drain have been denuded of most vegetation in lower reaches near the river. There is bank slumping and disturbance along the channel, and considerable rubble and debris on both bank slopes. Near the river is a thin stand of salt cedar and mostly barren riparian zone.
Trifolium No. 3	Near the New River, the banks of the drain are generally covered by stands of common reed and saltgrass. The drain cuts deeply to the river, with the upper slopes largely barren and the lower half of the slope covered by salt and bermuda grasses. There are scattered stands of salt bush and common reed along the banks.
Trifolium No. 4	There are lines with stands of common reed and saltgrass along most of channel. It is fairly open as there is a wide bench between the channel and the slope. The bench and slopes are mostly covered by saltgrass or bermuda grass and few stands of common reed. Near the end of the drain at the New River, the drain is deeper with an arrow 2- to 4-foot-wide channel at the bottom. The vegetation in the lower reach appears to have been sprayed with a herbicide.
Trifolium No. 5	This broad drainage channel has salt cedar and common reed along the banks. Near the New River, the drain passes through salt cedar thickets.
Trifolium No. 6	This deep drain channel is covered by common reed from the point downstream from the lateral spill to the confluence with the New River. Upstream from the lateral spill, additional stands of common reed occur.
Trifolium No. 7	Vegetation along Trifolium No. 7 is mostly saltgrass and stands of common reed; some vegetation appears to be dead from herbicide spray. The extent of the saltgrass cover on the bank slopes may also be limited by herbicide application.
Trifolium No. 8	The drainage channel is lined with salt cedar or is barren as a result of herbicide use. Near the channel alignment bend at the junction of Foulds Road and Lack Road, common reed and saltgrass line the banks of the 4- to 6-foot-wide ditch. Flow in the lower reach of the drain is augmented by spillage from the lateral at Gate 180E.
Trifolium No. 9	The upper reach is the broad channel about 6- to 8-feet-wide lined with saltgrass or common reed, although extensive portions appear to have been sprayed with herbicide. Spillage from the lateral mixes with the drain about 200 yards upstream of the New River. Portions of the lower channel are barren.
Trifolium No. 10	The channel width of Trifolium No. 10 is about 2 to 3 feet near Foulds Road and is lined with saltgrass, bermuda grass, and scattered stands of common reed. Near the end of the drain are trunks of dead salt cedar and stands of common reed that appear to have been killed by herbicides.
Trifolium No. 11	The drainage channel is about 7-feet wide near the confluence with the New River. The banks along the drain are lined with saltgrass and stands of common reed.
Trifolium No. 12	Along the lower reach of Trifolium No. 12, north of Foulds Road, the drain is lined with thick stands of common reed and salt cedar. To the west are thick stands of salt cedar bordering ponds of the NWR and private duck clubs. Before reaching the New River, the drain bends toward the Salton Sea and flows parallel to the New River and passes through cattail stands.
Barbara Worth	Predominantly barren channel with small patches of salt cedar and salt bush. A dense thicket of salt bush and salt cedar borders the top of the drain.
Ash Lat. 18	Typical vegetation found in this drain consists of saltgrass, bermuda grass, salt bush, and salt cedar.

TABLE 2.3-2
Habitat Along Drains in the Imperial Valley

Drain	Habitat Description
Ash No. 34	Saltgrass and bermuda grass are the dominant vegetative features of this drain, carpeting the lower edges of the banks.
Ash No. 30	The banks of the drain are barren except for the lower edges, where a band of saltgrass and bermuda grass lines the channel to the water line.
Ash Lat. 37	Saltgrass and bermuda grass are the dominant vegetation features of this drain, covering the lower edges of the channel banks.
Schenk No. 6	Typical vegetation found in this drain consists of saltgrass, bermuda grass, and salt bush.
Ash No. 25	This contains vegetation common to drains and ditches in this area, such as saltgrass, bermuda grass, salt bush, common reed, and mallow.
South Central No. 2-B	This contains vegetation common to drains and ditches in this area, such as saltgrass, bermuda grass, salt bush, common reed, and mallow.
EHL No. 1	This contains vegetation common to drains and ditches in this area, such as common reed, saltgrass, bermuda grass, salt bush, and mallow.
EHL No. 6	This contains vegetation common to drains and ditches in this area, such as common reed, saltgrass, bermuda grass, salt bush, and mallow.
EHL No. 7	This contains vegetation common to drains and ditches in this area, such as common reed, saltgrass, bermuda grass, salt bush, and mallow
Bonds Corner	At the proposed interceptor location, common reed is the dominant vegetative type in this drain. Saltgrass is found at the lower edges of the banks along the water line.
Verde No. 1	This contains vegetation common to drains and ditches in this area, such as common reed, saltgrass, bermuda grass, salt bush, and mallow.
Verde No. 2	This contains vegetation common to drains and ditches in this area, such as common reed, saltgrass, bermuda grass, salt bush, and mallow.
Whitcomb No. 3	Typical vegetation found in this drain includes common reed, saltgrass, bassia, salt bush, and juncus. Common reed is found in thick stands at scattered locations along this drain.
Hemlock Lat. 4	This contains vegetation common to drains and ditches in this area, such as common reed, saltgrass, bermuda grass, salt bush, and mallow.
Peach	Typical vegetation found in the drain includes saltgrass, salt bush, bermuda grass, and mallow.
Pampas	Salt cedar and common reed are found intermittently along the banks. Saltgrass and bermuda grass form a carpet along the lower edges.
Palmetto	Saltgrass and bermuda grass are the dominant plant species found in this drain. Salt cedar, salt bush, and common reed can be found interspersed along the banks.
Pear No. 2	The banks of this drain are predominantly bare, except for the lower edges, which are covered with a thick layer of saltgrass and bermuda grass. Salt bush is found occasionally along the top of the banks.
Warren	This contains vegetation common to drains and ditches in this area, such as saltgrass, bermuda grass, common reed, salt bush, and mallow.
EHL No. 8	This contains vegetation common to drains and ditches in this area, such as saltgrass, bermuda grass, common reed, salt bush, and mallow.

TABLE 2.3-2
Habitat Along Drains in the Imperial Valley

Drain	Habitat Description
EHL No. 10	Saltgrass and bermuda grass form a dense cover along the bottom and lower edges of this drain, obscuring the water level. Mexican sprangletop and salt bush are found occasionally mixed within this stand.
EHL No. 11	This contains vegetation common to drains and ditches in this area, such as saltgrass, bermuda grass, common reed, salt bush, and mallow.
EHL No. 12	This contains vegetation common to drains and ditches in this area, such as saltgrass, bermuda grass, common reed, salt bush, and mallow.
EHL No. 13	This contains vegetation common to drains and ditches in this area, such as saltgrass, bermuda grass, common reed, salt bush, and mallow.
EHL No. 14	This contains vegetation common to drains and ditches in this area, such as saltgrass, bermuda grass, common reed, salt bush, and mallow.
EHL No. 15	This contains vegetation common to drains and ditches in this area, such as saltgrass, bermuda grass, common reed, salt bush, and mallow.
Orita	Vegetation cover in this drain is predominantly saltgrass and bermuda grass.
Ohmar	The banks of this drain are mostly covered by saltgrass and bermuda grass, with patches of heliotrope, salt bush, and bassia growing along the upper reaches of the bank.
Orange	Dominant plant species along this drain are saltgrass and bermuda grass, forming a dense carpet along the lower edges. Small stands of salt bush and five-hook bassia are interspersed along the drain.
Oxalis	This contains vegetation common to drains and ditches in this area, such as saltgrass, bermuda grass, common reed, salt bush, and mallow.
Olive	This contains vegetation common to drains and ditches in this area, such as saltgrass, bermuda grass, common reed, salt bush, and mallow.
Orchid	This contains vegetation common to drains and ditches in this area, such as saltgrass, bermuda grass, common reed, salt bush, and mallow.
Holtville	This contains vegetation common to drains and ditches in this area, such as saltgrass, bermuda grass, common reed, salt bush, and mallow.
Occident	This contains vegetation common to drains and ditches in this area, such as saltgrass, bermuda grass, common reed, salt bush, and mallow.
Orient	This contains sparsely vegetated with salt cedar and salt bush. Past herbicide use is evident by the dead vegetation along the upper reaches of the bank.
Munyon	Dominant plant species along this drain are common reed, salt bush, and saltgrass. Saltgrass and bermuda grass form a dense carpet along the lower edges of the bank in spots. In the Alamo River floodplain, a section of this drain has extensive debris piles along the tops of its banks.
Myrtle	Typical vegetation found in this drain are salt cedar, salt bush, saltgrass, and bermuda grass. The saltgrass and bermuda grass inhabit the lower edges of the drain towards the water line, forming a thick layer.
Mullen	Saltgrass and bermuda grass cover the lower edges of this drain, with salt bush and curly dock interspersed among the sloping banks.

TABLE 2.3-2
Habitat Along Drains in the Imperial Valley

Drain	Habitat Description
Maple	This is vegetated primarily with saltgrass and salt bush, with some juncus growing along the water's edge.
Mesquite	Common reed is the dominant cover type in this drain, forming dense stands in some areas. Salt cedar and saltgrass are also found interspersed among the common reed.
Magnolia	Dominant plant species along this drain are common reed and salt bushy. In some sections of the drain, common reed was growing so densely as to obscure the bottom.
Moss	A light covering of saltgrass covers the lower half of this drain along the steep banks. Common reed has also established itself along this drain, occasionally growing in thick patches.
Oak	At the proposed interceptor location, the banks of this drain are predominantly bare with scattered patches of saltgrass and bermuda grass.
Osage	This contains vegetation common to drain sand ditches in this area, such as saltgrass, bermuda grass, common reed, salt bush, and mallow.
Lewis	This contains vegetation common to drains and ditches in this area, such as saltgrass, bermuda grass, common reed, salt bush, and mallow.
Orita	Vegetation cover is predominantly saltgrass and bermuda grass.
North Central	The banks of this drain were typically vegetated only at the bottom with saltgrass and bermuda grass. Some sections of the drain contained a thick stand of common reed, while other sections were bare banks with plant species such as mallow and heliotrope interspersed along the top.
Rice	The dominant plant cover in this drain was a mat of saltgrass and bermuda grass. Other plant species include heliotrope, salt bush, and mexican sprangletop.
Rice No. 3	At this proposed interceptor location, the banks of this drain were predominantly bare, with only scattered occurrence of established plants such as mallow or salt bush.
Rice No. 4	Saltgrass and bermuda grass are the dominant vegetative feature of this drain, covering the lower edges of the banks.
Rice No. 14	Saltgrass and bermuda grass are the dominant vegetative feature of this drain, covering the lower edges of the banks.
Wildcat	Dominated by saltgrass and bermuda grass on the lower edges of its banks, with a few sparse patches of salt bush and baccharis growing along the slopes.
Cook	Common plant species found along this drain include common reed, mexican sprangletop, and saltgrass, which form a dense cover on the lower edges.
Sumac	At the proposed interceptor location, the western portion of the canal is heavily vegetated, primarily with salt bush and salt cedar.
Fillaree	At the proposed interceptor location, this drain is heavily vegetated with salt bush as the dominant cover type. Saltgrass, bermuda grass, and some salt cedar are interspersed along the lower edges of the banks.
Dixie	Common reed and salt bush are the dominant vegetation types in this drain. Sparse patches of cattail and sedge also grow along the water line and bottom of this drain.
Dixie No. 1	This is primarily vegetated with salt cedar and salt bush. Cattail, saltgrass, and bermuda grass also grow along the banks. Farther east, the banks along Dixie Drain No. 1 became deeply cut with steep slopes. Most of the vegetation occurs in the bottom of the drain channel, forming a dense thicket of salt cedar and salt bush.

TABLE 2.3-2
Habitat Along Drains in the Imperial Valley

Drain	Habitat Description
Dixie No. 5	Vegetation along Dixie No. 5 is mostly saltgrass and bermuda grass; however, some sections of this drain are heavily vegetated with cattail and sedge. Salt bush, salt cedar, bassia, and mexican sprangletop also occur along this drain.
Fern Canal	The banks of this drain are primarily vegetated with dead and live bassia, salt bush, and saltgrass.
Fig	Plan species common to this drain include salt cedar, common reed, saltgrass, and sedge. Small, intermittent patches of saltgrass and sedge occur close to the water line.
Wormwood	Light coverings of saltgrass and bermuda grass occur on the predominantly barren banks. Salt bush, mexican sprangletop, common reed, and salt cedar are also found in varying densities along the length of this drain.
Greeson	Dominant vegetation in this drain include saltgrass, bermuda grass, and mexican sprangletop. These species grow toward the lower edges of the banks, creating a dense cover at the water line.
Greeson No. 2	Saltgrass and bermuda grass grow in a thick layer along the lower edges of this drain. Sparse patches of cattail and sedge occur intermittently.
Martin	Thick stands of cattail occur in this drain, while salt bush forms a border near the tops of the banks. In section of this drain, the emergent vegetation obscures the drain channel.
Brockman	Vegetation consists of predominantly saltgrass and bermuda grass growing at the lower edges of the bank slopes.
Brockman No. 2	Vegetation consists of predominantly saltgrass and bermuda grass growing at the lower edges of the bank slopes.
Carr	The banks slopes are largely barren, with patches of mexican sprangletop and saltgrass growing along the water's edge. Mallow and salt bush occur sparsely on the tops of the banks.
All American No. 11	The dominant plant species in this drain is saltgrass, which occurs in thick mats along the water line. Small clumps of salt bush and mexican sprangletop also occur along the banks.

NWR National Wildlife Refuge

Hurlbert (1997) also surveyed drains in the HCP area. In this study, the percent cover for each of the major plant species (e.g., *Phrgamites, Tamarix, Pluchea, Typha,* and *Atriplex*) and habitat type (e.g., herbaceous, bare ground, and other) was estimated in 10 drains. Each drain was surveyed by driving its length and stopping every 0.1 mile. At each stop, percent coverage for each major vegetation species (*Phragmites, Tamarix, Pluchea, Typha,* and *Atriplex*) or habitat type (herbaceous, bare ground, and other) was determined within the area extending 100 feet on either side of the point. The survey was conducted in the winter (late 1994/early 1995) and spring (late May 1995). Based on these data, Hurlbert (1997) calculated the average percentage cover of each major vegetation species in each drain separately for the winter and spring surveys. The 10 drains surveyed were distributed throughout Imperial Valley and covered about 78 miles (Figure 2.3-3).[1]

[1] Data for P Drain are believed to be reported incorrectly in Hurlbert (1997), and data from this drain were not used in this analysis. Without inclusion of P Drain, approximately 70 miles of drains were surveyed.

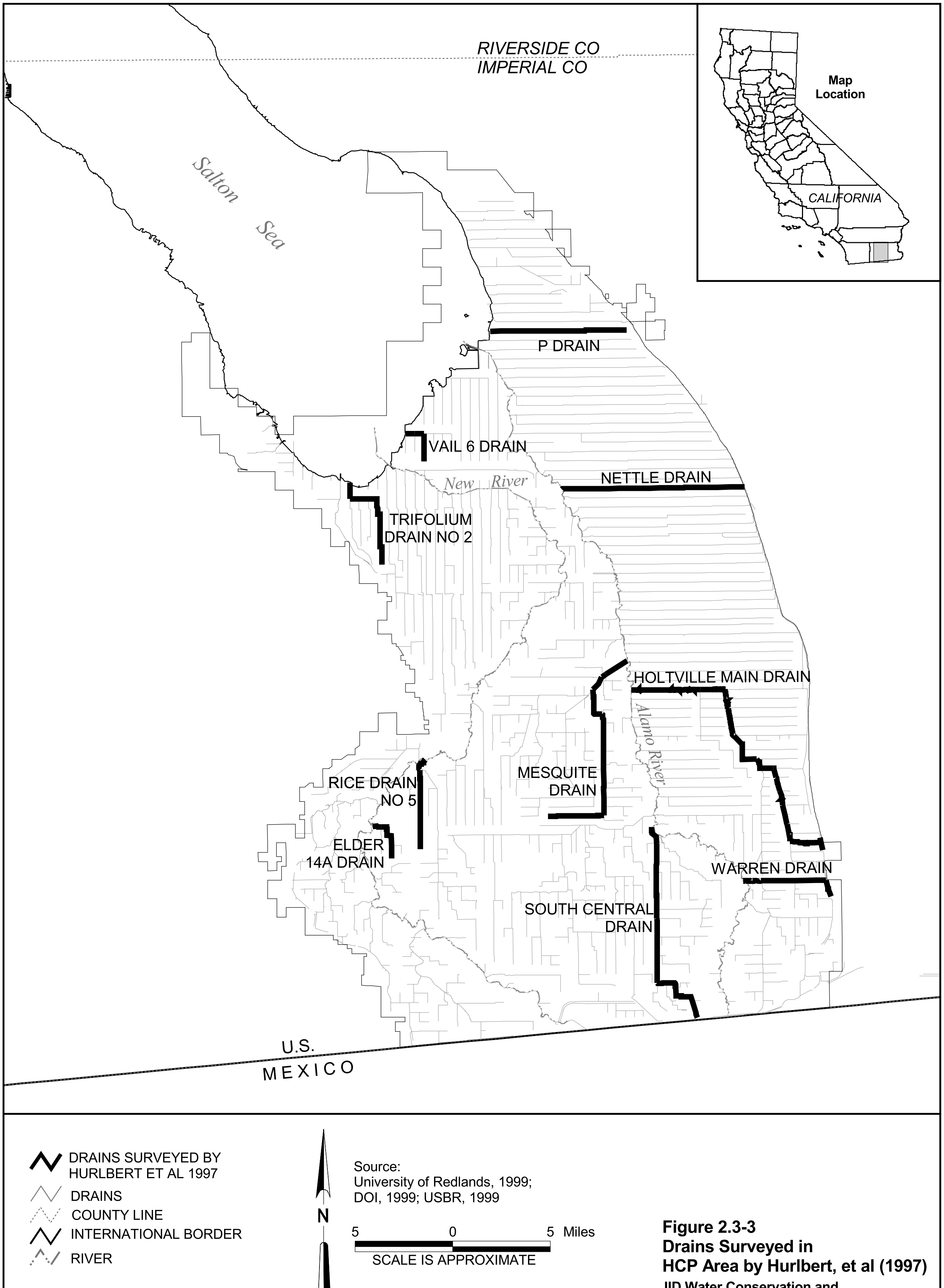


Figure 2.3-3
Drains Surveyed in HCP Area by Hurlbert, et al (1997)
IID Water Conservation and Transfer Project Draft HCP

Hurlbert (1997) summarized the data in two ways. First, the percentage of the total drain covered by the major vegetation species and cover categories was calculated (Table 2.3-3). This method provides the most accurate characterization of the plant species composition and percentage of the drain supporting vegetation. The second method of summarizing the data focused on habitat characteristics rather than plant species composition (Table 2.3-4). In this method, survey locations with less than a median of 15 percent vegetation cover were classified as bare ground / herbaceous. Survey locations with between 15 and 37.5 percent vegetation cover were classified as sparse cover.

TABLE 2.3-3
Percentage of Drain Area Covered by Each Major Plant Species or Other Habitat Type for the 10 Drains Surveyed by Hurlbert

	Drains									
Vegetation Cover	**Vail Cutoff**	**Trifolium No. 2**	**Elder Nos. 14/14A**	**Rice No. 5**	**Nettle**	**Holtville Main**	**Warren**	**South Central**	**Mesquite**	**P[a]**
Herbaceous	70.7	44.9	32.2	29.2	55.5	22.9	46.3	40.7	34.9	*34.9*
Bare Ground	18.9	31.7	58.9	64.8	31.3	20.7	33.0	41.9	45.8	*45.8*
Atriplex		0.6				2		1.1	3.2	*3.2*
Phragmites	7.5	3.5	2.1	3.3	10.6	7.7	12.9	3.5	0.9	*0.9*
Pluchea		8.7		0.9	0.7	6.8		4.6	5.2	*5.2*
Tamarix		7.6	0.5			29.6	1.0	0.5	3.0	*3.0*
Typha						6.3	1.5	3.8	1.1	*1.1*
Other	2.7	2.9	6.3	1.7	1.7	3.8	5.1	3.7	6.1	*6.1*

[a] Numeric values reported of percent vegetation for P Drain are identical to Mesquite Drain and are inconsistent with other information presented for P Drain. Thus, these values are believed to be incorrect.

Source: Hurlbert 1997.

TABLE 2.3-4
Percent of Different Habitat Types Occurring at Drains Surveyed by Hurlbert

	Drains									
Habitat	**Vail Cutoff**	**Trifolium No. 2**	**Elder Nos. 14/14A**	**Rice No. 5**	**Nettle**	**Holtville Main**	**Warren**	**South Central**	**Mesquite**	**P**
Bare Ground/ Herbaceous	79.2	41.0	88.0	89.2	58.2	13.5	59.1	61.9	48.8	64.3
Sparse Cover	6.3	31.4	8.0	4.9	19.8	22.2	17.2	20.0	36.0	17.1
Phragmites	14.6	2.9	4.0	3.6	19.6	9.4	19.8	3.5	1.2	7.1
Pluchea	0	13.3	0	0	1.5	6.4	0	6.2	6.0	5.5
Tamarix	0	10.5	0	0	0	35.1	0	0.5	0	0
Phragmites/ Pluchea	0	0	0	2.5	0.5	0	0	0.5	0	5.5
Atriplex	0	0	0	0	0.5	0	0	0.5	0.4	0
Typha	0	0	0	0	0	7.6	0	0	0.8	0

TABLE 2.3-4
Percent of Different Habitat Types Occurring at Drains Surveyed by Hurlbert

	Drains									
Habitat	**Vail Cutoff**	**Trifolium No. 2**	**Elder Nos. 14/14A**	**Rice No. 5**	**Nettle**	**Holtville Main**	**Warren**	**South Central**	**Mesquite**	**P**
Tamarix/ Pluchea	0	0	0	0	0	3.2	0	6.7	0	0
Phragmites/ Tamarix	0	1.0	0	0	0	0	3.9	0	0	0
Tamarix/ Typha	0	0	0	0	0	1.8	0	0	0	0
Tamarix/ Other	0	0	0	0	0	0.8	0	0	0	0
Pluchea/ Atriplex	0	0	0	0	0	0	0	0	0	0.7
Other	0	0	0	0	0	0.4	0	0.5	6.8	0

Source: Hurlbert 1997.

The qualitative descriptions from the 1994 EIR and Hurlbert (1997) data show that vegetation typically is very limited along the drains. Both studies also indicate that common reed (*Phragmites* sp.) is the most prevalent plant species. Cattails are uncommon and occur in small, localized areas. With the exception of small, localized areas of cattails and occasionally bulrushes, the drains do not support emergent vegetation. As such, habitat availability and quality for marsh-associated species are poor.

The data reported by Hurlbert (1997) were used to estimate the acreage of vegetation supported by IID's drainage network. Hurlbert (1997) only characterized vegetation between the drain banks. A standard lateral drain (excluding the water surface) is about 14 feet wide at the top of the drain embankment (Figure 2.3-4). Assuming all drains are 14 feet wide, the 1,456 miles (cited from IID Memorandum, dated October 4, 2000) of drains in the Imperial Valley cover 2,471 acres. However, as described above, potential habitat includes only a small proportion of the drains. The average percent cover of bare ground and herbaceous cover[2] was calculated for each of nine drains from data in Hurlbert (1997).[3] The remaining portion of the drain was assumed to be vegetated. It was then assumed that the drains surveyed were a representative sample of all drains in the Imperial Valley. Acres of vegetation supported by the entire drainage system were calculated based on the percentage vegetation supported by the drains surveyed weighted by the drain's length. With this method, an estimated 652 acres of vegetation are supported in the drains.

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[2] Herbaceous cover consists of annual weedy vegetation that provides little or no habitat value to wildlife.

[3] As noted in Table 2.3-4, data presented for P Drain in Hurlbert (1997) are believed to be incorrectly reported. As such, data from P Drain were not used in this analysis.

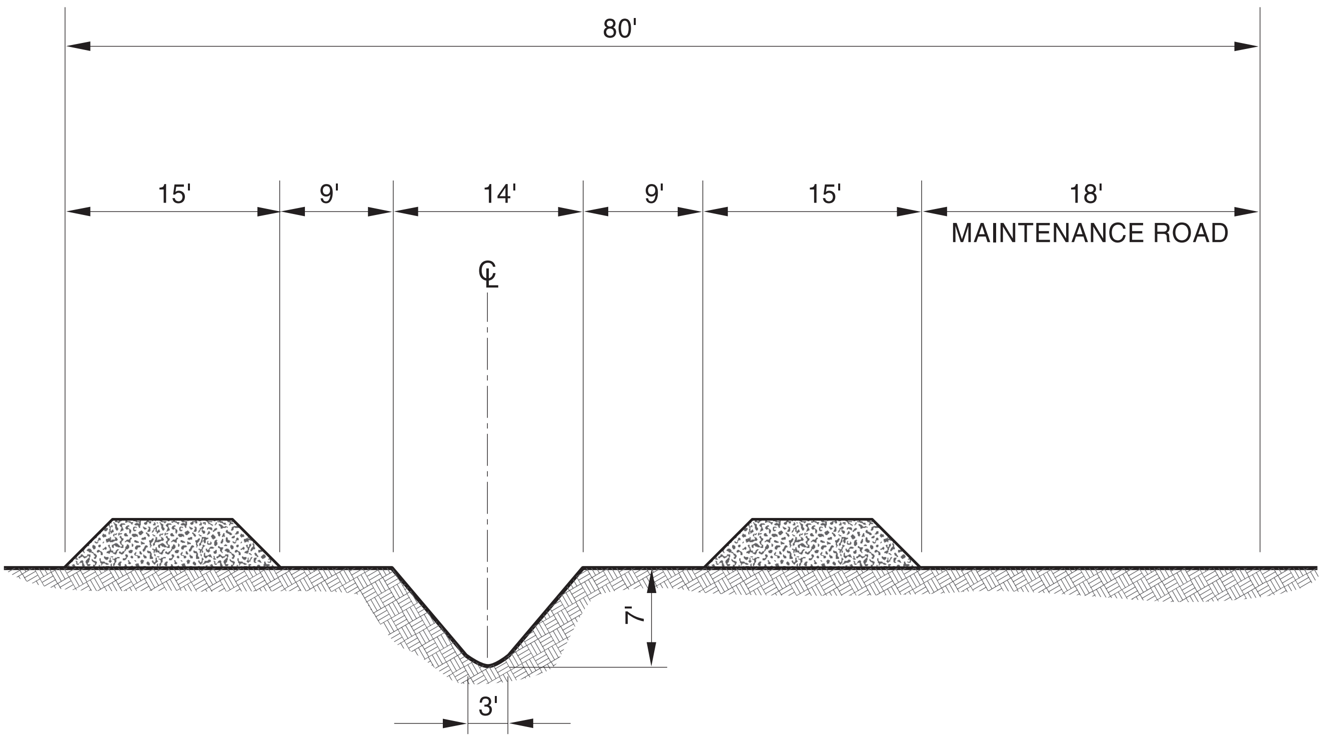

Figure 2.3-4
Typical Lateral Drain Profile
IID Water Conservation and Transfer Project Draft HCP

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Survey locations with 37.5 percent vegetation cover or greater were classified according to the dominant vegetation species (Table 2.3-4). Values reported in Tables 2.3-3 and 2.3-4 are the average of winter and spring surveys.

Hurlbert's (1997) quantitative data are consistent with the qualitative descriptions of the drains reported in the 1994 EIR (IID 1994). The first method used to characterize vegetation showed that herbaceous cover and bare ground comprised the majority of the drains (median equals 82.7 percent, range 43.6 to 94 percent). With the exception of Holtville Main Drain, herbaceous cover and bare ground comprised about 75 to 95 percent of the drains. The second method used to characterize drain habitat showed a similar pattern. Bare ground / herbaceous cover and sparse cover comprised 72 to 96 percent of the drains, except for the Holtville Main Drain where these habitats covered only 35 percent of the drain.

As noted above, the nine drains surveyed were assumed to be a representative sample of the entire drainage system. This assumption may not be accurate but is necessary in the absence of more complete information. In particular, the Holtville Main Drain is an unusual drain. Good water quality combined with the drain's large size results in Holtville Main Drain supporting substantially more vegetation than is typical for drains. As shown by Hurlbert's data, Holtville Main Drain is 56 percent vegetated while the next most vegetated drain (Trifolium 2) is only 23 percent vegetated. The remaining drains surveyed have less vegetation. Holtville Main Drain was also the longest drain surveyed at 17.8 miles followed by South Central Drain at 12.2 miles. Because the estimate of the amount of vegetation in the drainage system was derived from the percentage of vegetation in each of the drains surveyed weighted by their lengths, inclusion of Holtville Main Drain (the longest drain with an atypical amount of vegetation) may have resulted in an overestimation of the amount of vegetation in the entire drainage system.

Only a small proportion of the vegetated acreage consists of cattails which are favored by wildlife species associated with drain habitats. The Holtville Main Drain had the greatest percentage of cattails at 6.3 percent followed by the South Central, Warren, and Mesquite Drains at 3.8, 1.5, and 1.1 percents, respectively. The remaining five drains did not support cattails. For the nine drains, the average percent cover of cattails weighted by drain length was 2.5 percent. Based on this average, the entire IID drainage system supports about 63 acres of cattail vegetation.

Conveyance System

Canals that convey water from the Lower Colorado River to customers within the IID service area support little vegetation. Approximately 70 percent of the 1,667 miles (cited from IID Memorandum, dated October 4, 2000) of canals in Imperial Valley are concrete-lined or in pipes, and therefore do not support rooted vegetation. Embankment slopes of the lined canals also are maintained free of vegetation. About 537 miles (cited from IID Memorandum, dated October 4, 2000) of the delivery system consist of earthen channels. The canal slopes can support vegetation that typically consists of bands of vegetation at the water surface. The bands of vegetation consist of common reed, saltgrass, Bermuda grass, and seedling salt cedar. Tree and shrub cover are rare or nonexistent on most canals and laterals (IID 1994). Along the AAC, an almost continuous thick stand of common reed, 3- to 15-feet wide) grows along both sides of the canal for the majority of its length. The 30-mile long section of the AAC between Pilot Knob and Drop 4 supports about 30 acres of common reed (Reclamation and IID 1994). Vegetation along the canals is of minimal value to wildlife because it has little emergent vegetation and water velocity and depth in the canals are too great for most species.

Water seepage has induced phreatophytic vegetation[4] to develop along the AAC in a landscape previously dominated by dry, desert scrub. Between Drops 2 and 3, about 100 acres of scattered phreatophytic vegetation is supported by seepage. Only about 1 acre is emergent wetland vegetation. The remaining vegetation consists of screwbean and honey mesquite (22.6 acres), salt cedar (28.7 acres), and arrowweed (47.2 acres). However, under the AAC lining project this portion of the AAC will be abandoned and this vegetation will be lost. Effects of loss of this habitat on listed species have been evaluated in a previous Section 7 consultation. For this HCP, the lining project is assumed to be in place. A larger (1,422 acres) marsh complex that will not be affected by the AAC lining project is located between Drops 3 and 4. Marsh vegetation comprises about 111 acres of the complex. The other vegetation present within the complex includes salt cedar (755 acres), arrowweed (233 acres), screwbean mesquite (251 acres), cottonwood and willow (39 acres).

In addition to these areas, phreatophytic vegetation supported by seepage from the AAC exists between Drop 4 and the East Highline Canal. This area is about 100 to 150 acres in size. Closer to the Lower Colorado River in the vicinity of Mission Wash, seepage from the AAC probably contributes to supporting several areas of phreatophytic vegetation totaling about 100 acres. The vegetation composition of these areas has not been determined, but would be expected to exhibit a plant species composition similar to that found in other seepage areas along the AAC.

Seepage communities along Imperial Valley canals are rare and are generally limited to areas adjacent to the East Highline Canal. As part of the system-based water conservation activities, IID may install seepage recovery systems along portions of the west side of the East Highline Canal (Chapter 1, Section 1.7.2.2). Seepage communities in the vicinity of proposed seepage recovery systems were digitized from Digital Orthophoto Quarter Quadrangles (DOQQ) and visited during May 2001 to assess general vegetation characteristics. Seepage communities also occur on the east side of the East Highline Canal but these areas would not be affected by covered activities. The location of seepage communities in the vicinity of proposed seepage recovery systems is shown on Figure 2.3-5 and the sizes of the seepage areas are listed in Table 2.3-5.

The plant species composition of the seepage communities is diverse and varies substantially among the seepage areas. Arrowweed, common reed, and tamarisk are the most common species in the seepage communities, with mesquite, cattails and a few cottonwoods present in some areas. About 412 acres of vegetation supported by seepage from the East Highline Canal occurs in areas where seepage recovery systems are under consideration.

Unmanaged Vegetation Adjacent to the Salton Sea

Vegetation has naturally developed in some locations along the margins of the Salton Sea. This phreatophytic vegetation occurs above the shoreline and shoreline strand community (see the following discussion of tamarisk scrub habitat). Unmanaged vegetation includes

[4] Phreatophytic vegetation is vegetation associated with wet areas. In the HCP area, phreatophytic plant species include tamarisk, common reed, willows, and cattails.

TABLE 2.3-5
Seepage Communities Along the East Highline Canal. Area ID refers to Figure 2.3-5.

Area ID	Acres	Area ID	Acres
1	3.2	17	10.2
2	6.8	18	7.9
3	3.1	19	6.1
4	3.3	20	43.3
5	2.0	21	24.8
6	0.9	22	26.6
7	11.9	23	3.8
8	16.1	24	56.6
9	18.1	25	54.9
10	13.5	26	3.6
11	6.8	27	5.7
12	13.4	28	7.0
13	12.3	29	11.0
14	8.3	30	3.5
15	6.5	31	5.6
16	9.4	32	6.0
Grand Total		**412.2**	

diked wetlands that are below the water surface elevation of the Salton Sea. The Salton Sea database (University of Redlands 1999) refers to these unmanaged areas of phreatophytic vegetation as "adjacent wetlands."

The Salton Sea database (University of Redlands 1999) classifies 6,485 acres along the Salton Sea as adjacent wetlands, and 64 acres as mudflat. Tamarisk and iodine bush are the most common species of adjacent wetlands (Figure 2.3-6; Table 2.3-6). Cattails and bulrushes are identified as the primary vegetation on 217 acres of adjacent wetlands. In the HCP area, the Salton Sea database identifies three parcels as being dominated by cattails: one on the southwestern edge of the Salton Sea (35 acres), and two on the southern edge (32 acres). A fourth parcel on the eastern edge of the Salton Sea is dominated by bulrushes (17 acres). However, three of these areas are misclassified in the Salton Sea database. The first parcel of 35 acres is a managed duck club and therefore does not meet the definition of an "adjacent wetland" (i.e., unmanaged areas). Of the two parcels totaling 32 acres, one is an IID drain and the other is a marsh managed by the U.S. Fish and Wildlife Service (USFWS). The drain parcel is managed by IID as part of its drainage system. Habitat in this drain was accounted for in the quantification of habitat in the drainage system above. The other parcel managed by USFWS does not meet the definition of an adjacent wetland (i.e., unmanaged areas). The last parcel encompassing 17 acres is sustained by runoff from the California Department of Fish and Game (CDFG's) managed marsh area in the Wister Unit. The remaining 133 acres

SEEPAGE AREAS
DRAINS
CANALS
AQUEDUCT/CANAL

N

Source:
University of Redlands, 1999; DOI, 1999

2000 0 2000 Feet

SCALE IS APPROXIMATE

Figure 2.3-5
Seepage Communities Adjacent to the East Highline Canal
IID Water Conservation and Transfer Project HCP

CH2MHILL

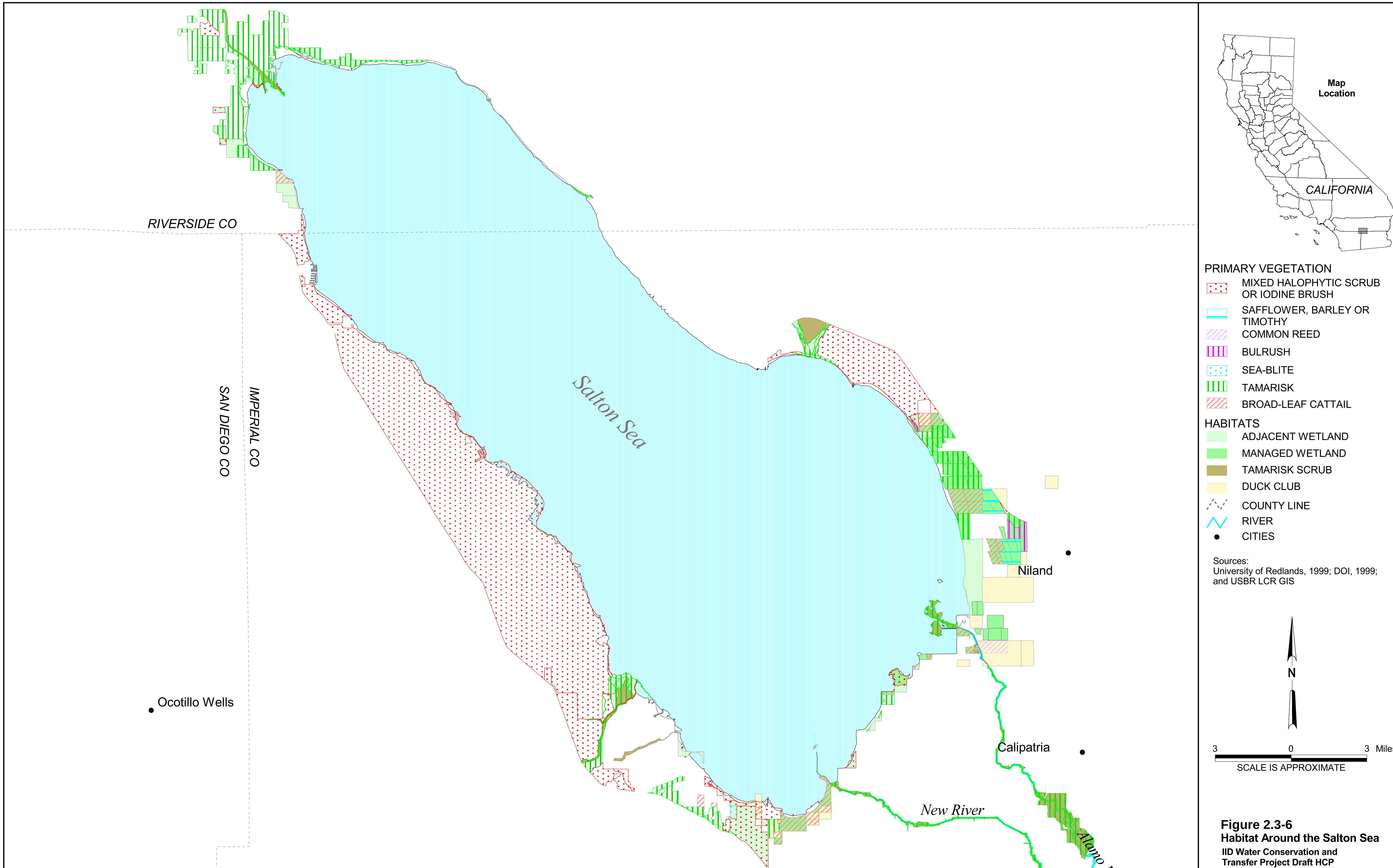

Figure 2.3-6
Habitat Around the Salton Sea
IID Water Conservation and Transfer Project Draft HCP

CH2M Hill RDD ArcView Project File \\rddgis\iid\biology_maps.apr FIG_2_3_7.pdf 1:41 p.m. 12-14-2001

CH2MHILL

identified as adjacent wetland dominated by cattail or bulrush occur adjacent to the northwestern portion of the Salton Sea. This area is outside of the HCP area.

TABLE 2.3-6
Primary Vegetation of Areas Classified as Adjacent Wetlands in the Salton Sea Database

Primary Vegetation	Total Acres at Salton Sea	Percentage of Adjacent Wetlands	Acres in HCP Area
Iodine bush	1,577	24	1,509
Mixed halophytic shrubs	65	1	-
Arrowweed	597	9	-
Bulrush	17[a]	<1	17
Sea-blite	86	1	86
Tamarisk	2,349	36	437
Cattail	200[a]	3	67
No primary wetland vegetation	1,595	25	1,305
Total	**6,485**		**3,421**

[a]See text for further description of these areas.
Source: Salton Sea Database (University of Redlands 1999)

Managed Marsh

Managed marsh consists of areas that are actively managed for one or more marsh habitat values and functions. In the HCP area, managed marsh occurs primarily on the state and federal refuges. Private duck clubs also support managed marsh.

The Imperial Wildlife Area (WA), managed by the CDFG, and the Sonny Bono - Salton Sea National Wildlife Refuge (NWR), managed by the USFWS lie within the HCP area (Figure 2.3-7). Both of these refuges were established to provide winter habitat for migratory waterfowl. However, in addition to providing habitat for migratory waterfowl, both refuges are managed to provide habitat for a wide diversity of resident and migratory wildlife. The refuges are also managed to provide marsh habitat and offer the highest quality, year-round marsh habitat value in the HCP area. Both Imperial WA and the Sonny Bono Salton Sea NWR receive irrigation delivery water from IID. Agricultural drainage water is not used on the refuges.

The HCP area also contains 17 private duck clubs, covering about 5,582 acres. Most of the duck clubs are near the Salton Sea. These clubs are managed exclusively to attract wintering waterfowl, although other wildlife will use these marsh areas when available. Managed marsh units on the duck clubs are flooded in fall and winter when wintering waterfowl are present in the valley. They are not flooded during other times of the year; therefore they do not provide habitat for year-round resident wildlife that are associated with marsh habitat. Generally duck clubs receive irrigation delivery water from the IID.

2.3.2.2 Tamarisk Scrub Habitat

Native riparian plant communities in the southwestern desert are dominated by cottonwoods and willows, but palo verde and mesquite also occur. Much of the native riparian plant communities in the desert southwest has been replaced by nonnative plant species, particularly tamarisk. Tamarisk scrub communities supplant native vegetation

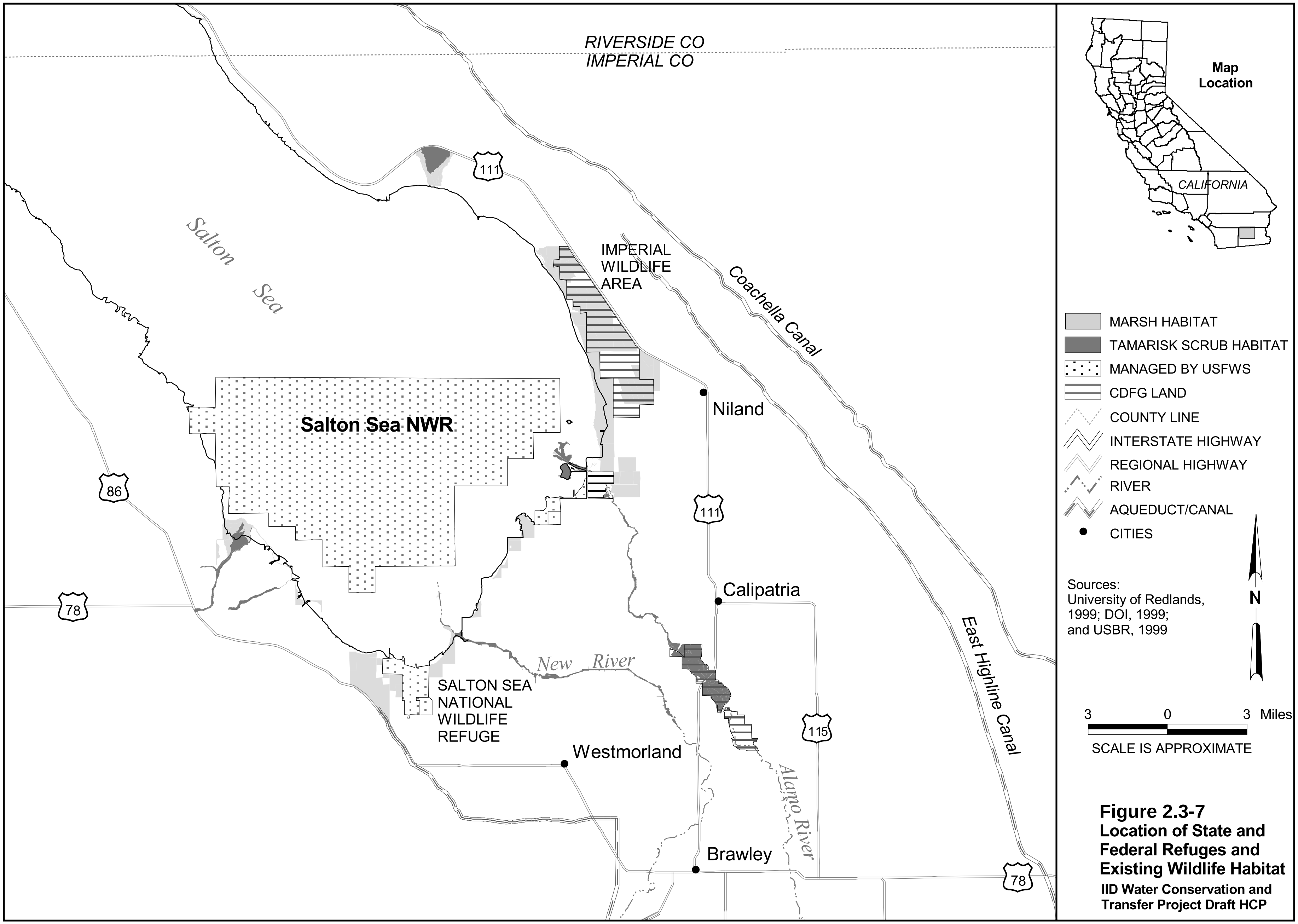

Figure 2.3-7
Location of State and Federal Refuges and Existing Wildlife Habitat
IID Water Conservation and Transfer Project Draft HCP

following major disturbance, including alterations in stream and river hydrology, and can form extensive stands in some places. Characteristic species include salt cedar (*Tamarix chinensis*, *T. ramosissima*), big saltbrush (*Atriplex lentiformis*), *Coldenia palmeri*, and saltgrass (*Distichlis spicata*); associate species can include common reed (*Phragmites communis* var. *berlandieri*) and giant reed (*Arundo donax*).

In the HCP area, tamarisk scrub is found along the New and Alamo Rivers. Areas along the New River are composed of a virtual monoculture of tamarisk, with only a few areas of native vegetation. Vegetation along the Alamo River is similarly dominated by tamarisk. Dredging has extended the river channels of both the New and Alamo Rivers into the Salton Sea. The banks of the extended river channels support a thick strand of tamarisk and common reed.

The width of tamarisk scrub stands adjacent to the New and Alamo Rivers varies substantially along their lengths. Based on a review of DOQQs, much of the length of the rivers supports only a narrow band of tamarisk of less than 50 feet on both sides of the channels. In more limited portions of the rivers, larger stands of tamarisk have developed that may extend 500 feet or more from the river channel. To estimate the amount of tamarisk scrub habitat occurring along the floodplains of the New and Alamo Rivers, vegetation along the rivers was digitized from the DOQQs. Vegetation along the rivers was assumed to consist of tamarisk scrub. Based on this work, the New and Alamo Rivers support about 2,568 acres and 962 acres of tamarisk scrub habitat respectively, for a total of 3,530 acres.

Tamarisk scrub occurs in other portions of the HCP area, wherever water is available, including the margins of the Salton Sea (Table 2.3-4). Tamarisk scrub is also one of the major plant species comprising vegetation along the drains and is found in seepage areas adjacent to canals. The HCP area contains about 438 acres of the tamarisk-dominated areas adjacent to the Salton Sea (University of Redlands 1999). The source of the water that supports tamarisk adjacent to the Salton Sea is uncertain, but is likely the result of shallow groundwater and seepage rising to the surface at its interface with the sea. In addition to the adjacent wetlands, tamarisk is a primary component of areas designated as shoreline strand community in the Salton Sea database. The shoreline strand community occupies about 293 acres (University of Redlands 1999) immediately adjacent to the Salton Sea and consists of tamarisk and iodine bush. As with the tamarisk-dominated areas adjacent to the Salton Sea described above, the source of water supporting this community is undetermined, but is likely the result of shallow groundwater and seepage rising to the surface at its interface with the sea. Along IID’s drainage system, Hurlbert (1997) can be used to estimate the acreage of tamarisk scrub supported by the drains. Of the drains surveyed by Hurlbert (1997), the percentage of drain area comprised of tamarisk varied from 0 to 29.6 percent (Table 2.3-3), yielding a weighted average percentage of 8.7. Assuming that tamarisk covers 8.7 percent of the drains, the drainage network in the HCP supports about 215 acres of tamarisk scrub habitat.

Cottonwood-willow habitat is largely absent from the HCP area. Cottonwoods and willows occur in seepage communities along the AAC. In addition, some remnant cottonwoods occur in Imperial Valley at distances of 20 to 60 feet from the East Highline Canal (IID 1994). A few patches of willow also persist along the Alamo River.

2.3.2.3 Agricultural Field Habitat

Irrigated agricultural land is the predominant land cover type in the Imperial Valley, and comprises most of the HCP area. Agricultural fields attract a variety of wildlife species. The crops grown, the methods used and the total acreage in production within IID's service area are based on the decisions of individual farmers. Current and anticipated market prices have an important role in the types of crops that are economically beneficial for farmers to grow. As a result, the total acreage in agricultural production and the types and amount of crops grown fluctuate from year-to-year. The different types of crops and the range of acreage of each of the major crops grown within the service area for 1999 are shown in Table 2.3-7. The cropping pattern is likely to be similar to Table 2.3-7 for the short term, but could change during the term of the permit as markets for various crops or other conditions change.

2.3.2.4 Salton Sea Habitat

Wildlife habitats at the Salton Sea have been largely described previously in Section 2.3.2.1, Drain Habitat and Section 2.3.2.2, Tamarisk Scrub Habitat. However, for the species covered by the HCP, use of the Salton Sea is a function of the abundant food resources, availability of a large, open body of water, and the presence of unique habitat features, rather than vegetation composition. The following discussion focuses on the food resources and food chain relationships, and unique habitat features supported by the Salton Sea.

Food Chain Relationships

The Salton Sea is considered eutrophic with plentiful phytoplankton, a condition that often results in algal blooms (Hurlbert 1999a). The dominant primary producers are phytoplankton and phytobenthos; plant life in the Salton Sea predominantly is single-celled algae. Major groups of algae include diatoms (*Chrysophyta*), dinoflagellates (*Pyrrophyta*), and green algae (*Chlorophyta*) (Carpelan 1961). Blue-green algae (*Cyanophyta*) have also been found on the seafloor in shallow water and on buoys and pilings in the Salton Sea. During recent sampling, several new species of diatoms were observed (Hurlbert 1999b). Many of the previously observed species are still present in the Salton Sea. The phytoplankton composition changes may be caused by an increase in the salinity of the Salton Sea, as well as from the introduction of tilapia (Hurlbert 1999b).

Within the Salton Sea, five phyla of invertebrates are represented: Protozoa, Rotifera, Nematoda, Annelida, and Arthropoda. Some of the common invertebrates found in the Salton Sea include ciliate protozoans, foraminifera, rotifers, copepods, barnacle, pileworm, amphipod, and the water boatman (a corixid). The rotifer *Brachionus plicatilis* is the dominant rotifer species, is completely planktonic, and has great value as food for larval fishes. The pileworm *Neanthes* is a major food source for fish and some birds and is a significant species in the benthos of the Salton Sea. Pileworms have been abundant since their introduction to the Salton Sea during the 1930s and are the principal detritus-feeding benthic organisms in the Salton Sea.

The major zooplanktonic organisms in the Salton Sea include *Brachionus*, copepods (*Apocyclops dengizicus*, *Cletocamptus dietersi*), the egg and larval stages of the pileworm, and the larval stages of the barnacle (*Balanus amphitrite saltonensis*). Other zooplanktonic species

TABLE 2.3-7
Crops Produced (Greater Than 200 Acres) in IID Service Area During 1999

Crop Description	Acres	Percentage
Alfalfa (all)	192,633	35.56
Sudan grass (all)	62,881	11.61
Bermuda grass (all)	55,179	10.19
Wheat	42,464	7.84
Sugar beets	33,997	6.28
Lettuce (all)	22,558	4.16
Carrots	16,995	3.14
Melons, spring (all)	14,293	2.64
Broccoli	12,305	2.27
Onions	11,526	2.13
Duck ponds (feed)	9,105	1.68
Cotton	7,131	1.32
Ear corn	6,790	1.25
Citrus (all)	6,169	1.14
Asparagus	6,166	1.14
Cauliflower	3,960	0.73
Onions (seed)	3,541	0.65
Potatoes	3,159	0.58
Klien grass	3,113	0.57
Rape	3,034	0.56
Rye grass	3,034	0.56
Vegetables, mixed	2,162	0.40
Watermelons	2,158	0.40
Tomatoes, spring	2,024	0.37
Melons, fall (all)	2,019	0.37
Rapini	1,323	0.24
Fish farms	1,293	0.24
Cabbage	1,284	0.24
Spinach	1,229	0.23
Garbanzo beans	1,057	0.20
Barley	868	0.16
Field corn	844	0.16
Pasture, permanent	701	0.13
Peppers, bell	429	0.08
Garlic	308	0.06
Flowers	279	0.05
Oats	212	0.04

that occur in the Salton Sea include brine shrimp, brinefly larva, and some surface-dwelling insects. The remaining invertebrate species or life stages are primarily benthic. Organisms that need to attach permanently to a hard surface are limited to the few rocky areas, docks, debris, or inundated brush along the shore.

Fish species inhabiting the Salton Sea are adapted to living in high-salinity waters. Most of the fish are nonnative species (Walker 1961; Dritschilo and Pluym 1984; and Setmire et al. 1993) that have been introduced from the Gulf of California by CDFG. Fish found in the Salton Sea include the sport fish sargo (*Anisotremus davidsoni*), orangemouth corvina (*Cynoscion xanthulus*), Gulf croaker (*Bairdiella icistia*), and other fish species listed in Table 2.3-8.

TABLE 2.3-8
Fish Species Present in the Salton Sea

Sargo (*Anisotremus davidsoni*)	Mosquitofish (*Gambusia affinis*)
Gulf croaker (*Bairdiella icistia*)	Longjaw mudsucker (*Gillichthys mirabilis*)
Orangemouth corvina (*Cynoscion xanthulus*)	Sailfin molly (*Poecilia latapinna*)
Desert pupfish (*Cyprinodon macularis*)	Mozambique tilapia (*Oreochromis mossambicus*)
Common carp (*Cyprinus carpio*)	Zill's tilapia (*Tilapia zilli*)
Threadfin shad (*Dorosoma petenense*)	

Source: Black 1988

Gulf croaker, sargo, and corvina are marine species, while the remaining species are estuarine or freshwater fish with extreme salinity tolerances. Tilapia are the most abundant fish in the Salton Sea. Tilapia were introduced into drainage ditches to control aquatic weeds in the late 1960s and early 1970s. They were also produced on fish farms close to the Salton Sea. The Salton Sea was colonized by tilapia that escaped from the fish farm and from those stocked in the drainage system. Anglers first reported catching tilapia in the Salton Sea in 1967 (Costa-Pierce and Riedel 2000a). The highest densities were reported from areas around the New and Alamo rivers and nearshore areas extending about 1,970 feet (600 m) from the shoreline (Costa-Pierce and Riedel 2000a; Costa-Pierce, pers. comm.). Tilapia productivity of the nearshore area has been estimated at 3,600 kg/ha/yr, far exceeding productivity of tilapia in tropical lakes (Costa-Pierce and Riedel 2000a). The abundant fish population attracts and supports large numbers of piscivorous birds, particularly during winter.

The Salton Sea represents one of the centers for avian biodiversity in the American Southwest, with occurrence records for more than 400 species and an annual average abundance of waterbirds of 1.5 to 2 million (Reclamation and SSA 2000; Hart et al. 1998; and Shuford et al. 1999). Numbers of birds can exceed this average by several million during certain years; (e.g., the maximum number of wintering eared grebes alone has exceeded 3.5 million individuals [Jehl 1988], representing the majority of the population of eared grebes in western North America). Populations of some species that use the Salton Sea are similarly of regional, continental, or worldwide importance, representing significant portions of the total populations for those species. The Salton Sea is an integral part of the Pacific Flyway, providing an important migratory stopover for fall and spring shorebirds, and supporting large populations of wintering waterfowl. In surveys from 1978 to 1987, midwinter waterfowl numbers averaged more than 75,000 (Heitmeyer et al. 1989); species typically present in large numbers include snow and Ross's geese, ruddy ducks, pintail, white-faced ibis (*Plegadis chihi*), and others. The Salton Sea represents one of only four remaining interior sites along the Pacific Flyway that supports more than 100,000 shorebirds during migration (Page et al. 1992), with as many as 44 species represented (McCaskie 1970; and Shuford et al. 1999). The Salton Sea also supports large breeding populations of waterbirds.

The overall high productivity of the Salton Sea can be attributed to a number of factors, including relatively mild-warm year-round temperatures, ample nutrient input through agricultural runoff and wastewater discharges to the tributary rivers, and a generally high morpho-edaphic index in the Salton Sea. A high morpho-edaphic index reflects the high surface-to-volume ratio of the Salton Sea (i.e., it has a large area, but is relatively shallow), which results in a number of conditions that can generate higher productivity (e.g., with more of the water column within the zone of light penetration, there is greater production of phytoplankton and other photosynthetic organisms relative to the overall quantity of water). The higher productivity transfers steadily up the food chain, resulting in higher densities of prey species for birds.

Aquatic invertebrates are important as food resources for species of birds in the Salton Sea include brine shrimp (*Artemia salina*), brine fly larvae (*Ephydra sp.*), adult pileworm (*Neanthes succinea*), and the nauplia and cypris of the barnacle (*Balanus amphitrite saltonensis;* Reclamation and SSA 2000). These species are forage for a wide variety of species including diving ducks, grebes, phalaropes (*Phalaropus* spp.), and a number of piscivorous fish that supplement their diet with invertebrates. Dabbling ducks also may forage on aquatic invertebrates in shallow areas, and many shorebirds will forage for invertebrates in shallow flooded areas and mudflats. Other bird species forage on fish including cormorants, diving ducks, pelicans, black skimmer, terns, egrets, and herons. Species of fish in Salton Sea used as prey include tilapia, bairdiella, sargo, mosquito fish, and larval orange-mouthed corvina (Reclamation and SSA 2000).

Since the early 1990s, there has been an unprecedented series of fish and bird die-offs at the Salton Sea (USFWS 2000; and Kuperman and Matey 1999). Fish kills often are massive, averaging between 10,000 and 100,000 fish, but sometimes several million fish. Fish die-offs produce substantial amounts of carrion for piscivorous birds, but can have adverse effects on bird populations by contributing to disease outbreaks. Causes of the fish die-offs are not always clear, but a number of potential pathogens have been identified; low oxygen levels also could be responsible for some fish kills. Pathogens implicated in fish kills include infestations with a lethal parasitic dinoflagellate (*Amyloodinium ocellatum*) and acute bacterial infections from bacteria of the genus *Vibrio* (USFWS 2000).

Large fish kills have been associated with avian botulism die-offs. It is likely that septicemia in fish produces the conditions in the intestinal tract of sick fish that allow botulism spores to germinate and produce the toxin. Birds foraging on sick fish may ingest fatal doses of the botulism toxin (USFWS 2000). A large botulism die-off in birds occurred in 1996, when 8,538 white pelicans and 1,129 brown pelicans died along with large numbers of great egret, snowy egret, eared grebe, black-crowned night heron, and numerous other birds (Jehl 1996). The total bird mortality in this event was more than 14,000 birds (USFWS 1996b).

Since 1987, significant avian die-offs have been recorded on an almost annual basis. While avian disease has been present at the Salton Sea for many years, the recent increase of disease occurrence, the magnitude of losses, and the variety of diseases has increased concern for birds using the Salton Sea (Reclamation and SSA 2000). Significant events have included a die-off of 4,515 cattle egrets in 1989 from salmonellosis; a die-off of an estimated 150,000 eared grebes in 1992 from unknown causes; a loss of more than 14,000 birds, including nearly 10,000 pelicans, in 1996 from avian botulism; a die-off of 6,845 birds in 1997; and a loss of 18,140 birds in 1998 from various agents, including avian cholera, botulism, Newcastle disease, and salmonella (USFWS 1996b).

Habitat Features

Most of the bird activity at the Salton Sea is concentrated at three primary locations. These locations include along the north and south shores (particularly at the New and Alamo river deltas), and near the mouth of Salt Creek on the eastern shore (Reclamation and SSA 2000). In these areas, concentrations of breeding colonies for colonial breeding birds occur. Suitable habitat conditions for colonial birds include an easily accessible and abundant food source and nest and roost sites that are generally protected from predators, such as trees or islands.

Some natural islands are available for nesting at the Salton Sea; however, a number of sites consists of old levees now inundated in sections and separated from the mainland, or other man-made islands. With the exception of Mullet Island at the south end of the Salton Sea, most sites are less than 10,750 square feet in area. Fluctuations in the level of the Salton Sea can increase or decrease the available habitat for island nesting birds.

Nesting islands in the Salton Sea are described in Molina (1996). Mullet Island is located 1.6 miles from the Alamo River mouth and has relatively high relief and ample nesting areas. It has historically supported nesting black skimmers, double-crested cormorants, gull-billed terns, and Caspian terns; since 1992 gulls have also nested there. The site is subjected to some human disturbance, with the Red Hill Marina only 1.9 miles from the island. Other nesting sites in the south portion of the sea include Morton Bay, which consists of an eroded impoundment east of the mouth of the Alamo River. It has two low-lying nesting islets, protected from wave inundation by a nearly continuous perimeter levee. Near Rock Hill, a series of small flat earthen islets within a freshwater impoundment have been suitable for nesting since 1995; this site is located within Sonny Bono-Salton Sea NWR and is under active management, including water-level control and protection from disturbance. Adjacent to Obsidian Butte, a nesting site is located on a small, low islet, consisting of a rocky perimeter and an interior beach composed of crushed barnacle. At Ramer Lake, located along the Alamo River 3.1 miles southeast of the Salton Sea, small, man-made, compacted earth islets provide nesting habitat. However, heavy recreational use in this area results in a high potential for colony disturbance. A small nesting site is present at Elmore Ranch on the southwest shore of the Salton Sea; it lies on a single, earthen levee remnant and is susceptible to wave action, erosion, and inundation. On the north end of the Salton Sea, one site is present at Johnson Street near the mouth of the Whitewater River. This site consists of remnants of earthen levees isolated from the Salton Sea by rising water levels.

2.3.2.5 Desert Habitat

The HCP area supports little native desert habitat. The primary occurrence of native desert habitat in the HCP area is along the AAC within IID's right-of-way (Figure 2.3-8). The 82-mile AAC traverses desert habitat for 60 miles; the remaining 22 miles of the canal lie within agricultural areas of the Imperial Valley. Desert habitat also occurs adjacent to rights-of-ways of the East Highline, Thistle, Trifolium, and Westside Main canals, but not within the rights-of-way. Within Imperial Valley, desert plant species have colonized small areas that have not been under agricultural production for many years. These areas occur as inclusions within the predominantly agricultural landscape. Two principal desert habitats are supported in the HCP area: creosote bush scrub and dunes. The characteristics and distribution of each of these habitats are described below.

Creosote Bush Scrub

Creosote bush scrub is characterized by widely spaced shrubs, approximately 1.6 to 9.8 feet tall, usually with largely bare ground between. It is the basic creosote scrub community of the Colorado Desert, typically occurring on well-drained secondary soils of slopes, fans, and valleys. Characteristic species include creosote bush (*Larrea divaricata*), burro weed (*Ambrosia dumosa*), brittle brush (*Encelia farinosa*), and ocotilla (*Fouquieria splendens*). Succulents are common, and ephemeral annual herbs are present and generally bloom during late February and March. Mesquite thickets, an important wildlife habitat component, are present in creosote bush scrub habitat.

Creosote bush scrub is the predominant desert habitat in the HCP area and occurs along much of the AAC. It is also present adjacent to the HCP area along the East Highline and Westside Main Canals. Plant species comprising this habitat may occur in the Imperial Valley in areas that have been fallowed.

Desert Dunes

AAC traverses the Algodones Dunes. The dunes consist of both active desert dunes and stabilized or partially stabilized dunes. Active desert dune communities are characterized as essentially barren expanses of actively moving wind-deposited sand with little or no stabilizing vegetation. Dune size and shape are determined by abiotic site factors, including wind patterns, site topography, and source of sand deposits. Characteristic plant species may include bee plant (*Cleome sparsifolia*), *Dicoria canescens*, evening primrose (*Oenothera avita*), and *Tiquilia plicata*.

Some desert dunes have been stabilized or partially stabilized by shrubs, scattered low annuals, and perennial grasses in areas with less wind or higher water availability. These dunes typically occupy sites that are lower and more sheltered than active dunes, with soil moisture retained just below the sand surface, allowing perennial vegetation to survive long drought periods. Mesquite (*Prosopis glandulosa, P. pubescens*) scrub is often associated with this community. Other characteristic plant species include sand verbena (*Abronia villosa*), burro weed, ankle grass (*Astragalus* spp.), salt cedar (*Tamarix* spp.), saltbrush (*Atriplex canescens*), croton (*Croton californicus* var. *mojavensis*), dalea grass, wild buckwheat (*Eriogonum deserticola*), desert sunflower (*Geraea canescens*), and others. Plant cover increases as dunes are progressively stabilized. This community intergrades with sandier phases of creosote bush scrub.

2.3.2.6 Aquatic Habitat

Aquatic habitat occurs in the HCP area within IID's conveyance and drainage infrastructure as well as in the New and Alamo Rivers. Aquatic habitat conditions associated with these features are described in the following section. The Salton Sea also provides aquatic habitat, but was discussed previously (Section 2.3.2.4).

The IID diverts water from the Colorado River into the AAC at Imperial Dam. The AAC conveys water to three main canals in Imperial Valley: the East Highline Canal, Westside Main Canal, and Central Main Canal (Figure 2.3-5). Customers take water from the main canals or lateral canals that branch off of the main canals. To service customers in Imperial Valley, IID maintains 1,667 miles of canals (cited from IID Memorandum, dated October 4, 2000). Most of the canals (1,114 miles) are concrete lined. About 16 miles of the conveyance are pipelines, while the remaining 537 miles are earthen canals (cited from IID Memorandum, dated October 4, 2000). IID also operates the 82-mile AAC, which conveys water from Imperial Dam on the Colorado River to IID's conveyance system in the valley. The AAC is currently unlined, but 24 miles are planned to be concrete lined in the future (Reclamation and IID 1994).

Water levels in the AAC are maintained as high as possible to maximize power generation from the hydropower facilities. Although other canals do not contain hydroelectric power generation facilities, water levels also are tightly controlled. Lowest flows in the canal system occur in January and February when irrigation demand is lowest. Water velocity in the AAC ranges from about 0.5 to 1 foot per second (ft/s) during these months. The highest flows occur during March through August, which is the main irrigation season. During this period, water velocities in the AAC increase to about 2.5 to 3.5 ft/s (USACOE 1996).

Within the AAC and main canals in the Imperial Valley, aquatic habitat in the center of the canals is characterized by high water velocities and a lack of aquatic vegetation and aquatic invertebrates. This portion of the main canals provides poor conditions for fish and other aquatic organisms. Along the canal edges, lower water velocities and deposition of sediment allow limited development of submerged and emergent vegetation. The lower water velocities and cover provided by aquatic vegetation, in combination with vegetation on the canal banks (primarily the common reed), provide better habitat conditions for aquatic invertebrates and fish. Submerged vegetation consists primarily of Eurasian water-milfoil with some sago pondweed (*Potamogetou pectinatus;* Reclamation and IID 1994). The noxious aquatic weed hydrilla (*Hydrilla verticillata*) is common in the canal system within the Imperial Valley, but is rare in the AAC (Reclamation and IID 1994). The canals are routinely cleaned of vegetation, thus limiting aquatic habitat quality.

As a result of high water velocities, concrete substrates in many canals, and the lack of submerged and aquatic vegetation, the canals (with the exception of the AAC) support few invertebrates. In the AAC, mollusks, particularly the exotic Asiatic clam and aquatic snail, are common along the shoreline where sediment deposits and submerged and emergent vegetation develops (USACOE 1996). Crayfish are present in small numbers (USACOE 1996).

Drainage Network

A system of subsurface tile drains, surface drainage ditches, and river channels collect and convey agricultural drainwater in the IID service area. Currently, IID operates and

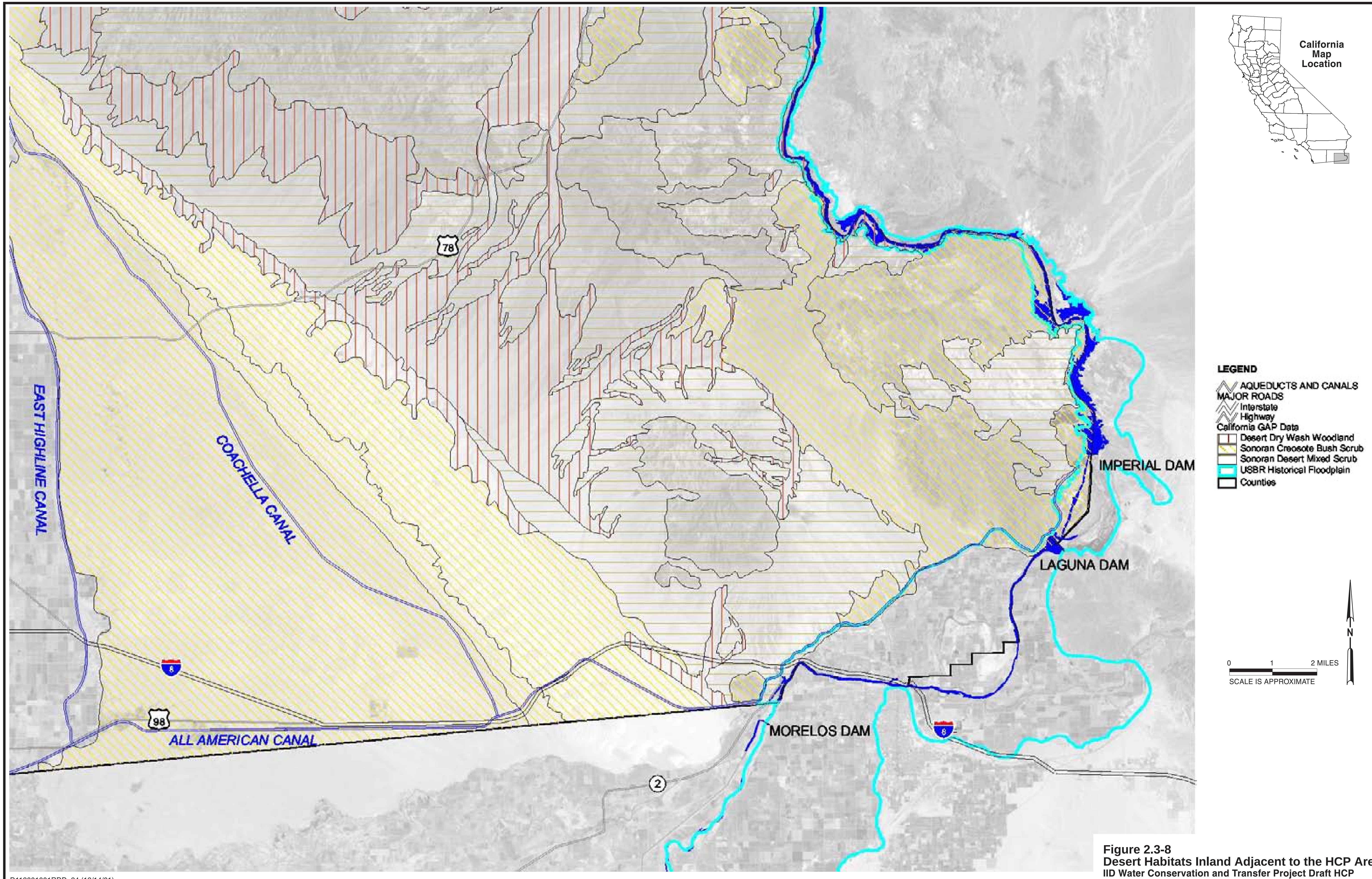

Figure 2.3-8
Desert Habitats Inland Adjacent to the HCP Area
IID Water Conservation and Transfer Project Draft HCP

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maintains 1,456 miles of drains (cited from IID Memorandum, dated October 4, 2000). These drains are primarily unlined earthen channels.

Aquatic habitat in the drains is of poor quality as a result of silty substrates, poor water quality, and shallow depth. Portions of the drains support rooted vegetation, such as cattails, common reed, or filamentous and mat-forming algae. These areas are more frequently found where canal (operational) discharge provides better water quality. However, vegetation is regularly cleared from the drains.

The availability of aquatic habitat in drains depends on drainwater from agricultural fields. This water comes from both surface and subsurface (tile) sources. As a result, the amount of water in the drains varies throughout the year in response to the level of irrigation. When the agricultural fields discharging into a drain are not being irrigated (i.e., little surface runoff), the drainwater flows are dominated by the highly saline subsurface (tile) water. In the upper portions of the drain watersheds, a lack of irrigation activity can result in drains experiencing a dry out condition and might not support aquatic habitat.

The drainage network supports abundant aquatic invertebrates, especially waterboatmen (*Corixa* sp.; Radke 1994). Analysis of benthic invertebrate communities in several of the irrigation drains indicates that the communities are composed of relatively few species and are dominated by one or two taxa. Of the 10 drains sampled, the mollusk family Thiaridae was the most abundant taxa in 8 of the drains, comprising between 50 and 95 percent of the sample (Setmire et al. 1996). Another taxon observed frequently, but with lesser abundance than Thiaridae, was the mollusk family Physidae. The pollution-sensitive mayflies, stoneflies, and caddisflies (Ephemeroptera, Plecoptera, and Trichoptera) were poorly represented. A single caddisfly larvae of the family Philopotamidae was the only pollution-sensitive taxon documented in the benthic samples (Setmire et al. 1996).

Invertebrate densities were found to be much lower in the water column than in the benthic samples (Setmire et al. 1996). The number of taxa ranged from a low of 4 to a high of 10. Chironomid larvae were the most abundant invertebrates found in 6 of the 10 drainwater column samples (Setmire et al. 1996). Other frequently observed taxa included mosquito larvae (*Culicidae*) and oligochaete worms. Larval chironomids are a food source for other invertebrates and fish, and adults are eaten by many kinds of birds.

New and Alamo Rivers

The New River was enlarged in the early 1900s when the Colorado River overflowed its banks and formed a new channel to the Salton Sea. When it crosses into the U.S., the New River is primarily composed of agricultural drainage water and wastewater from the Mexicali Valley in Mexico. In the Imperial Valley, agricultural drains discharge into the river. The Alamo River also enters the U.S. from Mexico and receives agricultural drainage water in the Imperial Valley. Aquatic habitat quality in the New and Alamo Rivers is poor because of poor water quality, as well as high turbidity and unstable substrates that inhibit production of benthic invertebrates and rooted vegetation.

2.3.3 Water Quality and Biological Resources

Water quality is a concern for biological resources in Imperial Valley and the Salton Sea. In the Imperial Valley, wildlife can be exposed to poor water quality conditions in the drains that carry agricultural drainage water. Much of the drain water empties into the Salton Sea where wildlife species also can be exposed to poor water quality conditions. The quality of water in drains and the Salton Sea can affect wildlife in a number of ways. Some contaminants (e.g., selenium) can bioaccumulate and have direct or indirect toxic effects. The concentrations of other constituents (e.g., salts) can affect survival or reproductive success of aquatic species inhabiting the Salton Sea. Finally, water quality can influence plant species composition of habitats supported along the Salton Sea or in agricultural drains, and thereby alter habitat suitability for species using these habitats. The constituents of greatest concern in the Imperial Valley and Salton Sea and potentially affected by the water conservation and transfer programs are salinity and selenium. These constituents are the focus of the following discussion. The IID Water Conservation and Transfer Project EIR/EIS provides information on other water quality constituents.

2.3.3.1 Salinity

The salinity of the Salton Sea has been increasing because of high evaporative water loss and continued input of salts from irrigation drainage water. The sea is currently hypersaline with a salinity greater than the ocean. The present salinity levels in the Salton Sea are 44 grams per liter (g/L; equivalent to parts per thousand). Tilapia are the most abundant fish in the Salton Sea and are the primary prey of piscivorous birds. Therefore, the salinity tolerance of tilapia is key to predicting the effects of the water conservation and transfer programs on covered species of piscivorous birds. The salinity tolerances of other fish species inhabiting the Salton Sea is provided in the IID Water Conservation and Transfer Project EIR/EIS.

Tilapia have been collected at a salinity level of 120 parts per thousand (ppt),[5] but reproduction has not been reported at this salinity level (Whitfield and Blaber 1979). Costa-Pierce and Riedel (2000a) provide a review of reported salinity tolerances of tilapia. Highest growth rates were reported at 14 parts per thousand (ppt), but growth was still good and tilapia reproduced at 30 ppt. At 69 ppt, tilapia grew poorly, but reproduced well. In the Salton Sea at about 44 ppt, tilapia also grew poorly, but reproduced well. Based on these studies, Costa-Pierce and Riedel (2000a) suggested that tilapia in the Salton Sea could successfully acclimate to and continue to reproduce at a salinity level of 60 ppt. In areas with higher salinity, growth, survival, and reproduction would be expected to decline (Costa-Pierce, pers. comm. January 12, 2001).

2.3.3.2 Selenium

Soil derived from parent rocks containing high amounts of selenium is found throughout much of the West (Seiler et al. 1999). Selenium enters soils, groundwater, and surface waters through irrigation of selenium-bearing soils, through selenium-bearing sediments brought in through local drainages, or through water imported for irrigation. Selenium enters the Imperial Valley through Colorado River water brought in for irrigation; its ultimate source is upstream from Parker Dam (Engberg 1992). Selenium is concentrated in irrigated soils through evapotranspiration and flushed into water sources through irrigation practices (Ohlendorf and Skorupa 1989; and Seiler et al. 1999). The primary source of selenium in

[5] Many of the studies regarding salinity tolerance of various species report the results in parts-per-thousand (ppt). Modeling conducted for this HCP utilized concentrations in mg/L (converted to g/L) which differs slightly from ppt as salinity increases due to the difference in the specific gravity of saltwater versus freshwater. Model results are reported in ppt for simplicity and to allow direct comparison with reported tolerances.

surface drains is from subsurface drainage discharges from sumps and tile drains (Setmire et al. 1996); subsequently it is discharged into rivers and the Salton Sea.

Selenium is essential in trace amounts for both plants and animals but toxic at higher concentrations (Rosenfeld and Beath 1946). At excessive levels, selenium can cause adverse effects in mammalian reproduction, but it is especially toxic to egg-laying organisms including birds and fish. Reproductive impairment is generally a more sensitive response variable than adult mortality. Selenium bioaccumulates readily in invertebrates (typically 1,000 times the waterborne concentration) and fish; hence, fish and birds that feed on aquatic organisms are most at risk for showing adverse effects (Ohlendorf 1989; and Eisler 2000).

Selenium concentrations were measured from Imperial Valley and Salton Sea in a number of different studies. These include broad-based studies of selenium in water, sediment, and biotic samples (Setmire et al. 1990; Setmire et al. 1993; and Rasmussen 1997) and more focused surveys looking at concentrations in tissues of specific fish or bird species (Ohlendorf and Marois 1990; Bruehler and de Peyster 1999; and Audet et al. 1997). These studies are reviewed below.

Early sampling (Rasmussen 1988) identified levels of selenium higher in Salton Sea fish than those occurring in the New and Alamo Rivers, reflecting the primary source of bioaccumulation of selenium from benthic food sources of the Salton Sea. More recent data show a similar pattern (Table 2.3-9).

TABLE 2.3-9
Selenium Concentrations in Freshwater and Marine Fish from Imperial Valley Rivers and the Salton Sea

Station No.	Station Name	Species	Tissue	Sample Date	Selenium (mg/kg WW)
719.47.00	Coachella Valley Stormwater Channel	Tilapia *Tilapia sp.*	Fillet	11/17/97	1.020
723.10.01	Alamo River / Calipatria	Channel Catfish *Ictalurus punctatus*	Fillet	11/20/97	1.060
723.10.02	New River / Westmorland	Channel Catfish *Ictalurus punctatus*	Fillet	11/20/97	0.360
723.10.02	New River / Westmorland	Channel Catfish *Ictalurus punctatus*	Liver	11/20/97	3.230
723.10.58	New River / Interboundary	Carp *Cyprinus carpio*	Fillet	12/10/97	0.460
728.00.90	Salton Sea / South	Tilapia *Tilapia sp.*	Fillet	11/20/97	1.310
728.00.90	Salton Sea / South	Tilapia *Tilapia sp.*	Liver	11/20/97	6.650
728.00.92	Salton Sea / North	Orangemouth Corvina *Cynoscion xanthulus*	Fillet	11/18/97	1.360
728.00.92	Salton Sea / North	Orangemouth Corvina *Cynoscion xanthulus*	Liver	11/18/97	2.040

Source: Rassmussen 1997
Notes:
WW Concentrations in wet weight
mg/kg milligrams per kilogram

Other early studies on selenium in tissues include the Selenium Verification Study (White et al. 1987), the reconnaissance investigation by the Department of Interior (DOI) in 1986 and 1987 (Setmire et al. 1990), and a follow-on detailed study by DOI from 1988 to 1990 (Setmire et al. 1993; and Schroeder et al. 1993). The Selenium Verification Study also identified higher selenium concentrations in samples from the Salton Sea fish than those reported in freshwater fish from the Alamo and New Rivers. In the reconnaissance investigation by DOI (Setmire et al. 1990), samples were taken of water, sediment, and biota in the Imperial Valley. Levels in fish and waterfowl in this study indicated bioaccumulation of selenium. Selenium concentrations in mollies and mosquitofish and in invertebrates are shown in Tables 2.3-10 and 2.3-11, respectively.

TABLE 2.3-10
Selenium Concentrations in Mosquitofish and Sailfin Molly from the New and Alamo Rivers and Irrigation Drains and San Felipe and Salt Creeks, Salton Sea, 1988-1990

	New and Alamo Rivers and Irrigation Drains			San Felipe and Salt Creeks		
Fish Species	**N/DV**	**GM (µg/g DW)**	**Range (µg/g DW)**	**N/DV**	**GM (µg/g DW)**	**Range (µg/g DW)**
Mosquitofish	3/3	3.5	2.6-4.7	2/2	6.9	6.4-7.4
Sailfin molly	4/4	3.9	2.5-5.8	2/2	6.4	5.5-7.4

Source: Setmire et al. 1993.
Notes:
DW Concentrations in dry weight
N/DV number of samples collected per number of samples with detectable values
GM Geometric mean; calculated using one-half detection limit when data set has more than 50 percent detectable values.

TABLE 2.3-11
Selenium Concentrations in Pelagic Invertebrates from the New and Alamo Rivers and Irrigation Drains and San Felipe and Salt Creeks, Salton Sea, 1988-1990

	New and Alamo Rivers and Irrigation Drains			San Felipe and Salt Creeks		
Pelagic Invertebrate Species	**N/DV**	**GM (µg/g DW)**	**Range (µg/g DW)**	**N/DV**	**GM (µg/g DW)**	**Range (µg/g DW)**
Amphipod, pileworm, waterboatman composite	-	-	-	2/2	2.8	2.6-3.1
Asiatic river clam	5/5	4.4	2.6-6.4	-	-	-
Crayfish	-	-	-	2/2	3.1	2.4-3.3
Pileworm	8/8	3.1	0.8-12.1	-	-	-
Waterboatman	3/3	2.1	1.4-3.3	-	-	-

Source: Setmire et al. 1993.
Notes:
DW Concentrations in dry weight
– no data
N/DV number of samples collected per number of samples with detectable values
GM Geometric mean; calculated using one-half detection limit when data set has more than 50 percent detectable values.

Selenium concentrations found in most invertebrates were generally below 5 µg/g dry weight (DW), which has been recommended as a dietary threshold to avoid adverse effects in fish and birds that prey on invertebrates (Setmire et al. 1993). This finding indicates that selenium in invertebrates at the Salton Sea are unlikely to cause toxicity to predators feeding on invertebrates. However, some of the pileworms analyzed did exceed 5 µg/g DW with concentrations ranging from 0.8 to 12.1 µg/g DW.

Several species of aquatic birds or eggs were also sampled (Table 2.3-12) (Setmire et al. 1993). Selenium exposure and potential effects in birds can be assessed most directly through the selenium concentrations in eggs (Skorupa and Ohlendorf 1991; and DOI 1998). In the detailed study, black-necked stilts were the only species for which eggs were sampled. Stilt eggs had geometric mean concentrations of 6.2 µg/g or less at all locations. Based on Lemly (1996), the geometric mean indicates that risks are low to none for reproductive impairment in black-necked stilts though the range of concentrations likely exceeds 6.2 µg/g and could result in some reproductive impairment. In fact, Bennett (1998) conducted a study that evaluated nesting proficiency in comparison to egg selenium concentrations, and the results indicated that the species is likely experiencing a low level of selenium-induced reproductive depression at the Salton Sea.

TABLE 2.3-12
Selenium Concentrations in Migratory Birds and Estimated Egg Concentrations from the New and Alamo Rivers, Agricultural Drains, San Felipe Creek, Salt Creek and the Salton Sea Collected During 1988-1990

	Salton Sea				New and Alamo Rivers and IID Drains			
Bird species	N/DV	GM (µg/g DW)	Range (µg/g/DW)	Est. egg Conc. (µg/g DW)[a]	N/DV	GM (µg/g DW)	Range (µg/g DW)	Est. Egg Conc. (µg/g DW)[a]
Migratory Birds								
Eared grebe (muscle)	5/5	12.7	2.7-35.1	-	-	-	-	-
Northern shoveler (liver)	-	-	-	-	19/19	19.1	9.1-47.0	6.3
Northern shoveler (muscle)	-	-	-	-	6/6	5.2	3.8-12.0	-
Ruddy duck (liver)	57/57	11.7	5.2-41.5	3.86	-	-	-	-
Ruddy duck (muscle)	17/17	4.8	2.7-7.2	-	-	-	-	-
White-faced ibis (carcass)	-	-	-	-	9/9	5.3	3.9-6.6	-
White faced ibis (liver)	-	-	-	-	9/9	7.4	5.0-13.2	2.44
Resident Birds								
American coot (liver)	-	-	-	-	3/3	10.3	7.9-16.3	3.4
Black-necked stilt (egg)	127/127	4.3	1.6-35.0	-	-	-	-	-
Black-necked stilt (carcass)	19/19	5.4	3.2-11.3	-	-	-	-	-

TABLE 2.3-12
Selenium Concentrations in Migratory Birds and Estimated Egg Concentrations from the New and Alamo Rivers, Agricultural Drains, San Felipe Creek, Salt Creek and the Salton Sea Collected During 1988-1990

	Salton Sea				New and Alamo Rivers and IID Drains			
Bird species	N/DV	GM (µg/g DW)	Range (µg/g/DW)	Est. egg Conc. (µg/g DW)[a]	N/DV	GM (µg/g DW)	Range (µg/g DW)	Est. Egg Conc. (µg/g DW)[a]
Listed Birds								
Yuma clapper rail (whole body)	-	-	-	-	1/1	-	4.8	-

Source: Setmire et al. 1993.
[a] Estimated from geometric mean using conversion factor from Lemly (1996)
Notes:
DW Concentrations in dry weight
\- No data
N/DV number of samples collected per number of samples with detectable values

A focused survey was conducted on selenium concentrations in subsurface drainwater, surface drainwater, bottom sediments, and transplanted Asiatic river clams at 48 irrigation drain sites in the Imperial Valley (Setmire et al. 1996; Roberts 1996; and Hurlbert 1997). Tilewater had the highest concentrations of selenium (median 28 µg/L). Drain samples showed considerable dilution of tilewater selenium (median 6 µg/L). Selenium in bottom sediments was correlated (r^2=0.55) with the percent material finer than 0.062 mm (median 0.5 µg/g).

In an attempt to evaluate concentrations of various compounds in colonial waterbirds, Audet et al. (1997) sampled eggs, bird livers, and fish from waterbird nesting colonies or adjacent areas at the Salton Sea. The results for selenium concentrations for bird egg and liver samples are presented in Table 2.3-13. Selenium concentrations found in eggs at the Salton Sea were below all teratogenesis thresholds indicating that selenium levels are below those found to cause teratogenesis. However, selenium concentrations in eggs were within the range at which reproductive performance could be affected. Fish samples were within the range of earlier studies (Saiki 1990; and Setmire et al. 1993).

TABLE 2.3-13
Selenium Concentrations in Bird Eggs and Livers Collected at the Salton Sea, 1991

	Egg Samples			Liver Samples		
Species	N	GM (µg/g DW)	Range (µg/g DW)	N	GM (µg/g DW)	Range (µg/g DW)
Double-crested cormorant	–	–	–	6	21.96	17-29
Great-blue heron	4	3.86	2.8-5	10	9.57	3.5-17
Black-crowned night-heron	3	5.27	4.6-6.5	4	12.24	4.8-20
White pelican	–	–	–	6	14.79	11-22
Black skimmer	12	4.65	2.2-8.2	–	–	–
Cattle egret	3	3.6	2.7-5.4	–	–	–

TABLE 2.3-13
Selenium Concentrations in Bird Eggs and Livers Collected at the Salton Sea, 1991

	Egg Samples			Liver Samples		
Species	N	GM (µg/g DW)	Range (µg/g DW)	N	GM (µg/g DW)	Range (µg/g DW)
Great egret	9	4.77	3.5-7.1	–	–	–
Gull-billed tern	6	4.1	3.4-5.3	–	–	–

Source: Audet et al. 1997.
Notes:
DW concentrations in dry weight;
– no data

Studies conducted on Yuma clapper rails (Roberts 1996; and USFWS 1994) involved analyses of sediment, crayfish, bird egg, kidney, liver, and whole body samples from salvaged birds for selenium and organochlorines. Egg and bird tissue samples were taken in the CDFG Wister Wildlife Management Unit when drainwater was being used as a water source for managed marshes. Concentrations of selenium from the study are presented in Table 2.3-14. The other samples (sediment and crayfish) were collected when most of the Wister Unit had been converted to the use of Colorado River water.

TABLE 2.3-14
Detection Frequency and Summary Statistics for Selenium in Yuma Clapper Rail Diet and Tissue Samples

Matrix	N/DV	Geometric Mean (µg/g DW)	Range (µg/g DW)
Sediments	19/19	1.43	0.55-9.57
Crayfish	19/19	2.16	0.92-4.67
Rail eggs	2/2	–	4.98-7.75
Rail liver	2/2	–	3.09-11.78
Rail kidney	1/1	–	3.69

Source: Roberts 1996.
Notes:
DW concentrations in dry weight
– no data
N/DV number of samples collected per number of samples with detected value

2.3.4 Covered Species and Habitat Associations

This HCP covers 96 species (Table 1.5-1). The covered species use one or more of the six general habitat types described below:

- Salton Sea
- Tamarisk scrub habitat
- Drain habitat
- Desert habitat
- Freshwater aquatic habitats
- Agricultural fields

The covered species can be grouped based on their habitat association and how they use the habitat. The following identifies the covered species associated with each of the habitat types in the HCP area, and describes how the habitat is used and the relative quality of the habitat for the covered species. Some species use more than one habitat in the HCP area and could be exposed to impacts in each of the habitats that they use. Such species are assigned to multiple habitats. More specific information on each of covered species' habitat requirements, status and distribution and life history traits is provided in Appendix A.

2.3.4.1 Salton Sea Habitat Associates

The Salton Sea is a large inland sea that attracts many species associated with large waterbodies as well as species that are more typically associated with coastal areas. Since its formation in the early 1900s the diversity and number of species using the Salton Sea has increased. The sea has become an important breeding location for several species. For example, the Salton Sea supports the largest inland breeding population of western snowy plovers. However, the Salton Sea is most well-known for the large populations of wintering birds. Located on the Pacific Flyway, many birds also pass through the Salton Sea area on migrations to and from Central and South America.

Table 2.3-15 identifies the covered species that are primarily associated with the Salton Sea. In the HCP area, some species (e.g., pelicans) only occur at the Salton Sea, while others use the Salton Sea in addition to other habitats within the HCP (e.g., western snowy plover).

TABLE 2.3-15
Covered Species Associated with the Salton Sea in the HCP Area

Resident Breeders[a]	Migratory Breeders[b]	Short-Term Residents[c]	Transient Species[d]
Desert pupfish	Van Rossem's gull-billed tern	Osprey	California least tern
Double-crested cormorant	Black skimmer	Black tern	Elegant tern
Western snowy plover		Laughing gull	Merlin
		American white pelican	Black swift
		Wood stork	Vaux's swift
		Long-billed curlew	Purple martin
		California brown pelican	Bank swallow
			Reddish egret
			Bald eagle
			Prairie falcon

[a] Resident breeders are species that occur at the Salton Sea year-round and breed in this habitat in the HCP area.
[b] Migratory breeders are species that breed at the Salton Sea, but migrate out of the HCP area or into other habitats for the non-breeding season.
[c] Short-term residents are species that do not breed in the HCP area, but migrate into the HCP area and use the Salton Sea for several months (e.g., during winter).
[d] Transient species are species that do not breed in the HCP area, but use the Salton Sea in the HCP area for short periods of time, typically during migration.

2.3.4.2 Tamarisk Scrub

The species associated with tamarisk scrub habitat are primarily riparian species that find optimal habitat in native riparian habitats consisting of cottonwoods, willows, and other native riparian plant species. As previously described, tamarisk invaded many areas and supplanted native riparian vegetation in the HCP area in most locations. Tamarisk also colonized non-riparian areas along drains or seepage areas. Tamarisk scrub habitat does not represent optimal habitat for the species that use this habitat in the HCP area. Rather, it constitutes the only available tree-dominated habitat in the HCP area. As such, it is used although not preferred. Table 2.3-16 identifies the covered species that use tamarisk scrub habitat in the HCP area.

2.3.4.3 Drain Habitat Associates

Covered species using drain habitat in the HCP area include species that use it exclusively (e.g., Yuma clapper rail) as well as species that will exploit the resources of the habitat, but are not dependent upon it (e.g., northern harrier; Table 2.3-17). The highest quality drain habitat within the HCP area occurs on the state and federal refuges where active management promotes development of emergent aquatic vegetation such as cattails and bulrushes. The drains themselves also provide habitat; however, much of the vegetation in the drains consists of common reed or salt cedar, and only a small proportion of the drains supports cattails or bulrushes. Thus, for species with an affinity for emergent vegetation, habitat quality and availability is limited outside of the state and federal refuges.

TABLE 2.3-16
Covered Species Associated with Tamarisk Scrub Habitat in the HCP Area

Resident Breeders	Migratory Breeders	Short-Term Residents	Transient Species
White-tailed kite	Elf owl[a]	Large-billed savannah sparrow	Merlin
Summer tanager	Brown-crested flycatcher	Sharp-shinned hawk	Black swift
Vermilion flycatcher	Yellow-breasted chat	Cooper’s hawk	Vaux’s swift
Gila woodpecker[a]	Yellow warbler		Long-eared owl
Gilded flicker[a]			Least Bell’s vireo
Harris hawk			Purple martin
Crissal thrasher			Western yellow-billed cuckoo[a]
			Bank swallow
			Willow flycatcher
			Arizona Bell’s vireo

[a] Species not known to use tamarisk, but could use native tree habitats.

TABLE 2.3-17
Covered Species Associated with Drain Habitats in the HCP Area

Resident Breeders	Migratory Breeders	Short-Term Residents	Transient Species
Yuma clapper rail	Fulvous whistling-duck	Short-eared owl	Golden eagle
California black rail		Northern harrier	Merlin
Desert pupfish[a]			Black swift
White-faced ibis			Vaux's swift
Least bittern			Purple martin
Lowland leopard frog[b]			Bank swallow
			Tricolored blackbird
			Bald eagle

[a] This species is addressed through a species-specific strategy.
[b] This species is addressed separately from the other species in this habitat group.

2.3.4.4 Desert Habitat Associates

Native desert habitat primarily occurs in the HCP area along the AAC. This portion of the HCP area consists of creosote bush scrub and desert dune habitats. This habitat has not been converted to another use, but is subject to disturbance from maintenance and recreational activities. Most of the covered species associated with desert habitat are limited to this habitat type (e.g., desert tortoise) and would not occur in other habitats in the HCP area. A few (e.g., loggerhead shrike) use desert habitats in addition to other habitats in the HCP area. Table 2.3-18 identifies the covered species associated with desert habitats.

TABLE 2.3-18
Covered Species Associated with Desert Habitat in the HCP Area

Resident Breeders	Migratory Breeders	Short-Term Residents	Transient Species
Cheeseweed moth lacewing[a]	Elf owl		Golden eagle
Andrew's scarab beetle[a]			Prairie falcon
Desert tortoise			
Colorado desert fringe-toed lizard			
Western chuckwalla			
Couch's spadefoot toad			
Colorado River toad[a]			
Flat-tailed horned lizard			
Banded gila monster[a]			
Harris' hawk			
Loggerhead shrike			
Le Conte's thrasher			

TABLE 2.3-18
Covered Species Associated with Desert Habitat in the HCP Area

Resident Breeders	Migratory Breeders	Short-Term Residents	Transient Species
Crissal thrasher			
Jacumba little pocket mouse[a]			
Nelson's bighorn sheep			
Peirson's milk-vetch			
Algodones Dunes sunflower			
Wiggin's croton			
Flat-seeded spurge[a]			
Foxtail cactus[a]			
Munz's cactus[a]			
Giant Spanish needle			
Sand food			
Orocopia sage[a]			
Orcutt's aster[a]			

[a] These species are addressed separately from the other species in this habitat group.

2.3.4.5 Aquatic Habitat Associates

The conveyance and drainage systems provide aquatic habitat. Most of the fish species present in these systems are foreign species. Razorback suckers are the only covered species that are residents in the canal system. Desert pupfish are the only covered species that are residents in drains.

2.3.4.6 Agricultural Field Habitat Associates

Agricultural fields make up most of the habitat in the Imperial Valley. While not a native habitat, many of the covered species have adapted to using agricultural fields in fulfilling one or more life requisites (Table 2.3-19). Often species show an association with certain crop types. Most of the covered species associated with agricultural fields use this habitat for foraging; only a few actually breed in agricultural habitats. Loggerhead shrike and Yuma cotton rat are the only species expected to breed in agricultural habitats. Actual nest locations of these species are on the margins of the fields. The remaining resident and migratory breeders breed in other habitats of the HCP area, but forage in agricultural fields during the breeding season. Agricultural habitats in the HCP area also provide foraging opportunities for wintering birds (i.e., short-term residents) and transient species.

TABLE 2.3-19
Covered Species Associated with Agricultural Fields in the HCP Area

Resident Breeders	Migratory Breeders	Short-Term Residents	Transient Species
Loggerhead shrike	Fulvous whistling-duck	Black tern	Prairie falcon
White-tailed kite		Mountain plover	Golden eagle
White-faced ibis		Ferruginous hawk	Swainson's hawk
Western snowy plover		Aleutian Canada goose	Merlin
Greater sandhill crane		Short-eared owl	Black swift
Yuma hispid cotton rat[a]		Northern harrier	Vaux's swift
Colorado River hispid cotton rat[a]		Long-billed curlew	Purple martin
			American peregrine falcon
			Bank swallow

[a]These species are addressed separately from the other species in this habitat group.

2.3.4.7 Other Species

Most of the covered species can be grouped according to their habitat associations. However, the occurrence of burrowing owls and the 12 bat species covered by the HCP are more a function of the occurrence of unique habitat features than the presence and quality of a general habitat type. Burrowing owls occur at high densities in the Imperial Valley and are associated with the general agricultural landscape. They are however, strongly associated with canals and drains where they inhabit burrows in the unlined banks of these structures. While the surrounding agricultural fields provide foraging opportunities, it is the presence of suitable burrows created by burrowing rodents that largely determine the occurrence of burrowing owls.

The HCP covers 12 bat species (Table 2.3-20). For foraging, it is likely that they use a wide range of habitats, exploiting localized areas of insect abundance. Habitats in the HCP area could be used for foraging. Whether any of the covered bat species roost in the HCP area and the types of structures that they use are unknown. Some bats probably roost outside of the HCP area but come into the HCP area to forage, while others can probably find suitable roosts within the HCP area in buildings, trees, bridges, or other structures. The location of suitable roosting sites is probably an important factor in the extent to which these species occur in the HCP area.

TABLE 2.3-20
Covered Bat Species in the HCP Area[a]

Spotted bat	Pale western big-eared bat
Western mastiff bat	Big free-tailed bat
California leaf-nosed bat	Mexican long-tongued bat
Occult little brown bat	Southwestern cave myotis
Western small-footed myotis	Pocketed free-tailed bat
Pallid bat	Yuma myotis

[a] The process for ensuring Federal Endangered Species Act and California Endangered Species Act coverage for these species is being developed.

CHAPTER 3

Habitat Conservation Plan Components and Effects on Covered Species

3.1 Approach to and Framework for the Conservation Strategy

The habitat conservation plan (HCP) employs both habitat-based and species-specific approaches. The habitat-based component of the conservation strategy of the HCP focuses on mitigating the potential loss of habitat values (quality and quantity) of each habitat type within the HCP area. This is accomplished primarily by creating or acquiring replacement habitat. The overall conservation strategy for the Imperial Irrigation District (IID) HCP is to maintain or increase the value (amount and/or quality) of each habitat in the HCP area in addition to implementing measures to minimize direct effects to covered species from operation and maintenance (O&M) and construction activities. The habitat-based conservation approach of the HCP is augmented by a species-specific treatment of individual species (i.e., burrowing owls, desert pupfish, and razorback sucker) that are not easily accommodated by a habitat approach. Consistent with the guidance provided by the U.S. Fish and Wildlife Service (USFWS), all HCP effects are evaluated on a species-by-species basis. In addition to the habitat-based and species-specific strategies, the HCP contains general commitments that guide and facilitate the implementation of the plan.

The area for which IID seeks coverage supports six general habitats as follows:

- Salton Sea
- Tamarisk scrub
- Drain vegetation
- Desert
- Aquatic
- Agricultural fields

Covered species are assigned to one or more habitat groups based on the habitats that they use in the HCP area. The overall conservation strategy for the IID HCP is to maintain or increase the value (amount and/or quality) of each habitat in the HCP area. Species for which the ecology is best understood are used to develop the appropriate level of mitigation for each of the habitats occurring in the HCP area. By ensuring the habitat representation and quality in the HCP area, the persistence of covered species using these habitats can be reasonably assumed.

Although the HCP predominantly follows a habitat-based approach, the effect of the covered activities and implementation of the HCP measures on each covered species are evaluated as required under the USFWS's 5-Point Policy. Life history, habitat requirements, occurrence and distribution in the HCP area, and overall population status of each species are used to predict the potential effects of implementing the HCP. By considering each species individually within the habitat-based framework, the adequacy of the HCP measures in meeting the issuance criteria for each covered species is demonstrated.

The occurrence and distribution of burrowing owls in the HCP area is determined more by the availability of unique features (e.g., burrows) than the occurrence and distribution of a particular habitat type. A species-specific conservation strategy was developed for burrowing owls to ensure adequate coverage by the HCP measures. Further, the Aquatic Habitat group contains desert pupfish and razorback suckers. However, these species occupy two different aquatic habitats, the IID drainage system, and the IID conveyance system, respectively, and the effects of covered activities on these species are distinctly different. Therefore, desert pupfish and razorback suckers are also addressed individually.

IID's HCP consists of five habitat conservation strategies and three species-specific strategies. The habitat conservation strategies are as follows:

- Salton Sea habitat
- Tamarisk scrub habitat
- Drain habitat
- Desert habitat
- Agricultural field habitat

The four species-specific strategies are as follows:

- Burrowing owl
- Desert pupfish
- Razorback sucker
- Other covered species

Each of these conservation strategies, described in the following sections, were developed based on the potential for and magnitude of the effects the covered activities could have on covered species using each habitat. The following description of the specific strategies and habitat conservation measures is presented to help facilitate an understanding of the details of the commitments made by IID. The italicized language presented within text boxes represents the specifics of the measure; the text that follows each measure provides a justification for the measure and additional clarification. This format is intended to improve the readers' ability to understand and distinguish the key elements and commitments of the plan. However, the document as a whole, not just the language contained in the text boxes, forms the basis of IID's HCP and its commitments.

The elements of this HCP that address the effects related to changes at the Salton Sea were not developed in anticipation that a project to restore the Salton Sea would be implemented nor are they dependent upon implementation of a future restoration project. However, because a future project could influence the appropriateness or need for certain mitigation measures, several of the measures contain alternative direction in the event that a restoration project is implemented.

3.2 General HCP Commitments

To ensure proper implementation of the HCP measures presented in the following sections and the Monitoring and Adaptive Management Program (Chapter 4), IID will hire a full-time biologist to oversee implementation of the HCP measures and convene an HCP Implementation Team (HCP IT) to guide implementation of and adjustments to the HCP. These commitments are described in more detail below.

General–1. *Within 1 year of issuance of the incidental take permit (ITP), IID will appoint a full-time equivalent biologist/project manager (HCP Implementation Biologist) to manage the proper implementation of the HCP. Responsibilities will include ensuring adequate staffing and resources. Prior to securing a full-time equivalent biologist/project manager, IID's existing environmental compliance staff will ensure compliance with the HCP requirements.*

The HCP contains a suite of measures covering a variety of habitats and species and requires a comprehensive monitoring program. To ensure that the terms of the HCP are carried out, IID will hire a full-time biologist. The HCP Implementation Biologist will be responsible for ensuring that IID is complying with the HCP conditions.

General–2. *Within 3 months of issuance of the ITP, IID will convene an HCP Implementation Team consisting of representatives from IID, USFWS, and California Department of Fish and Game (CDFG).*

IID will convene an HCP Implementation Team consisting of representatives from IID, USFWS, and CDFG to guide execution of the HCP over the term of the HCP. The purpose of the HCP IT is to collaboratively guide and coordinate execution of the HCP over the term of the permit. The HCP IT will be responsible for the following:

- Guiding implementation of the HCP measures (e.g., identifying the location and characteristics for managed marsh habitat to be created under the Drain Habitat Conservation Strategy)
- Developing specific methodologies for survey programs and studies
- Adjusting the HCP measures under the Adaptive Management Program

Specific responsibilities of the HCP IT are identified in the HCP measures presented in the following sections, in Chapter 4: Monitoring and Adaptive Management and Chapter 5: Plan Implementation.

3.3 Salton Sea Habitat Conservation Strategy

3.3.1 Amount and Quality of Salton Sea Habitat

For the species covered by the HCP, use of the Salton Sea is a function of the abundant food resources, availability of a large, open body of water, and the presence of unique habitat features. The attractiveness of the Salton Sea to piscivorous birds stems from the very high abundance of fish at the Salton Sea. The availability of protected nesting and roosting locations adds to the attractiveness of the Salton Sea to these birds and other colonial-nesting birds. For nonpiscivorous bird species, abundant aquatic invertebrates are an important food resource. Aquatic invertebrates include brine shrimp, brine fly larvae, adult pileworm, and barnacle nauplia and cypris. In addition to the food resources and nesting/roosting areas for birds, the Salton Sea provides habitat for desert pupfish and could play a role in supporting shoreline strand and adjacent wetland vegetation. Potential impacts of the covered activities to covered species using these resources relate to changes in salinity and the water surface elevation of the Salton Sea.

3.3.1.1 Fish Abundance

The tilapia, *Oreochromis mossambicus*, is the primary prey for covered species of piscivorous birds at the Salton Sea. Changes in the abundance of tilapia could alter the level of use of the Salton Sea by covered species of piscivorous birds. Thus, it is important to consider the ecology of tilapia at the Salton Sea in assessing the potential effects of the water conservation and transfer programs on covered piscivorous birds.

The Salton Sea supports the highest density of tilapia reported. Costa-Pierce and Riedel (2000a) estimated the standing crop of tilapia as 3,200 pounds per acre (lb/acre), 3.6 to 14.4 times greater than some tropical lakes in Southeast Asia. Within the Salton Sea, the highest densities of tilapia occur at the New and Alamo River deltas and in nearshore areas (Costa-Pierce and Riedel 2000a; Costa-Pierce pers. comm. 2000). The nearshore area of high tilapia density extends about 1,970 feet from the shoreline and at the deltas areas about 0.39 square miles (mi^2) in size around each river mouth support high tilapia density. The catches per unit effort of tilapia in the deltas and nearshore areas were more than 10 to 30 times greater than in pelagic areas of the sea and in the rivers (Table 3.3-1).

TABLE 3.3-1
Catch Per Unit Effort for Tilapia in the Salton Sea

Area	Catch Per Unit Effort (kg/hr)
Pelagic	0.22
Nearshore	2.37
River deltas	3.29
River channels	0.1

Source: Costa-Pierce and Riedel (2000a)

A food habit study of tilapia in the Salton Sea showed that in pelagic areas tilapia feed on zooplankton, particularly copepods and rotifers, whereas in the nearshore and deltaic areas, the diet was much more diverse and included a substantial amount of sediment and detrital matter (Costa-Pierce and Riedel 2000b). The high concentration of tilapia in the river deltas and nearshore areas may be related to the high levels of organic matter in the river and drain discharges to the sea at these locations. The nearshore and delta areas also support breeding by tilapia. In addition to nearshore and delta areas, tilapia spawn in drains.

Tilapia have a high salinity tolerance and they are able to adapt to very high salinity levels, particularly if the increase in salinity is gradual (Phillipart and Ruwet 1982 cited in Costa-Pierce and Riedel 2000a). Tilapia have been collected at a salinity of 120 parts per thousand (ppt),[1] but reproduction has not been reported at this salinity level (Whitfield and Blaber 1979). Costa-Pierce and Riedel (2000a) provide a review of reported salinity tolerances of

[1] Many of the studies regarding salinity tolerance of various species report the results in parts-per-thousand (ppt). Modeling conducted for this HCP utilized concentrations in mg/L (converted to g/L) which differs slightly from ppt as salinity increases due to the difference in the specific gravity of saltwater versus freshwater. Model results are reported in ppt for simplicity and to allow direct comparison with reported tolerances.

tilapia. Highest growth rates were reported at 14 ppt, but growth was still good and tilapia reproduced at 30 ppt. At 69 ppt, tilapia grew poorly, but reproduced well. In the Salton Sea at about 44 ppt, tilapia also grew poorly, but reproduced well. Based on these studies, Costa-Pierce and Riedel (2000a) suggested that tilapia in the Salton Sea could successfully acclimate to and continue to reproduce at a salinity level of 60 ppt. Above a salinity level of 60 to 70 ppt, growth, survival, and reproduction would decline (Costa-Pierce, pers. comm. January 12, 2001). While evidence suggests that reproduction of tilapia will begin to decline at a salinity level above 60 ppt, the actual salinity thresholds for reproduction and survival in the Salton Sea could be higher.

3.3.1.2 Nesting and Roosting Sites

Nesting and roosting sites used by covered species (i.e., black skimmers, gull-billed terns, white pelicans, brown pelicans, and double-crested cormorants) are presently available at several locations around the Salton Sea. Most sites are small, generally less than 0.25 acres, and with low relief, sometimes only a few inches above the level of wind-driven wave inundation. Water depth between islands and the mainland is only a few feet. Mullet Island is the largest island and used heavily as a nesting and roosting site. Other smaller islands consisting of old earthen levees are also available. Fewer islands are present in the northern portion of the sea; remnants of earthen levees near the mouth of the Whitewater River provide some nesting and roosting sites.

3.3.1.3 Desert Pupfish

Desert pupfish inhabit pools formed by barnacle bars located in near-shore and shoreline areas of the Salton Sea and at Salt and San Felipe creeks. Barnacle bars are deposits of barnacle shells on beaches, near the shore, and at the mouths of drains that discharge to the Salton Sea. Pools form behind the barnacle bars. These pools provide habitat for pupfish and also are believed to be important for allowing pupfish movement among drains, shoreline pools and smaller tributaries such as Salt and San Felipe creeks.

3.3.1.4 Shoreline Strand and Adjacent Wetland Habitat

The Salton Sea database identifies 293 acres of shoreline strand habitat along the Salton Sea. Shoreline strand habitat consists of tamarisk and iodine bush. In addition to the shoreline strand, the Salton Sea database identifies 2,349 acres of adjacent wetlands dominated by tamarisk. The source of the water that supports the shoreline strand community is uncertain but could consist of a combination of shallow groundwater and seepage from the Salton Sea. These areas potentially provide habitat for covered species associated with tamarisk scrub habitat.

3.3.2 Effects of the Covered Activities

The primary potential effects of the covered activities on covered species using the Salton Sea relate to changes in the rate of salinization of the sea and changes in the water surface elevation. The salinity level influences the abundance and persistence of fish that support foraging by piscivorous birds and also could influence the ability for pupfish to use the sea to move among drains and to move from Salton Sea to San Felipe Creek and mouth of Salt Creek. Reductions in the water surface elevation could influence the availability and suitability of nesting and roosting areas for colonial nesting birds and also the extent of tamarisk along the sea's margins. The projected changes in salinity and water surface elevation with and without implementation of the water conservation and transfer programs and the potential responses of covered species to these changes are described below.

3.3.2.1 Increased Salinity

Since its formation, the salinity of the Salton Sea has been increasing because of high evaporative water loss and continued input of salts from irrigation drainage water. Increasing salinity of Colorado River water delivered at Imperial Dam, which is the sole source for irrigation water in Imperial Valley, also is a factor. The Salton Sea is currently hypersaline, with salinity greater than the ocean.

The Mozambique tilapia is the most abundant fish species in the Salton Sea (Costa-Pierce and Riedel 2000a; Black 1988) and is the primary forage species for piscivorous birds at the Salton Sea (Molina 1996; S. Johnson, pers. comm. 2000). Because of the importance of tilapia in the diet of piscivorous birds at the Salton Sea, the potential change in the tilapia population of the Salton Sea is the focus of assessing the impact of the covered activities on covered piscivorous bird species.

Modeling by Reclamation (January 2002) indicates that the salinity of the Salton Sea would continue to gradually increase over the next 75 years in the absence of the water conservation and transfer programs. The mean of the salinity projections show the salinity of the Salton Sea surpassing 60 ppt in 2023 (Table 3.3-2; Figure 3.3-1). Costa-Pierce and Riedel (2000a) stated that survival, growth and reproduction would decline at a salinity above 60 ppt. Thus, once the salinity of the Salton Sea surpassed 60 ppt, tilapia abundance would be expected to decline as the increasing salinity impaired reproduction. However, relatively freshwater inflow from the New and Alamo Rivers creates an estuarine environment in the river deltas where salinity levels are lower than in the main body of the Salton Sea. Under current conditions, Costa-Pierce and Riedel (2000c) reported salinity levels ranging from 10 to 30 ppt in the river deltas. Tilapia could persist at the Salton Sea if the deltas continued to provide lower salinity environments.

TABLE 3.3-2
Mean and Upper and Lower Bounds of the 95 Percent Confidence Interval Around the Year that Salinity of the Salton Sea is Projected to Exceed 60 ppt Under the Baseline Condition and Various Water Conservation and Transfer Scenarios

Scenario	Upper Bound	Mean	Lower Bound
Baseline	2030	2023	2018
300 KAFY to SDCWA by Fallowing	2021	2017	2014
130 KAFY to SDCWA	2015	2013	2011
230 KAFY to SDCWA	2014	2012	2011
300 KAFY to SDCWA	2014	2012	2011

Source: Reclamation (January 2002)
KAFY = thousand acre-feet per year

Water conserved through IID’s water conservation programs would result in a reduction in inflows to the Salton Sea. This inflow reduction would increase the rate of salinization of the sea. IID could achieve water conservation through a combination of on-farm and system-based measures, and fallowing. The degree to which water conservation would

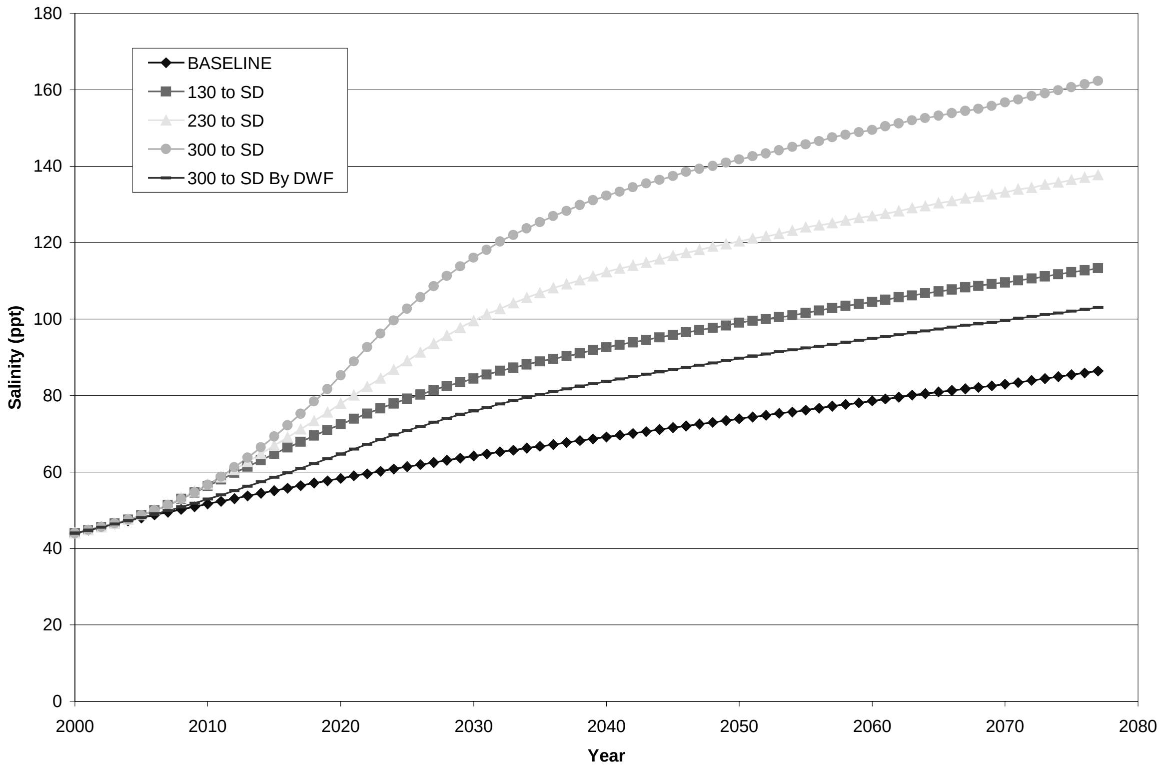

FIGURE 3.3-1
Projected Salinity Levels With and Without Implementation of the Water Conservation and Transfer Programs

accelerate salinization would depend on the method of water conservation, the amount of water conserved, and the amount of water transferred out of the Salton Sea basin.

The potential effects of the water conservation and transfer programs on the rate of salinization are bounded by projections of (1) using all on-farm and system-based measures to achieve 300 thousand acre-feet per year (KAFY) of conservation and (2) using all fallowing to achieve 300 KAFY of conservation (Figure 3.3-1). With conservation and transfer of 300 KAF using on-farm and system-based measures the mean salinity of the Salton Sea is predicted to surpass 60 ppt in 2012 (Figure 3.3-2), 11 years earlier than under the baseline projections. Using all fallowing to achieve the same level of conservation, the mean salinity of the Salton Sea is predicted to exceed 60 ppt in 2017, six years earlier than under the baseline condition.

The preceding discussion could be interpreted as suggesting that the rate and magnitude of future changes in salinity and the response of tilapia are certain and determinant. The modeling conducted by Reclamation constitutes the best available information on the rate and magnitude of salinity increases at the Salton Sea. However, models are necessarily simplified representations of complex systems that can and do react unpredictably. Myriad factors will influence the actual salinity trajectory of the sea. Factors potentially influencing the salinity trajectory include but are not limited to future weather conditions; unknown chemical dynamics; variations in inflows from Mexico; implementation of a Salton Sea

Restoration Project; variations in IID diversion levels because of legal or political changes, drought in the upper basins states, or others factors.

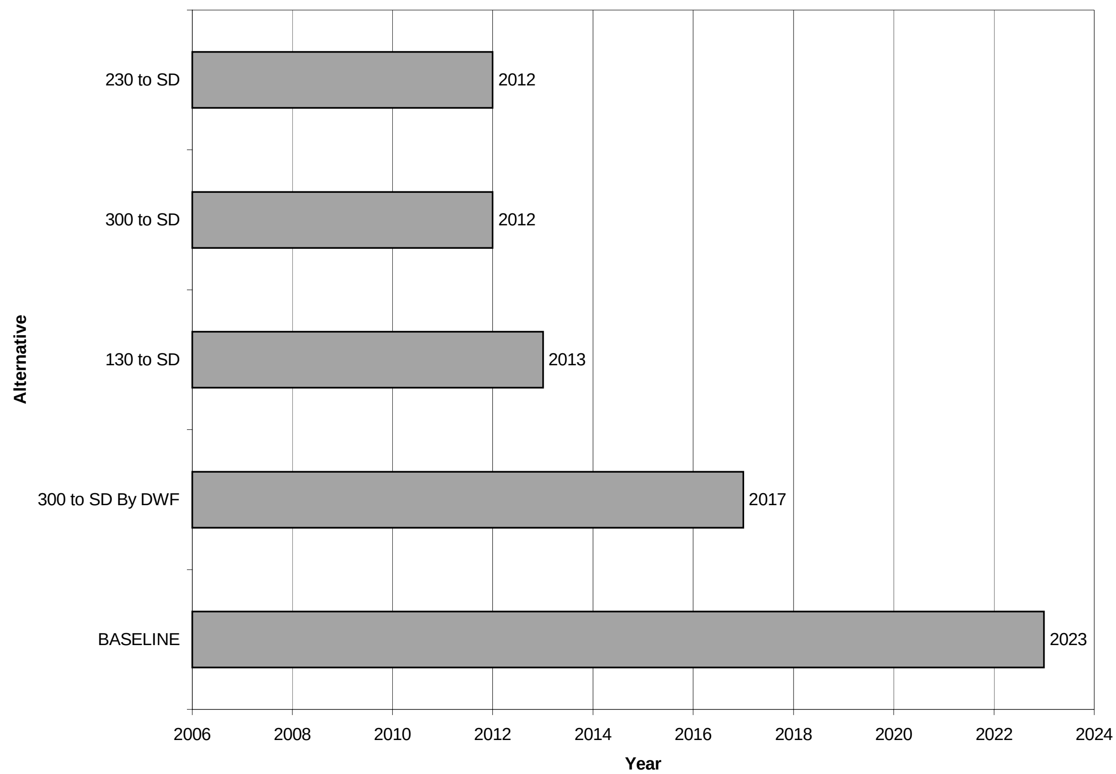

FIGURE 3.3-2
Year that Mean Salinity of the Salton Sea is Projected to Exceed 60 ppt Under the Baseline Condition and the Potential Range of Water Conservation Amounts and Transfer Locations

These unknowns could accelerate or decelerate the salinization of the Sea relative to the current projections. However, these factors would be expected to equally affect the projections with and without implementation of the water conservation and transfer programs. As such, the differences between the salinity projections with implementation of the water conservation and transfer programs and the baseline would not be expected to change substantially.

In the preceding discussion, tilapia were assumed to no longer be able to reproduce once the salinity of the sea reached 60 ppt and at that point their abundance at the sea would decline. The actual response of tilapia to increased salinity at the Salton Sea likely will be much less definitive for several reasons. First, relatively freshwater will continue to flow into the Salton Sea at the New, Alamo and Whitewater rivers and from the drains. Some tilapia could persist at the Salton Sea if low salinity areas persisted around the deltas and potentially near drain outlets. Second, given tilapia's ability to tolerate very high salinity levels as juveniles and adults, the deltas and drains could serve as a breeding population from which individuals could disperse to populate other areas of the sea until the salinity of the main body became intolerable to adults and juveniles. Third, tilapia at the Salton Sea could adapt or evolve to tolerate higher salinities. These three factors could act to extend the persistence and abundance of tilapia at the Salton Sea. Alternatively, increased stress associated with higher salinity could increase the susceptibility of tilapia to disease and lead to an increased incidence of massive die-offs. Although the exact response of tilapia to increased salinity cannot be predicted with certainty, it is reasonable to expect that the total tilapia population supported in the Salton Sea would be reduced relative to existing conditions. This reduction would occur with or without implementation of the water conservation and transfer programs. The potential effects of a reduction in tilapia at the Salton Sea on the four major piscivorous birds covered by the HCP are described below.

American White Pelican

White pelicans use the Salton Sea as a migratory stopover and wintering area. As a migratory stopover, individual pelicans appear to use the Salton Sea for a few weeks to a few months before continuing on their migration to Mexico (Shuford et al. 1999). Some birds probably remain at the Salton Sea throughout the winter rather than continuing on to Mexico.

The number of pelicans using the Salton Sea at any time varies substantially. According to counts reported by USFWS and aerial surveys conducted by Point Reyes Bird Observatory (Shuford et al. 2000), the Salton Sea at times supports one of the largest concentrations of white pelicans in the Pacific Flyway. McKay reported maximum counts of white pelicans at the Salton Sea during 1984 to 1990. The maximum counts ranged from 2,000 to 17,000 and usually occurred in February. The average of maximum counts for these years was 6,500 white pelicans. Based on a sharp decline in counts between 1985 and 1990, the population of pelicans using the Salton Sea was believed to be declining. However, the aerial surveys conducted in 1999 found 16,697 pelicans using the Salton Sea in January and February, a similar number as reported by McKay in 1985 (17,000; Shuford et al. 2000). The following November, Shuford et al. (2000) reported 19,197 pelicans at the Salton Sea. Christmas Bird count data show white pelicans at the Salton Sea in every year since 1979 (Figure 3.3-3). The number of birds observed in Christmas Bird Counts at the Salton Sea from 1979 to 2000 averages about 2,195. The USFWS recorded numbers of white pelicans at the Salton Sea for a 21-month period between December 1999 and August 2001. White pelican numbers were highest (24,110) in February 2000 and lowest (770) in June 2001 (Table 3.3-3).

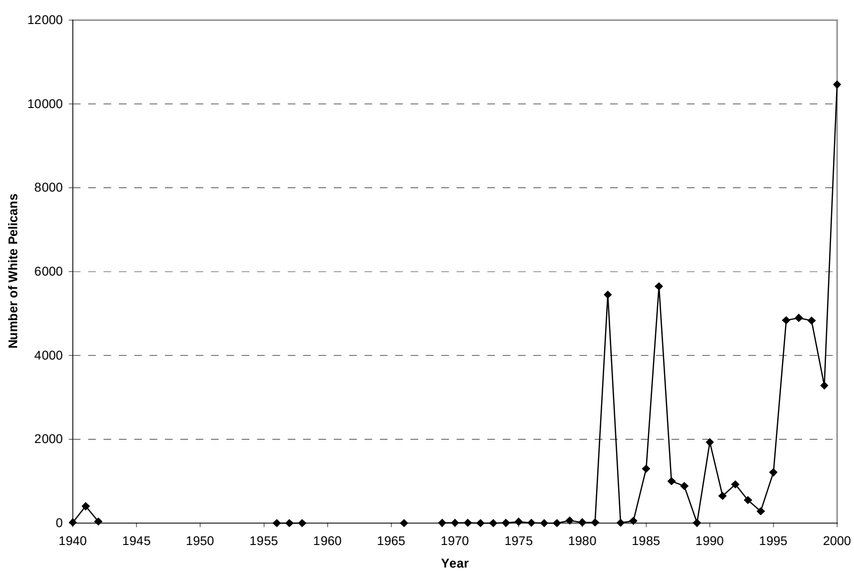

FIGURE 3.3-3
Number of White Pelicans Reported in Christmas Bird Counts at the Salton Sea from 1940 to 2000

TABLE 3.3-3
American White Pelicans Reported at the Salton Sea, California

Date	Number Counted
December 1999	5,000
January 2000	8,875
February 2000	24,110
March 2000	15,408
April 2000	7,255
May 2000	3,510
June 2000	3,459
July 2000	1,147
August 2000	994
September 2000	13,997
October 2000	5,075
November 2000	3,000
December 2000	7,380
January 2001	8,736
February 2001	18,705
March 2001	15,036
April 2001	3,200
May 2001	1,245
June 2001	770
July 2001	1,320
August 2001	7,430
Average	**7,412**

Source: Salton Sea Authority, Wildlife Disease Program

These data indicate that winter and migratory use of the Salton Sea is highly variable within and among years. While large numbers of white pelicans stop at the Salton Sea for brief periods of time on migration or exploit food resources at the sea sporadically during the winter, the average wintering population is much lower. Pelicans that overwinter at the Salton Sea usually are present in greatest numbers at the Salton Sea from November to April (Shuford et al. 2000). In addition to the Salton Sea, pelicans using the Pacific Flyway also overwinter along the California coast south of San Francisco, the San Joaquin Valley, throughout Baja California, and in the Gulf of California (Johnsgard 1993).

Pelicans are highly opportunistic and mobile in selecting foraging sites, and have been reported to travel long distances to forage even during breeding, an energetically stressful time (Knopf and Kennedy 1980). At Pyramid Lake, Nevada, pelicans have been reported foraging at seven different lakes during the breeding season. With the exception of Pyramid Lake where the breeding colony is located, all of the foraging sites were more than 37 miles from Pyramid Lake, with the farthest foraging site (Stillwater National Wildlife Refuge [NWR]), nearly 62 miles away (Knopf and Kennedy 1980). Knopf and Kennedy (1980) found that pelicans nesting at Pyramid Lake switched foraging locations frequently during the nesting season. Changes in foraging location appeared to be linked to the availability of fish. For example, pelicans used Pyramid Lake, the closest foraging location to the breeding colony, at relatively low levels except for June when tui chub became available in shoreline areas. Knopf and Kennedy (1980) characterized pelicans as “opportunistic in selecting foraging sites where fish are most readily available.” Johnsgard (1993) also notes the great distances that pelicans will travel to forage. Summarizing data from other studies, Johnsgard (1993) reports one-way foraging flights of up to 100 miles (Great Salt Lake), round trips of 60 to 380 miles (Chase Lake, ND), and one-way distances of 90 miles (Harvey and Warner basins).

The reported foraging behavior of white pelicans indicates that they seek the most favorable foraging area within a wide area. The availability of an abundant source of fish, tilapia in particular, makes the Salton Sea attractive to pelicans. With increased salinity of the Salton Sea, the abundance of tilapia would likely decline as described above. However, tilapia could persist at the Salton Sea, particularly in the New and Alamo River deltas. Pelicans currently concentrate foraging in the deltas (Shuford et al. 2000). With the continued persistence of tilapia at the Salton Sea, pelicans would likely continue to use the Salton Sea as a migratory stopover and wintering area. However, if salinity increases result in a substantial decline in the abundance of tilapia, it is reasonable to expect that the level of use of the Salton Sea by white pelicans would decline. A decline in the level of use of the Salton Sea by pelicans could be manifested as a shorter stopover time for birds that continue to wintering grounds farther south, lower numbers of birds, or shorter residence periods of overwintering birds. Given their opportunistic foraging strategy and ability to travel long distances, it is likely that pelicans would switch to other wintering areas if fish at the Salton Sea became less abundant and if the energetic costs of foraging there became greater than at other locations in California and Mexico. Other locations where white pelicans have been reported during migration and overwintering include the Lower Colorado River (LCR) (USFWS unpublished data), Mystic Lake and Lake Elsinore in southern California (G. Black, pers. comm. 2001), coastal bays along the southern California and Mexican coasts (Small 1994; Johnsgard 1993). As such, the actual level of take resulting from changes in fish abundance at the Salton Sea is uncertain. However, it is reasonably likely that the level of use of the Salton Sea by white pelicans would decline as tilapia abundance declined. This effect would occur with and without implementation of the water conservation programs. The effect of the water conservation programs would be to accelerate the rate at which this effect would be manifested.

Adult pelicans are capable of moving long distances to find food. As such, with a decline in the abundance of fish at the Salton Sea, at least some of the adult pelicans, albeit possibly not all, should be able to find alternate food resources. The segment of the population most at risk to adverse effects of reduced fish abundance at the Salton Sea likely would be first year birds. First year birds are not as experienced as older birds at locating food and exploiting food resources. For brown pelicans, Johnsgard (1993) suggested that the high mortality rate of first year birds and substantially lower mortality rate of birds older than 1 year reflected an improved foraging efficiency of older birds. Similarly, first year white pelicans could be the least adept segment of the population at finding and exploiting alternate foraging habitat with a decline in the abundance of fish at the Salton Sea. A portion of the birds using the Salton Sea, possibly disproportionately first year birds, could be injured or killed if they could not find alternate foraging habitat or forage efficiently.

California Brown Pelican

Brown pelicans probably had little historical use of the Salton Sea (Anderson, pers. comm. 1993). Some postbreeding pelicans were documented at the sea in the late 1970s. Use of the Salton Sea by brown pelicans subsequently increased, with the maximum summer usage estimated at 5,000 birds. Nearly 2,000 were recorded in 1999, but a maximum of only 1,000 were recorded in 2000 (Shuford et al. 2000). The USFWS recorded numbers of brown pelicans at the Salton Sea for a 21-month period between December 1999 and August 2001. Brown pelican numbers were highest (3,990) in July 2001 and lowest (5) March 2000 (Table 3.3-4).

TABLE 3.3-4
California Brown Pelicans Reported at the Salton Sea, California.

Date	Number Counted
December 1999	100
January 2000	50
February 2000	40
March 2000	5
April 2000	10
May 2000	82
June 2000	2,563
July 2000	1,948
August 2000	1,354
September 2000	918
October 2000	300
November 2000	319
December 2000	96
January 2001	38
February 2001	65
March 2001	6
April 2001	16
May 2001	530
June 2001	2,650
July 2001	3,990
August 2001	3,280
Average	**874**

Source: Salton Sea Authority, Wildlife Disease Program

The post-breeding visitors are mostly young birds that disperse northward from breeding areas in the Gulf of California (Hazard, pers. comm.). Most use of the Salton Sea is by post-breeding visitors, with more limited use for wintering. Shuford et al. (2000) reported that brown pelicans occur at the Salton Sea primarily from mid-June to early October. They observed the highest numbers in August. The primary wintering area in the United States is along the California coast (Johnsgard 1993).

Brown pelicans only recently, in 1996, started nesting at the Salton Sea (Shuford et al. 1999). The number of breeding birds has been low with 6 pairs nesting in 1996 and several pairs attempting to nest in most years since then (Shuford et al. 1999). Brown pelicans did not nest at the Salton Sea in 1999 (Shuford et al. 2000). Nesting birds have used tamarisk at the Alamo River delta and also attempted to nest at Obsidian Butte (S. Johnson, pers. comm. 2000). Compared to the nearest breeding colonies of brown pelicans located in the Gulf of California on San Luis Island (4,000 to 12,000 pairs), Puerto Refugio (1,000 to 4,000 breeding pairs) and Salsipuedes / Animas / San Lorenzo area (3,000 to 18,000 pairs), the population nesting at the Salton Sea makes a small contribution to the overall population. Other breeding populations occur off the southern California Coast and the western coast of Baja California (Johnsgard 1993).

Dispersing juveniles wander considerably from nesting locations and can travel long distances (Johnsgard 1993). Young eastern brown pelicans can move more than 310 miles from breeding areas (Johnsgard 1993). Similarly in California, most banded birds were recovered within 310 miles of the breeding site but one was found in Mexico, 1,375 miles away from the banding location (Johnsgard 1993). Adults also appear to become wanderers after breeding and have been reported to move 280 to 360 miles from nesting areas (Johnsgard 1993).

As previously described, the abundance of tilapia is expected to decline as the salinity of the sea increases. However, tilapia could persist at the Salton Sea, particularly in the New and

Alamo River deltas. Pelicans currently concentrate foraging in the deltas (Shuford et al. 2000). With the continued persistence of tilapia at the Salton Sea, brown pelicans would likely continue to visit the Salton Sea as post-breeders. Because post-breeding pelicans are known to wander over large areas, it is likely that the pelicans would remain at the Salton Sea for a shorter period of time and/or seek out more favorable foraging areas in the Gulf of California or along the Pacific Coast, if foraging becomes energetically unfavorable at the Salton Sea. These areas are within the distances that brown pelicans can travel. As such, the actual level of take of post-breeding visitors resulting from changes in fish abundance is uncertain. However, it is reasonably likely that the level of use of the Salton Sea by brown pelicans would decline as tilapia abundance declined. This effect would occur with and without implementation of the water conservation programs. The water conservation programs would only act to accelerate the rate at which this effect would be manifested.

Breeding only recently was initiated at the Salton Sea and only in small numbers of birds (6 pairs or fewer). Brown pelicans did not nest at the sea in 1999 (Shuford et al. 2000). Brown pelicans that have nested at the Salton Sea represent less than 1 percent of the California breeding population (Johnsgard 1993) and a far smaller percentage of the subspecies' entire population. Depending on the degree to which the tilapia population declines, brown pelicans might not nest at the Salton Sea again in the future Because of the small number of birds that have nested at the sea and the infrequency of nesting, the impact associated with the potential loss of future breeding opportunities for brown pelicans at the Salton Sea would be minor.

Black Skimmer

Black skimmers first appeared in California in 1962. Six years later five skimmers were sighted at the Salton Sea (Collins and Garrett 1996). The first nesting by black skimmers in California occurred in 1972 at the Salton Sea (Collins and Garrett 1996). Since black skimmers were first observed in California, their numbers have been steadily increasing. New breeding locations have been reported at several locations along the California coast from San Diego to San Francisco Bay and the number of birds using these various locations has generally been increasing (Table 3.3-5). In addition to the California nesting sites, black skimmers nest at Montague Island in the Gulf of California (Collins and Garret 1996).

At the Salton Sea, nesting colonies of black skimmers have ranged in size from 10 to several hundred pairs; most colonies consist of 50 to 200 pairs (Molina 1996). As many as 777 black skimmers have been reported in summer (Shuford et al. 2000). The Salton Sea is unique in being the only inland breeding site of this species and currently supports about 30 percent of the known breeding population in California. Skimmers nest on bare earthen slopes, terraces, and levees adjacent to the Sea. Specific nesting locations include Mullet Island, the Whitewater River delta, Morton Bay, Rock Hill, and Obsidian Butte.

After breeding, skimmers appear to be very mobile, moving among a number of wintering locations. Gazzaniga (1996) showed wide month-to-month fluctuations in the number of skimmers using five locations on the California coast. The reasons for the fluctuations were unclear, but she suggested that weather and food resources could play a role. Long distance movements by black skimmers also have been reported. Palacios and Alfaro (1992) captured birds banded at Bolsa Chica along the coast of Baja California and Gazzaniga (1996) observed a bird banded at Bolsa Chica at Princeton Harbor, 160 miles north of Bolsa Chica. Skimmers banded as chicks at Bolsa Chica have also been found breeding at Montague

Island in the Gulf of California (Collins and Garret 1996). In combination with the observed colonization of several locations on the California coast since the 1970s, these observations suggest that skimmers regularly travel long distances during the winter and will establish breeding colonies where suitable nesting conditions exist.

TABLE 3.3-5
Number of Pairs or Nest Initiations* by Black Skimmers at Various Locations in California, 1972-1995

Year	Salton Sea	San Diego Bay	Bolsa Chica	Upper Newport Bay	San Francisco Bay	Batiquitos Lagoon
1972	5					
1973	3					
1974	10					
1975	9					
1976	25	1				
1977	100	3				
1978	100	6				
1979	ND	14				
1980	0	30				
1981	0	25				
1982	0	35				
1983	0	50				
1984	0	++				
1985	47	150	10*			
1986	300	130	60*	2		
1987	500	++	106*	ND		
1988	100	200	150*	15		
1989	0	++	112*	45		
1990	100	++	338*	14		
1991	80	>157	398*	40		
1992	100	++	278*	++		
1993	300	326 (473*)	284*	++		
1994	450	310 (420*)	353*	++	2*	
1995	487	>200	201*	451*	2*	14*

Source: Collins and Garrett (1996)
ND: no data available
++ birds seen, possibly in large numbers, but no nest census data available.

Black skimmers could be adversely affected by the changes predicted at the Salton Sea in two ways. First, the water surface elevation of the Salton Sea is projected to decline and to create a land bridge to Mullet Island (see Section 3.3.2.2). The suitability of this nesting location for black skimmers could decline if predation or disturbance increased as a result of formation of the land bridge. In addition, other nesting and roosting locations could become less suitable for black skimmers as the sea elevation declines. Second, the increased salinity is expected to result in reduced abundance of tilapia. These effects would occur with or without implementation of the water conservation and transfer programs. However, the projected salinity change and decline in tilapia abundance could be accelerated by the water conservation programs.

Skimmers are believed to feed on young tilapia to a large extent at the Salton Sea (Molina 1996). While tilapia could persist at the Salton Sea, their abundance and reproductive rate is expected to decline. As a result, prey availability for skimmers could decline, and nesting might not be sustained or could occur at a lower level than currently is supported at the Salton Sea.

Double-Crested Cormorant

At the Salton Sea, cormorants nest on rocky ledges on Mullet Island or on dead vegetation at the deltas of the New and Alamo rivers. Snags in the Salton Sea are important for providing protected roost sites for double-crested cormorants. Cormorants regularly move between the Salton Sea and the lakes at the Finney-Ramer Unit of the Imperial Wildlife Area where they forage. Lakes at the Finney-Ramer Unit of Imperial WA also support double-crested cormorant nesting and roosting.

Double-crested cormorants are a common and abundant species at Salton Sea, with counts of up to 10,000 individuals (USFWS 1993; IID 1994). Small nesting colonies were documented at the north end of the sea in 1995 (USFWS 1996), but recently (1999) more than 7,000 double-crested cormorants and 4,500 nests were counted on Mullet Island. Mullet Island now represents the largest breeding colony of double-crested cormorants in California (Shuford et al. 1999). The year-round resident population is about 3,000 birds (Shuford et al. 2000).

With increased salinity of the Salton Sea, the abundance of cormorants at the Salton Sea could decline with reduced prey availability (i.e., tilapia). Increased salinity and reduced fish abundance at the Salton Sea would occur irrespective of the water conservation programs. However, the implementation of the water conservation programs could accelerate the occurrence of these changes. Changes in the suitability of nest and roost sites as the sea's elevation recedes also could occur. As described below, the sea's elevation is projected to decline under the baseline condition and with the water conservation and transfer programs. As a result, Mullet Island would become connected to the mainland potentially leading to increased disturbance or predation at the cormorant colony. Cormorants could abandon the colony on Mullet Island as a result of changes in the suitability of the site and/or changes in prey availability.

Even with changes in the suitability of foraging, roosting, and nesting habitat quality at the Salton Sea, cormorants would still inhabit the HCP area. They currently nest and roost on the Finney-Ramer Unit of the Imperial Wildlife Area (WA) and forage at lakes on this unit as well as in agricultural drains, reservoirs, and Fig Lagoon. The New, Alamo, and

Whitewater River deltas currently support nesting colonies of double-crested cormorants (Shuford et al. 2000) and would continue to provide nesting, roosting, and foraging opportunities. However, the large colony on Mullet Island would probably not persist.

Desert Pupfish

Desert pupfish have a high salinity tolerance. They have been collected and grown at salinities as high as 90 ppt (Kinne and Kinne 1962). Under baseline conditions, the projections show that the mean salinity of the Salton Sea would not exceed 90 ppt in 75 years. (Table 3.3-6). Thus, under baseline conditions, pupfish would be expected to be able to continue to use the sea to move among drains.

TABLE 3.3-6
Mean and Upper and Lower Bounds of the 95 Percent Confidence Interval Around the Year that Salinity of the Salton Sea is Projected to Exceed 90 ppt Under the Baseline Condition and Various Water Conservation and Transfer Scenarios

Scenario	Upper Bound	Mean	Lower Bound
Baseline	>2077 [a]	>2077[a]	2072
300 KAFY to SDCWA by Fallowing	2063	2051	2042
130 KAFY to SDCWA	2046	2037	2030
230 KAFY to SDCWA	2029	2026	2023
300 KAFY to SDCWA	2024	2022	2020

[a] The model projections stopped in 2077.
Source: Reclamation (January 2002)

With conservation using on-farm and system-based measures to conserve 300 KAFY, the mean projections show the salinity of the Salton Sea exceeding 90 ppt in 2022 (Table 3.3-6). At this salinity, the sea could become intolerable to pupfish and prevent them from moving among drains. If the sea becomes a barrier to pupfish, pupfish could be isolated in individual drains. Small, isolated populations are at risk of extinction because of environmental and genetic stochasticity. Ultimately, this condition also would occur under the baseline and with water conservation achieved with all fallowing, but at a later time.

3.3.2.2 Water Surface Elevation

The water surface elevation of the Salton Sea is projected to decline under both the baseline condition and with implementation of the water conservation and transfer programs. Under the baseline condition, the water surface elevation is projected to decline until a new equilibrium (evaporation equals inflows) is reached at about –235 ft mean sea level (msl) in the years 2070 to 2077 (Figure 3.3-4). The projected baseline is based on changes in current inflows as a result of the following:

- Continued and full implementation of the existing IID / MWD transfer
- Higher salinity in the Colorado River at Imperial Dam
- Reduced surplus flows available from the Colorado River
- Reduced contributions from the Coachella Aquifer

The IID / Metropolitan Water District of Southern California (MWD) transfer began producing water in about 1990, ramping up to full implementation in 1999. The projected baseline continues this transfer for the 75-year period at full implementation of 100 to 110 KAFY. The continued and full implementation of the IID / MWD transfer for the 75-year

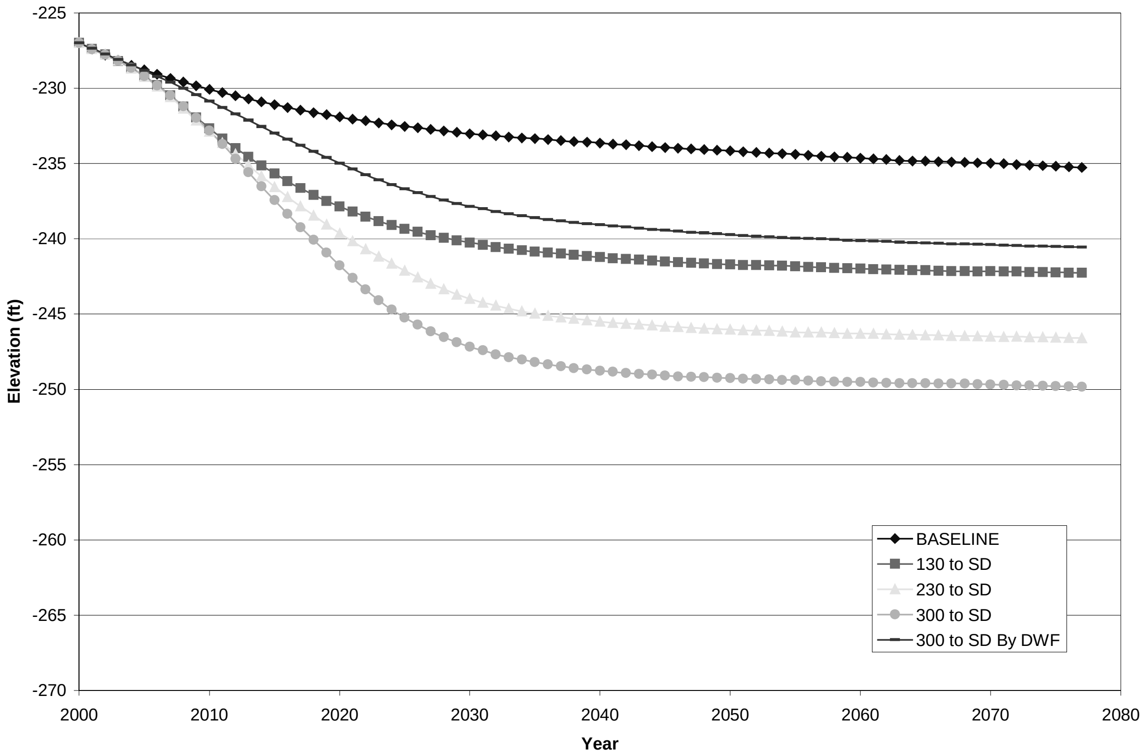

FIGURE 3.3-4
Projected Water Surface Elevation With and Without Implementation of the Water Conservation and Transfer Programs

period as projected in the IID / MWD Transfer EIR will on average reduce flows to the Salton Sea approximately 100 KAFY.

Higher salinity in the Colorado River will require that IID and Coachella Valley Water District (CVWD) divert more water from the Colorado River to leach salt from the agricultural fields for crop production. This however will be offset by California's Colorado River agriculture entitlement of 3.85 million acre-feet per year (MAFY) which will limit additional diversions from the Colorado River for this required additional salt leaching. As a result, crop yields and eventually crop production could decline resulting in less need for water and less return flows to the Salton Sea. In addition, some farmers may choose to idle some of their agriculture ground to allow for additional leaching of other more productive ground. The baseline modeling assumptions include this combination of a limit on agriculture diversions and the potential of idle ground for salt leaching. The net result to the baseline will be reduced flows to the Salton Sea over time.

Based on long-range forecasts of snowmelt runoff in the Colorado River Basin and the fact that all lower basin states are using their full entitlements leads to the conclusion of less surplus flows available from the Colorado River. As a result, the California agriculture water users will be limited to their entitlement of 3.85 MAFY. Currently CVWD requires surplus Colorado River water to meet its full demand. The projected baseline assumes that CVWD and IID would be limited to a maximum diversion of 3.43 MAFY (Palo Verde Irrigation District will continue to use 420 KAFY) in order to maintain the California agriculture entitlement of 3.85 MAFY. This is included in the baseline and, combined with the salt leaching projection, results in less diversion of Colorado River water by IID and CVWD, which reduces flows to the Salton Sea.

CVWD derives a portion of its water supply from groundwater. Based on population and agricultural growth within the CVWD and the limited water supply entitlement from the Colorado River, groundwater usage within the CVWD is required to continue into the future. Without additional recharge to this aquifer, the water table will continue to decline causing less inflows to the Salton Sea and CVWD projects that the Salton Sea water will eventually intrude into the CVWD aquifer. This assumption was included in the baseline projection and resulted in less flow to the Salton Sea over the modeling period.

Implementation of the water conservation and transfer programs would result in less inflow to the sea and would result in a more rapid decline in water surface elevation than under the baseline. With conservation of 300 KAFY through on-farm and system-based measures, the water surface elevation would decline rapidly for the first 35 years. After this period, the rate of elevation decline would lessen and the water surface elevation would stabilize at about –250 ft msl (Figure 3.3-5). With conservation of 300 KAFY through fallowing, the water surface elevation would decline at a faster rate than under the baseline condition (Figure 3.3-4), and stabilize at about –240 ft msl. Figure 3.3-5 shows the location of the shoreline at various surface elevations.

Nesting and Roosting Sites

Colonial nesting birds, including several covered species nest and roost on a number of small islands (islets) around the Salton Sea and a large island, Mullet Island. Bathymetry data of the Salton Sea indicates that the elevation of the land between the mainland and Mullet Island is less than –231 feet, or less than 4 feet below the existing surface water elevation (University of Redlands 1999). Thus, Mullet Island would be connected to the mainland with a decline in sea level of about 4 feet. Other islands used for nesting in addition to Mullet Island that could be connected to the mainland include a small barren islet at Johnson Street that supports gull-billed terns and black skimmers, and a single levee remnant at Elmore Ranch that has supported several species of ground-nesting birds. These sites are separated from the mainland by water that is about 2 to 3 feet deep.

The decline in water surface elevation projected for the baseline and the water conservation scenarios would result in these islands becoming connected to the mainland. Under the baseline condition, the water surface elevation would decline by about 8 feet. With conservation of 300 KAFY through on-farm and system-based measures, the water surface elevation is projected to decline about 27 feet. Although the islands would become connected to the mainland under all levels of conservation including the baseline condition, the timing would vary by a few years depending on the methods used to conserve water, the amount of conservation, and where the water is transferred (Table 3.3-7). With water conservation through on-farm and system-based measures, nesting islands could become connected to the mainland from 1 to 7 years earlier than under the baseline. Use of all fallowing to conserve water would decrease this difference to 0 to 4 years.

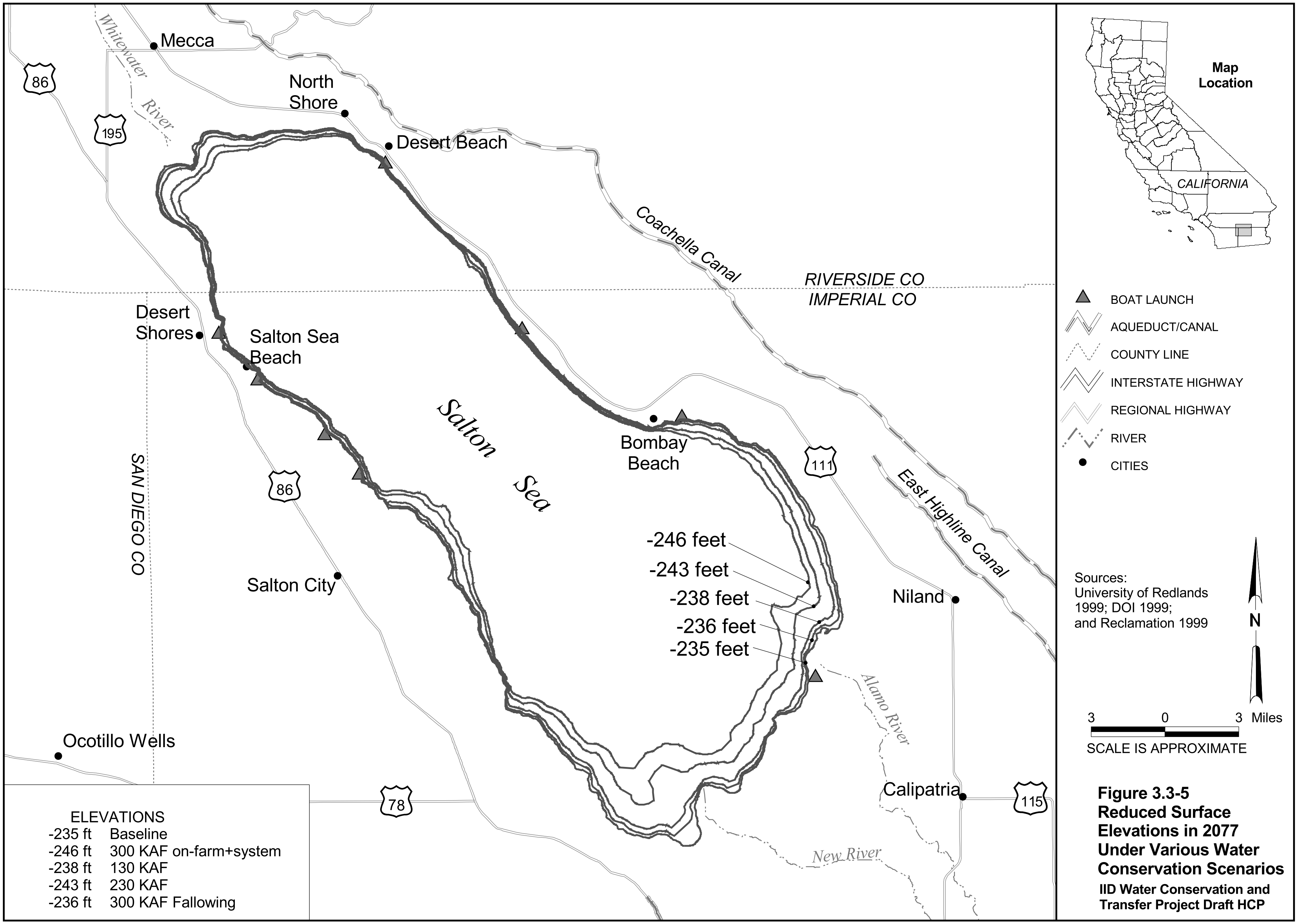

Figure 3.3-5
Reduced Surface Elevations in 2077 Under Various Water Conservation Scenarios
IID Water Conservation and Transfer Project Draft HCP

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TABLE 3.3-7
Year When the Water Surface Elevation of the Salton Sea is Projected to Decline 2, 3, and 4 Feet Under the Baseline Condition and Various Water Conservation and Transfer Scenarios.

	Elevation Decline		
	2 Feet	**3 Feet**	**4 Feet**
Baseline	2006	2010	2015
130 to SDCWA	2005	2007	2008
230 to	2005	2007	2008
300 to SDCWA	2005	2007	2008
300 to SDCWA by Fallowing	2006	2008	2011

Tamarisk Scrub Shoreline Strand

Depending on the relationship between the water surface elevation of the Salton Sea and maintenance of the shoreline strand and adjacent wetlands, the water conservation program could cause changes in the amount of tamarisk scrub habitat in shoreline strand and adjacent wetland areas. There is, however, considerable uncertainty about the extent of these possible changes. As the sea recedes, tamarisk could establish at lower elevations, replacing vegetation lost at high elevations. Alternatively, it has been suggested that tamarisk will not establish in areas exposed by a receding sea level because of excessive soil salinity (Reclamation and SSA 2000). In areas where drain water or shallow groundwater is the predominant water source, no change in tamarisk-dominated adjacent wetlands is expected. It is currently not possible to predict the magnitude of changes in tamarisk in shoreline strand and adjacent wetland areas.

3.3.2.3 Other Covered Activities

Through their effect on the rate of salinization and surface elevation decline, water conservation and transfer activities are the primary covered activities anticipated to impact covered species associated with the Salton Sea. Table 3.3-8 summarizes the relationships of other covered activities to covered species associated with the Salton Sea.

TABLE 3.3-8
Potential Effects of Covered Activities on Covered Species Associated with the Salton Sea

Activity	Potential Effects (Positive and Negative)
Water Use and Conservation	
Combined effects of on-farm and system-based water conservation	Water conservation could reduce the amount of water flowing to the Salton Sea and accelerate declines in sea elevation and accelerate the rate of salinization.
Installation of on-farm water conservation features	On-farm water conservation practices would be constructed within agricultural fields or their margins, removed from portions of the Salton Sea used by covered species.

TABLE 3.3-8
Potential Effects of Covered Activities on Covered Species Associated with the Salton Sea

Activity	Potential Effects (Positive and Negative)
Installation of system-based water conservation features	System-based water conservation practices would be constructed within the Imperial Valley in association with IID's conveyance system and in agricultural fields and their margins. System-based conservation activities would not be conducted at the Salton Sea.
Operation and Maintenance	
Conveyance system operation	Conveyance system operation is limited to moving water through the canals to meet customer needs and to address maintenance requirements. Other than the filling, draining and moving water through the canals, no physical effects are encompassed by conveyance system operation. No effects to covered species associated with the Salton Sea would be expected.
Drainage System Operation	
Rerouting or constructing new drains	IID reroutes or constructs about 2 miles of drains every 10 years. During the term of the permit IID could reroute drains near the Salton Sea to ensure adequate drainage and to provide connectivity among drains for pupfish. However, given the infrequent, transient and localized nature of the activities, no effects to covered species associated with the Salton Sea would not be expected.
Piping drains	IID does not anticipated piping drains at the Salton Sea.
Inspection activities	Potential effects of inspection activities would be limited to a minor potential for disturbance of covered species if they occur in the vicinity of structures at the time of inspection.
Canal lining maintenance	Canal lining maintenance consists of repairing the concrete lining of canals only. Lined canals do not occur in portions of the Salton Sea used by covered species.
Right-of-way maintenance Embankment maintenance Erosion maintenance	Along drains, right-of-way maintenance, embankment maintenance and erosion maintenance is conducted in association with vegetation control/sediment removal along drains. Given the infrequent, transient and localized nature of the activities, no effects to covered species associated with the Salton Sea would be expected.
Seepage maintenance	Seepage maintenance is conducted only along the canal system and consists of repairing leaks. Few canals occur near the Salton Sea in areas used by covered species associated with the Salton Sea. Given the infrequent, transient and localized nature of the activities, no effects to covered species associated with the Salton Sea would be expected.
Structure maintenance	Few structures requiring replacement occur at the Salton Sea in areas used by covered species. With the infrequent, transient and localized nature of the activities, no effects to covered species associated with the Salton Sea would be expected.
Pipeline maintenance	No piped drains occur at the Salton Sea.
Reservoir maintenance	No reservoirs occur at the Salton Sea.
Sediment removal Vegetation control	IID controls vegetation and removes sediment from drains that discharge directly to the sea. Because these activities are localized (within and immediately adjacent to the drain channels) and conducted relatively infrequently on drains discharging directly to the Sea (about once every 5 years), they have a minor potential to affect species associated with the Salton Sea. Effects to desert pupfish are addressed separately in Section 3.7.

TABLE 3.3-8
Potential Effects of Covered Activities on Covered Species Associated with the Salton Sea

Activity	Potential Effects (Positive and Negative)
New and Alamo River maintenance	IID dredges the deltas of the New and Alamo rivers about once every four years. In conducting this dredging, IID retains the vegetation on the banks. Thus, habitat is not removed by these dredging operations, but the dredging could temporarily disturb covered species using the deltas. IID coordinates with USFWS at the refuge prior to conducting these activities.
Salton Sea dike maintenance	Salton Sea dike maintenance activities consist of replacing riprap, grooming embankments and repairing damaged sections of the dikes. With the infrequent, transient and localized nature of the activities, no effects to covered species associated with the Salton Sea would be expected.
Gravel and rock quarrying	IID quarries gravel and rock from two quarries adjacent to the Salton Sea (Red Hill and Pumice Island).The quarries are barren and do not support vegetation. Covered species associated with the Salton Sea are not known to occur at either of these quarries.
Fish hatchery operation and maintenance	The fish hatchery is located in the Imperial Valley, removed from the Salton Sea.
Recreational facilities	IID conducts dredging at Salton Sea Beach, Corvina Beach and Bombay Beach about every 60 days. IID also dredges at Red Hill Marina on request. This dredging presents a minor potential to displace birds that are foraging or resting on the water in the vicinity. The HCP does not cover take of covered species by recreationists.
HCP/EIS/EIR mitigation	IID would have the flexibility in locating specific HCP and EIR/EIS mitigation measures away from sensitive areas for covered species (e.g., nesting or roosting sites).

3.3.3 Approach and Biological Goals

The overall goal of the Salton Sea Conservation Strategy is to maintain the same duration and level of use of the Salton Sea by covered piscivorous birds, to maintain viable populations of desert pupfish occupying the drains that discharge directly to the Sea, and to provide habitat to support the species composition and seasonal occurrence of riparian-associated covered species that could use tamarisk scrub habitat in the HCP Area. This overall goal is to be accomplished through implementing measures to meet the following specific objectives.

- Avoid and minimize the effects of increased salinity on the fish that provide the forage base for covered piscivorous birds using the Salton Sea
- Maintain connectivity and genetic exchange among populations of desert pupfish inhabiting the drains
- Avoid and minimize take of covered species associated with loss of tamarisk scrub habitat
- Create or acquire and preserve native tree habitat to mitigate any take of covered species caused by removal of tamarisk

3.3.4 Salton Sea Mitigation Measures

The water conservation and transfer program could affect covered species at the Salton Sea in two ways: acceleration in the rate at which salinity increases in the Salton Sea and a reduction of the surface elevation. The primary effect of increased salinity is the earlier loss of fish in the Sea and the loss of the forage base for covered piscivorous birds. The primary effects of a reduction in Sea elevation are the potential loss of tamarisk scrub habitat adjacent to the Sea used by covered species and creation of land bridges to islands used by covered species for nesting and roosting. The measures developed to address these potential impacts are presented below.

Salton Sea–1. *IID will avoid and minimize the potential for take of covered piscivorous birds resulting from implementation of the water conservation and transfer project by acquiring and discharging additional water the Salton Sea. The amount of water discharged to the Sea will be sufficient to offset the reduction in inflow to the Salton Sea caused by the water conservation and transfer project and to maintain salinity in the Sea at or below 60 ppt until the year 2030. The annual amount of mitigation water discharged to the Sea will be equal to the actual discharge reduction caused by the water conservation and transfer program plus or minus any amount of water necessary to maintain the salinity trajectory of the 95 percent confidence bound under the baseline (Figure 3.3-6). IID will not be required to discharge water to the Sea for mitigation if the discharge of that water increases the surface elevation of the Salton Sea above the level established by the projected elevation change as shown for the Proposed Project in Figure 3.3-7. IID may discontinue to discharge water to the Salton Sea for mitigation prior to 2030 if a Salton Sea restoration project is implemented or if it can be demonstrated that tilapia can no longer reproduce successfully in the Sea.*

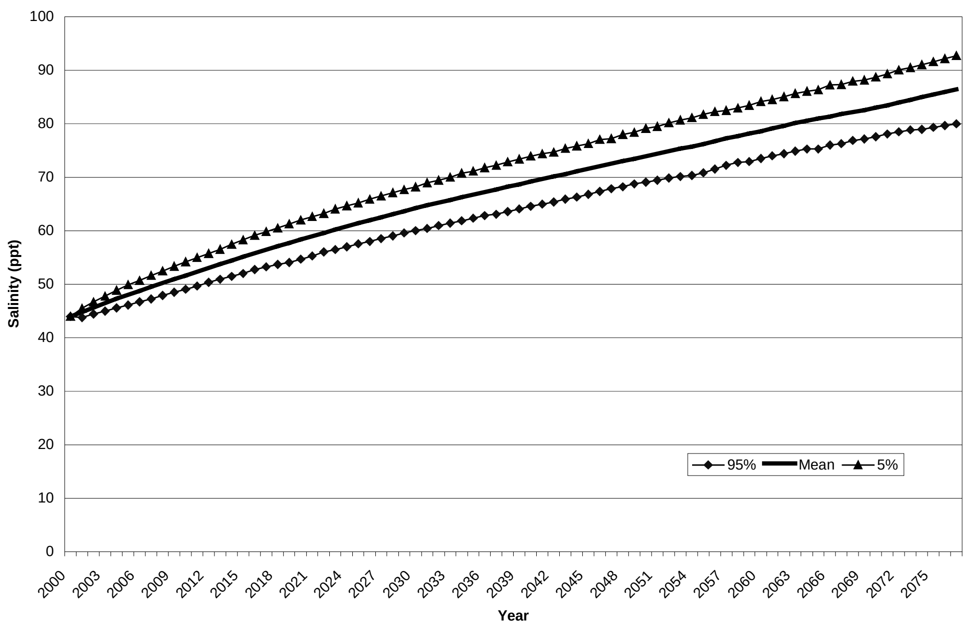


FIGURE 3.3-6
Salinity Projections in the Salton Sea Under the Baseline

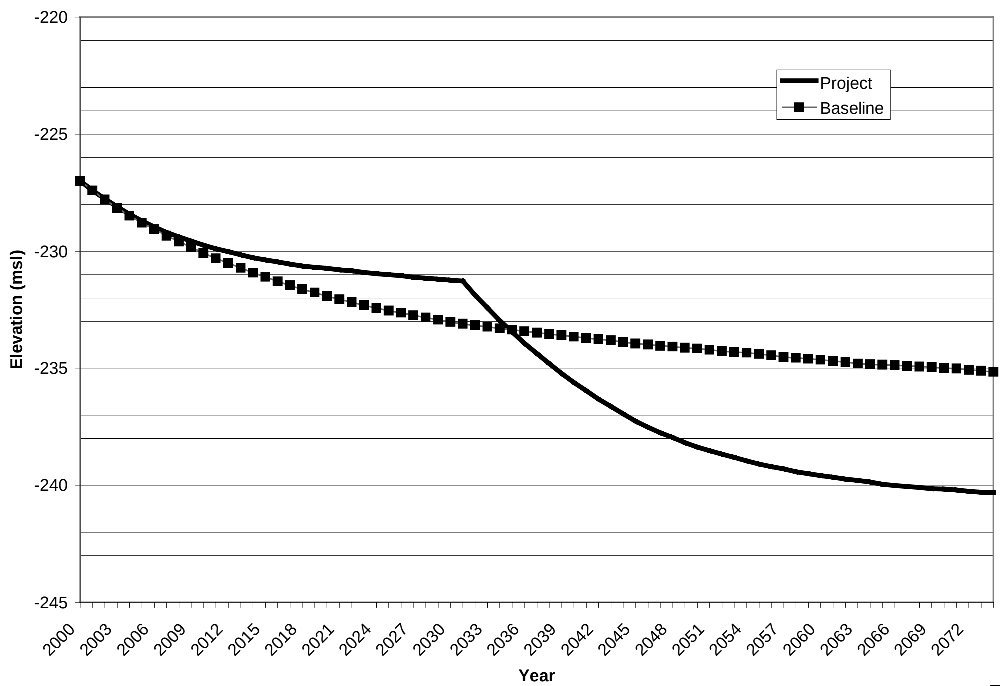


FIGURE 3.3-7
Projected Mean Water Surface Elevation of the Salton Sea Under the Proposed Project and the Baseline

Under this measure, IID would conserve and discharge water to the Salton Sea for the purpose of mitigating the impact of the water conservation and transfer program on salinity in the Sea and avoiding and minimizing the indirect effects on fish and covered piscivorous birds. The amount of water used to mitigate project effects on salinity and the number of years over which that water would be discharged to the Sea was based on the projection of when salinity in the Sea would reach a level at which tilapia could no longer reproduce. By maintaining suitable salinity conditions in the Sea, IID would ensure continued persistence of fish (and therefore piscivorous birds) for a period the same as that projected under the baseline. Under this strategy, the duration and level of use of the Salton Sea by piscivorous birds would be expected to be the same as under the Baseline.

Two elements of uncertainty were considered in defining the increment of impact associated with the water conservation and transfer component of the Proposed Project: (1) the uncertainty associated with the projection of when the salinity threshold (i.e., 60 ppt) for reduced fish reproduction would be reached and (2) the uncertainty associated with the accuracy of the threshold. The uncertainty associated with defining when the threshold would be reached was addressed through the modeling of the salinity in the Salton Sea. To account for the variability in the factors that influence salinity (e.g., hydrology), multiple runs of the Salton Sea model were made in which the variables were allowed to differ in each iteration. From these model runs, the probability (mean and 5/95 percent confidence bounds) of the projected salinity trajectory under the Salton Sea Baseline was determined (Figure 3.3-6). These projections indicate a 90 percent probability that the actual salinity trajectory will fall between the lines representing the 5 and 95 percent confidence bounds. The mean of the modeled projections indicated that salinity in the Salton Sea would reach 60 ppt under the Salton Sea Baseline in the year 2023. Thus, under the assumption that 60 ppt accurately represents the threshold above which fish production and bird use will decline at the Sea, IID could avoid and minimize the impact of any Project-related take of piscivorous birds by maintaining salinity at levels less than 60 ppt until 2023.

As described in the HCP, the best available information suggests that growth, survival, and reproduction of tilapia would begin to decline at a salinity of about 60 ppt (Costa-Pierce and Riedel 2000a). However, because of the complexity of the Salton Sea ecosystem and other factors that contribute to reproductive success of tilapia, the actual threshold could be lower or higher than 60 ppt. Available data are insufficient to gain better precision on the threshold or to calculate confidence bounds. Because of the uncertainty associated with the salinity threshold for tilipia in the Salton Sea could not be quantified, a salinity of 60 ppt was used. This salinity value represents the best professional judgment of scientists very familiar with this species in the Salton Sea and because no information could be found in the scientific literature to suggest a different threshold should be used. The uncertainty associated with the model predictions was quanitified in the form of 5- and 95-percent confidence intervals on the model projections. In order to allow the slowest reasonable increase in salinity under the Baseline guide mitigation requirements, the 95-percent confidence interval, which indicates that a salinity of 60 ppt would be exceeded in the year 2030, was used as the basis of the mitigation.

Under this revised strategy, IID would avoid the potential for take of covered piscivorous birds resulting from implementation of the water conservation and transfer component of the Project by discharging mitigation water to the Salton Sea. The amount of mitigation water would be sufficient to offset the reduction in inflow to the Salton Sea caused by the Proposed Project and to maintain salinity in the Sea at or below 60 ppt until the year 2030. The annual amount of mitigation water would be equal to the actual inflow reduction caused by the water conservation and transfer component of the Project plus or minus an amount of water necessary to maintain the target salinity trajectory. This trajectory would correspond to the salinity projection for the 95 percent confidence bound (see Figure 3.3-6) until 2030. However, because of the continued threat of potential flooding of lands adjacent to the Salton Sea, IID would not be required to discharge mitigation water to the Sea if the discharge of that water would increase the surface elevation of the Salton Sea above the levels established by the projected elevation change associated with the Proposed Project (Figure 3.3-7). That is, IID would not be required to discharge water to the Sea in years in which the elevation of the Sea was at or above the elevation projection for the Proposed Project described in Figure 3.3-7 due to unforeseen increases in elevation (e.g., increased inflow from a major storm event). In addition, IID could discontinue to discharge water to the Salton Sea for mitigation prior to 2030 if a Salton Sea restoration project were implemented or if it could be demonstrated that tilapia were no longer successfully reproducing in the Sea.

Mitigation water sources to offset Project-related inflow reductions could be acquired by IID by fallowing in the Imperial Valley or by using any other legally permissible water provided to IID for this purpose by other parties to the Quantification Settlement Agreement (QSA), by state or federal agencies, by any other third parties willing to contribute to the mitigation effort, or any combination of the foregoing. The use of water obtained by IID from sources outside the Imperial Valley could require appropriate subsequent environmental review. The amount of water discharged to the Sea would be calculated annually based on the proportion of efficiency conservation (e.g., system and on-farm) and fallowing used to generate the water for transfer. As previously described, the amount of water discharged annually would match the anticipated Project-related reduction in inflow plus or minus any increment necessary to maintain the salinity trajectory, but not to exceed the elevation levels projected for the Project as described above.

By maintaining suitable salinity conditions in the Sea, IID would ensure continued persistence of fish (and therefore piscivorous birds covered by the HCP) for a period consistent with that projected under the Salton Sea Baseline. Under this approach, the level and duration of use of the Salton Sea by piscivorous birds would be expected to be the same as under the Salton Sea Baseline. In addition, maintaining the salinity trajectory associated with the 95 percent confidence bound until 2030 likely would result in a deceleration in the rate of salinization in the Sea. Any improvement over the Salton Sea Baseline likely would benefit piscivorous birds by extending the period of time that fish are supported in the Sea.

Avoiding salinity impacts also would result in the avoidance of biological impacts associated with changes in surface elevation. Because water surface elevation in the Sea under this strategy would be held at or above the Salton Sea Baseline projections, conservation-related changes in the use of nesting islands by covered species would not occur as a result of the Project. Likewise, potential impacts on the tamarisk scrub community adjacent to the Sea (e.g., shoreline strand) would not be affected by the Project prior to 2030 and might be avoided altogether. Implementation of this strategy also provides the ancillary benefit of allowing time for a Salton Sea restoration project to be developed.

Salton Sea–2. *IID will ensure that an appropriate level of connectivity between pupfish populations within individual drains (at the north and south ends of the sea) that are connected to the Salton Sea either directly or indirectly and that are below the first check will be maintained in the event that conditions in the Salton Sea become unsuitable for pupfish during the term of the HCP. When the salinity of the Salton Sea reaches 90 ppt (or lower as determined by the HCP IT), IID will work with the HCP IT to prepare and implement a detailed plan for ensuring genetic interchange among the pupfish populations in the drains. IID will continue to maintain created pupfish habitats for the duration of the term of the permits. IID also will construct and maintain one pupfish refugium pond consistent with the "Desert Pupfish Recovery Plan." This pond will be maintained for the purpose of assisting in the recovery efforts for that species. IID will work with the HCP IT to determine the location, timing, and technique in implementing this measure.*

As previously described, desert pupfish occupy many of IID's drains that discharge directly to the sea. Similarly, many of CVWD's drains that discharge directly to the sea also support pupfish. Individual pupfish are believed to use shoreline pools and the Salton Sea to move among the various drains. As the sea becomes more saline and nears the limit of pupfish tolerance, movement among the drains could cease and isolate populations. Small, isolated populations are more susceptible to problems associated with reduced genetic variability and the effects of random environmental events. To avoid the potential for isolating pupfish populations in the drains, IID will work with the HCP IT to restore a connection between populations or otherwise ensure continued genetic exchange among populations. IID will ensure connectivity among drains at the north end of the sea and among drains at the south end of the sea but not between drains at the north and south ends of the sea. This would be accomplished by constructing new drain channels or rerouting channels to encourage confluence.

Pupfish have a high salinity tolerance, and have been recorded at a salinity of 90 ppt. Model results suggest that with implementation of Salton Sea–1, the 90 ppt level would not be reached for at least 50 years. Given the time period between project initiation and when mitigation would be required, IID will defer the specifics of the mechanism by which connectivity will be achieved in order to take advantage of additional information that might be available at the time mitigation is necessary. When the salinity of the Salton Sea reaches 90 ppt (or lower as determined by the HCP IT), IID will work with the HCP IT to prepare a detailed plan for ensuring genetic interchange among the pupfish populations in the drains. The plan will be submitted to USFWS and CDFG for approval before implementation. The plan will include construction details, the schedule for completion, and a monitoring program to demonstrate effectiveness (including adaptive management elements if appropriate). The budget allocated for ensuring genetic interchange among populations in the drains will be based on the assumption that physical connections (channels) will be constructed and maintained. However, this should not preclude IID or the HCP IT from developing more suitable alternatives, which would need to be approved by the USFWS and CDFG.

In addition to ensuring connectivity among pupfish populations, IID will take a positive step to contribute to the recovery of desert pupfish by constructing and managing a refugium pond to support a population of pupfish consistent with the goals of the *Desert Pupfish Recovery Plan* (Marsh and Sada 1993). The pond will be designed and located in consultation with the HCP IT, USFWS, and CDFG. IID will develop a detailed plan in coordination with the HCP IT, and the USFWS and CDFG will have approval of the plan. The USFWS and CDFG will be responsible for identifying the source population. A person qualified to capture and handle pupfish and that meets the approval of CDFG and USFWS will make the introductions. Management of the pond will be carried out by IID, although IID may choose to transfer management to another entity (e.g., USFWS or CDFG). Any transfer of management responsibility would be accompanied by a management endowment to ensure continued management until the end of the term of the HCP.

Salton Sea–3. *IID will conduct the following to address potential changes in tamarisk scrub habitat adjacent to the Salton Sea. Upon completion of the implementation of Salton Sea–1(i.e., 2030 or sooner), IID will conduct a survey of the areas designated as (1) "shoreline strand," (2) "adjacent wetland" with tamarisk as the primary vegetation as shown in the Salton Sea Digital Atlas (University of Redlands 1999), and (3) currently inundated areas that become exposed in the future by a reduction in water surface elevation of the Salton Sea. The general approach to the survey is described in Chapter 4. In consultation with the HCP IT, IID will develop the specific survey protocol necessary to establish the acreage in 2030 and to verify and quantify net changes in the total amount of tamarisk in shoreline strand and adjacent wetland areas in the future. The study plan will be submitted to USFWS and CDFG for approval.*

If the survey conducted in 2030 (or sooner based on cessation of Salton Sea–1) shows no change or a net gain in the acreage of tamarisk relative to the 2,642 acres currently available, no mitigation will be required at that time. IID will repeat the survey every 5 years for the remainder of the permit term, but may choose to conduct the surveys more frequently. If the acreage of tamarisk scrub in shoreline strand, adjacent wetland, and currently inundated areas exposed in the future is found to be less than 2,642 acres at any time during the remainder of the permit, and the reduction can be reasonably attributable to the water conservation and transfer project, IID will mitigate the net loss (i.e., the difference between the acreage found in survey and 2,642 acres except as qualified below) by acquiring or creating native tree habitat as described below. IID will not be responsible for losses of tamarisk clearly caused by unrelated activities such as fire, or chemical or mechanical removal by a landowner other than IID. Under no circumstances will IID be required to mitigate losses of tamarisk scrub greater than 2,642 acres.

If necessary, IID will create or acquire native tree habitat consisting of mesquite bosque or cottonwood-willow habitat in amounts calculated based on the following ratios.

- *If IID creates habitat prior to the surveys showing a net loss in the amount of tamarisk, the mitigation ratio for the acreage of created habitat to net lost acreage of tamarisk will be 0.25:1 as long as the created habitat meets the success criteria.*

- *If IID creates habitat after the surveys show a net loss or IID acquires existing habitat, the mitigation ratio for the acreage of the created or acquired habitat to lost acreage of tamarisk will be 0.75:1. The habitat will be created or acquired within 1 year of documenting a net reduction in tamarisk scrub unless otherwise agreed to by IID, USFWS, and CDFG.*

- *If IID elects to acquire habitat, IID will work with the HCP IT to identify a property for acquisition. Habitat to be acquired must support mesquite bosque or cottonwood-willow habitat and occur within the Salton Sea Basin. If the only available properties that meet these requirements are larger than required to compensate for the lost acreage, IID will acquire the least expensive property. IID can use the additional acreage of the acquired habitat to fulfill future mitigation obligations of Tree Habitat–1 or Tree Habitat–2. IID will place a conservation easement on acquired lands and provide for the property to be managed for covered species for the term of the permit. Within 1 year of recording the conservation easement, IID will prepare and submit to USFWS and CDFG for approval a management plan for the property that describes how the property will be managed. The management plan will describe the actions that IID will take to maintain the ecological functions of the acquired habitat. While the specific management needs will vary depending on the property acquired, considerations for the management plan include:*

  - *Measures to control human access (e.g., fencing, signage)*
  - *Frequency at which land will be visited to assess maintenance/management needs*
  - *Types of maintenance action (e.g., removing garbage, repairing fences)*
  - *Vegetation management practices (e.g., prescribed burning, removal of exotic plants)*

With the approval of USFWS and CDFG, which approval shall not be unreasonably withheld, IID may transfer the land to a third party who agrees to and is authorized to manage the land for habitat conservation purposes. If IID transfers the land to a third party, IID will establish an endowment fund adequate to provide for the management of the lands for the term of the permit.

If IID elects to create habitat, IID will develop a habitat creation and management plan. The habitat creation and management plan will include the following information:

- *Location*
- *Planting plan (including species composition and layout)*
- *Grading and other construction activities*
- *Long-term management practices*
- *Vegetation and species use monitoring*
- *Success criteria for the plantings and the actions that IID will take if the success criteria are not met*

If a Salton Sea restoration project is implemented that affects the water surface elevation of the Sea prior to 2030, IID will not be required to conduct the surveys or mitigate any changes in the amount of tamarisk scrub adjacent to the Sea. If a Salton Sea restoration project is implemented following completion of Salton Sea – 1, IID will discontinue monitoring the shoreline strand and adjacent wetlands and will not be responsible for mitigating any additional reductions in the amount of tamarisk in these areas over the term of the permit. Further, in the event that mitigation water is allowed to flow to the Sea beyond 2030 (e.g., mitigation of air quality impacts), IID will not be required to conduct surveys or mitigate changes in the amount of tamarisk scrub adjacent to the Sea.

The Salton Sea database identifies 293 acres of shoreline strand habitat along the Salton Sea. Shoreline strand habitat consists of tamarisk and iodine bush. In addition to the shoreline strand, the Salton Sea database identifies 2,349 acres of adjacent wetlands dominated by tamarisk. The source of the water that supports the shoreline strand community is uncertain but could consist of a combination of shallow groundwater and seepage from the Salton Sea. The extent to which the water surface elevation of the Salton Sea contributes to supporting this community is uncertain.

Depending on the relationship between the water surface elevation of the Salton Sea and maintenance of the shoreline strand and adjacent wetlands, the water conservation program could cause changes in the amount of tamarisk scrub habitat in shoreline strand and adjacent wetland areas once mitigation water is no longer supplied to the Sea (i.e., 2030). There is, however, considerable uncertainty about the extent of these possible changes. As the Sea recedes, tamarisk could establish at lower elevations, replacing habitat lost at high elevations. Alternatively, it has been suggested that tamarisk will not establish in areas exposed by a receding sea level because of excessive soil salinity (Reclamation and SSA 2000). In areas where drain water or shallow groundwater is the predominant water source, no change in tamarisk-dominated adjacent wetlands is expected. It is currently not possible to predict the magnitude of changes in tamarisk in shoreline strand and adjacent wetland areas.

Because of the uncertainty about the potential changes in the amount of tamarisk scrub adjacent to the Salton Sea, IID would monitor changes in this community and mitigate measured net losses in the amount of tamarisk reasonably attributable to the conservation and transfer of water. Within three years following the discontinued supply of mitigation water to the Sea (i.e., 2030), IID will conduct a field survey to determine areas typed as shoreline strand or adjacent wetland with tamarisk as the primary vegetation as shown in the Salton Sea Digital Atlas (University of Redlands 1999). The habitat boundaries will be determined, and the percent coverage by live tamarisk and dead tamarisk will be estimated. This information will establish the baseline and provide the basis for determining the extent of future changes in tamarisk scrub.

Potential impacts to the tamarisk scrub adjacent to the Salton Sea as a result of the covered activities would be associated with water conservation and transfer after 2030 and the resulting projected decline in the water surface elevation of the Salton Sea. Hydrologic modeling of the Proposed Project indicates that the water surface elevation would decrease at a slower rate than the Baseline prior to 2030, but decrease more rapidly than the Baseline after 2030 (see Figure 3.3-7).

IID will monitor the tamarisk scrub every 5 years after 2030 to identify reductions in tamarisk that occur as the plants adjust to the new sea elevation. It is important to note that the water surface elevation is projected to decline in the absence of the proposed water conservation and transfer programs as well. However, it will not be possible to differentiate changes in the adjacent wetland/shoreline strand community attributable to the conservation and transfer relative to the changes that would have occurred in the absence of the transfer. Nevertheless, IID has agreed to mitigate measured changes in the amount of tamarisk scrub that occur following 2030 in the delineated shoreline strand and adjacent wetland areas.

IID will continue to survey the adjacent wetland and shoreline strand areas every five years after completion of the baseline survey for the remainder of the HCP term. These data will be compared with the previous survey data to determine if there was a decline in the amount of tamarisk scrub habitat. In addition to evaluating changes in the shoreline strand and adjacent wetlands demarcated in the Salton Sea Digital Atlas (University of Redlands 1999), IID will review aerial photographs and conduct ground-truthing to determine if tamarisk scrub has colonized new areas in response to changes in sea elevation. The acreage of any new areas of tamarisk scrub will be determined. If the baseline acreage of tamarisk scrub established in 2030 is greater than the 2,642 acres currently available, IID would have no mitigation obligation. If the 2030 baseline acreage is less than 2,642, IID would be obligated to create or acquire and preserve native tree habitat to mitigate any take of covered species resulting from net loss of tamarisk scrub relative to the 2030 baseline levels. Net changes in the amount of tamarisk scrub would be identified in the surveys conducted subsequent to 2030. IID's mitigation responsibility would extend only to net losses reasonably attributable to reductions in Sea elevation and not to losses clearly caused by unrelated activities such as fire, or chemical or mechanical removal by a landowner other than IID. Under no circumstances would IID be required to mitigate a loss of more than 2,642 acres.

IID may mitigate net losses of tamarisk scrub in two ways: (1) acquire native tree habitat or (2) create native tree habitat. IID may elect to create native tree habitat prior to a reduction in tamarisk occurring. In this case, IID would be able establish functioning native tree habitat prior to any loss in tamarisk scrub. Native tree habitat has a higher value than tamarisk scrub. Based on the relative habitat values developed by Anderson and Ohmart (1984), the habitat value of native tree habitat is about four times greater than tamarisk. Thus, IID would replace tamarisk at a 0.25:1 ratio (native tree to tamarisk), if it creates native tree habitat prior to measuring a reduction in tamarisk in the shoreline strand or adjacent wetlands.

If IID acquires native tree habitat or creates native tree habitat after measuring a net loss, a higher mitigation ratio (0.75:1) will be used to determine the acreage of native tree habitat to acquire or create. In the case of acquiring habitat, a higher mitigation ratio is used because there would be a net loss of vegetation. A higher mitigation ratio also is used if habitat is created after the reduction has been measured to account for the delay between when the habitat is created and when it starts functioning as habitat.

IID will maintain or provide funding for the maintenance of created/acquired native tree habitat until the end of permit term. At the end of the permit, IID would either stop water conservation or continue with the water conservation and transfer program covered by this HCP. If IID continues with the water conservation and transfer program, then the impacts attributable to the water conservation and transfer program would continue. Compliance with FESA would need to be extended and likely would include continued maintenance of created/acquired native tree habitat to mitigate the impact associated with continuing the water conservation and transfer program. Alternatively, if IID terminated the water conservation and transfer project after 75 years, inflow from the IID Water Service Area to the Salton Sea would return to pre-project levels and therefore, the elevation of the Salton Sea would increase toward pre-project levels. To the extent that a decline in the sea elevation from the water conservation and transfer project caused a reduction in tamarisk scrub in adjacent wetland areas, tamarisk would be expected to reestablish in these areas as the sea elevation increased. With the reestablishment of tamarisk after cessation of the water conservation and transfer project, continued maintenance of native tree habitat created or acquired under this measure would not be necessary to maintain habitat values for covered species. Therefore, it is not necessary to maintain native tree habitat that is created or acquired under this measure in perpetuity.

3.3.5 Effects on Covered Species

Covered species potentially using the Salton Sea in the HCP area include resident breeding species, migratory breeding species, short-term residents during winter or migration, and transient species that occur in the HCP area irregularly during migration or other wanderings. Under the Salton Sea Conservation Strategy, IID would conserve additional water and allow that water to flow to the Sea to address potential changes in fish resources. In addition, IID would implement specified measures to address potential effects to desert pupfish from increases in salinity and potential effects to species associated with tamarisk scrub from changes in tamarisk scrub habitat adjacent to the Salton Sea. The effects of implementing the HCP on covered species are evaluated below.

As part of the Monitoring and Adaptive Management Program (Chapter 4), IID could implement a survey or study program requiring capture of covered species. Capture of covered species constitutes take under both the federal and state ESAs. Take that occurs in association with surveys or studies conducted for this HCP is a covered activity and will be authorized under the state and federal ITPs. Any of the covered species could be taken through surveys or studies.

Studies and surveys conducted during the course of this HCP will be developed by IID in coordination with the HCP IT and will be subject to the approval of CDFG and USFWS prior to implementation. In approving the studies/surveys, the CDFG and USFWS will require capture methods that minimize the potential for death and injury of covered species. In addition, these agencies will specify the number of individuals of covered species that may be captured. Thus, the level of take authorized to occur through this mechanism will be specified on a case-by-case basis through the approval of the CDFG and USFWS.

3.3.5.1 White Pelican

The primary mechanism through which the covered activities could result in take of white pelicans is a reduction in fish abundance. As described in Section 3.3.2.1 the abundance of tilapia is expected to decrease as the salinity of the sea increases. With implementation of the Salton Sea Conservation Strategy, IID would avoid changes in salinity of the Salton Sea as a result of the water conservation and transfer programs. This approach is predicted to avoid impacts to white pelicans resulting from the acceleration of salinity increases and reduced fish abundance attributable to the water conservation and transfer programs. Under this strategy, fish would be expected to persist until about 2030 when the salinity of the sea is projected to exceed 60 ppt. The potential response of white pelicans to reduced fish availability at the Salton Sea after this salinity is exceeded is described in Section 3.3.2.1.

3.3.5.2 California Brown Pelican

The primary mechanism through which the covered activities could result in take of brown pelicans is a reduction in fish abundance. As described in Section 3.3.2.1 the abundance of tilapia is expected to decrease as the salinity of the sea increases. Under the Salton Sea Conservation Strategy, IID would maintain the prey resource for brown pelicans until that resource would be lost without implementation of the water conservation and transfer program. Maintenance of the salinity below 60 ppt is predicted to avoid impacts to brown pelicans attributable to the water conservation and transfer programs. The potential response of brown pelicans to reduced fish availability at the Salton Sea after this point was described in Section 3.3.2.1.

3.3.5.3 Black Skimmer

The primary mechanism through which the covered activities could result in take of black skimmers is a reduction in fish abundance. As described in Section 3.3.2.1 the abundance of fish is expected to decrease as the salinity of the sea increases. Water conservation also could accelerate and increase the magnitude of the decline in the water surface elevation. With the accelerated drop in surface elevation, islands where black skimmers nest would become connected to the mainland earlier than under the baseline. Predation on eggs and chicks could be increased relative to the baseline during this period. Black skimmers could abandon nesting areas once they become accessible to land-based predators. The potential effects to black skimmers of changes in fish abundance and water surface elevation are described in more detail in Sections 3.3.2.1 and 3.3.2.2.

With implementation of the Salton Sea Conservation Strategy, changes in the salinity of the Salton Sea as a result of the water conservation and transfer programs are expected to be avoided. This approach would avoid impacts to black skimmers resulting from the acceleration of salinity increases and reduced fish abundance attributable to the water conservation and transfer programs. Under this strategy, fish would be expected to persist until about 2030 when the salinity of the sea is projected to exceed 60 ppt. This approach also would avoid the acceleration of surface elevation declines attributable to the water conservation and transfer programs. As a result, nesting and roosting islands would become connected to the mainland at about the same time as under the baseline after which nesting might not continue. The potential response of black skimmers to reduced fish availability at the Salton Sea after this salinity is exceeded was described in Section 3.3.2.1.

3.3.5.4 Van Rossem's Gull-Billed Tern

Gull-billed terns typically are associated with salt marshes and coastal bays, but also frequent open habitats such as pastures and farmlands for foraging. They primarily feed on insects, such as grasshoppers and beetles, but also will prey on earthworms, fish, frogs, lizards, small mammals, eggs, and young of other birds (CDFG 1999). Foraging likely occurs at the mudflats along the Sea as well as in adjacent agricultural fields and marshes. Potentially, a few gull-billed terns could be taken as a result of the accelerated decline in fish abundance. However, given their broad food habits and the availability of alternate foraging habitat, the potential reduction in tilapia abundance at the Salton Sea probably would not adversely affect the gull-billed tern population using the Salton Sea.

The Salton Sea is one of only two breeding locations for gull-billed terns in the United States, the other being in San Diego. About 160 pairs nest at the Sea each year (USFWS 1997b; Shuford et al. 1999). Numbers of nesting birds at the Salton Sea have declined from earlier estimates of about 500 as the rising sea has flooded nests (CDFG 1999). They nest on sandy flats amidst shells and debris (CDFG 1999) around the south end of the Sea (Shuford et al. 1999). The largest breeding colonies are at the southeast corner of the Sea and to the south of Salton City (CDFG 1999) on Mullet Island and a small barren islet at Johnson Street. The islets at Rock Hill also support nesting gull-billed terns. The islets are in an impoundment of the Salton Sea NWR.

As explained in Section 3.3.2.2, nesting/roosting islands would become connected to the mainland with the reduction in the water surface elevation with and without implementation of the water conservation and transfer programs. Water conservation would accelerate and increase the magnitude of the decline in the water surface elevation relative to the baseline. With the accelerated drop in surface elevation, islands where gull-billed terns nest would become connected to the mainland a few years earlier than under the baseline. Predation on eggs and chicks could increase relative to the baseline during this period. Gull-billed terns could abandon some or all of their current nesting areas once they become accessible to land-based predators. Under the Salton Sea Conservation Strategy, the nesting/roosting islands would become connected to the mainland at about the same time as under the baseline condition, thus potential impacts would be avoided.

3.3.5.5 Double-Crested Cormorant

At the Salton Sea, cormorants nest on rocky ledges on Mullet Island or on dead vegetation at the deltas of the New and Alamo rivers. Snags in the Salton Sea are important for providing protected roost sites for double-crested cormorants. Cormorants regularly move between the Salton Sea and the lakes at the Finney-Ramer Unit of the Imperial WA where they forage. The Finney-Ramer Unit of the Imperial WA also supports nesting and roosting double-crested cormorants at the lakes on this unit.

Double-crested cormorants are a common and abundant species at Salton Sea, with counts of up to 10,000 individuals (IID 1994). Small nesting colonies were documented at the north end of the Sea in 1995 (USFWS 1996), but recently (1999) over 7,000 double-crested cormorants and 4,500 nests were counted on Mullet Island. Mullet Island currently supports the largest breeding colony of double-crested cormorants in California (Shuford et al. 1999).

The covered activities could result in take of double-crested cormorants through two mechanisms. First, the covered activities could result in take of cormorants through a reduction in fish abundance. As described in Section 3.3.2.1 the abundance of fish is expected to decrease as the salinity of the sea increases. Water conservation to implement the water conservation and transfer programs could increase the rate of salinization of the sea and concomitantly accelerate the decline in fish abundance. Survival of adults or chicks could be reduced as prey availability declines at the Salton Sea.

Water conservation also could accelerate and increase the magnitude of the decline in the water surface elevation. With the accelerated drop in surface elevation, snags and islands where double-crested cormorants nest would become connected to the mainland a few years earlier than under the baseline. Predation on eggs and chicks could be increased relative to the baseline during this period. Double-crested cormorants could abandon nesting areas once they become accessible to land-based predators.

The population of double-crested cormorants in the United States declined considerably during the 1960s and early 1970s. This decline was attributed to pesticide residues in the marine food chain, principally DDT (Small 1994). The population began recovering in the late 1970s and 1980s, and is currently estimated to number 1 to 2 million birds in the United States and Canada with the U.S. population increasing at a rate of about 6 percent (*64 Federal Register* [*FR*] 60826). In some locations, cormorant populations have increased to levels that some consider them a significant competitor with recreational fishing. In response, the USFWS is developing a national double-crested cormorant management plan (*64 FR* 608266).

Double-crested cormorants are abundant throughout California and the United States. With the large and increasing population throughout the United States and Canada, even complete loss of cormorants breeding at the Salton Sea would not jeopardize or substantially reduce the United States population of cormorants, despite the Sea harboring the largest breeding colony in California. Thus, even if some individuals were lost as a result of the covered activities, the effects on the entire cormorant population would be minor.

Under the Salton Sea Conservation Strategy, impacts to fish-eating birds, including double-crested cormorants are predicted to be avoided by avoiding changes in the salinity of the Salton Sea attributable to the water conservation and transfer program. IID would supply sufficient water to the sea to offset the salinity increases attributable to water conservation and transfer. This is predicted to avoid accelerating salinization of the sea and the earlier occurrence of expected declines in fish abundance. Under the baseline condition, the salinity of the Salton Sea is projected to exceed 60 ppt, the threshold above which reproduction of tilapia is expected to decline, in 2030. The potential response of double-crested cormorants to reduced fish availability at the Salton Sea after the threshold is reached was described in Section 3.3.2.1.

Provision of mitigation water to the Salton Sea also would avoid impacts to nesting sites used by cormorants and potentially provide a beneficial effect. As shown in Figure 3.3-7, the surface elevation of the Sea would be higher than under the baseline from about 2009 until 2035. Mullet Island where the largest colony of double-crested cormorants occurs at the Salton Sea is separated from the mainland by about 4 feet of water. Under the baseline, the surface elevation of the Sea would fall 4 feet by 2015. With implementation of Salton Sea–1, this degree of elevation drop would not occur until 2026, thereby retaining the separation of Mullet Island from the mainland for 11 more years.

3.3.5.6 Western Snowy Plover

Western snowy plovers are year-round breeding residents and winter migrants at the Salton Sea. The Salton Sea supports the largest wintering population of snowy plovers in the interior western United States and one of only a few key breeding populations in interior California (Shuford et al. 1999). The summer breeding population typically consists of over 200 individuals (IID 1994).

Nesting habitat for the western snowy plover in the project area is limited to the shoreline of the Salton Sea where they are known to nest on undisturbed, flat, sandy or gravelly beaches (Reclamation and SSA 2000). For foraging, snowy plovers use the shoreline of the Salton Sea, primarily concentrated on sandy beaches or alkali flats along the western and southern shorelines. They also could forage in agricultural fields in the valley.

Use of the Salton Sea by western snowy plovers is not expected to change substantially as a result of the covered activities, including implementation of the water conservation and transfer project. This species forages for insect prey on mudflats, and nests in similar habitats. Mudflat habitats would continue to exist with a decline in Sea elevation, thus, continuing to provide nesting and foraging opportunities for western snowy plover.

Under the Salton Sea Conservation Strategy, IID would conserve additional water and allow this water to flow to the Salton Sea until 2030 such that there would be no change in salinity of the Salton Sea from implementation of the water conservation and transfer programs. Fallowing could be used to generate this water which could reduce foraging opportunities for snowy plover by reducing the amount of agricultural land in production. Take of snowy plovers could result from reductions in agricultural fields; this potential effect is evaluated in Section 3.8.6.9.

3.3.5.7 Osprey

Ospreys occur at the Salton Sea in small numbers as a nonbreeding visitor throughout the year (IID 1994). They prey almost exclusively on fish. Large trees and snags near the water are used for roosting and nesting. In the HCP area, suitable habitat conditions exist for the osprey at the Salton Sea and other water bodies in the HCP area including Fig Lagoon, the New and Alamo rivers, and Finney and Ramer lakes.

The primary mechanism through which the covered activities could result in take of osprey is a reduction in fish abundance. As described in Section 3.3.2.1 the abundance of tilapia is expected to decrease as the salinity of sea increases. Water conservation to implement the water conservation and transfer programs could increase the rate of salinization of the sea and accelerate the decline in fish abundance. Potentially a few individual ospreys could be taken as a result of reduced foraging opportunities in the HCP area.

Under the Salton Sea Conservation Strategy, IID would implement measures to maintain fish at the Salton Sea on which osprey could prey until that resource would be lost without implementation of the water conservation and transfer program. This measure would offset take of osprey that could result from the accelerate decline in fish in the Sea. In addition, foraging opportunities for osprey would continue to be available at other locations in the HCP area. Because only a small number of ospreys currently use the HCP area, these other foraging locations likely would be adequate to support the existing level of use of the HCP area by ospreys. With the small numbers of ospreys that use the HCP area and the minimal potential for take to occur, implementation of the HCP would not jeopardize the continued existence of the species.

3.3.5.8 Black Tern

Black terns are common at the Salton Sea during the spring, summer and fall; they rarely occur at the Sea during the winter (USFWS 1997b). The Salton Sea watershed is thought to be the most important staging area for black terns in the Pacific Flyway (Shuford et al. 1999). In addition to the Salton Sea, black terns are common summer residents and migrants in Imperial Valley with up to about 10,000 individuals foraging over agricultural fields at some times (Shuford et al. (1999). There is no evidence that nesting occurs in the HCP area (CDFG 1999) although nesting could be supported in future.

Black terns forage primarily on insects and fish, but tadpoles, frogs, spiders, earthworms, and crustaceans are also taken. While black terns foraging in agricultural fields are assumed to be foraging on insects, those at the Salton Sea could forage on insect prey as well as fish. The relative importance of these different prey types to black terns at the Salton Sea has not been determined.

Water conservation to implement the water conservation and transfer programs could increase the rate of salinization of the sea and accelerate the decline in fish abundance at the Salton Sea. Potentially a few individual black terns could be taken as a result of reduced foraging opportunities in the HCP area. Under the Salton Sea Conservation Strategy, IID would implement measures to maintain fish at the Salton Sea until that resource would be lost without implementation of the water conservation and transfer program. This approach would avoid impacts to black tern resulting from accelerated declines in fish abundance. However, if fallowing is used to generate water for mitigation, the reduction of agricultural land in production could reduce foraging opportunities for black terns. The effect of the potential take of black terns resulting from reductions in agricultural fields is evaluated in Section 3.8.6.10.

Black terns eat a wide variety of prey and forage in a variety of habitats. As a result, foraging opportunities will continue to be available in the HCP area and the potential for take is low. The Salton Sea, Drain Habitat, and Agricultural Field Habitat conservation strategies will contribute to maintaining foraging opportunities for black tern in the HCP area. The Salton Sea Conservation Strategy will avoid changes in fish abundance attributable to the water conservation and transfer programs. Under the Drain Habitat Conservation Strategy, 190 to 652 acres of managed marsh will be created and the Agricultural Field Habitat Conservation Strategy will enhance the probability that agricultural will remain the predominant land use in the HCP area. In combination, these strategies would mitigate the minimal amount of take potentially occurring and would not jeopardize the continued existence of the species.

3.3.5.9 Laughing Gull

Laughing gulls are a common post-breeding visitor (up to 1,000 individuals) at the Salton Sea and nested in the area up until the 1950s (USFWS 1997b; IID 1994; Shuford et al. 1999). They previously nested on sandy islets along the southwestern shore of the Salton Sea. Nesting habitat on the islets was lost to erosion as the Sea elevation increase and could have caused laughing gulls to abandon nesting at the Salton Sea. Currently, most laughing gulls occur at the south end of the Sea and in adjacent marsh habitats on the state and federal refuges.

The primary mechanism through which the covered activities could result in take of laughing gulls is a reduction in fish abundance. As described in Section 3.3.2.1 the abundance of tilapia is expected to decrease as the salinity of sea increases. Water conservation for the water conservation and transfer programs could increase the rate of salinization of the sea and concomitantly accelerate the decline in fish abundance. Potentially a few laughing gulls could be taken as a result of reduced foraging opportunities at the Salton Sea. Under the Salton Sea Conservation Strategy, IID would implement measures to maintain fish at the Salton Sea until that resource would be lost without implementation of the water conservation and transfer program. This would avoid or offset impacts to laughing gull resulting from accelerated declines in fish abundance.

3.3.5.10 Wood Stork

Wood storks have a limited distribution in the United States, breeding only in Florida. Wood storks do not breed at the Salton Sea but use the area as a post-breeding visitor. Storks using the Salton Sea probably come from breeding colonies in Mexico. They can arrive at the Salton Sea as early as May after the breeding season and remain as late as October (Small 1994). At the Salton Sea, as many as 1,500 wood storks were counted in the 1950s (Shuford et al. 1999), but more recently counts of only 275 have been reported (IID 1994).

Wood storks forage in shallow water for small fish, small vertebrates and aquatic invertebrates. At the Salton Sea, shallow shoreline areas and pools formed by barnacle bars provide appropriate foraging conditions for wood storks. They also forage in freshwater impoundments on the refuges adjacent to the sea. Most wood storks at the Salton Sea occur at the southern end (CDFG 1999).

The effects of the water conservation and transfer project on wood storks would be similar to that described for laughing gulls, black terns and gull-billed terns with respect to changes in food resources. As described for these species, a few wood storks could be taken as a result of reduced foraging opportunities in the HCP area. Under the Salton Sea Conservation Strategy, IID would implement measures to maintain fish at the Salton Sea until that resource would be lost without implementation of the water conservation and transfer program. Depending on its location and characteristics, managed marsh created under the Drain Habitat Conservation Strategy could increase foraging opportunities for wood storks by supporting a variety of vertebrate and invertebrate prey species. The Salton Sea and Drain Habitat conservation strategies would avoid impacts to wood stork from changes in foraging opportunities at the Salton Sea; therefore, implementation of the HCP would not jeopardize the continued existence of wood stork.

3.3.5.11 Long-Billed Curlew

The long-billed curlew is a common, year round resident in the HCP area, with a large wintering population (Shuford et al. 2000). The number of birds in the Imperial Valley and at the Salton Sea varies throughout the year. Shuford et al. (2000) reported a total of 5,593 individuals in December 1999 during a survey for mountain plover that covered about 60 percent of the Imperial Valley. The highest count of long-billed curlews in the HCP area was nearly 7,500 birds in August 1995 (Shuford et al. 1999). Long-billed curlews are not known to breed in the HCP area (Shuford et al. 1999).

Long-billed curlews forage on a variety of insect prey, including beetles, grasshoppers, and spiders. In coastal areas, it also feeds on crabs, crayfish, mollusks, and other large invertebrates. With these food habitats, long-billed curlews could forage along the shoreline of the Salton Sea but commonly forage in agricultural fields.

The covered activities, including implementation of the water conservation and transfer project are not expected to substantially affect use of the HCP area by long-billed curlew. Mudflats at the Salton Sea that long-billed curlews could use for foraging would continue to be available and abundant even at reduced Sea elevations. Take of long-billed curlew could result from reductions in agricultural fields even though agricultural fields that long-billed curlews frequent for foraging would remain abundant. The degree of reduction in agricultural fields would depend in part on the extent to which fallowing is used to conserve water. Effects to long-billed curlew from changes in agricultural fields are evaluated in Section 3.8.6.15.

3.3.5.12 California Least Tern

The California least tern occurs at the Salton Sea only accidentally. Fewer than 10 records of this species exist at the Salton Sea NWR (USFWS 1997b). Nesting has not been reported. Given the very low level of use of the HCP area, it is very unlikely that the covered activities would result in take of any California least terns. However, an individual potentially could be taken as a result of reduced foraging opportunities at the Salton Sea because of the accelerated reduction in fish abundance. Under the Salton Sea Conservation Strategy, IID would implement measures to maintain fish at the Salton Sea as potential forage base for California least tern until that resource would be lost without implementation of the water conservation and transfer program. The predicted avoidance of changes in fish abundance attributable to the water conservation and transfer program with implementation of the Salton Sea Conservation Strategy would offset the minimal amount of take of California least tern that could occur. Therefore, implementation of the HCP would not jeopardize the continued existence of least tern.

3.3.5.13 Bald Eagle

Bald eagles are a rare and occasional winter visitor to the Salton Sea with one to three individuals typically observed during winter. When visiting the Salton Sea, bald eagles probably prey on the abundant fish but probably also pursue waterfowl at the Sea or managed marshes in the Imperial Valley.

The primary mechanism through which the covered activities could result in take of bald eagle at the Salton Sea is a reduction in fish abundance. As described in Section 3.3.2.1 the abundance of tilapia is expected to decrease as the salinity of sea increases. Water conservation to implement the water conservation and transfer programs is projected to increase the rate of salinization of the sea and accelerate the decline in fish abundance at the Salton Sea. A few bald eagles potentially could be taken as a result of reduced foraging opportunities.

Under the Salton Sea Conservation Strategy, IID would implement measures to maintain fish at the Salton Sea until that resource would be lost without implementation of the water conservation and transfer program. The Salton Sea Conservation Strategy would avoid impacts to bald eagles from changes in foraging opportunities at the Salton Sea; therefore, implementation of the HCP would not jeopardize the continued existence of bald eagles.

3.3.5.14 Bank Swallow

Bank swallows are casual visitors to the HCP area, potentially occurring in the HCP area as migrants during the spring and fall. For foraging, they are not strongly associated with any particular habitat type, although they often forage near water where insects are abundant. Insects would continue to be available at the Salton Sea and adjacent marsh habitats. To the extent that bank swallows currently forage along the Salton Sea, foraging opportunities would persist with no impacts to bank swallows anticipated as a result of changes at the sea.

Bank swallows could be taken by covered activities that affect tamarisk scrub habitat and agricultural habitat as discussed in Sections 3.5.6.7 and 3.8.6.4.

3.3.5.15 Elegant Tern

Elegant terns occur only accidentally at the Salton Sea during spring. In the HCP area, elegant terns would be expected to occur only at the Salton Sea where they would forage on fish. Given the very low level of use of the HCP area, it is very unlikely that the covered activities would result in take of any elegant terns. However, an individual could be taken as a result of reduced foraging opportunities in the HCP because of the accelerated reduction in fish abundance.

Under the Salton Sea Conservation Strategy, IID would implement measures to maintain fish at the Salton Sea until that resource would be lost without implementation of the water conservation and transfer program. By avoiding changes in fish abundance, implementation of the Salton Sea Conservation Strategy would avoid or minimize the impact of any take of elegant terns.

3.3.5.16 Reddish Egret

The reddish egret is a rare visitor to the HCP area in the summer and fall. They are mainly expected to occur at the Salton Sea where suitable foraging habitat exists along the margins of the Salton Sea. Marsh habitats adjacent to the Salton Sea also could provide suitable foraging conditions for this species.

The effects of the water conservation and transfer project on reddish egrets would be similar to that described for laughing gulls, black terns and gull-billed terns with respect to changes in food resources. As described for these species, a few reddish egrets could be taken as a result of reduced foraging opportunities in the HCP area. Under the Salton Sea Conservation Strategy, IID would implement measures to maintain fish at the Salton Sea until that resource would be lost without implementation of the water conservation and transfer program. By avoiding changes in fish abundance, implementation of the Salton Sea Conservation Strategy would avoid or minimize the impact of any take of reddish egret.

3.3.5.17 Merlin

Merlins are rare visitors to the HCP area in the fall and winter (USFWS, 1997b). They are not known to nest in the area; therefore, use of the HCP area is limited to foraging. Merlins forage for shorebirds and other small birds in open habitats. With the exception of desert habitat, all of the habitats in the HCP area could be used by foraging merlins to varying degrees. The covered activities are unlikely to adversely affect merlins because of their very rare occurrence in the HCP area and broad habitat use for foraging. However, a few individuals could be taken because of changes in foraging habitat availability or quality potentially resulting from permanent or temporary reductions in drain vegetation (See Section 3.5.2.2), permanent or temporary reductions in tamarisk scrub habitat (See Section 3.4.2), or changes in the composition and amount of agricultural field habitat (See Section 3.8.2). Although the ecology of the Salton Sea will change as the salinity of the sea increases, shorebirds would be expected to continue to use the sea and adjacent habitats and provide foraging opportunities for merlins.

The minimal amount of potential take would be mitigated by implementation of the Salton Sea, Tamarisk Scrub Habitat, Drain Habitat, and Agricultural Field Habitat conservation strategies. Loss of tamarisk scrub habitat at the Salton Sea and in the Imperial Valley would be offset through the creation/acquisition and long-term protection of native tree habitat (See Sections 3.3.4.2 and 3.4.5). By attracting a variety of songbirds, native tree habitat would provide higher quality foraging opportunities for merlins. The Drain Habitat Conservation Strategy also would contribute to mitigating the impact of any take of merlin that could occur by increasing foraging opportunities through creation of managed marsh habitat. Finally, the Agricultural Field Habitat Conservation Strategy (See Section 3.8.4) would enhance the likelihood that agriculture would remain the dominant land use in the Imperial Valley and thereby continue to provide foraging opportunities for merlins. In combination, these strategies would mitigate the minimal amount of take of merlin potentially occurring and would not jeopardize the continued existence of the species.

3.3.5.18 Black Swift

Black swifts occur accidentally in the HCP area during the spring. Only two records of this species exist for the Salton Sea NWR (USFWS, 1997b). Black swift forage for insects in open habitats. For foraging, they are not strongly associated with any particular habitat type, although they often forage near water where insects are abundant. The covered activities are unlikely to adversely affect black swift because of the swift’s very rare occurrence in the HCP area and broad habitat use for foraging. However, a few individuals could be taken because of changes in foraging habitat availability or quality potentially resulting from permanent or temporary reductions in drain vegetation (See Section 3.5.2.2), permanent or temporary reductions in tamarisk scrub habitat (See Section 3.4.2), or changes in the composition and amount of agricultural field habitat (See Section 3.8.2). Although the ecology of the Salton Sea will change as the salinity of the sea increases, insects would be expected to continue to be available at the sea and adjacent habitats and provide foraging opportunities for black swift.

The minimal amount of potential take would be mitigated by implementation of the Salton Sea, Tamarisk Scrub Habitat, Drain Habitat, and Agricultural Field Habitat conservation strategies. Loss of tamarisk scrub habitat at the Salton Sea and in the Imperial Valley would be avoided or offset through the creation/acquisition and long-term protection of native tree habitat (See Sections 3.3.4.2 and 3.4.5). By supporting more abundance and diverse insect populations than tamarisk scrub, native tree habitat would provide higher quality foraging opportunities for black swift. The Drain Habitat Conservation Strategy also would contribute to mitigating the impact of any take of black swifts that could occur by increasing foraging opportunities through creation of managed marsh habitat. Finally, the Agricultural Field Habitat Conservation Strategy (See Section 3.8.4) would enhance the likelihood that agriculture will remain the dominant land use in the Imperial Valley and thereby continue to provide foraging opportunities for black swift. In combination, these strategies would mitigate the minimal amount of take potentially occurring and would not jeopardize the continued existence of the species.

3.3.5.19 Vaux’s Swift

Vaux’s swifts occur in the HCP area as a migrant during the spring and fall. It is relatively common at the Salton Sea during the spring but considered uncommon in the fall (USFWS

1997b). Thousands of migrating birds have been reported at the north end of the Salton Sea during the spring but are relatively uncommon elsewhere in the Salton Basin during spring migration (Garrett and Dunn, 1981). For foraging, they are not strongly associated with any particular habitat type, although they often forage near water where insects are abundant.

The covered activities are unlikely to adversely affect Vaux's swift because of the swift's brief occurrence in the HCP area and broad habitat use for foraging. However, a few individuals could be taken because of changes in foraging habitat availability or quality potentially resulting from permanent or temporary reductions in drain vegetation (See Section 3.5.2.2), permanent or temporary reductions in tamarisk scrub habitat (See Section 3.4.2), or changes in the composition and amount of agricultural field habitat (See Section 3.8.2). Although the ecology of the Salton Sea will change as the salinity of the sea increases, insects would remain available at the sea and in other habitats throughout the HCP area.

The minimal amount of potential take would be mitigated by implementation of the Salton Sea, Tamarisk Scrub Habitat, Drain Habitat, and Agricultural Field Habitat conservation strategies. Loss of tamarisk scrub habitat at the Salton Sea and in the Imperial Valley would be avoided or offset through the creation / acquisition and long-term protection of native tree habitat (See Sections 3.3.4.2 and 3.4.5). By supporting more abundant and diverse insect populations than tamarisk scrub, native tree habitat would provide higher quality foraging opportunities for Vaux's swift. The Drain Habitat Conservation Strategy also would contribute to mitigating the impact of any take of Vaux's swift that could occur by increasing foraging opportunities through creation of managed marsh habitat. Finally, the Agricultural Field Habitat Conservation Strategy (see section 3.8.4) would enhance the likelihood that agriculture will remain the dominant land use in the Imperial Valley and thereby continue to provide foraging opportunities for Vaux's swift. In combination, these strategies would mitigate the minimal amount of take potentially occurring and would not jeopardize the continued existence of the species.

3.3.5.20 Purple Martin

Purple martins are occasional visitors to the Salton Sea area as spring and fall migrants (USFWS, 1997b). No published records exist of purple martins nesting in the southeastern portion of California (Williams, 1996), and purple martins are not expected to nest in the HCP area. For foraging, they are not strongly associated with any particular habitat type, although they often forage near water where insects are abundant. However, a few individuals could be taken because of changes in foraging habitat availability or quality potentially resulting from permanent or temporary reductions in drain vegetation (See Section 3.5.2.2), permanent or temporary reductions in tamarisk scrub habitat (See Section 3.4.2), or changes in the composition and amount of agricultural field habitat (See Section 3.8.2). Although the ecology of the Salton Sea will change as the salinity of the sea increases, insects would be expected to continue to be available at the sea and adjacent habitats and provide foraging opportunities for purple martin.

The minimal amount of potential take would be mitigated by implementation of the Salton Sea, Tamarisk Scrub Habitat, Drain Habitat, and Agricultural Field Habitat conservation strategies. Loss of tamarisk scrub habitat at the Salton Sea and in the Imperial Valley would be avoided or offset through the creation / acquisition and long-term protection of native tree habitat (See Sections 3.3.4.2 and 3.4.5). By supporting more abundant and diverse insect populations than tamarisk scrub, native tree habitat would provide higher quality foraging opportunities for purple martin. The Drain Habitat Conservation Strategy also would contribute mitigating the impact of any take of purple martin that could occur by increasing foraging opportunities through creation of managed marsh habitat. Finally, the Agricultural Field Habitat Conservation Strategy (See Section 3.8.4) would enhance the likelihood that agriculture will remain the dominant land use in the Imperial Valley and thereby continue to provide foraging opportunities for purple martin. In combination, these strategies would mitigate the minimal amount of take potentially occurring and would not jeopardize the continued existence of the species.

3.4 Tamarisk Scrub Habitat Conservation Strategy

3.4.1 Amount and Quality of Habitat in the HCP Area

In the HCP area, tamarisk scrub is found along the New and Alamo rivers, sporadically along some drains, in seepage areas adjacent to the East Highline Canal and All American Canal (AAC), adjacent to the Salton Sea, and in other scattered and isolated patches throughout the HCP area wherever water is available. The covered species associated with tamarisk scrub habitat (Table 2.3-16) primarily are riparian species that find optimal habitat in riparian vegetation consisting of mesquite, cottonwoods, willows, and other native riparian plant species. Tamarisk has invaded most areas within the HCP area where water supplied from the Colorado River provides sufficient soil moisture. Native riparian or mesquite bosque habitat is largely absent from the HCP area. Tamarisk also has colonized non-riparian areas along drains or seepage areas. Tamarisk scrub habitat is not optimal habitat for the species that use this habitat in the HCP area. Rather, it constitutes the only available tree-dominated habitat in the HCP area. While covered species will use tamarisk scrub, it is poor quality habitat and is not preferred.

The New and Alamo rivers support about 2,568 acres and 962 acres of tamarisk scrub habitat respectively, for a total of 3,530 acres. About 31 acres occur in the deltas of these rivers. With its tolerance for high salt concentrations, tamarisk has colonized the margins of the Salton Sea. Tamarisk is a primary component of areas designated as shoreline strand community in the Salton Sea database. The shoreline strand community occurs immediately adjacent to the sea and consists of tamarisk and iodine bush and encompasses about 293 acres (University of Redlands 1999). The source of the water that supports the shoreline strand community is uncertain, but is likely the result of shallow groundwater and seepage rising to the surface at its interface with the Salton Sea. In addition to the shoreline strand community, tamarisk scrub occupies about 2,349 acres of adjacent wetland areas of the Salton Sea as designated in the Salton Sea database. Section 2.3.2 provides additional information on the location and characteristics of the shoreline strand and adjacent wetland areas. Tamarisk is a common species in the drains. Drains support an estimated 215 acres of tamarisk scrub habitat. About 412 acres and 755 acres of tamarisk scrub habitat also are supported in seepage areas adjacent to the East Highline Canal and AAC, respectively. Table 3.4-1 summarizes the location and acreage of tamarisk scrub in the HCP area.

TABLE 3.4-1
Location and Acreage of Tamarisk Scrub Habitat in the IID HCP Area

Location	Acreage
New River	2,568
Alamo River	962
Shoreline strand	293
Adjacent to Salton Sea	2,349
Drains	215
AAC Seepage area	755
East Highline Canal seepage areas	412
Other patches	Unquantified
Total Quantified	**7,554**

3.4.2 Effects of the Covered Activities

The mechanisms through which the covered activities could take a covered species associated with tamarisk scrub are changes in habitat (permanent or temporary changes), disturbance, or mortality/injury. The potential effects of each of the covered activities on tamarisk scrub vegetation and covered species using tamarisk scrub habitat is described in Table 3.4-2. Activities with the potential to affect habitat are described in more detail following the table. Activities that are not expected to affect habitat have a very limited potential to affect covered species, with potential effects limited to disturbance in the event that the activity was conducted in proximity to tamarisk scrub inhabited by covered species.

TABLE 3.4-2
Potential Effects of Covered Activities on Covered Species Associated With Tamarisk Scrub Habitat

Activity	Potential Effects (Positive and Negative)
Water Use and Conservation	
Combined effects of on-farm and system-based water conservation	Water conservation could reduce the amount of water flowing to the Salton Sea and contribute to a reduced sea elevation. The acreage of tamarisk scrub in areas adjacent to the Salton Sea could be reduced. This potential effect is addressed as part of the Salton Sea Habitat Conservation Strategy (See Salton Sea–3 in Section 3.3.4.2).
Installation of on-farm water conservation features	On-farm water conservation practices would be constructed within agricultural fields or their margins and therefore would not likely affect tamarisk scrub habitat or covered species using tamarisk scrub habitat. Tamarisk could colonize the margins of constructed tailwater return ponds and delivery ponds and thereby increase the availability of this habitat to covered species.
Installation of System-Based Water Conservation Features	
Canal lining and piping	Canal lining is proposed along 1.74 miles of canal to reduce seepage. Canals proposed for lining (see Section 1.7) are surrounded by agricultural fields. Tamarisk does not occur along the canals proposed for lining because IID tightly controls vegetation within the canal right-of-way and farming adjacent to the canals prevent the development of tamarisk outside of IID's right-of-way.
Construction of new canals	New canals would be constructed through agricultural fields and would tie into the existing canal system. Only if a new canal crossed a drain in an area supporting tamarisk scrub would there be the potential for impacts to species associated with tamarisk scrub. It is anticipated that construction of new canals would not affect tamarisk scrub habitat or covered species using this habitat to any meaningful level because little additional canal would be constructed over the term of the permit and

TABLE 3.4-2
Potential Effects of Covered Activities on Covered Species Associated With Tamarisk Scrub Habitat

Activity	Potential Effects (Positive and Negative)
	effects to tamarisk scrub habitat would only occur if the new canal crossed a drain in an area supporting tamarisk.
Lateral interceptors	Lateral interceptors would be constructed in agricultural fields but would cross some drains where there could be tamarisk scrub. As described under Structure Maintenance below, IID anticipates constructing up to six drain crossings each year. Drain crossings for lateral interceptors are encompassed by those described under Structure Maintenance.
	A lateral interceptor system includes a small reservoir (see Section 1.7). Construction of the reservoirs could remove up to 15 acres of tamarisk scrub vegetation.
Reservoirs	IID could construct up to 100 reservoirs 1 to 10 acres in size, and encompassing up to 1,000 acres. These reservoirs would be on agricultural lands or barren lands and would not impact tamarisk scrub habitat.
	Farmers are expected to construct 1 to 2 acre reservoirs to better regulate irrigation water. These reservoirs would be installed in agricultural fields and would not impact tamarisk scrub habitat.
Seepage Recovery Systems	Seepage recovery systems are proposed along the East Highline Canal. About 43 acres of tamarisk scrub habitat could be permanently lost because of installation of subsurface seepage recovery systems. Effects of surface seepage recovery systems on vegetation are addressed under the Drain Habitat Conservation Strategy (Section 3.5.4).
Operation and Maintenance	
Conveyance system operation	Conveyance system operation is limited to moving water through the canals to meet customer needs and to address maintenance requirements. Other than the filling, draining and moving water through the canals, no physical effects are encompassed by conveyance system operation. No effects to tamarisk or covered species using tamarisk scrub habitat would be expected.
Drainage System Operation	
Rerouting or constructing new drains	IID reroutes or constructs about 2 miles of drains every 10 years. Newly constructed drains could increase habitat for covered species associated with tamarisk scrub habitat. If IID constructed 2 miles of drains every 10 years, 15 miles of new drains would be created over the 75-year permit term, which could increase habitat for species associated with tamarisk scrub habitat as tamarisk colonized the new drain.
	Rerouting drains could result in the temporary reduction in vegetation in the drains during the period between abandonment of the old drain and when vegetation develops in the rerouted drain. No net loss of vegetation would occur because the rerouted portion would replace the abandoned section.
Piping drains	Over the 75-year term IID anticipates that about 50 miles of open drains would be pipelined, with an annual average of 0.67 miles of drain pipelining. About 22 acres of vegetation in the drains could be lost over the term of the permit of which an estimated 7 acres could be tamarisk.
Inspection activities	Potential effects of inspection activities would be limited to a minor potential for disturbance of covered species if they occur in the vicinity of structures at the time of inspection.
Canal lining maintenance	Canal lining maintenance consists of repairing the concrete lining of canals only. Activities required for canal lining maintenance are limited to

TABLE 3.4-2
Potential Effects of Covered Activities on Covered Species Associated With Tamarisk Scrub Habitat

Activity	Potential Effects (Positive and Negative)
	the canal prism and adjacent roadway. Tamarisk does not grow in these areas. Therefore, canal lining maintenance would not likely affect tamarisk scrub habitat or covered species using this habitat.
Right-of-way maintenance Embankment maintenance Erosion maintenance	Along drains, right-of-way maintenance, embankment maintenance and erosion maintenance is conducted in association with vegetation control/sediment removal along drains. Potential impacts to covered species from these activities are encompassed by those under vegetation control. Along canals, these activities consist of grading and grooming canal embankments and maintaining the right-of-way free of vegetation. Vegetation typically consists of *Atriplex* and arrowweed but can include tamarisk. All canals are treated annually. Because of this annual treatment, tamarisk cannot become established and develop enough to provide habitat for covered species. Occasionally, storm events will cause bank sloughing or wash outs along drains and require immediate repair. The bank sloughing or wash outs remove vegetation (e.g., tamarisk) such that IID's actions to correct the erosion problem require minimal additional vegetation removal, including removal of tamarisk.
Seepage maintenance	Seepage maintenance is conducted only along the canal system and consists of repairing leaks. Because seepage maintenance is done regularly and routinely, tamarisk does not become established. Therefore, seepage maintenance would not likely affect tamarisk habitat or covered species using this habitat.
Structure maintenance	IID estimates that about 300 structures will be replaced each year. About 100 of these structures would be drainage structures with the remaining 200 canal structures. Replacement of canal structures would not be expected to affect tamarisk scrub habitat. All construction activity would be conducted with the canal's right-of-way that is maintained free of vegetation. Along lateral drains, replacing each structure temporarily disturbs an area about 75 feet long. Thus, each year about 7,500 feet (1.4 miles) of the drains would be disturbed, potentially and temporarily removing 0.6 acres of vegetation, a portion of which could be tamarisk ([7500 ft X 14 ft / 43560]*26 percent vegetated). This potential loss of vegetation is addressed in the Drain Habitat Conservation Strategy (Section 3.5.4). Installation of new drain crossings could result in the permanent loss of drain vegetation. IID estimates that six 40-foot-wide crossings will be constructed each year. Based on this estimate, 18,000 feet (3.4 miles) of drain would be affected by drain crossings over the term of the permit, potentially resulting in the loss of 1.5 acres of drain vegetation, a portion of which could be tamarisk. ([18,000 ft X 14 ft / 43560]*26 percent vegetated). This potential loss of vegetation is addressed in the Drain Habitat Conservation Strategy (Section 3.5.4). New structures that would be constructed on the drainage system would consist of control structures. Control structures are installed in steep drains that are eroding. Because of the erosion, drains needing control structures support little vegetation. Thus, construction of new control structures has a limited potential to affect tamarisk scrub habitat or associated covered species

TABLE 3.4-2
Potential Effects of Covered Activities on Covered Species Associated With Tamarisk Scrub Habitat

Activity	Potential Effects (Positive and Negative)
Pipeline maintenance	Drain pipelines primarily occur in farm fields while conveyance system pipelines occur through developed areas. Neither of these areas support tamarisk scrub habitat. As such, the potential for pipeline maintenance to affect covered species is very low.
Reservoir maintenance	Reservoirs are located on the conveyance system. Vegetation is tightly controlled around the reservoir such that tamarisk scrub habitat does not develop. As such, continued reservoir maintenance would not likely affect species associated with tamarisk scrub habitat.
Sediment removal Vegetation control	IID removes sediment from about 300 miles of drains annually. Mechanical and chemical control of vegetation is conducted in association with sediment removal as necessary. While IID strives to maintain vegetation on drain banks, vegetation within the channel bottom is removed with sediment, potentially including tamarisk. These activities can temporarily reduce the amount of vegetation in the drains. An estimated 130 acres of vegetated drain is affected by sediment removal and vegetation control each year of which about 43 acres are tamarisk. Vegetation impacts in the drains are addressed and mitigated by the Drain Habitat Conservation Strategy (Section 3.5.4). Vegetation control along canals focuses on removing moss and algae. Thus, no effects to tamarisk scrub habitat would occur.
New and Alamo River maintenance	IID dredges the deltas of the New and Alamo rivers about once every four years. In conducting this dredging, IID retains the vegetation on the banks. Thus, tamarisk scrub habitat is not removed by these dredging operations, but the dredging could temporarily disturb covered species using tamarisk along the river channels. IID coordinates with USFWS at the refuge prior to conducting these activities. Mechanical and chemical control is used to treat the banks around the 20 drop structures on the New and Alamo rivers. About 10 acres are treated annually. Because of this annual treatment, tamarisk cannot become established and develop enough to provide habitat for covered species.
Salton Sea dike maintenance	Salton Sea dike maintenance activities consist of replacing riprap, grooming embankments and repairing damaged sections of the dikes. Because tamarisk does not occur on or immediately adjacent to the dikes, no change in habitat would occur with these activities and no disturbance of covered species would be expected.
Gravel and rock quarrying	Tamarisk scrub habitat is not found at the gravel and rock quarries. Thus, quarrying is not likely to affect covered species associated with tamarisk scrub habitat.
Fish hatchery operation and maintenance	The fish hatchery is a developed facility and does not support habitat for covered species associated with tamarisk scrub habitat.
Recreational facilities	New recreational facilities could be constructed in association with IID's drain and canals. As described in Section 1.7, potential recreational facilities may include bikepaths, footpaths, picnic tables, and similar facilities. Because recreational facilities would not be constructed in the drain prism where tamarisk scrub habitat could occur, construction of recreational facilities would not be expected to affect habitat for species associated with this habitat. If recreational facilities were constructed adjacent to drains, there would be a minor potential for disturbance of covered species during construction. Vegetation along canals is tightly controlled such that it is unlikely that any tamarisk would be removed to develop recreational facilities along canals. Further, IID would not locate

TABLE 3.4-2
Potential Effects of Covered Activities on Covered Species Associated With Tamarisk Scrub Habitat

Activity	Potential Effects (Positive and Negative)
	new recreational facilities in areas with extensive tamarisk due to the increased construction cost associated with removal of tamarisk. The HCP does not cover take of covered species by recreationists.
HCP/EIS/EIR mitigation	HCP measures consisting of habitat construction could eliminate some tamarisk scrub habitat depending on its specific location. However, IID would not locate habitat creation areas in areas with extensive tamarisk if possible due to the increased construction cost associated with removal of tamarisk.

3.4.2.1 Habitat Changes at the Salton Sea

Covered species using tamarisk scrub also could be adversely affected by the water conservation and transfer programs if reductions in the sea elevation resulted in the loss of tamarisk scrub in shoreline strand and adjacent wetland areas around the Salton Sea. Impacts to covered species potentially resulting from changes in tamarisk scrub adjacent to the Salton Sea as a result of a reduced sea elevation are addressed as part of the Salton Sea Habitat Conservation Strategy (See Salton Sea–3 in Section 3.3.4.2). The following provides a general description of the nature and extent of potential changes in tamarisk scrub habitat adjacent to the Salton Sea. Mitigation for impacts to covered species using tamarisk scrub adjacent to the Salton Sea is covered under the Salton Sea Habitat Conservation Strategy.

The Salton Sea database identifies 293 acres of shoreline strand habitat along the Salton Sea. Shoreline strand habitat consists of tamarisk and iodine bush. In addition to the shoreline strand, the Salton Sea database identifies 2,349 acres of adjacent wetlands dominated by tamarisk. The source of the water that supports the shoreline strand community is uncertain but likely is the result of shallow groundwater rising to the surface at its interface to the Salton Sea. Depending on the extent to which seepage from the Salton Sea contributes to supporting the shoreline strand community and adjacent wetlands dominated by tamarisk, the water conservation program could result in a reduction in the amount of tamarisk scrub habitat. There is, however, considerable uncertainty about the extent of these possible changes. As the sea recedes, tamarisk could establish at lower elevations, replacing habitat lost at higher elevations. Alternatively, it has been suggested that tamarisk will not establish in areas exposed by a receding sea level because of excessive soil salinity (Reclamation and SSA 2000). In areas where relatively good quality drain water or shallow groundwater is the predominant water source, no change in tamarisk-dominated adjacent wetlands is expected. It is currently not possible to predict the magnitude of changes in tamarisk in shoreline strand and adjacent wetland areas as a result of the water conservation and transfer programs.

3.4.2.2 Permanent Habitat Loss in the Imperial Valley

Covered activities potentially resulting in the permanent loss of tamarisk scrub habitat in the Imperial Valley are installation of lateral interceptors, installation of seepage recovery systems, piping drains, and structure maintenance. The potential effects of each of these activities on habitat are described below. In total, an estimated 65.5 acres of tamarisk scrub could be lost because of the covered activities over the term of the permit.

As part of the water conservation and transfer project, IID could install 16 lateral interceptor systems (see Section 1.7). These systems consist of a canal and a reservoir about 40 surface acres in size. Some of the reservoirs could be located close to the New or Alamo rivers and their construction could result in removal of some tamarisk scrub adjacent to these rivers. IID anticipates that up to 15 acres of tamarisk scrub could be removed to construct reservoirs associated with lateral interceptor systems.

Seepage recovery systems are proposed along the East Highline Canal. Subsurface recovery systems are proposed where there is not an existing drain. These systems consist of an underground, perforated pipeline that collects the water and directs it to a sump. Along the East Highline Canal, the pipelines would be installed in close proximity to the outside toe of the canal embankment. Vegetation supported by seepage generally occurs on the embankment where it intercepts seepage water. Because the recovery system would be at the base of the embankment, vegetation would not be lost as a consequence of removing seepage water. However, construction would likely require removal of some of the seepage-supported vegetation. Construction to install these systems disturbs an area about 70 feet wide along the pipeline installation route. About 13.2 miles of pipeline are anticipated to be installed for the seepage recovery systems resulting in the removal of about 43 acres of tamarisk scrub habitat. This amount constitutes about 10 percent of the estimated 412 acres of tamarisk scrub habitat supported in seepage areas adjacent to the East Highline Canal in the HCP area.

Over the 75-year term, IID anticipates that about 50 miles of open drains (an annual average of 0.67 mile) would be pipelined. The entire drainage system encompasses an estimated 2,471 acres of which an estimated 26 percent (652 acres) is vegetated. Tamarisk comprises about 33 percent of the vegetation in the drains. Assuming that 26 percent of the 50 miles of drains piped is vegetated, 22 acres of drain vegetation could be lost over the term of the permit from piping drains. On average, about 7 acres could be tamarisk. This potential loss of vegetation in the drains is addressed through the Drain Habitat Conservation Strategy.

Structure maintenance with the potential to eliminate drain vegetation consists of installation of new drain crossings. IID estimates that six 40-foot-wide crossings will be constructed each year. Based on this estimate, 18,000 feet (3.4 miles) of drain would be affected by drain crossings over the term of the permit. Assuming the impacted area is 26 percent vegetated, about 1.5 acres of drain vegetation could be lost of which an estimated 0.5 acre could be tamarisk. This potential loss of vegetation in the drains is addressed through the Drain Habitat Conservation Strategy.

Tamarisk scrub habitat also occurs in some locations along the AAC in association with washes, where there is seepage from the canal or in other locations where water is available (e.g., from adjacent agricultural fields or from the LCR). As described in more detail in the Desert Habitat Conservation Strategy (see Section 3.6.2), the covered activities include replacement of structures along the AAC. Construction activities required to replace structures along the AAC could result in the removal of desert habitat or tamarisk scrub habitat. Under Desert Habitat–2, IID has committed to permanently remove no more than 100 acres of native desert habitat and tamarisk scrub habitat combined adjacent to the AAC and on the desert sides of the other canals adjacent to desert habitat. Thus, a maximum of an additional 100 acres of tamarisk scrub habitat (assuming all of the habitat impacted by construction along the canals adjacent to desert habitat is tamarisk scrub habitat) could be removed by the covered species.

3.4.2.3 Temporary Habitat Disturbance in the Imperial Valley

Covered activities potentially resulting in the temporary loss of tamarisk scrub habitat are sediment removal/vegetation control and structure maintenance. The potential effects of these activities are described below. In total, an estimated 43.2 acres of tamarisk could be temporarily disturbed by the covered activities each year. However, all of this tamarisk is in the drains and is addressed through the Drain Habitat Conservation Strategy.

The amount of vegetation in the drains was conservatively estimated at 652 acres; about 215 acres are tamarisk IID anticipates that it will clear vegetation/sediment from approximately one-fifth (about 130 acres) of the vegetated acreage in the drains each year. Thus, about 43 acres of tamarisk scrub and species associated with tamarisk scrub could be exposed to drain cleaning each year. Drain cleaning could displace individuals, temporarily reduce habitat in the localized area of the cleaning, or destroy nests if covered species breed in the drains. These potential impacts are addressed through the Drain Habitat Conservation Strategy.

Structure replacement could temporarily remove drain vegetation, some of which could be tamarisk. IID estimates that about 100 structures on drains will need to be replaced each year. Along lateral drains, replacing each structure temporarily disturbs an area about 75 feet long. Thus, each year about 7,500 feet (1.4 miles) of the drains would be disturbed, potentially resulting in the temporary removal of 0.6 acre of vegetation of which about 0.2 acre could be tamarisk. This potential impact is addressed through the Drain Habitat Conservation Strategy.

3.4.2.4 Summary of Habitat Effects in the Imperial Valley

Within the Imperial Valley, the covered activities have the potential to permanently remove 65.5 acres of tamarisk and temporarily disturb 43.2 acres (Table 3.4-3). All of the tamarisk potentially temporarily affected is in the drains and is addressed under the Drain Habitat Conservation Strategy. Of the 65.5 acres potentially permanently lost, 15 acres would be located along the New and/or Alamo rivers, 43 would be along the East Highline Canal, and 7.5 acres would be in the drainage system. The potential loss of 7.5 acres of tamarisk in the drains is addressed under the Drain Habitat Conservation Strategy. The 65.5 acres of potential permanent loss of tamarisk constitutes less than one percent of the quantified acreage of tamarisk scrub (Table 3.4-1). Up to an additional 100 acres of tamarisk scrub habitat could be lost of the term of permit from construction activities along the AAC.

TABLE 3.4-3
Potential Impacts to Tamarisk Scrub Habitat in the Imperial Valley

Covered Activity	Acreage	Comments
Permanent Loss		
Lateral interceptors	15	
Subsurface recovery systems	43	
Piping drains	7	Covered by Drain Habitat Conservation Strategy
Structure maintenance	0.5	Covered by Drain Habitat Conservation Strategy
Total permanent loss	65.5	7.5 acres are covered by the Drain Habitat Conservation Strategy
Temporary Loss		
Vegetation control/sediment removal	43	Covered by Drain Habitat Conservation Strategy
Structure maintenance	0.2	Covered by Drain Habitat Conservation Strategy
Total temporary loss	43.2	Covered by Drain Habitat Conservation Strategy

3.4.3 Approach and Biological Goals

The overall goal of the Tamarisk Scrub Habitat Conservation Strategy is to provide habitat to support the species composition and seasonal occurrence of riparian-associated covered species that could use tamarisk scrub habitat in the HCP Area. This overall goal is to be accomplished through implementing measures to meet two specific objectives:

- Avoid and minimize take of covered species associated with removal of tamarisk scrub habitat
- Create or acquire and preserve native tree habitat to mitigate any take of covered species caused by removal of tamarisk

3.4.4 Tamarisk Scrub Habitat Mitigation and Management Measures

The mitigation and management measures described below are the specific actions that IID will undertake to fulfill the goals of the Tamarisk Scrub Habitat Conservation Strategy. The key elements of the conservation strategy are as follows:

- Minimize take, including disturbance, of covered species associated with tamarisk scrub habitat as a result of construction activities
- Acquire or create, and preserve native tree habitat to mitigate for the take of covered species resulting from the loss of tamarisk scrub or native tree/shrub habitat permanently removed as a result of construction activities

Tree Habitat–1. *For scheduled construction activities (except for the installation of subsurface seepage recovery systems – see Tree Habitat – 2), the site will be surveyed before initiation of construction activities. If tamarisk scrub habitat occurs on the project site and would be affected by the construction activities or operation of the constructed facilities, the acreage and plant species composition of the affected vegetation will be determined.*

For tamarisk that would be permanently lost, IID will create or acquire native tree habitat consisting of mesquite bosque or cottonwood-willow habitat. The amount of habitat to acquire or create will be calculated based on the following ratios.

- *If IID creates habitat prior to conducting the construction activities, the mitigation ratio for the acreage of created habitat to lost acreage of tamarisk will be 0.25:1 as long as the created habitat meets the success criteria.*
- *If IID creates habitat after conducting the construction activities or if IID acquires existing habitat, the mitigation ratio for the acreage of the created or acquired habitat to lost acreage of tamarisk will be 0.75:1. The habitat will be created or acquired within 1 year of initiation of the construction activities unless otherwise agreed to by IID, USFWS, and CDFG.*

For native tree habitat that would be removed by construction activities, IID will create or acquire native tree habitat consisting of mesquite bosque or cottonwood-willow habitat at a 3:1 ratio for the acreage impacted. The habitat will be created or acquired within 1 year of initiation of the construction activities unless otherwise agreed to by IID, USFWS, and CDFG.

If IID elects to acquire habitat, IID will work with the HCP IT to identify a property for acquisition. Habitat to be acquired must support mesquite bosque or cottonwood-willow habitat, occur within the Salton Sea Basin and meet with the approval of the USFWS and CDFG. If the only available properties that meet these requirements are larger than required to compensate for the lost acreage, IID will acquire the least expensive property. IID can use the additional acreage of the acquired habitat to fulfill the mitigation obligations of Tree Habitat–1 or Tree Habitat–2 for future projects, or Salton Sea–3. IID will place a conservation easement on acquired lands and provide for the property to be managed for covered species in perpetuity. With the approval of USFWS and CDFG, which approval shall not be unreasonably withheld, IID may transfer the land to a third party who agrees to

and is authorized to manage the land for habitat conservation purposes. If IID transfers the land to a third party, IID will establish an endowment fund adequate to provide for the management of the lands in perpetuity.

If IID elects to create habitat, IID will work with the HCP IT to develop a habitat creation plan. The habitat creation plan will include the following information:

- *Location*
- *Planting plan (including species composition and layout)*
- *Grading and other construction activities*
- *Long-term management practices*
- *Vegetation and species use monitoring*
- *Success criteria for the plantings and the actions that iid will take if the success criteria are not met*

IID will submit habitat creation plans to the USFWS and CDFG for approval prior to initiation of habitat creation activities. IID will provide for the management of created native tree habitat in perpetuity.

For created and acquired habitat, IID will work with the HCP IT to prepare a management plan for the property that describes how the property will be managed. The management plan will describe the actions that IID will take to maintain the ecological functions of the created and acquired habitat. While the specific management needs will vary depending on the property, considerations for the management plan include:

- *Measures to control human access (e.g., fencing, signage)*
- *Frequency at which land will be visited to assess maintenance/management needs*
- *Types of maintenance action (e.g., removing garbage, repairing fences)*
- *Vegetation management practices (e.g., prescribed burning, removal of exotic plants)*

IID will submit management plans to the USFWS and CDFG for approval within 1 year of completing habitat creation activities or recording a conservation easement for acquired habitat.

IID will undertake a variety of construction activities in the future, primarily as part of the water conservation and transfer project and to modernize and rehabilitate its facilities. As described above, these construction activities have the potential to remove a small amount of tamarisk scrub vegetation which has a small potential to result in take of a covered species. This mitigation measure addresses this potential take by requiring site-specific surveys for every scheduled construction activity to determine if the construction would impact tamarisk scrub habitat and subsequently taking actions to compensate for the loss if habitat would be permanently lost because of the construction. By conducting site-specific surveys, IID will determine if any tamarisk scrub habitat will be affected and create native tree habitat to replace lost habitat values. If areas of tamarisk scrub habitat will be affected, IID will create or acquire and preserve native tree habitat at a 0.25:1 or 0.75:1 mitigation ratio.

The 0.25:1 mitigation ratio for tamarisk was derived based on the relative value of the habitat affected (i.e., tamarisk scrub) and the habitat that would be created (i.e., cottonwood-willow or mesquite bosque). Anderson and Ohmart (1984) developed a classification system for riparian plant communities along the LCR based on the plant species composition and structural characteristics. Their plant species composition categories are cottonwood-willow, tamarisk, screwbean mesquite, honey mesquite, tamarisk / honey mesquite, and arrowweed. The structural classes and their characteristics are described in Table 3.4-4. Anderson and Ohmart (1984) further assigned a habitat value rating to each plant community / structural class that ranged from 1 (lowest value) to 26 (highest value). Based on this rating system, tamarisk scrub habitats have low habitat value ratings for all structural classes, ranging from 3 to 8 units (Table 3.4-5). Tamarisk is considered to be a relatively unimportant plant community for most bird species along the LCR (Rice et al. 1980). In contrast, the habitat value ratings for cottonwood-willow communities range from 17 to 26 for communities that contained trees greater than 15 feet tall. Cottonwood-willow stands with few cottonwood trees greater than 15 feet tall, have a similar habitat value rating as tamarisk communities. Similarly, honey mesquite communities have high habitat value ratings.

TABLE 3.4-4
Structural Characteristics of Riparian Vegetation According to Anderson and Ohmart (1984) Classification System

Structure Type	Characteristics
I	Mature stand with distinctive overstory greater than 15 feet in height, intermediate class from 2 to 15 feet, tall, and understory from 0 to 2 feet tall.
II	Overstory is greater than 15 feet tall and constitutes greater than 50 percent of the trees with little or no intermediate class present.
III	Largest proportion of trees is between 10 and 20 feet in height with few trees above 20 feet or below 5 feet in height.
IV	Few trees above 15 feet present. Fifty percent of the vegetation is 5 to 15 feet tall with the other 50 percent between 1 to 2 feet in height.
V	Sixty to 70 percent of the vegetation present is between 0 to 2 feet tall, with the remainder in the 5- to 15-foot class.
VI	Seventy-five to 100 percent of the vegetation from 0 to 2 feet in height.

The structural characteristics of the tamarisk scrub in the HCP area has not been determined with the exception of the tamarisk present in seepage areas along the AAC between Drops 2 and 3 and between Drops 3 and 4. The tamarisk scrub in these areas is structural types III and V (Reclamation and IID 1994). These structural types are likely to be the predominant types within the HCP area as well. Thus, the tamarisk scrub in the HCP area provides a relative habitat value of 5. The cottonwood-willow community between Drops 3 and 4 was structural type IV with a relative habitat value of 19 (Reclamation and IID 1994) suggesting that at least a structural type IV community can be created in the native tree habitats. This seepage community also supports a honey mesquite community of structural type IV with a relative habitat value rating of 21. Thus, it is reasonable to expect that created or acquired

TABLE 3.4-5
Wildlife Habitat Value Rating for Tamarisk and Cottonwood-Willow Habitats

Community/Structure	Value
Cottonwood-Willow	
Type I	17
Type II	23
Type III	26
Type IV	19
Type V	5
Type VI	6
Honey Mesquite	
Type III	20
Type IV	21
Type V	10
Type VI	9
Tamarisk	
Type I	4
Type II	8
Type III	5
Type IV	3
Type V	5
Type VI	7
Mixed Communities[a]	
Saltcedar/palms V	10
Saltcedar/honey mesquite IV	8
Saltcedar/honey mesquite V	7.5
Saltcedar/honey mesquite/palms V	12.5
Screwbean mesquite/palms IV	14
Screwbean mesquite/palms V	14

Source: Anderson and Ohmart (1984, presented in Reclamation and IID 1994) unless noted
[a]USFWS (1993)

native tree habitat would provide at least a relative habitat value of 19. As compared to tamarisk scrub with a relative habitat value of 5, the created native tree habitat with a relative habitat value of 19, would provide a habitat value about 4 times greater than the value of the tamarisk scrub currently available. As such, using a 0.25:1 mitigation ratio would result in a similar habitat value in the created native tree habitat as the tamarisk scrub habitat.

If native tree habitat is created prior to removal of tamarisk by construction activities, the habitat will be available to covered species at the time the tamarisk is removed. As described above, native tree habitat is four times more valuable to wildlife than tamarisk and creating native tree habitat at a 0.25:1 ratio prior to removal of tamarisk would ensure that there would be not net loss of habitat value for covered species. If native tree habitat is created after tamarisk is removed, there would be slight reduction in habitat value between when the tamarisk is removed and the created habitat is installed and develops into functional habitat. A higher mitigation ratio (0.75:1) is used to account for this delay. If IID elects to acquire existing habitat, there could still be a slight reduction in habitat value because of an overall net loss in acreage. A higher mitigation ratio (0.75:1) is used to account for the net loss.

Tree Habitat–2. *If IID installs subsurface seepage recovery systems on the East Highline Canal, prior to the initiation of construction, IID will determine the acreage of seepage community vegetation that will be removed and permanently lost because of the construction. For seepage community vegetation that would be permanently lost, IID will create or acquire native tree habitat consisting of mesquite bosque or cottonwood-willow habitat. The amount of habitat to acquire or create will be calculated based on the following ratios.*

- *If IID creates habitat prior to installing the subsurface recovery systems, the mitigation ratio for the acreage of created habitat to lost acreage of tamarisk will be 0.5:1 as long as the created habitat meets the success criteria.*
- *If IID creates habitat after installing the subsurface recovery systems, the mitigation ratio for the acreage of the created or acquired habitat to lost acreage of tamarisk will be 1.5:1. The habitat will be created or acquired within 1 year of initiation of construction activities unless otherwise agreed to by IID, USFWS, and CDFG.*

If IID elects to acquire habitat, IID will work with the HCP IT to identify a property for acquisition. Habitat to be acquired must support mesquite bosque or cottonwood-willow habitat, occur within the Salton Sea Basin and meet with the approval of the USFWS and CDFG. If the only available properties that meet these requirements are larger than required to compensate for the lost acreage, IID will acquire the least expensive property. IID can use the additional acreage of the acquired habitat to fulfill the mitigation obligations of Tree Habitat–1 or Tree Habitat–2 for future projects, or Salton Sea–3. IID will place a conservation easement on acquired lands and provide for the property to be managed for covered species in perpetuity. With the approval of USFWS and CDFG, which approval shall not be unreasonably withheld, IID may transfer the land to a third party who agrees to and is authorized to manage the land for habitat conservation purposes. If IID transfers the land to a third party, IID will establish an endowment fund adequate to provide for the management of the lands in perpetuity.

If IID elects to create habitat, IID will work with the HCP IT to develop a habitat creation plan. The habitat creation plan will include the following information:

- *Location*
- *Planting plan (including species composition and layout)*
- *Grading and other construction activities*
- *Long-term management practices*
- *Vegetation and species use monitoring*
- *Success criteria for the plantings and the actions that iid will take if the success criteria are not met*

IID will submit habitat creation plans to the USFWS and CDFG for approval prior to initiation of habitat creation activities. IID will provide for the management of created native tree habitat in perpetuity.

For created and acquired habitat, IID will work with the HCP IT to prepare a management plan for the property that describes how the property will be managed. The management plan will describe the actions that IID will take to maintain the ecological functions of the created or acquired habitat. While the specific management needs will vary depending on the property, considerations for the management plan include:

- *Measures to control human access (e.g., fencing, signage)*
- *Frequency at which land will be visited to assess maintenance/management needs*
- *Types of maintenance action (e.g., removing garbage, repairing fences)*
- *Vegetation management practices (e.g., prescribed burning, removal of exotic plants)*

IID will submit management plans to the USFWS and CDFG for approval within 1 year of completing habitat creation activities or recording a conservation easement for acquired habitat.

IID may install subsurface seepage recovery systems along the East Highline Canal as part of the water conservation and transfer program. The plant communities adjacent to the East Highline Canal that are supported by seepage from the canal consist of a wide variety of plants, including tamarisk, mesquite, arrowweed, common reed, and a few cottonwoods. Covered species associated with tamarisk scrub habitats could use these plant communities. Installation of subsurface seepage recovery systems would result in the loss of some vegetation and the USFWS and CDFG identified potential take of covered species from removal of a portion of the seepage community vegetation. This measure will mitigate potential impacts of the take of covered species that could result from construction of subsurface seepage recovery systems by acquiring or creating native tree vegetation sufficient to offset lost habitat value.

The 0.5:1 mitigation ratio was derived from relative habitat value ratings for mixed communities (Table 3.4-5). The vegetation of the seepage communities consists of a mix of species, including but not limited to tamarisk, mesquite, *Atriplex*, nonnative palms, cottonwoods, and *Phragmites*. Depending on the species composition and structural conditions, the habitat value ratings for mixed communities range from 7.5 to 14. The habitat value of seepage communities is probably on the lower end of this range because of the preponderance of nonnative species. As described above, the created or acquired habitat would be expected to have a habitat value of at least 19, about twice the value of the seepage communities. Thus, a 0.5:1 mitigation ratio would be adequate to offset any loss in habitat value from removal of seepage communities along the East Highline Canal.

For the same reason as described under Tree Habitat–1, a higher mitigation ration (1.5:1) is used if the habitat is created after the subsurface seepage recovery systems are installed or if habitat is acquired.

Tree Habitat–3. *For scheduled construction activities, including installation of subsurface seepage recovery systems, that will remove tamarisk, cottonwoods, willows or mesquite, the site will be surveyed to determine whether any covered species are potentially breeding at the site. If covered species are found to be potentially breeding on the project site, IID will schedule the construction activities that directly affect habitat to occur outside of the breeding season.*

In addition to potentially reducing the amount of tamarisk scrub habitat available to covered species, construction activities could disturb or injure covered species using the habitat. The effect of disturbance and the potential for injury would be greatest on covered species if covered species were nesting in the habitat to be removed by construction. To minimize the potential for take of covered species from construction activities, IID will survey tamarisk, cottonwood, willow or mesquite vegetation to determine if any covered species are breeding in the habitat that would be affected by the construction activities. If the surveys indicate that covered species are likely to be breeding in the habitat that would be affected, IID will schedule activities that would affect the habitat to occur outside of the breeding season. Outside of the breeding season, IID could remove the habitat. By scheduling construction activities that would affect habitat to occur outside of the breeding season, IID will minimize the potential to injure or disturb a covered species.

3.4.5 Effects on Habitat

Tamarisk is a nonnative species that has invaded riparian areas of the southwest and readily colonizes non-riparian areas with adequate soil moisture. Tamarisk is considered poor quality habitat for native wildlife species although some wildlife species have adapted to using tamarisk where it has displaced native vegetation. Tamarisk can form dense monocultures with little structural diversity. Bird species diversity and abundance have been found to be lower in tamarisk than in stands of native riparian vegetation. There have been 32 riparian-dependent bird species identified in the Southwestern U.S. (Anderson and Ohmart 1984, Kelly and Finch 1999), with 26 of these species requiring broadleaf trees for nesting and breeding along the Lower Color River and cannot fulfill these life requisites in tamarisk (Anderson and Ohmart 1984, Kelly and Finch 1999). Two groups, large raptors, and cavity nesting species, are not known to occur in tamarisk. Tamarisk’s growth form is generally as a large shrub that does not possess the structural characteristics required by species such as raptors or woodpeckers that rely on trees as perch and/or nest sites. Some birds have been found to use tamarisk for nesting along the Rio Grande and Pecos Rivers in New Mexico, but are broadleaf obligates at lower elevations along the Colorado River. The discrepancy in use of tamarisk between these two areas is believed to be caused by a difference in temperature extremes between the higher elevation eastern watersheds and the low elevation rivers of southwest Arizona and California. Most tamarisk habitat along the LCR lacks the species diversity and canopy structure necessary to ameliorate extreme climate conditions and as a result does not provide suitable habitat for many of the species known to successfully breed in tamarisk farther east (Hunter et al. 1985, 1987, and 1988). These studies indicate the poor quality of tamarisk as wildlife habitat.

Tamarisk currently is common and abundant in the HCP area, having colonized areas adjacent to the New and Alamo Rivers, agricultural drains, areas adjacent to the Salton Sea and areas receiving seepage or agricultural runoff (Table 3.4-1). Construction of lateral interceptors and subsurface recovery systems could result in the removal of 58 acres of tamarisk scrub which constitutes less than one percent of the quantified acreage of tamarisk scrub in the HCP area (Table 3.4-3). These acres are addressed through Tamarisk Scrub Habitat Conservation Strategy (Tree Habitat–1 and –2). Thus, tamarisk would be expected to remain locally and regionally abundant. Furthermore, because of its poor quality and high abundance, the distribution and amount of tamarisk is not likely to limit the abundance or distribution of any covered species. Nonetheless, because tamarisk is known to be used by several covered species, the Tamarisk Scrub Habitat Conservation Strategy includes habitat creation or acquisition to offset any take of covered species resulting from a local reduction in the distribution or abundance of tamarisk. Created or acquired native tree habitat would provide higher quality habitat, increase habitat diversity in the HCP area, and provide true tree habitat for covered species.

3.4.6 Effects on Covered Species

Tamarisk is not a preferred habitat for any of the covered species. Most of the covered species potentially using this habitat are considered riparian species associated with native riparian plant communities such as cottonwoods, willows, palo verde, and mesquite. Covered species associated with tamarisk scrub fall into this category because tamarisk scrub represents the only tree-dominated habitat in the HCP area. Covered species potentially using tamarisk scrub habitats in the HCP area include resident breeding species, migratory breeding species, winter visitors, and transient species that may visit tamarisk scrub habitat during migration or other wanderings. The effects of the Tamarisk Scrub Habitat Conservation Strategy on covered species are evaluated below.

As part of the Monitoring and Adaptive Management Program (Chapter 4), IID could implement a survey or study program requiring capture of covered species. Capture of covered species constitutes take under both the federal and state ESAs. Take that occurs in association with surveys or studies conducted for this HCP is a covered activity and will be authorized under the state and federal ITPs. Any of the covered species could be taken through surveys or studies.

Studies and surveys conducted during the course of this HCP will be developed by IID in coordination with the HCP IT and will be subject to the approval of CDFG and USFWS prior to implementation. In approving the studies/surveys, the CDFG and USFWS will require capture methods that minimize the potential for death and injury of covered species. In addition, these agencies will specify the number of individuals of covered species that may be captured. Thus, the level of take authorized to occur through this mechanism will be specified on a case-by-case basis through the approval of the CDFG and USFWS.

3.4.6.1 Willow Flycatcher

Willow flycatchers consistently occur in the HCP area during migration. They are not known to breed in the HCP area, but recent observations of willow flycatchers during the breeding season along the Whitewater River suggest that this species could breed in the HCP area in the future. Willow flycatchers typically are associated with willow thickets. Willow thickets do not exist in the HCP area, but willow flycatchers have been reported using tamarisk and common reed along the Salton Sea and agricultural drains, and in seepage communities adjacent to the East Highline Canal during migration.

Willow flycatchers could be directly or indirectly taken as a result of several covered activities. Willow flycatchers have been reported using vegetation in the drains and could occur along the New and Alamo rivers as well. Drain and river maintenance activities could flush willow flycatchers from drain vegetation which could constitute take as harassment or cause death or injury to individuals if as a result of being flushed from the cover of drain vegetation they are subject to predation.

On an annual basis, IID conducts drain maintenance activities on about 20 percent of the drainage system, affecting about 130 acres of vegetation. Much of this vegetation could be used by willow flycatchers. The New and Alamo rivers are dredged about every four years which similarly could affect willow flycatchers. Currently, willow flycatchers are only known to occur in the HCP area during migration. With 80 percent of the drain vegetation undisturbed each year and considering IID would be actively cleaning only a fraction of the 20 percent of the drainage system that is maintained each year during the period when willow flycatchers are in the HCP area, the potential for take and the level of take resulting from displacement of birds by drain maintenance activities is low. In the event that willow flycatchers currently are breeding in drain vegetation in the HCP area or start breeding in the HCP area over the 75-year permit term, drain maintenance activities could result in the direct destruction of nests.

Drain maintenance activities and several other covered activities also have the potential to result in take of willow flycatchers through temporary or permanent reductions in the amount of tamarisk scrub habitat. As shown in Table 3.4-3, various maintenance and water conservation activities have the potential to temporarily impact about 43.2 acres of tamarisk scrub habitat and permanently impact about 65.5 acres in the Imperial Valley. Up to an additional 100 acres of tamarisk scrub habitat could be removed during construction activities along the AAC or other canals adjacent to desert habitat. In addition, a reduction in the water surface elevation of the Salton Sea resulting from water conservation could impact up to 2,642 acres of tamarisk scrub habitat adjacent to the Salton Sea. These reductions in tamarisk scrub habitat could reduce foraging opportunities and cover for willow flycatchers. Over the term of the permit, a few individuals could be adversely affected (e.g., killed, injured, or harmed) as a result of this reduction. Because of the abundance of tamarisk scrub in the HCP area (more than 7,500 acres), low level of use of the HCP area by willow flycatchers and poor quality of tamarisk as habitat for willow flycatchers, overall population-level effects would not be expected.

Various construction activities anticipated by IID have the potential to remove tamarisk scrub habitat that could be used by willow flycatchers. Construction activities could displace individuals and result in take if displaced birds were unable to find alternate habitat or were exposed to other hazards (e.g., predation). Because of the abundance of tamarisk scrub habitat in the HCP area (more than 7,500 acres) and small amount of habitat that would be permanently impacted by construction activities over the term of the permit, the amount of take potentially occurring from displacement of individuals as habitat is removed would be minimal. If willow flycatchers nest in the HCP area over the term of the permit, construction activities could result in the destruction of nests during habitat removal. Tamarisk is poor quality habitat for willow flycatchers and the HCP area is outside this species' currently known breeding range. As such, the number of willow flycatchers potentially breeding in the HCP area over the term of the permit would be expected to be low. Given this low level of expected use and the small amount of habitat that would be impacted, the amount of take attributable to nest destruction during construction activities would be very low.

Implementation of the Tamarisk Scrub Habitat Conservation Strategy would be expected to maintain or improve habitat value for willow flycatchers in the HCP area. Native tree habitat would be created or acquired, and preserved to replace any tamarisk scrub habitat that would be permanently lost as a result of the construction activities (see Tree Habitat–1 and –2). As part of the Salton Sea Habitat Conservation Strategy, native tree habitat also would be created or acquired, and preserved if a net loss of tamarisk scrub habitat occurs within the shoreline strand or adjacent wetlands. Consisting of native plant species, the created or acquired habitat would be expected to provide better habitat quality for willow flycatchers than the tamarisk that would be lost. The creation or acquisition of native tree habitat under Tree Habitat–1 and –2 and Salton Sea–3 would offset the reduction in habitat value for willow flycatchers resulting from reductions in the amount of tamarisk scrub thus mitigating the impact of take potentially resulting from changes in habitat.

Although willow flycatchers currently are not known to breed in the HCP area, IID will implement measures to avoid and minimize impacts of construction activities on willow flycatchers that could breed in the HCP area in the future. Under Tree Habitat–3 and Drain Habitat–3, prior to conducting scheduled construction activities IID will survey construction areas and if covered species are found breeding in impacted areas, IID will schedule construction to occur outside the breeding season. With this measure, IID will minimize the potential for construction activities to destroy nests.

Implementation of the HCP measures would minimize and mitigate the impact of take of willow flycatchers that could result from the covered activities and would not jeopardize the continued existence of this species. Based on (1) the low level of use of the HCP area by willow flycatchers, (2) the low quality of tamarisk as habitat for this species, (3) the abundance of potential habitat in and around the HCP area, and (4) implementation of measures to minimize take of flycatchers, the potential for take and the magnitude of take of willow flycatchers as a result of the covered activities is low. Creation or acquisition and long-term protection of native tree habitat would provide high quality habitat for willow flycatcher in perpetuity. This long-term protection of native habitat would ensure the availability of migratory stopover habitat and nesting opportunities for willow flycatcher of at least equivalent value (considering both acreage and quality) as the tamarisk scrub habitat impacted by the covered activities, thus mitigating take of willow flycatcher that could result from reductions in the amount of tamarisk scrub habitat. With the take minimization measures and compensation for take potentially resulting from reduced habitat, implementation of the HCP would not jeopardize the continued existence of willow flycatcher.

3.4.6.2 Least Bell's Vireo

Least Bell's vireo occurs accidentally in the HCP area during migration. This low level of use is reflected by only two observations of this species at the Salton Sea NWR. On the rare occasion that it does occur in the HCP area, it could use tamarisk as the only available tree or shrub habitat. Because of the very low level of use, it is very unlikely that any least Bell's vireo would be taken as a result of the covered activities. Nonetheless, over the term of the permit, it is possible for a covered activity to directly or indirectly cause take of a least Bell's vireo.

On the rare occasions that this species occurs in the HCP area, they would be expected to use trees or shrubs because their typical habitat consists of native riparian habitat. As the dominant tree and shrub, tamarisk is the most likely habitat that least Bell's vireo would use in the HCP area. Among other locations, tamarisk occurs in the drains. Drain maintenance activities could flush least Bell's vireo from drain vegetation which could constitute take as harassment or cause death or injury to individuals if as a result of being flushed from the cover of drain vegetation they are subject to predation. On an annual basis, IID conducts drain maintenance activities on about 20 percent of the drainage system, affecting about 130 acres of vegetation. Much of this vegetation could be used by least Bell's vireo. Currently, least Bell's vireo are known only as accidentals in the HCP area. As a result, the likelihood of drain maintenance activities being conducted in an area coincident with a vireo is remote and the potential for take and the extent of take through this mechanism is very low.

Drain maintenance activities and several other covered activities have the potential to result in take of least Bell's vireo through temporary or permanent reductions in the amount of tamarisk scrub habitat. As shown in Table 3.4-3, various maintenance and water conservation activities have the potential to temporarily impact about 43.2 acres of tamarisk scrub habitat and permanently impact about 65.5 acres. In addition, a reduction in the water surface elevation of the Salton Sea resulting from water conservation could impact up to 2,642 acres of tamarisk scrub habitat adjacent to the Salton Sea and construction along the AAC or other canals adjacent to desert habitat could remove up to 100 acres of tamarisk scrub habitat. These reductions in tamarisk scrub habitat could reduce foraging opportunities and cover for least Bell's vireo. Over the term of the permit, a few individuals could be adversely affected (e.g., killed, injured, or harmed) as a result of this reduction, but because of the abundance of tamarisk scrub in the HCP area (more than 7,500 acres), accidental use of the HCP area by least Bell's vireo and poor quality of tamarisk as habitat for this species, no adverse population-level effects would be expected.

Various construction activities anticipated by IID have the potential to remove tamarisk scrub habitat that could be used by least Bell's vireo. Construction activities could displace individuals and result in take if displaced birds were unable to find alternate habitat or were exposed to other hazards (e.g., predation). Because of the abundance of tamarisk scrub habitat in the HCP area (more than 7,500 acres), the small amount of habitat the would be permanently impacted by construction activities over the term of that permit, and few individuals anticipated to occur in the HCP area, the amount of take potentially occurring from displacement of individuals as habitat is removed would be minimal.

Implementation of the Tamarisk Scrub Habitat Conservation Strategy would be expected to maintain or improve habitat value for least Bell's vireo in the HCP area. Native tree habitat would be created or acquired, and preserved to replace any tamarisk scrub habitat that would be permanently lost as a result of the construction activities (see Tree Habitat–1 and –2). As part of the Salton Sea Habitat Conservation Strategy, native tree habitat also would be created or acquired, and preserved if a net loss of tamarisk scrub habitat occurs within the shoreline strand or adjacent wetlands. Consisting of native plant species, the created or acquired habitat would be expected to provide better habitat quality for least Bell's vireo than the tamarisk that would be lost. The creation or acquisition of native tree habitat under Tree Habitat–1 and –2 and Salton Sea–3 would offset any reduction in habitat value for least Bell's vireo resulting from reductions in the amount of tamarisk scrub thus mitigating the impact of take potentially resulting from changes in habitat.

Implementation of the HCP measures would minimize and mitigate the impact of take of least Bell's vireo that could result from the covered activities and would not jeopardize the continued existence of this species. Based on (1) the accidental use of the HCP area by least

Bell's vireo, (2) the low quality of tamarisk as habitat for this species, and (3) the abundance of potential habitat in and around the HCP area, the potential for take and the magnitude of take of least Bell's vireo as a result of the covered activities is very low. Creation or acquisition and long-term protection of native tree habitat would provide high quality habitat for least Bell's vireo in perpetuity. This long-term protection of native habitat would ensure the availability of habitat in the HCP area for least Bell's vireo of at least equivalent value (considering both acreage and quality) as the tamarisk scrub habitat impacted by the covered activities, thus mitigating take of least Bell's vireo that could result from reductions in the amount of tamarisk scrub habitat. With the compensation for take potentially resulting from reduced habitat, implementation of the HCP would not jeopardize the continued existence of least Bell's vireo.

3.4.6.3 Arizona Bell's Vireo

Historically and currently, the distribution of Arizona Bell's vireo is limited to areas along the LCR. The nearest known occurrence of this species to the HCP area is from eastern Imperial County near the Colorado River. Arizona Bell's vireo is closely associated with native riparian habitat.

The Arizona Bell's vireo has not be reported in the Imperial Valley, but over the term of the permit its range could expand to include this portion of the HCP area. If such a range expansion occurs, Arizona Bell's vireo could be subject to take from the covered activities in the same manner as described for the willow flycatcher. Arizona Bell's vireo is more likely to occur in seepage areas along the AAC or in other shrub or tree habitats closer to the LCR than tamarisk scrub habitat found in the Imperial Valley. Temporary or permanent removal of tamarisk scrub habitat along the AAC (e.g., in the seepage community between Drops 3 and 4) is not anticipated. Construction and O&M activities along the AAC present a minor potential to disturb Arizona Bell's vireo that might use tamarisk scrub habitat in seepage areas.

Implementation of the HCP measures would minimize and mitigate the impact of take of Arizona Bell's vireo that could result from the covered activities and would not jeopardize the continued existence of this species. Based on: (1) the very low level of use of the HCP area by Arizona Bell's vireo, (2) the low quality of tamarisk as habitat for this species, and (3) the abundance of potential habitat in and around the HCP area, the potential for take and the magnitude of take of Arizona Bell's vireo as a result of the covered activities is very low. Creation / acquisition and long-term protection of native tree habitat would make high quality habitat available for this species in perpetuity. This long-term protection of native habitat would ensure the availability of habitat in the HCP area for Arizona Bell's vireo of at least equivalent value (considering both acreage and quality) as the tamarisk scrub habitat impacted by the covered activities, thus mitigating take of Arizona Bell's vireo that could result from reductions in the amount of tamarisk scrub habitat. With the compensation for take potentially resulting from reduced habitat, implementation of the HCP would not jeopardize the continued existence of Arizona Bell's vireo.

3.4.6.4 Swainson's Hawk

Swainson's hawks are occasional visitors to the Salton Sea area during their spring and fall migrations. They are not known to breed in the HCP area. For foraging, Swainson's hawk frequent agricultural fields. Trees and utility poles are used as perch and roost sites. Agricultural fields that Swainson's hawks can use for foraging are abundant in the HCP area.

The extent to which the Swainson's hawks use individual fields could be related to the availability of perch sites in the vicinity of the fields. Although tamarisk is abundant in the HCP area, tamarisk probably provides few perching opportunities for Swainson's hawk because it typically remains a large shrub, lacking the more robust and open structure required by Swainson's hawk for perching and roosting. As such, Swainson's hawks probably would not be affected by the projected reduction in tamarisk scrub habitat. Take of Swainson's hawks potentially resulting from reductions in agricultural field habitat is described in Section 3.8.6.2: Agricultural Field Habitat Conservation Strategy.

Under the Tamarisk Scrub Habitat Conservation Strategy, native tree habitat would be created / acquired, and preserved to replace tamarisk scrub habitat that would be permanently lost as a result of the construction activities. This created or acquired habitat would provide better habitat for Swainson's hawk because of the presence of trees that the hawks could use for roosting or perching while foraging. Additional benefits could be realized if native tree habitat is created as part of the Salton Sea Habitat Conservation Strategy. Creation of native tree habitat could increase the accessibility of foraging habitat for Swainson's hawks by providing perch sites near agricultural fields in areas previously lacking suitable perches. If native tree habitat was acquired to compensate for reductions in tamarisk scrub habitat, Swainson's hawks could benefit from the long-term certainty that perch and roost sites would be available in the HCP area. No take of Swainson's hawks is anticipated as a result of removal of tamarisk, but this species could benefit from implementation of the Tamarisk Scrub Habitat Conservation Strategy.

3.4.6.5 Gila Woodpecker

Gila woodpeckers have been observed at a number of locations in the Imperial Valley in areas that support large trees, such as near towns and houses. They also are known to occur along the AAC in areas with trees supported by seepage, or in association with telephone poles that may also be used to create nesting cavities. The species may breed in these locations. The Gila woodpecker has declined dramatically in California. Loss and degradation of mature riparian habitat and saguaros have been implicated as the primary reason for this decline.

Tamarisk is very poor habitat for Gila woodpeckers. The few birds that have been observed using tamarisk along the LCR are believed to be dispersing juveniles rather than territorial adults (Larsen 1987). Gila woodpeckers have not been found to nest in tamarisk (Larsen 1987). Where other tree species occur within tamarisk scrub habitat (e.g., seepage communities along the East Highline Canal or AAC), Gila woodpeckers could find suitable nesting habitat. Based on the overall low level of use and lack of use by breeding birds, the potential for the covered activities to result in take of Gila woodpeckers is low. In the Imperial Valley, Gila woodpeckers are only known to occur in association with trees in urban areas or agricultural operations (e.g., ranch yards).

Drain maintenance activities would not be expected to impact Gila woodpeckers because, as a result of regular maintenance trees do not grow large enough to provide habitat for this species. However, as shown in Table 3.4-3, various other covered activities have the potential to permanently impact about 65.5 acres and tamarisk scrub habitat in the Imperial Valley. Up to an additional 100 acres of tamarisk scrub habitat could be removed during construction activities along the AAC or other canals adjacent to desert habitat. Installation of seepage recovery systems along the East Highline Canal in particular, have the potential to impact habitat for Gila woodpecker. Depending on the plant species composition of the areas impacted, the loss of tamarisk scrub habitat could reduce foraging and/or nesting opportunities for Gila woodpeckers. Over the term of the permit, a few individuals could be adversely affected (e.g., killed, injured, or harmed) as a result of this reduction. Because of the low level of use of the HCP area by Gila woodpeckers, generally poor quality of tamarisk scrub habitat as habitat for Gila woodpeckers, and continued availability of trees in urban areas or in ranch yards, no adverse population-level effects would be expected.

The potential for Gila woodpeckers to be disturbed or injured as a result of the covered activities is low because this species is typically found in association with trees in urban areas or agricultural fields. Few, if any, of the covered activities would be conducted near areas supporting trees. Nonetheless, some potential for take of Gila woodpeckers is associated with construction activities that could destroy a nest if an occupied nest tree is removed. Under the Tamarisk Scrub Habitat Conservation Strategy, IID will survey areas that would be disturbed during construction to determine if any covered species, including Gila woodpeckers, are breeding in habitat that would be disturbed. Removal of habitat will be avoided until after the breeding season and native tree habitat created to compensate for tamarisk scrub or cottonwood-willow habitat that is permanently lost. These measures will minimize and mitigate any take of Gila woodpeckers as a result of construction activities.

Implementation of the Tamarisk Scrub Habitat Conservation Strategy could benefit Gila woodpeckers. The availability of trees suitable for excavating nesting cavities has been identified as a limiting factor for Gila woodpeckers (Larsen 1987). Under the Tamarisk Scrub Habitat Conservation Strategy, native tree habitat would be created/acquired, and preserved in perpetuity. Native trees such as cottonwoods and mesquite would be an important component of this habitat. Given the limited availability of trees of suitable size and wood characteristics in the HCP area, the creation or long-term preservation of native tree habitat would contribute to maintaining or increasing the availability of nest trees suitable for Gila woodpecker over the term of the permit. With their apparent tolerance for human activity and willingness to exploit suitably sized trees, regardless of species, Gila woodpeckers would likely exploit the trees provided under Tamarisk Scrub Habitat Conservation Strategy. Gila woodpeckers would further benefit if native tree habitat was created or acquired, and preserved as part of the Salton Sea Habitat Conservation Strategy. Given the limited potential for take of Gila woodpecker as a result of covered activities, the beneficial aspects of the Tamarisk Scrub Habitat Conservation Strategy would minimize and mitigate the impact of any take of this species resulting from the covered activities. Implementation of the HCP would not jeopardize the continued existence of this species.

3.4.6.6 Gilded Flicker

Gilded flickers have habitat requirements similar to those of the Gila woodpecker described above and similarly are believed to have declined in California because of loss of mature riparian habitat and saguaros. Unlike Gila woodpeckers, they appear intolerant of human activity and have not been reported in the Imperial Valley. Their occurrence along the AAC is unknown but possible.

Little potential habitat for gilded flickers exists in the HCP area. The few trees available in the Imperial Valley are generally located near human activity, such as in parks, residential areas, or on ranches. Because they have a low tolerance for human activity and are not known to use tamarisk, gilded flickers are unlikely to occur in the Imperial Valley. Like the Gila woodpecker, they would be most likely to occur in association with the seepage communities along the East Highline Canal or AAC.

Drain maintenance activities would not be expected to impact gilded flicker because, as a result of regular maintenance trees do not grow large enough to provide habitat for this species. However, as shown in Table 3.4-3, various other covered activities have the potential to permanently impact about 65.5 acres and tamarisk scrub habitat in the Imperial Valley. Up to an additional 100 acres of tamarisk scrub habitat could be removed during construction activities along the AAC or other canals adjacent to desert habitat. Installation of seepage recovery systems along the East Highline Canal in particular, have the potential to impact habitat for gilded flicker. Depending on the plant species composition of the areas impacted, the loss of tamarisk scrub habitat could reduce foraging and / or nesting opportunities for gilded flicker. Over the term of the permit, a few individuals could be adversely affected (e.g., killed, injured, or harmed) as a result of this reduction. Because of the low level of use of the HCP area by gilded flicker, and generally poor quality of tamarisk scrub habitat as habitat for this species, no adverse population-level effects would be expected.

The Tamarisk Scrub Habitat Conservation Strategy would minimize and mitigate impacts to gilded flickers in the event that they occur in the HCP area. Some potential for take of gilded flickers is associated with construction activities that could destroy a nest if an occupied nest tree is removed. Under the Tamarisk Scrub Habitat Conservation Strategy, IID will survey areas that would be disturbed during construction to determine if any covered species, including gilded flickers, are breeding in habitat that would be disturbed. Removal of habitat will be avoided until after the breeding season and native tree habitat created or acquired, and preserved to compensate for tamarisk scrub habitat that is permanently lost.

The creation or long-term preservation of native tree habitat would contribute to maintaining or increasing the availability of suitable nesting conditions for gilded flickers if located in areas of limited human activity. Additional nesting habitat could be gained if native tree habitat is created or acquired, and preserved as part of the Salton Sea Habitat Conservation Strategy. Given the limited potential for take of gilded flicker as a result of covered activities, the beneficial aspects of the Tamarisk Scrub Habitat Conservation Strategy would minimize and mitigate the impact of any take of this species resulting from the covered activities. Implementation of the HCP would not jeopardize the continued existence of this species.

3.4.6.7 Western Yellow-Billed Cuckoo

Yellow-billed cuckoos are rare in the HCP area and occur only as accidentals. The species has been observed on two occasions at the Salton Sea NWR, but has not been reported in the Imperial Valley. On one occasion, a single individual was observed along the AAC. The absence of yellow-billed cuckoos from the HCP area is expected because riparian cottonwood-willow habitat that yellow-billed cuckoos require does not exist in the HCP area. On the rare occasion that it does occur in the HCP area, it could use tamarisk as the only available tree or shrub habitat. Because of the low level of use of the HCP area by yellow-billed cuckoos, the potential for take is very low. Nonetheless, over the term of the permit, it is possible for a covered activity to directly or indirectly cause take of a yellow-billed cuckoo.

Drain maintenance activities would not be expected to impact yellow-billed cuckoo because, as a result of regular maintenance, trees do not grow large enough to attract this species. However, as shown in Table 3.4-3, various other covered activities have the potential to permanently impact about 65.5 acres and tamarisk scrub habitat in the Imperial Valley. Up to an additional 100 acres of tamarisk scrub habitat could be removed during construction activities along the AAC or other canals adjacent to desert habitat. Installation of seepage recovery systems along the East Highline Canal in particular, have the potential to impact habitat for yellow-billed cuckoo. The permanent loss of tamarisk scrub habitat could reduce foraging and cover opportunities for yellow-billed cuckoo. Over the term of the permit, a few individuals could be adversely affected (e.g., killed, injured, or harmed) as a result of this reduction. Because of the accidental use of the HCP area by yellow-billed cuckoo, and generally poor quality of tamarisk scrub habitat as habitat for this species, no adverse population-level effects would be expected.

Implementation of the Tamarisk Scrub Habitat Conservation Strategy would be expected to maintain or improve habitat value for yellow-billed cuckoo in the HCP area. Native tree habitat would be created or acquired, and preserved to replace any tamarisk scrub habitat that would be permanently lost as a result of the construction activities (See Tree Habitat–1 and –2). As part of the Salton Sea Habitat Conservation Strategy, native tree habitat also would be created or acquired, and preserved if a net loss of tamarisk scrub habitat occurs within the shoreline strand or adjacent wetlands. Consisting of native plant species, the created or acquired habitat would provide better habitat quality for yellow-billed cuckoo than the tamarisk that would be lost. The creation or acquisition of native tree habitat under Tree Habitat–1 and –2 and Salton Sea–3 would offset any reduction in habitat value for yellow-billed cuckoo resulting from reductions in the amount of tamarisk scrub habitat thus mitigating the impact of take potentially resulting from changes in habitat.

Implementation of the HCP measures would minimize and mitigate the impact of take of yellow-billed cuckoo that could result from the covered activities and would not jeopardize the continued existence of this species. Based on the accidental use of the HCP area by yellow-billed cuckoo, and the low quality of tamarisk as habitat for this species, the potential for take and the magnitude of take of yellow-billed cuckoo as a result of the covered activities is very low. Creation or acquisition and long-term protection of native tree habitat would make high-quality habitat for yellow-billed cuckoo available in perpetuity. This long-term protection of native habitat would ensure the availability of habitat in the HCP area for yellow-billed cuckoo of at least equivalent value (considering both acreage and quality) as the tamarisk scrub habitat impacted by the covered activities, thus mitigating take of yellow-billed cuckoo that could result from reductions in the amount of tamarisk scrub habitat. With the compensation for take potentially resulting from reduced habitat, implementation of the HCP would not jeopardize the continued existence of yellow-billed cuckoo.

3.4.6.8 White-Tailed Kite

White-tailed kites can occur in the HCP area throughout the year. Their current breeding status in the HCP area is uncertain. They have bred in the HCP area previously, but have not been verified to breed there recently. White-tailed kites typically forage in agricultural fields and are known to roost in Bermuda grass fields. Nests are located in trees. If white-tailed kites currently nest in the HCP area, they are most likely to use landscape trees or eucalyptus trees bordering agricultural fields as there are few other trees available in the Imperial Valley. Use of tamarisk is probably minimal because it does not provide a structure conducive to perching or nesting by raptors. Where other tree species occur within tamarisk scrub habitat (e.g., seepage communities along the East Highline Canal), white-tailed kites could find suitable nesting habitat.

Drain maintenance activities would not be expected to impact white-tailed kites because, as a result of regular maintenance trees do not grow large enough to provide habitat for this species. However, as shown in Table 3.4-3, various other covered activities have the potential to permanently impact about 65.5 acres and tamarisk scrub habitat in the Imperial Valley. Up to an additional 100 acres of tamarisk scrub habitat could be removed during construction activities along the AAC or other canals adjacent to desert habitat. Installation of subsurface recovery systems along the East Highline Canal in particular, have the potential to impact habitat for white-tailed kites. Depending on the plant species composition of the areas impacted, the loss of tamarisk scrub habitat could reduce nesting opportunities for white-tailed kites. Over the term of the permit, a few individuals could be adversely affected (e.g., killed, injured, or harmed) as a result of removal of this habitat. Although not known to currently nest in the HCP area, white-tailed kites have nested in the HCP area in the past. Potentially, white-tailed kites could nest in the HCP area in the future, and the seepage communities adjacent to the East Highline Canal could support suitable trees for nesting. If kites nest in the seepage communities in the future, installation of subsurface recovery systems could result in take of white-tailed kites. Because they are not known to currently nest in the HCP, the probability and the level of take potentially occurring through this mechanism is low.

The potential for white-tailed kites to be disturbed or injured as a result of the covered activities is also low because this species is most likely to be found in association with trees in urban areas or along agricultural fields. Few, if any, of the covered activities would be conducted in areas supporting potentially suitable nest trees with the exception of installation of subsurface recovery systems described above. Nonetheless, some potential for disturbance of white-tailed kites is associated with construction activities that could occur in the vicinity of an active nest. Under the Tamarisk Scrub Habitat Conservation Strategy, IID will survey areas that would be disturbed during construction to determine if any covered species, including white-tailed kites, are breeding in habitat that would be disturbed. Removal of habitat will be avoided until after the breeding season and native tree habitat created to compensate for tamarisk scrub or cottonwood-willow habitat that is permanently lost.

The Tamarisk Scrub Habitat Conservation Strategy could benefit white-tailed kites. Foraging and roosting habitat is abundant in the HCP area, but few trees are available for nesting. The native tree habitat that would be created or acquired, and preserved under the Tamarisk Scrub Habitat Conservation Strategy could provide suitable nest and perch locations for white-tailed kites if located in proximity to suitable foraging habitat. White-tailed kites will readily use lone trees adjacent to agricultural fields for nesting. Although they have not been reported to nest in the HCP area in recent years, white-tailed kites previously nested in the area. The native tree habitat created or acquired, and preserved under Tamarisk Scrub Habitat Conservation Strategy and potentially the Salton Sea Habitat Conservation Strategy could increase the likelihood that this species would breed in the HCP area again. The creation or acquisition of native tree habitat under Tree Habitat–1 and –2 and Salton Sea–3 would offset a reduction in habitat value for resulting from reductions in the amount of tamarisk scrub thus mitigating the impact of take potentially resulting from changes in habitat.

Implementation of the HCP measures would minimize and mitigate the impact of take of white-tailed kites that could result from the covered activities and would not jeopardize the continued existence of this species. Creation or acquisition and long-term protection of native tree habitat would provide high-quality habitat for white-tailed kites and, given the small amount of potentially suitable nesting habitat for this species, would benefit the species by increasing nesting opportunities over the long term. With the take minimization measures and compensation for take potentially resulting from reduced habitat, implementation of the HCP would not jeopardize the continued existence of white-tailed kites.

3.4.6.9 Summer Tanager

Summer tanagers are rare in the HCP area, but have been reported in the HCP area in summer and winter. Although they have not been reported to breed in the HCP area, reports of summer tanagers in the HCP area during the summer suggest that the species could become a breeding species in the future. Summer tanagers are typically associated with mature cottonwood-willow riparian forest habitat; however, they are known to use areas supporting large tamarisk. In the HCP area they could use tamarisk along the drains, rivers, Salton Sea, and seepage communities adjacent to the East Highline Canal.

Summer tanagers could be directly or indirectly taken as a result of several covered activities. If summer tanagers use vegetation in the drains or rivers, drain and river maintenance activities could flush summer tanagers which could constitute take as harassment or cause death or injury to individuals if as a result of being flushed they are subject to predation. On an annual basis, IID conducts drain maintenance activities on about 20 percent of the drainage system, affecting about 130 acres of vegetation. Much of this vegetation could be used by summer tanagers. The New and Alamo rivers are dredged about every four years which similarly could affect summer tanagers. Currently, summer tanagers are rare in the HCP area. Considering that only 20 percent of the drainage system is maintained each year, and dredging of the river mouths is only conducted about once every four years, the likelihood of these activities coinciding with the presence of a summer tanager and thereby resulting in take from displacement of birds is low. In the event that summer tanagers start breeding in the HCP area over the 75-year permit term, drain maintenance activities could result in the direct destruction of nests.

Drain maintenance activities and several other covered activities also have the potential to result in take of summer tanagers through temporary or permanent reductions in the amount of tamarisk scrub habitat. As shown in Table 3.4-3, various maintenance and water conservation activities have the potential to temporarily impact about 43.2 acres of tamarisk scrub habitat and permanently impact about 65.5 acres in the Imperial Valley. Up to 100 acres of tamarisk scrub habitat could be removed during construction activities along the AAC or other canals adjacent to desert habitat. In addition, a reduction in the water surface elevation of the Salton Sea resulting from water conservation could impact up to 2,642 acres of tamarisk scrub habitat adjacent to the Salton Sea. These reductions in tamarisk scrub habitat could reduce foraging opportunities and cover for summer tanagers. Over the term of the permit, a few individuals could be adversely affected (e.g., killed, injured, or harmed) as a result of this reduction, but because of the abundance of tamarisk scrub in the HCP area (more than 7,500 acres), low level of use of the HCP area by summer tanagers and poor quality of tamarisk as habitat for summer tanagers, no adverse population-level effects would be expected.

Various construction activities anticipated by IID have the potential to remove tamarisk scrub habitat that could be used by summer tanagers. Construction activities could displace individuals and result in take if displaced birds were unable to find alternate habitat or were exposed to other hazards (e.g., predation). Because of the abundance of tamarisk scrub habitat in the HCP area (more than 7,500 acres) and small amount of habitat that would be permanently impacted by construction activities (about 65 acres in the Imperial Valley and up to 100 acres adjacent to the AAC and other canals adjacent to desert habitat) over the term of the permit, the amount of take potentially occurring from displacement of individuals as habitat is removed would be minimal. If summer tanagers nest in the HCP area over the term of the permit, construction activities could result in the destruction of nests during habitat removal. Tamarisk is poor quality habitat for summer tanagers and the HCP area is outside this species' currently known breeding range. As such, the number of summer tanagers potentially breeding in the HCP area over the term of the permit would be expected to be low. Given this low level of expected use and the small amount of habitat that would be impacted, the amount of take attributable to nest destruction during construction activities would be very low.

Summer tanagers could benefit from the creation or long-term protection of native tree habitat under the Tamarisk Scrub Habitat Conservation Strategy and potentially the Salton Sea Habitat Conservation Strategy. Implementation of the Tamarisk Scrub Habitat Conservation Strategy would be expected to maintain or improve habitat value for summer tanagers in the HCP area. Native tree habitat would be created or acquired, and preserved to replace any tamarisk scrub habitat that would be permanently lost as a result of the construction activities (see Tree Habitat–1 and –2). As part of the Salton Sea Habitat Conservation Strategy, native tree habitat also would be created or acquired, and preserved if a net loss of tamarisk scrub habitat occurs within the shoreline strand or adjacent wetlands. The native tree habitat would consist of cottonwoods, willows, mesquite, and other plant species typical of southwestern riparian areas. Native riparian habitat is preferred by summer tanagers and the decline in this habitat type is believed to have been the primary cause of declines in this species. At least the current level of use of the HCP area by summer tanagers would be expected to continue but use could increase over the tern of the permit if breeding pairs were attracted to native tree habitat created or acquired and preserved under the Tamarisk Scrub Habitat Conservation Strategy.

The Tamarisk Scrub Habitat Conservation Strategy also includes measures to minimize injury or disturbance to summer tanagers if construction activities would affect habitat that summer tanagers use for nesting. Under the Tamarisk Scrub Habitat Conservation Strategy, IID will survey areas that would be disturbed during construction to determine if any covered species, including summer tanagers, are breeding in habitat that would be disturbed. If summer tanagers are found likely to be breeding in affected habitat, removal of habitat will be avoided until after the breeding season. Native tree habitat also will be created to compensate for tamarisk scrub or cottonwood-willow habitat that is permanently lost. With the take minimization measures and compensation for take potentially resulting from reduced habitat, implementation of the HCP would not jeopardize the continued existence of summer tanager.

3.4.6.10 Vermilion Flycatcher

Vermilion flycatchers are known to occur within the HCP area, but are considered rare (Shuford et al. 1999). Although the species is thought to have bred in the HCP area at one time, no nesting populations currently are known. Historically, vermilion flycatchers were associated with native riparian plant communities. However, unlike some other riparian habitat associates, vermilion flycatchers have come to exploit nonnative habitats such as common reed and tamarisk supported in agricultural drains.

Vermilion flycatchers could be directly or indirectly taken as a result of several covered activities. This species has been reported using vegetation in the drains. Drain maintenance activities could flush vermilion flycatchers from drain vegetation which could constitute take as harassment or cause death or injury to individuals if as a result of being flushed from the cover of drain vegetation they are subject to predation. On an annual basis, IID conducts drain maintenance activities on about 20 percent of the drainage system, affecting about 130 acres of vegetation. Much of this vegetation could be used by vermilion flycatchers. The New and Alamo rivers are dredged about every four years which similarly could affect summer tanagers. Currently, vermilion flycatchers are rare in the HCP area. Considering that only 20 percent of the drainage system is maintained each year, and dredging of the river mouths is only conducted about once every four years, the likelihood of these activities coinciding with the presence of a vermilion flycatcher and thereby resulting in take from displacement of birds is low. In the event that vermilion flycatchers start breeding in the HCP area over the 75-year permit term, drain maintenance activities could result in the direct destruction of nests.

Drain maintenance activities and several other covered activities also have the potential to result in take of vermilion flycatchers through temporary or permanent reductions in the amount of tamarisk scrub habitat. As shown in Table 3.4-3, various maintenance and water conservation activities have the potential to temporarily impact about 43.2 acres of tamarisk scrub habitat and permanently impact about 65.5 acres in the Imperial Valley. Up to an additional 100 acres of tamarisk scrub habitat could be removed during construction activities along the AAC or other canals adjacent to desert habitat. In addition, a reduction in the water surface elevation of the Salton Sea resulting from water conservation could impact up to 2,642 acres of tamarisk scrub habitat adjacent to the Salton Sea. These reductions in tamarisk scrub habitat could reduce foraging opportunities and cover for vermilion flycatchers. Over the term of the permit, a few individuals could be adversely affected (e.g., killed, injured, or harmed) as a result of this reduction, but because of the abundance of tamarisk scrub in the HCP area (more than 7,500 acres), low level of use of the HCP area by vermilion flycatchers and poor quality of tamarisk as habitat for vermilion flycatchers, overall population-level effects would not be expected.

Various construction activities anticipated by IID have the potential to remove tamarisk scrub habitat that could be used by vermilion flycatchers. Construction activities could displace individuals and result in take if displaced birds were unable to find alternate habitat or were exposed to other hazards (e.g., predation). Because of the abundance of tamarisk scrub habitat in the HCP area (more than 7,500 acres) and small amount of habitat that would be permanently impacted by construction activities over the term of the permit, the amount of take potentially occurring from displacement of individuals as habitat is removed would be minimal. If vermilion flycatchers nest in the HCP area over the term of the permit, construction activities could result in the destruction of nests during habitat removal. Tamarisk is poor quality habitat for vermilion flycatchers and the species is not known to currently breed in the HCP area. As such, the number of vermilion flycatchers potentially breeding in the HCP area over the term of the permit would be expected to be low. Given this low level of expected use and the small amount of habitat that would be impacted, the amount of take attributable to nest destruction during construction activities would be very low.

Implementation of the Tamarisk Scrub Habitat Conservation Strategy would be expected to maintain or improve habitat value for vermilion flycatchers in the HCP area. Native tree habitat would be created or acquired, and preserved to replace any tamarisk scrub habitat that would be permanently lost as a result of the construction activities (see Tree Habitat–1 and –2). As part of the Salton Sea Habitat Conservation Strategy, native tree habitat also would be created or acquired, and preserved if a net loss of tamarisk scrub habitat occurs within the shoreline strand or adjacent wetlands. Consisting of native plant species, the created or acquired habitat would be expected to provide better habitat quality for vermilion flycatcher than the tamarisk scrub habitat that would be lost. The creation or acquisition of native tree habitat under Tree Habitat–1 and –2 and Salton Sea–3 would offset the reduction in habitat value for vermilion flycatcher resulting from reductions in the amount of tamarisk scrub, thus mitigating the impact of take potentially resulting from changes in habitat.

Although vermilion flycatchers currently are not known to breed in the HCP area, IID will implement measures to avoid and minimize impacts of construction activities on vermilion flycatcher that might breed in the HCP area in the future. Under Tree Habitat–3 and Drain Habitat–3, prior to conducting scheduled construction activities IID will survey construction areas and if covered species are found breeding in impacted areas, IID will schedule construction to occur outside the breeding season. With this measure, IID will minimize the potential for construction activities to destroy nests.

Implementation of the HCP measures would minimize and mitigate the impact of take of vermilion flycatcher that could result from the covered activities and would not jeopardize the continued existence of this species. Based on: (1) the low level of use of the HCP area by vermilion flycatcher, (2) the low quality of tamarisk as habitat for this species, (3) the abundance of potential habitat in and around the HCP area, and (4) implementation of measures to minimize take of vermilion flycatchers, the potential for take and the magnitude of take of vermilion flycatcher as a result of the covered activities is low. Creation or acquisition and long-term protection of native tree habitat would provide high-quality habitat for vermilion flycatcher in perpetuity. This long-term protection of native habitat would ensure the availability of migratory stopover and wintering habitat as well as nesting opportunities for vermilion flycatcher of at least equivalent value (considering both acreage and quality) as the tamarisk scrub habitat impacted by the covered activities, thus mitigating take of vermilion flycatcher that could result from reductions in the amount of tamarisk scrub habitat. With the take minimization measures and compensation for take potentially resulting from reduced habitat, implementation of the HCP would not jeopardize the continued existence of vermilion flycatcher.

3.4.6.11 Harris' Hawk

Historically Harris' hawks bred at the south end of the Salton Sea, but have not been reported in the HCP area in recent years. Harris' hawks occur in desert scrub dominated by saguaro, palo verde, and ironwood; cottonwood-mesquite forests; and semi-desert prairies. Saguaro cacti, palo verde, mesquite, and riparian trees, especially cottonwoods, are used as nest sites. Harris' hawks are somewhat tolerant of human activity and will use trees in urban settings as well as utility poles. They are not known to use tamarisk. Where other tree species occur within tamarisk scrub habitat (e.g., seepage communities along the East Highline Canal), Harris' hawk could find suitable nesting habitat.

Drain maintenance activities would not be expected to impact Harris' hawk because, as a result of regular maintenance trees do not grow large enough to provide habitat for this species. However, as shown in Table 3.4-3, various other covered activities have the potential to permanently impact about 65.5 acres of tamarisk scrub habitat in the Imperial Valley. Up to an additional 100 acres of tamarisk scrub habitat could be removed during construction activities along the AAC or other canals adjacent to desert habitat. Installation of subsurface recovery systems along the East Highline Canal in particular, have the potential to impact habitat for Harris' hawk. Depending on the plant species composition of the areas impacted, the loss of tamarisk scrub habitat could reduce nesting and foraging opportunities for Harris' hawk. Over the term of the permit, a few individuals could be adversely affected (e.g., killed, injured, or harmed) as a result of removal of this habitat.

Although not known to currently nest in the HCP area, Harris' hawk have nested in the HCP area in the past. Potentially, Harris' hawk could nest in the HCP area in the future, and the seepage communities adjacent to the East Highline Canal could support suitable trees for nesting. If Harris' hawk nested in the seepage communities, installation of subsurface recovery systems could result in take. Because they are not known to currently nest in the HCP, the probability and the level of take potentially occurring through this mechanism is currently low.

A reduction in the water surface elevation of the Salton Sea resulting from water conservation could impact up to 2,642 acres of tamarisk scrub habitat adjacent to the Salton Sea. Potentially some of this habitat could be used by Harris' hawk for nesting in the future. Over the term of the permit, a few individuals could be adversely affected (e.g., killed, injured, or harmed) as a result of this reduction, but because of the abundance of tamarisk scrub in the HCP area (more than 7,500 acres), current lack of use of this habitat by Harris hawk the poor quality of tamarisk as habitat for Harris' hawk, no adverse population-level effects would be expected.

The potential for Harris' hawks to be disturbed or injured as a result of the covered activities is also low. Harris' hawks are probably most likely to occur in the HCP area in the seepage community between Drops 3 and 4 on the AAC. This community contains cottonwoods and mesquite that could be used for nesting with adjacent desert scrub, a commonly used habitat for foraging. O&M activities would not affect this community and no construction activities affecting that seepage area are anticipated under this HCP. In addition, under the Tamarisk Scrub Habitat Conservation Strategy and Desert Habitat Conservation Strategy, IID will survey areas that would be disturbed during construction to determine if any covered species, including Harris' hawk, are breeding in habitat that would be disturbed. Removal of habitat will be avoided until after the breeding season and native tree or desert habitat created or acquired to compensate for habitat that is permanently lost. These measures will minimize and mitigate any take of Harris' hawk as a result of construction activities.

The Tamarisk Scrub Habitat Conservation Strategy could benefit Harris' hawk. The native tree habitat that would be created or acquired, and preserved under the Tamarisk Scrub Habitat Conservation Strategy could provide suitable nest and perch locations for Harris' hawk if located in proximity to suitable foraging habitat. Although they have not been reported to nest in the HCP area in recent years, Harris' hawk previously nested in the area. The native tree habitat created or acquired, and preserved under Tamarisk Scrub Habitat Conservation Strategy and potentially the Salton Sea Habitat Conservation Strategy could increase the likelihood that this species would breed in the HCP area again. The creation or acquisition of native tree habitat under Tree Habitat–1 and –2 and Salton Sea–3 would more than offset a reduction in habitat value for resulting from reductions in the amount of tamarisk scrub, thus mitigating the impact of take potentially resulting from changes in habitat. With the take minimization measures and compensation for take potentially resulting from reduced habitat, implementation of the HCP would not jeopardize the continued existence of Harris' hawk.

3.4.6.12 Crissal Thrasher

The crissal thrasher occupies dense thickets of shrubs or low trees in desert habitats. Mesquite, ironwood, catclaw acacia, and arrowweed willow are preferred vegetation. Crissal thrashers are resident, breeding species in the HCP area and have been reported along the Alamo River and near the towns of Niland and Brawley. Tamarisk represents the primary shrub vegetation available in the HCP area. The extent to which crissal thrasher use tamarisk is uncertain, but invasion of mesquite scrub habitats by tamarisk has been implicated as contributing to declines of this species, suggesting that tamarisk scrub is poor-quality habitat, if it is used at all. Crissal thrasher also could occur in seepage communities adjacent to the East Highline Canal.

Crissal thrasher could be directly or indirectly taken as a result of several covered activities. This species has been reported along the Alamo River and in other locations in the HCP area and could also use vegetation in the drains. Drain and river maintenance activities could flush crissal thrasher which could constitute take as harassment or cause death or injury to individuals if as a result of being flushed from the cover of drain vegetation they are subject to predation. IID conducts annual drain maintenance activities on about 20 percent of the drainage system, affecting about 130 acres of vegetation. Some of this vegetation could be used by crissal thrasher. The river mouths are dredged about once every four years.

Assuming that crissal thrasher currently are breeding in drain vegetation or along the rivers, drain and river maintenance activities could result in the direct destruction of nests.

IID has and will continue to conduct O&M activities of the drains. The vegetation currently supported in the drains is a product of these maintenance activities and current use of this habitat by crissal thrasher occurs in light of these activities. Although water conservation activities could reduce the amount and quality of water in the drains, this potential reduction is not expected to result in a substantial change in the extent and characteristics of vegetation in the drains. Thus, the drains would continue to support habitat for crissal thrasher at a level similar to existing conditions.

Drain maintenance activities and several other covered activities also have the potential to result in take of crissal thrasher through temporary or permanent reductions in the amount of tamarisk scrub habitat. As shown in Table 3.4-3, various maintenance and water conservation activities have the potential to temporarily impact about 43.2 acres of tamarisk scrub habitat and permanently impact about 65.5 acres in the Imperial Valley. Up to an additional 100 acres of tamarisk scrub habitat could be removed during construction activities along the AAC or other canals adjacent to desert habitat. In addition, a reduction in the water surface elevation of the Salton Sea resulting from water conservation could impact up to 2,642 acres of tamarisk scrub habitat adjacent to the Salton Sea. These reductions in tamarisk scrub habitat could reduce foraging, nesting and cover opportunities for crissal thrasher. Over the term of the permit, a few individuals could be adversely affected (e.g., killed, injured, or harmed) as a result of this reduction, but because of the abundance of tamarisk scrub in the HCP area (more than 7,500 acres), no adverse population-level effects would be expected.

Various construction activities anticipated by IID have the potential to remove tamarisk scrub habitat that could be used by crissal thrasher. Construction activities could displace individuals and result in take if displaced birds were unable to find alternate habitat or were exposed to other hazards (e.g., predation). Because of the abundance of tamarisk scrub habitat in the HCP area (over 7,500 acres) and small amount of habitat that would be permanently impacted by construction activities over the term of the permit, the amount of take potentially occurring from displacement of individuals as habitat is removed would be minimal. Assuming crissal thrasher nest in the HCP area, construction activities could result in the destruction of nests during habitat removal.

Implementation of the Tamarisk Scrub Habitat Conservation Strategy would be expected to maintain or improve habitat value for crissal thrasher in the HCP area. Native tree habitat would be created or acquired, and preserved to replace any tamarisk scrub habitat that would be permanently lost as a result of the construction activities (see Tree Habitat –1 and –2). As part of the Salton Sea Habitat Conservation Strategy, native tree habitat also would be created or acquired, and preserved if a net loss of tamarisk scrub habitat occurs within the shoreline strand or adjacent wetlands. Consisting of native plant species, the created or acquired habitat would be expected to provide better habitat quality for crissal thrasher than the tamarisk that would be lost. The creation or acquisition of native tree habitat under Tree Habitat–1 and –2 and Salton Sea–3 would offset the reduction in habitat value for crissal thrasher resulting from reductions in the amount of tamarisk scrub thus mitigating the impact of take potentially resulting from changes in habitat.

IID will implement measures to avoid and minimize impacts of construction activities on nesting by crissal thrasher. Under Tree Habitat–3, Drain Habitat–3 and Desert Habitat–3, prior to conducting scheduled construction activities IID will survey construction areas, and if covered species are found breeding in impacted areas, IID will schedule construction to occur outside the breeding season. With this measure, IID will minimize the potential for construction activities to destroy nests.

The Imperial Valley is composed of highly modified habitats. Crissal thrashers apparently have adapted to this highly modified environment as evidenced by their persistence and continued breeding in the Imperial Valley. Little change in the extent or availability of tamarisk is expected with implementation of the HCP and the habitat conditions of the Imperial Valley would remain largely the same as existing conditions. As such, crissal thrasher would be expected to persist at levels similar to existing levels.

Implementation of the HCP measures would minimize and mitigate the impact of take of crissal thrasher that could result from the covered activities and would not jeopardize the continued existence of this species. Based on: (1) abundance of tamarisk scrub habitat in the HCP area, (2) creation/acquisition and protection of higher quality habitat to offset habitat reductions, and (3) implementation of measures to minimize take of crissal thrasher, the potential for take and the magnitude of take of crissal thrasher as a result of the covered activities is low. Creation or acquisition and long-term protection of native tree habitat would provide high-quality habitat for crissal thrasher in perpetuity. This long-term protection of native habitat would ensure the availability of habitat for crissal thrasher of at least equivalent value (considering both acreage and quality) as the tamarisk scrub habitat impacted by the covered activities, thus mitigating take of crissal thrasher that could result from reductions in the amount of tamarisk scrub habitat. With the take minimization measures and compensation for take potentially resulting from reduced habitat, implementation of the HCP would not jeopardize the continued existence of crissal thrasher.

3.4.6.13 Bank Swallow

Bank swallows are casual visitors to the HCP area, potentially occurring in the HCP area as migrants during the spring and fall. For foraging, they are not strongly associated with any particular habitat type, although they often forage near water where insects are abundant. The covered activities are unlikely to adversely affect bank swallows because of the swallow’s rare occurrence in the HCP area and broad habitat use for foraging. However, a few individuals could be taken because of changes in foraging habitat availability or quality potentially resulting from permanent or temporary reductions in drain vegetation (see Section 3.5.2.2), permanent or temporary reductions in tamarisk scrub habitat (see Section 3.4.2), or changes in the composition and amount of agricultural field habitat (see Section 3.8.2).

The Tamarisk Scrub Habitat and Salton Sea Conservation Strategies would contribute to mitigating the impact of any take of bank swallows that could result from the covered activities. Under the these two strategies, native tree habitat would be created or acquired and protected over the long-term to offset changes in habitat value resulting from reductions in tamarisk scrub (see Sections 3.3.4.2 and 3.4.5). By supporting more abundant and diverse insect populations than tamarisk scrub, native tree habitat would provide higher quality foraging opportunities for bank swallow. The Agricultural Field Habitat (see Section 3.8.6.4) and Drain Habitat (see Section 3.5.6.7) Conservation Strategies would also contribute to mitigating impacts to bank swallow that could result from the covered activities.

3.4.6.14 Elf Owl

The elf owl population in California has declined to low levels, such that it currently is only known from a few locations along the LCR and some isolated locations in Riverside County. Given the low population size and limited distribution, it is very unlikely that elf owls would occur in the HCP area. Thus, the potential for take of elf owls is very low.

Seepage communities along the AAC are the most likely places where elf owls would occur in the HCP area, given the AAC's closer proximity to the LCR than the Imperial Valley and the presence of adjacent desert scrub habitat. For nesting, elf owls appear to prefer forest habitat bordering desert habitat, conditions that exist in this seepage community. No construction activities affecting that seepage area are anticipated under this HCP.

The seepage communities adjacent to the East Highline Canal constitute other potential habitat for elf owl. Installation of subsurface recovery systems would remove about 43 acres of vegetation, some of which could provide habitat for elf owl. The primary concern for elf owls regarding installation of subsurface recovery systems would be disturbance of nesting birds or removal of a nest site. Elf owls also rely on tall shrubs and trees as perch sites from which to forage. Removal of these features could adversely affect elf owls and potentially result in take by reducing foraging efficiency. Although these mechanisms could conceivably result in take of an individual elf owl, the likelihood of a take resulting from installation of subsurface recovery systems and the level of take potentially occurring is considered to be very low because this species is rare in the HCP area and the available habitat is of poor quality.

Some potential for take of elf owls is associated with construction activities that could destroy a nest if an occupied nest tree is removed. Under the Tamarisk Scrub Habitat Conservation Strategy, IID will survey areas that would be disturbed during construction to determine if any covered species, including elf owls, are breeding in habitat that would be disturbed. Removal of habitat will be avoided until after the breeding season and native tree habitat created or acquired, and preserved to compensate for tamarisk scrub habitat that is permanently lost. These measures will minimize and mitigate any take of elf owls as a result of construction activities.

The creation or long-term preservation of native tree habitat under the Tamarisk Scrub Habitat Conservation Strategy could contribute to maintaining or increasing the availability of suitable nesting conditions for elf owls. Additional nesting habitat could be gained if native tree habitat is created or acquired, and preserved as part of the Salton Sea Habitat Conservation Strategy. Given the limited potential for take of elf owl as a result of covered activities, the beneficial aspects of the Tamarisk Scrub Habitat Conservation Strategy would minimize and mitigate the impact of any take of this species resulting from the covered activities. Implementation of the HCP would not jeopardize the continued existence of this species.

3.4.6.15 Brown-Crested Flycatcher

Brown-crested flycatchers are most numerous in riparian groves of cottonwood, mesquite, and willow, which afford suitable nest sites, but often forage in adjacent desert scrub or tamarisk (Garrett and Dunn 1981). In the HCP area, brown-crested flycatchers have been observed along the AAC in seepage communities and the northern shoreline of the Salton Sea. Given its apparent ability to use tamarisk for foraging, brown-crested flycatchers could occur throughout much of the HCP area. Brown-crested flycatchers are secondary cavity nesters. As such, breeding by this species in the HCP area is limited to the few areas supporting trees that are suitable for woodpeckers. Tamarisk is not suitable for woodpeckers and potentially suitable trees are principally landscape trees or where other tree species occur within tamarisk scrub habitat (e.g., seepage communities along the East Highline Canal or AAC).

Brown-crested flycatchers could be directly or indirectly taken as a result of several covered activities. Although this species has not been reported using vegetation in the drains, its use of tamarisk scrub elsewhere in the HCP area indicates that it could forage in vegetation in the drains as well. On an annual basis, IID conducts drain maintenance activities on about 20 percent of the drainage system, affecting about 130 acres of vegetation. Only a portion of this vegetation would be tamarisk (estimated 43 acres) and be potential habitat for this species. The river mouths are dredged about every four years. Drain and river maintenance activities could flush brown-crested flycatchers that are foraging or roosting in drain vegetation which could constitute take as harassment or cause death or injury to individuals if as a result of being flushed from the cover of drain vegetation such that they are subject to predation. This species is a secondary cavity nester and because drain vegetation is not suitable for primary cavity nesters, suitable nesting habitat for brown-crested flycatchers is not supported in the drains.

Drain maintenance activities and several other covered activities also have the potential to result in take of brown-crested flycatcher through temporary or permanent reductions in the amount of tamarisk scrub habitat. As shown in Table 3.4-3, various maintenance and water conservation activities have the potential to temporarily impact about 43.2 acres of tamarisk scrub habitat and permanently impact about 65.5 acres in the Imperial Valley. Up to an additional 100 acres of tamarisk scrub habitat could be removed during construction activities along the AAC or other canals adjacent to desert habitat. In addition, a reduction in the water surface elevation of the Salton Sea resulting from water conservation could impact up to 2,642 acres of tamarisk scrub habitat adjacent to the Salton Sea. These reductions in tamarisk scrub habitat could reduce foraging opportunities for brown-crested flycatcher. Over the term of the permit, a few individuals could be adversely affected (e.g., killed, injured, or harmed) as a result of this reduction, but because of the abundance of tamarisk scrub in the HCP area (more than 7,500 acres), overall population-level effects would be negligible.

Various construction activities anticipated by IID have the potential to remove tamarisk scrub habitat that could be used by brown-crested flycatcher. Construction activities could displace individuals and result in take if displaced birds were unable to find alternate habitat or were exposed to other hazards (e.g., predation). Because of the abundance of tamarisk scrub habitat in the HCP area (more than 7,500 acres) and small amount of habitat that would be permanently impacted by construction activities over the term of the permit, the amount of take potentially occurring from displacement of individuals as habitat is removed would be minimal.

Construction activities could result in the destruction of nests of brown-crested flycatcher during habitat removal. Installation of seepage recovery systems along the East Highline Canal in particular, has the greatest potential to cause destruction of nests of brown-crested flycatcher because these areas have the greatest likelihood to support woodpeckers on which brown-crested flycatchers depend to create nesting cavities (see for example discussion of Gila woodpecker and gilded flicker). Under the Tamarisk Scrub Habitat and Desert Habitat Conservation Strategies, IID will survey areas that would be disturbed during construction to determine if any covered species, including brown-crested flycatcher, are breeding in habitat that would be disturbed. Removal of habitat will be avoided until after the breeding season and native tree habitat created to compensate for tamarisk scrub or cottonwood-willow habitat that is permanently lost. These measures will minimize and mitigate any take of brown-crested flycatcher as a result of construction activities.

Implementation of the Tamarisk Scrub Habitat Conservation Strategy could benefit brown-crested flycatcher. As a secondary cavity nester, brown-crested flycatchers depend on woodpeckers to create nesting cavities. Trees suitable for excavating nesting cavities are limited in the HCP area. Under the Tamarisk Scrub Habitat Conservation Strategy, native tree habitat would be created / acquired, and preserved in perpetuity. Trees such as cottonwoods or mesquite would be an important component of this habitat. Given the limited availability of trees of suitable size and wood characteristics in the HCP area, the creation and / or long-term preservation of native tree habitat would contribute to maintaining or increasing the availability of nest trees suitable for woodpeckers over the term of the permit, which could increase nesting opportunities for brown-crested flycatchers. Brown-crested flycatchers would further benefit if native tree habitat was created or acquired, and preserved as part of the Salton Sea Habitat Conservation Strategy. Given the limited potential for take of brown-crested flycatcher as a result of covered activities, the beneficial aspects of the Tamarisk Scrub Habitat Conservation Strategy would minimize and mitigate the impact of any take of this species resulting from the covered activities. Implementation of the HCP would not jeopardize the continued existence of this species.

3.4.6.16 Yellow-Breasted Chat

Yellow-breasted chats are occasional migrants and summer residents in the HCP area. Preferred habitat for the chat consists of cottonwood-willow riparian habitats, in which they primarily use the willow scrub component. This type of habitat is rare in the HCP area. However, yellow-breasted chats have been reported to use tamarisk scrub habitat and to breed in tamarisk scrub habitats around the Salton Sea.

Yellow-breasted chats could be directly or indirectly taken as a result of several covered activities. Although this species has not been reported using vegetation in the drains, its use of tamarisk scrub elsewhere in the HCP area indicates that it could use vegetation in the drains as well, including for nesting. Drain maintenance activities could flush yellow-breasted chats from drain vegetation which could constitute take as harassment or cause death or injury to individuals if as a result of being flushed from the cover of drain vegetation they are subject to predation. Nests also could be destroyed by drain maintenance activities. On an annual basis, IID conducts drain maintenance activities on about 20 percent of the drainage system, affecting about 130 acres of vegetation. Much of this vegetation could be used by yellow-breasted chats. Currently, yellow-breasted chats are only known to occur in the HCP area during the summer and as occasional migrants. With 80 percent of the drain vegetation undisturbed each year and considering IID would be actively cleaning only a fraction of the 20 percent of the drainage system that is maintained each year during the period when yellow-breasted chats are in the HCP area, the potential for take and the level of take resulting from displacement of birds by drain maintenance activities is low.

The drains would continue to support tamarisk that could be used by yellow-breasted chats. The tamarisk currently in the drains persists under IID’s drain maintenance activities. As these activities would continue, tamarisk would remain available in the drains as potential habitat for yellow-breasted chats. Although water conservation activities could reduce the amount and quality of water in the drains, this potential reduction is not expected to result in a substantial change in the extent and characteristics of vegetation in the drains. Thus, the drains would continue to support habitat for yellow-breasted chats at a level similar to existing conditions.

Drain maintenance activities and several other covered activities also have the potential to result in take of yellow-breasted chats through temporary or permanent reductions in the amount of tamarisk scrub habitat. As shown in Table 3.4-3, various maintenance and water conservation activities have the potential to temporarily impact about 43.2 acres of tamarisk scrub habitat and permanently impact about 65.5 acres in the Imperial Valley. Up to an additional 100 acres of tamarisk scrub habitat could be removed during construction activities along the AAC or other canals adjacent to desert habitat. In addition, a reduction in the water surface elevation of the Salton Sea resulting from water conservation could impact up to 2,642 acres of tamarisk scrub habitat adjacent to the Salton Sea. These reductions in tamarisk scrub habitat could reduce foraging and nesting opportunities for yellow-breasted chats. Over the term of the permit, a few individuals could be adversely affected (e.g., killed, injured, or harmed) as a result of this reduction, but because of the abundance of tamarisk scrub in the HCP area (more than 7,500 acres), overall population-level effects would be negligible.

Various construction activities anticipated by IID have the potential to remove tamarisk scrub habitat that could be used by yellow-breasted chat. Construction activities could displace individuals and result in take if displaced birds were unable to find alternate habitat or were exposed to other hazards (e.g., predation). Because of the abundance of tamarisk scrub habitat in the HCP area (more than 7,500 acres) and small amount of habitat that would be permanently impacted by construction activities over the term of the permit, the amount of take potentially occurring from displacement of individuals as habitat is removed would be minimal. Construction activities could result in the destruction of nests of yellow-breasted chats during habitat removal. With the small amount of habitat that would be impacted and considering that tamarisk is poor quality habitat for yellow-breasted chats, the amount of take attributable to nest destruction during construction activities would be low.

Implementation of the Tamarisk Scrub Habitat Conservation Strategy would be expected to maintain or improve habitat value for yellow-breasted chat in the HCP area. Native tree habitat would be created or acquired, and preserved to replace any tamarisk scrub habitat that would be permanently lost as a result of the construction activities (see Tree Habitat–1 and –2). As part of the Salton Sea Habitat Conservation Strategy, native tree habitat also would be created or acquired, and preserved if a net loss of tamarisk scrub habitat occurs within the shoreline strand or adjacent wetlands. Consisting of native plant species, the created or acquired habitat would be expected to provide better habitat quality for yellow-breasted chat than the tamarisk that would be lost. The creation or acquisition of native tree habitat under Tree Habitat–1 and –2 and Salton Sea–3 would offset the reduction in habitat value for yellow-breasted chat resulting from reductions in the amount of tamarisk scrub thus mitigating the impact of take potentially resulting from changes in habitat.

IID will implement measures to avoid and minimize impacts of construction activities on yellow-breasted chats breeding in the HCP area. Under Tree Habitat–3 and Drain Habitat–3, prior to conducting scheduled construction activities IID will survey construction areas and if covered species are found breeding in impacted areas, IID will schedule construction to occur outside the breeding season. With this measure, IID will minimize the potential for construction activities to destroy nests.

Implementation of the HCP measures would minimize and mitigate the impact of take of yellow-breasted chat that could result from the covered activities and would not jeopardize the continued existence of this species. Based on: (1) the low quality of tamarisk as habitat for this species, (2) the abundance of potential habitat in and around the HCP area, and (3) implementation of measures to minimize take of chats, the potential for take and the magnitude of take of yellow-breasted chat as a result of the covered activities is low. Creation or acquisition and long-term protection of native tree habitat would provide high-quality habitat for yellow-breasted chat in perpetuity. This long-term protection of native habitat would ensure the availability of migratory stopover habitat and nesting opportunities for yellow-breasted chat of at least equivalent value (considering both acreage and quality) as the tamarisk scrub habitat impacted by the covered activities, thus mitigating take of yellow-breasted chat that could result from reductions in the amount of tamarisk scrub habitat. With the take minimization measures and compensation for take potentially resulting from reduced habitat, implementation of the HCP would not jeopardize the continued existence of yellow-breasted chat.

3.4.6.17 Yellow Warbler

The yellow warbler is a common spring and fall migrant and a rare winter visitor to the Salton Sea area. Small numbers regularly winter in the Imperial Valley, and have been observed near the towns of Niland and Calexico. The species has not been reported to breed in the HCP area but could in the future. Yellow warblers are typically associated with riparian shrub habitats, consisting of willows and young cottonwoods. This type of habitat is largely absent in the HCP area. Agricultural drains support tamarisk as well as dense stands of common reed and yellow warblers have been observed to use these habitats.

Yellow warblers could be directly or indirectly taken as a result of several covered activities. This species has been reported using vegetation in the drains. Drain maintenance activities could flush yellow warblers from drain vegetation which could constitute take as harassment or cause death or injury to individuals if as a result of being flushed from the cover of drain vegetation they are subject to predation.

On an annual basis, IID conducts drain maintenance activities on about 20 percent of the drainage system, affecting about 130 acres of vegetation. Much of this vegetation could be used by yellow warblers. Currently, yellow warblers are only known to occur in the HCP area as fall and spring migrants and rare winter visitors. With 80 percent of the drain vegetation undisturbed each year and considering IID would be actively cleaning only a fraction of the 20 percent of the drainage system that is maintained each year during the period when yellow warblers are in the HCP area, the potential for take and the level of take resulting from displacement of birds by drain maintenance activities is low. In the event that yellow warblers currently are breeding in drain vegetation in the HCP area or start breeding in the HCP area over the 75-year permit term, drain maintenance activities could result in the direct destruction of nests.

IID has and will continue to conduct O&M activities of the drains. The vegetation currently supported in the drains is a product of these maintenance activities and current use of this habitat by yellow warblers occurs in light of these activities. Although water conservation activities could reduce the amount and quality of water in the drains, this potential reduction is not expected to result in a substantial change in the extent and characteristics of vegetation in the drains. Thus, the drains would continue to support habitat for yellow warblers at a level similar to existing conditions.

Drain maintenance activities and several other covered activities also have the potential to result in take of yellow warblers through temporary or permanent reductions in the amount of tamarisk scrub habitat. As shown in Table 3.4-3, various maintenance and water conservation activities have the potential to temporarily impact about 43.2 acres of tamarisk scrub habitat and permanently impact about 65.5 acres in the Imperial Valley. Up to 100 acres of tamarisk scrub habitat could be removed during construction activities along the AAC or other canals adjacent to desert habitat. In addition, a reduction in the water surface elevation of the Salton Sea resulting from water conservation could impact up to 2,642 acres of tamarisk scrub habitat adjacent to the Salton Sea. These reductions in tamarisk scrub habitat could reduce foraging opportunities and cover for yellow warblers. Over the term of the permit, a few individuals could be adversely affected (e.g., killed, injured, or harmed) as a result of this reduction, but because of the abundance of tamarisk scrub in the HCP area (more than 7,500 acres), low level of use of the HCP area by yellow warblers and poor quality of tamarisk as habitat for yellow warblers, overall population-level effects would not be expected.

Various construction activities anticipated by IID have the potential to remove tamarisk scrub habitat that could be used by yellow warblers. Construction activities could displace individuals and result in take if displaced birds were unable to find alternate habitat or were exposed to other hazards (e.g., predation). Because of the abundance of tamarisk scrub habitat in the HCP area (more than 7,500 acres) and small amount of habitat that would be permanently impacted by construction activities (about 65 acres) over the term of the permit, the amount of take potentially occurring from displacement of individuals as habitat is removed would be minimal. If yellow warblers nest in the HCP area over the term of the permit, construction activities could result in the destruction of nests during habitat removal. Tamarisk is poor quality habitat for yellow warblers and the HCP area is outside this species' currently known breeding range. As such, the number of yellow warblers potentially breeding in the HCP area over the term of the permit would be expected to be low. Given this low level of expected use and the small amount of habitat that would be impacted, the amount of take attributable to nest destruction during construction activities would be very low.

Implementation of the Tamarisk Scrub Habitat Conservation Strategy would be expected to maintain or improve habitat value for yellow warblers in the HCP area. Native tree habitat would be created or acquired, and preserved to replace any tamarisk scrub habitat that would be permanently lost as a result of the construction activities (see Tree Habitat–1 and –2). As part of the Salton Sea Habitat Conservation Strategy, native tree habitat also would be created or acquired, and preserved if a net loss of tamarisk scrub habitat occurs within the shoreline strand or adjacent wetlands. Consisting of native plant species, the created or acquired habitat would be expected to provide better habitat quality for yellow warblers than the tamarisk that would be lost. The creation or acquisition of native tree habitat under Tree Habitat–1 and –2 and Salton Sea–3 would offset the reduction in habitat value for yellow warblers resulting from reductions in the amount of tamarisk scrub thus mitigating the impact of take potentially resulting from changes in habitat.

Although yellow warblers currently are not known to breed in the HCP area, IID will implement measures to avoid and minimize impacts of construction activities on yellow warblers that could breed in the HCP area in the future. Under Tree Habitat–3 and Drain Habitat–3, prior to conducting scheduled construction activities IID will survey construction areas and if covered species are found breeding in impacted areas, IID will schedule construction to occur outside the breeding season. With this measure, IID will minimize the potential for construction activities to destroy nests.

Implementation of the HCP measures would minimize and mitigate the impact of take of yellow warblers that could result from the covered activities and would not jeopardize the continued existence of this species. Based on: (1) the low level of use of the HCP area by yellow warblers, (2) the low quality of tamarisk as habitat for this species, (3) the abundance of potential habitat in and around the HCP area, and (4) implementation of measures to minimize take of yellow warblers, the potential for take and the magnitude of take of yellow warbler as a result of the covered activities is low. Creation or acquisition and long-term protection of native tree habitat would provide high quality habitat for yellow warbler in perpetuity. This long-term protection of native habitat would ensure the availability of migratory stopover and wintering habitat as well as nesting opportunities for yellow warbler of at least equivalent value (considering both acreage and quality) as the tamarisk scrub habitat impacted by the covered activities, thus mitigating take of yellow warbler that could result from reductions in the amount of tamarisk scrub habitat. With the take minimization measures and compensation for take potentially resulting from reduced habitat, implementation of the HCP would not jeopardize the continued existence of yellow warbler.

3.4.6.18 Large-Billed Savannah Sparrow

This subspecies of savannah sparrow is a rare to uncommon postbreeding and winter visitor to the Salton Sea area. It occurs in the HCP area from mid-July through the winter, migrating to the Colorado River Delta and Mexico to breed (Garrett and Dunn, 1981).

Although not currently known to breed in the HCP area it could do so in the future. Large-billed savannah sparrows are known to use only tamarisk scrub near mouths of the New and Alamo Rivers at the Salton Sea (Garrett and Dunn, 1981). Given this association with tamarisk at the Salton Sea, large-billed savannah sparrows also could use tamarisk scrub throughout the HCP area.

Large-billed savannah sparrows could be directly or indirectly taken as a result of several covered activities. Although this species has not been reported using vegetation in the drains, its use of tamarisk scrub elsewhere in the HCP area indicates that it could use vegetation in the drains as well. Drain maintenance activities could flush large-billed savannah sparrows from drain vegetation which could constitute take as harassment or cause death or injury to individuals if as a result of being flushed from the cover of drain vegetation they are subject to predation. If this species breeds in the HCP area in the future, nests also could be destroyed by drain maintenance activities.

On an annual basis, IID conducts drain maintenance activities on about 20 percent of the drainage system, affecting about 130 acres of vegetation. A portion of this vegetation (an estimated 215 acres of tamarisk) could be used by large-billed savannah sparrows. Currently, large-billed savannah sparrows are only known to occur in the HCP area during the late summer and as occasional migrants at other times of the year. With 80 percent of the drain vegetation undisturbed each year, and considering IID would be actively cleaning only a fraction of the 20 percent of the drainage system that is maintained each year during the period when large-billed savannah sparrows are in the HCP area, the potential for take and the level of take resulting from displacement of birds by drain maintenance activities is low. River dredging also could flush birds. The potential for take and the level of take potentially resulting from displacement of birds during river dredging is low, given that this activity is conducted only every four years.

Drain maintenance activities and several other covered activities also have the potential to result in take of large-billed savannah sparrows through temporary or permanent reductions in the amount of tamarisk scrub habitat. As shown in Table 3.4-3, various maintenance and water conservation activities have the potential to temporarily impact about 43.2 acres of tamarisk scrub habitat and permanently impact about 65.5 acres in the Imperial Valley. Up to an additional 100 acres of tamarisk scrub habitat could be removed during construction activities along the AAC or other canals adjacent to desert habitat. In addition, a reduction in the water surface elevation of the Salton Sea resulting from water conservation could impact up to 2,642 acres of tamarisk scrub habitat adjacent to the Salton Sea. These reductions in tamarisk scrub habitat could reduce foraging and nesting opportunities for large-billed savannah sparrows. Over the term of the permit, a few individuals could be adversely affected (e.g., killed, injured, or harmed) as a result of this reduction, but because of the abundance of tamarisk scrub in the HCP area (more than 7,500 acres), no adverse population-level effects would be expected.

Various construction activities anticipated by IID have the potential to remove tamarisk scrub habitat that could be used by large-billed savannah sparrow. Construction activities could displace individuals and result in take if displaced birds were unable to find alternate habitat or were exposed to other hazards (e.g., predation). Because of the abundance of tamarisk scrub habitat in the HCP area (more than 7,500 acres) and small amount of habitat that would be permanently impacted by construction activities over the term of the permit, the amount of take potentially occurring from displacement of individuals as habitat is removed would be minimal. Construction activities could result in the destruction of nests of large-billed savannah sparrows during habitat removal. With the small amount of habitat that would be impacted and considering that tamarisk is poor-quality habitat for large-billed savannah sparrows, the amount of take attributable to nest destruction during construction activities would be low.

Implementation of the Tamarisk Scrub Habitat Conservation Strategy would be expected to maintain or improve habitat value for large-billed savannah sparrow in the HCP area. Native tree habitat would be created or acquired, and preserved to replace any tamarisk scrub habitat that would be permanently lost as a result of the construction activities (see Tree Habitat–1 and –2). As part of the Salton Sea Habitat Conservation Strategy, native tree habitat also would be created or acquired, and preserved if a net loss of tamarisk scrub habitat occurs within the shoreline strand or adjacent wetlands. Consisting of native plant species, the created or acquired habitat would be expected to provide better habitat quality for large-billed savannah sparrow than the tamarisk that would be lost. The creation or acquisition of native tree habitat under Tree Habitat–1 and –2 and Salton Sea–3 would offset the reduction in habitat value for large-billed savannah sparrow resulting from reductions in the amount of tamarisk scrub thus mitigating the impact of take potentially resulting from changes in habitat.

IID will implement measures to avoid and minimize impacts of construction activities on large-billed savannah sparrows breeding in the HCP area. Under Tree Habitat–3 and Drain Habitat–3, prior to conducting scheduled construction activities IID will survey construction areas and if covered species are found breeding in impacted areas, IID will schedule construction to occur outside the breeding season. With this measure, IID will minimize the potential for construction activities to destroy nests if this species breeds in the HCP area.

Implementation of the HCP measures would minimize and mitigate the impact of take of large-billed savannah sparrow that could result from the covered activities and would not jeopardize the continued existence of this species. Considering the abundance of potential habitat in and around the HCP area, and implementation of measures to minimize take of savannah sparrows, the potential for take and the magnitude of take of large-billed savannah sparrow as a result of the covered activities is low. Creation or acquisition and long-term protection of native tree habitat would provide high-quality habitat for large-billed savannah sparrow in perpetuity. This long-term protection of native habitat would ensure the availability of post-breeding habitat and nesting opportunities for large-billed savannah sparrow of at least equivalent value (considering both acreage and quality) as the tamarisk scrub habitat impacted by the covered activities, thus mitigating take of large-billed savannah sparrow that could result from reductions in the amount of tamarisk scrub habitat. With the take minimization measures and compensation for take potentially resulting from reduced habitat, implementation of the HCP would not jeopardize the continued existence of large-billed savannah sparrow.

3.4.6.19 Sharp-Shinned Hawk

Sharp-shinned hawks occur in the HCP area as migrants and winter visitors (USFWS, 1997b). Sharp-shinned hawks typically use woodland habitats; they primarily prey on small birds. In the HCP area, woodland habitats are relatively rare and consist mainly of tamarisk scrub along the Salton Sea, the New and Alamo Rivers, and agricultural drains. Sharp-shinned hawks have been observed along larger drains in the Imperial Valley (Hurlbert et al. 1997).

Various covered activities have the potential to permanently impact about 65.5 acres of tamarisk scrub habitat in the Imperial Valley. Up to an additional 100 acres of tamarisk scrub habitat could be removed during construction activities along the AAC or other canals adjacent to desert habitat. Over the term of the permit, a few individuals could be adversely affected (e.g., killed, injured, or harmed) as a result of removal of this habitat. A reduction in the water surface elevation of the Salton Sea resulting from water conservation could impact up to 2,642 acres of tamarisk scrub habitat adjacent to the Salton Sea. Sharp-shinned hawk could forage in association with this habitat. Over the term of the permit, a few individuals could be adversely affected (e.g., killed, injured, or harmed) as a result of this reduction. Because of the abundance of tamarisk scrub in the HCP area (more than 7,500 acres), current low level of use of the HCP area by sharp-shinned hawk and the poor quality of tamarisk as habitat for this species, no adverse population-level effects would be expected.

The Tamarisk Scrub Habitat Conservation Strategy could benefit sharp-shinned hawk. The native tree habitat that would be created or acquired, and preserved under the Tamarisk Scrub Habitat Conservation Strategy could improve foraging opportunities by providing higher-quality habitat that attracts songbirds on which sharp-shinned hawks prey. The creation or acquisition of native tree habitat under Tree Habitat–1 and –2 and Salton Sea–3 would more than offset a reduction in habitat value for resulting from reductions in the amount of tamarisk scrub thus mitigating the impact of take potentially resulting from changes in habitat. With the compensation for the minimal amount take potentially resulting from reduced habitat, implementation of the HCP would not jeopardize the continued existence of sharp-shinned hawk.

3.4.6.20 Cooper's Hawk

Cooper's hawks currently are known to occur in the HCP area only in the winter (USFWS, 1997b) although they could breed in the HCP area over the term of the permit. Cooper's hawks typically use open woodland habitats where they primarily prey on small birds. In the HCP area, woodland habitats are relatively rare and consist mainly of tamarisk scrub along the Salton Sea, the New and Alamo Rivers, and agricultural drains. Cooper's hawks have been observed along larger drains in the Imperial Valley (Hurlbert et al. 1997).

A number of covered activities have the potential to permanently impact about 65.5 acres and tamarisk scrub habitat in the Imperial Valley. Up to an additional 100 acres of tamarisk scrub habitat could be removed during construction activities along the AAC or other canals adjacent to desert habitat. Over the term of the permit, a few individuals could be adversely affected (e.g., killed, injured, or harmed) as a result of removal of this habitat. In particularly, installation of subsurface recovery systems along the East Highline Canal would reduce tamarisk scrub habitat that could be used by Cooper's hawk for foraging and nesting. Potentially, Cooper's hawk could nest in the HCP area in the future, and the seepage communities adjacent to the East Highline Canal could support suitable trees for nesting. If Cooper's hawk nest in the seepage communities, installation of subsurface recovery systems could result in take. Because of they are not known to currently nest in the HCP, the probability and extent of take potentially occurring through this mechanism is low.

A reduction in the water surface elevation of the Salton Sea resulting from water conservation could impact up to 2,642 acres of tamarisk scrub habitat adjacent to the Salton Sea. Potentially some of this habitat could be used by Cooper's hawk for nesting in the future. Over the term of the permit, a few individuals could be adversely affected (e.g., killed, injured, or harmed) as a result of this reduction, but because of the abundance of tamarisk scrub in the HCP area (more than 7,500 acres), current lack of use of this habitat by Cooper's hawk the poor quality of tamarisk as habitat for this species, no adverse population-level effects would be expected.

The Tamarisk Scrub Habitat Conservation Strategy could benefit Cooper's hawk. The native tree habitat that would be created or acquired, and preserved under the Tamarisk Scrub Habitat Conservation Strategy could provide suitable nest and perch locations for Cooper's hawk and potentially improve foraging habitat quality by attracting songbirds. The native tree habitat created or acquired, and preserved under Tamarisk Scrub Habitat Conservation Strategy and potentially the Salton Sea Habitat Conservation Strategy could increase the likelihood that this species would breed in the HCP area again. The creation or acquisition of native tree habitat under Tree Habitat–1 and –2 and Salton Sea–3 would more than offset a reduction in habitat value for resulting from reductions in the amount of tamarisk scrub thus mitigating the impact of take potentially resulting from changes in habitat. The Drain Habitat Conservation Strategy also could benefit this species as the 190 to 652 acres of managed marsh habitat could attract a variety of songbirds, on which this species preys. With the take minimization measures and compensation for take potentially resulting from reduced habitat, implementation of the HCP would not jeopardize the continued existence of Cooper's hawk.

3.4.6.21 Long-Eared Owl

Long-eared owls are occasional winter visitors to the Salton Sea area (USFWS, 1997b). They are not known to breed in the area. Potential habitat for long-eared owls in the HCP area consists mainly of tamarisk scrub habitat along the New and Alamo Rivers, Salton Sea, and agricultural drains. They predominantly prey on small mammals.

Various covered activities have the potential to permanently impact about 65.5 acres of tamarisk scrub habitat. Over the term of the permit, a few individuals could be adversely affected (e.g., killed, injured, or harmed) as a result of removal of this habitat. A reduction in the water surface elevation of the Salton Sea resulting from water conservation could impact up to 2,642 acres of tamarisk scrub habitat adjacent to the Salton Sea. Long-eared owls could forage in association with this habitat. Over the term of the permit, a few individuals could be adversely affected (e.g., killed, injured, or harmed) as a result of this reduction, but because of the abundance of tamarisk scrub in the HCP area (more than 7,500 acres), current low level of use of the HCP area by long-eared owl and the poor quality of tamarisk as habitat for this species, no adverse population-level effects would be expected.

The Tamarisk Scrub Habitat Conservation Strategy could benefit long-eared owl. The native tree habitat that would be created or acquired, and preserved under the Tamarisk Scrub Habitat Conservation Strategy could improve foraging opportunities by providing perch sites and potentially supporting more abundant small mammal populations. The creation or acquisition of native tree habitat under Tree Habitat–1 and –2 and Salton Sea–3 would more than offset a reduction in habitat value for resulting from reductions in the amount of tamarisk scrub thus mitigating the impact of take potentially resulting from changes in habitat. With the compensation for take potentially resulting from reduced habitat, implementation of the HCP would not jeopardize the continued existence of long-eared owl.

3.5 Drain Habitat Conservation Strategy

3.5.1 Amount and Quality of Habitat in the HCP Area

Habitat in the HCP area potentially used by species associated with drain habitat occurs in association with the drainage system, in managed marsh on the state and federal refuges, and on private duck clubs. Species associated with drain habitat also could use seepage areas adjacent to the AAC or East Highline Canal. Seepage areas adjacent to the AAC would not be affected by the covered activities. Potential effects to seepage areas adjacent to the East Highline Canal are addressed under the Tamarisk Scrub Conservation Strategy. The quality and quantity of habitat on the state and federal refuges and on private duck clubs will not be affected by the covered activities. Thus, potential effects to covered species are restricted to habitat in the drains.

For drain-associated species, cattail/bulrush vegetation is preferred and provides the highest quality habitat in the HCP area. Although potentially used, nonnative plants provide poor quality habitat for covered species. Additional information on the habitat preferences of the covered species associated with drain habitat is provided in Appendix A, Species Covered by the HCP.

Drains support an estimated 63 acres of cattail vegetation and 589 acres of other vegetation consisting of tamarisk, common reed, and other plant species (see discussion of drain habitat in Chapter 2). This vegetation has developed and coexists with IID's drain cleaning activities and other maintenance activities. During the HCP term, IID would continue its current drain maintenance practices; thus, the existing type and amount of vegetation supported in the drains would be expected to remain similar to existing conditions but its physical location would move throughout the drains in the HCP area. In conducting drain maintenance, IID only cleans drains when necessary to maintain gravity flow of tilewater from the farm fields into the drains. About one-fifth of the drain system is cleaned annually. Drain cleaning is focused on removing sediment that accumulates in the bottom of the drain. Flow-obstructing vegetation is removed during this process as well but bank vegetation is often retained to maintain bank stability and to control erosion. These practices moderate fluctuations in habitat availability in the drains and reduce the exposure of covered species to disturbance as a result of drain cleaning activities.

In addition to vegetation in the drains, cattail/bulrush vegetation also occurs in the seepage area between Drops 3 and 4 along the AAC and in small patches in some of the seepage areas adjacent to the East Highline Canal. Table 3.5-1 summarizes the amount and location of drain habitat and areas of emergent vegetation in the HCP area.

TABLE 3.5-1
Estimated Acreage and Characteristics of Drain Habitat in Drains and Seepage Areas in the IID HCP Area

Location	Acreage	Characteristics
Drains	652	63 acres of cattail vegetation 589 acres of tamarisk, common reed and other plant species
AAC Seepage Areas	111	Primarily cattails

3.5.2 Effects of the Covered Activities

The covered activities have the potential to take a covered species via changes in water quality or through changes in the amount of habitat, disturbance, injury or mortality. The following describes the potential effects to covered species from changes in water quality. Habitat changes, disturbance, injury or mortality potentially resulting from the covered activities are addressed collectively following the water quality evaluation.

3.5.2.1 Water Quality Effects

System-based and on-farm water conservation activities, in combination, could contribute to increased selenium concentrations in drain water and affect reproductive success of some covered species associated with drain habitat. The potential effect of the water conservation activities on selenium concentrations in drain water and the subsequent potential effects on reproductive success were predicted using the IID Water Conservation Model and mathematical equations that relate selenium concentrations in water to egg concentrations and hatchability as described below.

Prediction of Selenium Concentrations

The IID Water Conservation Model was used to predict selenium concentrations (in parts per billion [ppb]) in drain water at specific locations (nodes)[2] in the drainage system over a 12-year period for the following scenarios:

- Conservation of 130 KAFY of on-farm conservation (130 KAFY on-farm)
- Conservation of 230 KAFY of on-farm conservation (230 KAFY on-farm)
- Conservation of 230 KAFY consisting of 130 KAFY from on-farm measures and 100 KAFY from system improvements (130 KAFY on-farm + 100 KAFY system-based)
- Conservation of 300 KAFY consisting of 200 KAFY from on-farm measures and 100 KAFY from system improvements (230 KAFY on-farm + 70 KAFY system-based).

On-farm conservation of 130 KAFY is the lowest level of conservation under the IID / San Diego County Water Authority (SDCWA) water conservation and transfer project. Under the QSA, a minimum of 230 KAFY is to be conserved. The maximum amount of conservation and transfer is 300 KAFY under both agreements. The maximum amount of water conservation that can be achieved using system-based measures is 100 KAFY. Thus, the scenarios reflect the range of water conservation levels (130 KAFY to 300 KAFY) and techniques (up to 100 KAFY system-based measures).

Implementation of various on-farm conservation methods would vary from year to year and cannot be predicted with certainty for each node. Therefore, a number of model runs for each level of conservation were completed and the average selenium concentration at each node over the various runs was computed for use in the analysis of potential toxic effects. The number of miles of drain associated with each node was used to compute summary statistics that express the overall number of miles of drain with waterborne selenium concentrations in the following categories:

0-5 ppb	5-6 ppb	6-7 ppb	7-8 ppb	8-9 ppb
9-10 ppb	10-11 ppb	11-12 ppb	12-13 ppb	>13 ppb

[2] In the IID Water Conservation Model, nodes were located at the end of each drain where the drain empties into the New or Alamo River or the Salton Sea.

For both the conversion from waterborne selenium to egg selenium concentrations and the probability of effects on hatchability (described below), the upper end of each concentration category was used (e.g., 5, 6, 7,… ppb). For the category representing greater than 13 ppb of waterborne selenium, the maximum selenium concentration predicted by the model under each conservation level was used. The number of miles associated with each node was converted to number of acres by assuming that the vegetated area along drains averaged 14 feet in width.

$$\text{No. of acres} = (\text{No. of miles} \times 5{,}280 \times 14) / 43{,}560$$

Conversion of Waterborne Selenium to Egg Selenium Concentration

Based on samples of eggs from 18 different pond systems and three non-drainwater reference sites in the San Joaquin Valley (Skorupa et al. unpub. data), there is a very strong correlation between mean waterborne selenium and mean egg concentrations ($r=0.901$, $N=36$, $P<0.01$) with the following regression equation for the relationship as reported by Ohlendorf et al. (1993):

$$\log \text{egg Se } (\mu g/g) = 0.44 + 0.434 \log \text{water Se } (\mu g/l)$$

Based on this relationship, the predicted selenium concentrations in drainwater were converted to selenium concentrations in eggs for black-necked stilt. Black-necked stilt was used because of the extensive data available on this species and because it displays an intermediate level of sensitivity to selenium (Skorupa 1998). The “stilt standard” is considered the appropriate standard for generalized assessments of toxic impacts (Skorupa 1998).

Probability of Toxic Effects

The probability of effects on the hatchability of eggs was computed from the following logistic equation reported in Skorupa (1998).

$$P(>1 \text{ inviable egg}) = EXP(-2.327 + 0.0503[\text{selenium conc.}]) / \{1 + EXP(-2.327 + 0.0503[\text{selenium conc.}])\}$$

Although the probability of teratogenic effects (e.g., embryonic deformities) could have been used as a measure of potential impact, egg hatchability was chosen as the response variable for assessing the potential impact of selenium toxicity because of the relative insensitivity of teratogenesis as a response variable. Egg hatchability effects were expressed as the probability of a hen producing a clutch in which at least one egg was inviable (did not hatch). Hatchability effects were corrected for background rates of inviability as described in Skorupa (1998).

Computation of Affected Acreage

The number of miles (acres) at each selenium concentration and the probability of hatchability effects at that concentration were used to predict the level of potential effect at each level of water conservation. The probability of hatchability effects in each category of waterborne selenium concentration was multiplied by the number of miles (acres) in each category as predicted by the water quality model and summed over all categories to produce an estimate of the overall number of miles (acres) of drain habitat that would be necessary to offset potential selenium effects.

Only a portion of the drainage system is vegetated and covered species associated with drain habitat primarily use vegetated areas. Some of the covered species (e.g., white-faced ibis and long-billed curlew) forage occasionally in unvegetated portions of the drains. However, these species primarily forage in other habitats (e.g., agricultural fields or on the state and federal refuges) such that their exposure to selenium in the drains is sporadic. Selenium is metabolized by birds when exposed through their diet, and losses from tissue begin within a few weeks following exposure if not continuously resupplied through elevated dietary concentrations of selenium. As a result, occasional use of unvegetated portions of the drains would not be expected to result in accumulation of selenium to levels that would compromise the reproductive success of the covered species. Therefore, the analysis of the potential effects of increased selenium on covered species was restricted to vegetated portions of the drains, and the maximum effects value was adjusted by the proportion of the drainage system that is vegetated. Currently, this proportion is estimated to be 0.26. This conversion was used to determine the number of acres of additional vegetated drain habitat needed to offset potential selenium effects attributable to the water conservation and transfer program.

The estimated number of additional vegetated drain acres necessary to offset the potential effects (reduced hatchability) of increased selenium concentrations in the drains under each alternative are presented in Table 3.5-2. Hatchability effects are presented at the level of the clutch (or hen) rather than at the level of an individual egg. Hens that are affected may still produce viable eggs, but this analysis assumes that the entire clutch is lost, making the estimate of overall effect a conservative measure of potential impacts.

TABLE 3.5-2
Estimated Number of Additional Vegetated Acres Necessary to Offset Potential Selenium Effects on Hatchability Associated With Varying Water Conservation Amounts and Techniques

			Acres of Additional Drain Habitat Needed to Offset Effect			
Maximum Water Se conc. (µg/L)	**Egg Se conc. (µg/g)**	**Probability of >1 inviable eggs in clutch (Corrected)**	**130 KAFY on-farm**	**230 KAFY on-farm**	**130 KAFY on-farm + 100 KAFY system-based**	**200 KAFY on-farm + 100 KAFY system-based**
5	5.538	0.02767	1.48	1.14	1.00	0.83
6	5.994012	0.03024	3.55	1.79	1.75	1.04
7	6.408738	0.03261	5.84	4.75	4.40	3.54
8	6.791115	0.03484	4.94	5.49	5.92	4.99
9	7.147287	0.036946	2.87	3.98	4.40	5.05
10	7.481695	0.03894	1.49	2.69	2.46	3.68
11	7.797662	0.04085	0.64	1.38	1.24	1.89
12	8.097756	0.04269	0.37	0.65	0.63	0.96
13	8.384003	0.0444	0.3	0.36	0.38	0.58
>13	Variable	Variable	1.15[a]	1.31[a]	14.88[b]	19.76[b]
		Total	22.64	23.53	37.06	42.32

[a] Maximum water concentration = 46.5; egg concentration = 14.6; probability of hatchability effects = 0.0876714813
[b] Maximum water concentration = 2658; egg concentration = 84.4; probability of hatchability effects = 0.8594

Results of the analysis indicate that conservation of 130 KAFY using on-farm methods would require the addition of up to 23 acres as indicated by predicted decreases in hatchability. Increasing the conservation level to 230 KAFY using only on-farm methods would increase the level of impact only slightly to 24 acres. A maximum of about 42 acres of drain vegetation would be necessary under a water conservation program using both on-farm and system-based conservation methods at the 300 KAFY level of conservation (Table 3.5-2).

Other Water Quality Effects

Water conservation activities would reduce tailwater entering the drains. This reduction in tailwater would result in less sediment reaching the drains with an associated reduction in DDT and metabolite levels and other organochlorides attached to sediments. Likewise, reductions in organophosphate pesticides and phosphate and nitrogen fertilizers would be achieved. Exposure of covered species to these compounds therefore would be reduced.

3.5.2.2 Habitat and Direct Effects

The mechanisms through which the covered activities could take a covered species are changes in habitat (permanent or temporary changes), disturbance, or mortality/injury. The potential effects of each of the covered activities on drain vegetation and covered species using drain habitat are described in Table 3.5-3. Activities with the potential to affect habitat are described in more detail below. Activities that are not expected to affect habitat have a very limited potential to affect covered species, with potential effects limited to disturbance.

TABLE 3.5-3
Potential Effects of Covered Activities on Covered Species Associated With Drain Habitat

Activity	Potential Effects (Positive and Negative)
Water Use and Conservation	
Combined effects of on-farm and system-based water conservation	Water conservation will reduce the flow in the drains. However, the small reduction in the flow in the drains is not expected to result in changes in the amount of vegetation supported in the drains.
Installation of on-farm water conservation features	On-farm water conservation practices would be constructed within agricultural fields or their margins and therefore would not likely affect drain habitat or covered species using drain habitat. Constructed tailwater return ponds and delivery ponds could serve as added freshwater foraging areas to aquatic species in drains.
Installation of System-Based Water Conservation Features	
Canal lining and piping	Canal lining or piping results in modifications to canals with no physical changes to drains. Therefore, canal lining or piping would not likely affect drain habitat or covered species using drain habitat.
Construction of new canals	New canals would be constructed through agricultural fields and would tie into the existing canal system. Modifications, if any, to drains would occur where a crossing was necessary for the canal and one did not already exist. It is anticipated that construction of new canals would not likely affect drain habitat or covered species using drain habitat to any meaningful level. However, although drain crossings can remove vegetation when installed, they provide refugia for small fish and invertebrates that provide prey for foraging birds.

TABLE 3.5-3
Potential Effects of Covered Activities on Covered Species Associated With Drain Habitat

Activity	Potential Effects (Positive and Negative)
Lateral interceptors	Lateral interceptors would be constructed in agricultural fields but would cross some drains. As described under Structure Maintenance below, IID anticipates constructing up to six drain crossings each year. Drain crossings for lateral interceptors are encompassed by those described under Structure Maintenance.
Reservoirs	IID could construct up to 100 reservoirs, 1 to 10 acres in size and encompassing up to 1,000 acres. These reservoirs would be on agricultural lands or barren lands and would not impact drain habitat.
	Farmers are expected to construct 1- to 2-acre reservoirs to better regulate irrigation water. These reservoirs would be installed in agricultural fields and would not impact drain habitat.
Seepage recovery systems	Seepage recovery systems are proposed along the East Highline Canal. Potential effects to covered species using plant communities supported by seepage from the East Highline Canal are addressed under the Tamarisk Scrub Conservation Strategy. For covered species using drain habitat, potential effects of construction of seepage recovery systems are limited to construction of check structures for the surface recovery systems. Approximately 1.6 acres of drain vegetation could be permanently lost because of installation of surface seepage recovery systems.
Operation and Maintenance	
Conveyance system operation	Conveyance system operation is limited to moving water through the canals to meet maintenance and customer needs. Other than the filling, draining and moving water through the canals, no physical effects are encompassed by conveyance system operation. No effects to drain habitat or covered species using drain habitat would be expected.
Drainage System Operation	
Rerouting or constructing new drains	IID reroutes or constructs about 2 miles of drains every 10 years. Newly constructed drains would increase habitat for covered species associated with drain habitat. If IID constructed 2 miles of drains every 10 years, 15 miles of new drains would be created over the 75-year permit term, which could increase habitat for species associated with drain habitat. Rerouting drains would not change the amount of drain habitat.
	Rerouting drains could result in the temporary reduction in vegetation in the drains during the period between abandonment of the old drain and when vegetation develops in the rerouted drain. No net loss of vegetation would occur because the rerouted portion would replace the abandoned section.
Piping drains	Over the 75-year term IID anticipates that about 50 miles of open drains would be pipelined, with an annual average of 0.67 mile of drain piping. About 22 acres of drain vegetation could be lost over the term of the permit from piping drains.
Inspection activities	Potential effects of inspection activities would be limited to a minor potential for disturbance of covered species if they occur in the vicinity of structures at the time of inspection.

TABLE 3.5-3
Potential Effects of Covered Activities on Covered Species Associated With Drain Habitat

Activity	Potential Effects (Positive and Negative)
Canal lining maintenance	Canal lining maintenance consists of repairing the concrete lining of canals only with no physical changes to drains. Therefore, canal lining maintenance would not likely affect drain habitat or covered species using drain habitat.
Right-of-way maintenance Embankment maintenance Erosion maintenance	Along drains, right-of-way maintenance, including embankment and erosion maintenance, is conducted in association with vegetation control/sediment removal along drains. Potential impacts to covered species from these activities are encompassed by those under vegetation control.
Seepage maintenance	Seepage maintenance is conducted only along the canal system. Therefore, seepage maintenance would not likely affect drain habitat or covered species using drain habitat.
Structure maintenance	IID estimates that about 300 structures will be replaced each year. About 100 of these structures would be drainage structures. Along lateral drains, replacing each structure temporarily disturbs an area about 75 feet long. Thus, each year about 7,500 feet (1.4 miles) of the drains would be disturbed, temporarily removing 0.6 acres of vegetation. ([7500 ft X 14 ft / 43560]*26 percent vegetated)
	Installation of new drain crossings could result in the permanent loss of drain vegetation. IID estimates that six 40-foot-wide crossings will be constructed each year. Based on this estimate, 18,000 feet (3.4 miles) of drain would be affected by drain crossings over the term of the permit, potentially resulting in the loss of 1.5 acres of drain vegetation. ([18,000 ft X 14 ft / 43560]*26 percent vegetated)
	New structures that would be constructed on the drainage system would consist of control structures. Control structures are installed in steep drains that are eroding. Because of the erosion, drains needing control structures support little vegetation. Thus, construction of new control structures has a limited potential to affect drain habitat or associated covered species
Pipeline maintenance	Drain pipelines primarily occur in farm fields while conveyance system pipelines occur through developed areas. Neither of these areas support vegetation used by species associated with drain habitat. As such, the potential for pipeline maintenance to affect covered species is very low.
Reservoir maintenance	Reservoirs are located on the conveyance system. The reservoir embankments are relatively steep and vegetation is tightly controlled. These features make the reservoirs unattractive to covered species such that the potential for reservoir maintenance to affect covered species associated with drain habitat is very low.
Sediment removal	IID removes sediment from about 300 miles of drains annually. While IID strives to maintain vegetation on drain banks, vegetation within the channel is removed with sediment. Sediment removal temporarily reduces vegetation in the drains. An estimated 130 acres of vegetated drain is affected by sediment removal each year.

TABLE 3.5-3
Potential Effects of Covered Activities on Covered Species Associated With Drain Habitat

Activity	Potential Effects (Positive and Negative)
Vegetation control	Vegetation control along canals focuses on removing moss and algae, and has little potential to affected covered species associated with drain habitat. Covered species associated with drain habitat are not expected to use canals because of the lack of vegetation, deep water, and high water velocity. Along drains, mechanical and chemical methods are used to control vegetation. Mechanical and chemical control of vegetation is conducted in association with sediment removal described above. Thus, an estimated 130 acres of vegetation are temporarily affected each year.
New and Alamo River maintenance	IID dredges the deltas of the New and Alamo rivers about once every four years. In conducting this dredging, IID retains the vegetation on the banks. Thus, habitat is not affected by these dredging operations, but the dredging could temporarily disturb covered species using vegetation along the river channels. IID coordinates with USFWS at the refuge prior to conducting these activities.
Salton Sea dike maintenance	Salton Sea dike maintenance activities consist of replacing riprap, grooming embankments and repairing damaged sections of the dikes. Because the dikes do not support vegetation that covered species associated with drain habitat use, no change in habitat would occur with these activities. Potential effects are limited to a minor potential for disturbance.
Gravel and rock quarrying	Gravel and rock quarries do not occur in drains or immediately adjacent to marsh habitats. Thus, the potential for quarrying to affect covered species associated with drain habitat is minor.
Fish hatchery operation and maintenance	The fish hatchery is a developed facility and does not support habitat for covered species associated with drain habitat.
Recreational facilities	Because new recreational facilities would not be constructed in the drain prism, construction of recreational facilities would not be expected to affect habitat for species associated with drain habitat. If recreational facilities were constructed adjacent to drains, there would be a minor potential for disturbance of covered species during construction. The HCP does not cover take of covered species by recreationists.

Permanent Habitat Loss

Covered activities potentially resulting in the permanent loss of drain habitat are installation of seepage recovery systems, piping drains, and structure maintenance. The potential habitat effects of each of these activities is described below. In total, an estimated 25.1 acres of drain vegetation could be lost because of the covered activities over the term of the permit.

Seepage recovery systems are proposed along the East Highline Canal. Surface recovery systems are proposed where there is an existing drain that currently collects seepage from the East Highline Canal. Construction in the drain for these systems is minimal consisting of installation of a small check structure. Conservatively assuming 0.1 acre is impacted by each check structure, a maximum of 1.6 acres of drain vegetation could be permanently lost because of installation of surface seepage recovery systems.

Over the 75-year term, IID anticipates that about 50 miles of open drains (an annual average of 0.67 mile) would be pipelined. The entire drainage system encompasses an estimated 2,471 acres of which an estimated 26 percent (652 acres) is vegetated. Assuming that 26 percent of the 50 miles of drains piped is vegetated, 22 acres of drain vegetation could be lost over the term of the permit from piping drains.

Structure maintenance with the potential to eliminate drain vegetation consists of installation of new drain crossings. IID estimates that six, 40-foot-wide crossings will be constructed each year. Based on this estimate, 18,000 feet (3.4 miles) of drain would be affected by drain crossings over the term of the permit. Assuming the impacted area is 26 percent vegetated, about 1.5 acres of drain vegetation could be lost.

Temporary Habitat Disturbance

Covered activities potentially resulting in the temporary loss of drain habitat are sediment removal/vegetation control and structure maintenance. The potential effects of these activities are described below. In total, an estimated 130 acres of drain vegetation could be temporarily disturbed by the covered activities each year.

The amount of vegetation in the drains was conservatively estimated at 652 acres; about 63 acres are cattail/bulrush and about 589 acres support other vegetation. IID anticipates that it will clear vegetation/sediment from approximately one-fifth (about 130 acres) of the vegetated acreage in the drains each year. Thus, on average, covered species in one-fifth of the habitat in the drains are exposed to drain cleaning each year. Drain cleaning could displace individuals, temporarily reduce habitat in the localized area of the cleaning, or destroy nests if covered species breed in the drains at the time of cleaning.

Structure replacement could temporarily remove drain vegetation. IID estimates that about 100 structures on drains will need to be replaced each year. Along lateral drains, replacing each structure temporarily disturbs an area about 75 feet long. Thus, each year about 7,500 feet (1.4 miles) of the drains would be disturbed, potentially resulting in the temporary removal of 0.6 acre of vegetation.

Drain cleaning and structure replacement does not permanently eliminate habitat. Rather, it results in a temporary reduction of vegetation in portions of the drains. Vegetation remains undisturbed in the remainder of the drainage system. In conducting drain cleaning activities, IID focuses sediment and vegetation removal on the center of the drain and strives to maintain vegetation on the drain banks. These aspects of IID’s drain cleaning activities minimize impacts to covered species potentially resulting from fluctuations in the amount or type of vegetation. Furthermore, the existing habitat conditions in the drains are the product of IID’s drain cleaning regime in which about one-fifth of the drainage system is cleaned each year. Thus, habitat would be expected to persist in the drains at a level and species composition similar to existing conditions.

Drain cleaning and other activities occurring near the drains is ongoing. Covered species use drain habitats in the HCP area and persist in the HCP area coincident with these activities. Yuma clapper rails have been reported in Holtville Main Drain annually since 1995 and in Trifolium No. 1 drain in all but one year since 1994 (USFWS unpublished data). In addition to Yuma clapper rails, the following covered species were reported in surveys of drains in the Imperial Valley: Cooper’s hawk, loggerhead shrike, long-billed curlew, northern harrier, peregrine falcon, sharp-shinned hawk, short-eared owl, tricolored blackbird, white-faced ibis, white-tailed kite, willow flycatcher, and yellow warbler (Hurlbert 1997). The observed use of the drains by American bitterns also suggests that least bitterns could use the drains. Because these species currently coexist with drain cleaning and other maintenance activities and habitat conditions in the drains are expected to remain similar to existing conditions, use of drain habitat by covered species is expected to remain similar to existing levels.

3.5.3 Approach and Biological Goals

The biological goal of the Drain Habitat Conservation Strategy is to maintain the species composition and life history functions (i.e., seasonal occurrence) of covered species using drain habitat within the HCP area. The specific objectives are to:

- Create managed marsh habitat that supports covered species associated with drain habitat
- Optimize management of the created marsh habitat to support covered species associated with drain habitat over the term of the permit

The Drain Habitat Conservation Strategy is composed of minimization and mitigation measures. Under the water conservation and transfer programs, the amount of water conservation will gradually increase. Thus, changes in water quality caused by the water conservation and transfer programs will occur gradually. This gradual increase in water conservation constitutes a minimization aspect of the HCP. Additional HCP measures that would minimize effects on covered species using drain habitats include:

- Avoiding dredging of the river deltas during the period when covered species could be breeding at the deltas (Drain Habitat–2)
- Survey for covered species prior to conducting scheduled construction activities and schedule construction activities to avoid the breeding season if covered species are found breeding in the area that would be affected (Drain Habitat–3)
- Seasonal restrictions on construction activities in areas inhabited by burrowing owls (Owl–4, –5, and –8)
- Seasonal restrictions on activities in pupfish drains (Pupfish–1)

These measures will reduce the potential for covered activities to result in take of covered species. In addition to these minimization aspects of the HCP, impacts to covered species potentially resulting from increased selenium concentration in the drains or from operation and maintenance activities associated with the drains will be mitigated by creating managed marsh habitat.

Creating additional habitat directly addresses actual effects of the covered activities that relate to changes in the amount or quality of habitat by providing alternative habitat. It also addresses disturbance and other risks to covered species using drain habitats by creating a safe haven where they are not exposed to the covered activities. By creating habitat that provides equal or greater habitat value than that currently supported in the HCP area, a similar or greater number of individuals of the covered species can be supported, particularly because the amount of habitat in the drains is not expected to change substantially over the term of the permit. Thus, the impact of the take of any individuals using impacted habitats in the HCP area (e.g., drains) is minimized and mitigated by increasing the overall quality and quantity of available habitat in the HCP area and thereby creating conditions capable of supporting larger populations of the covered species than currently inhabit the HCP area.

3.5.4 Habitat Mitigation and Management Measures

The mitigation and management measures presented below are the specific actions that IID will undertake to fulfill the goals of the Drain Habitat Conservation Strategy. These measures serve as the basis for the contractual commitments described in the Implementation Agreement. The text following each measure provides additional clarification and describes the rationale for the measure. The key elements of the Drain Habitat Conservation Strategy are as follows:

- Create at least 190 acres of managed marsh habitat and up to a total of 652 acres of managed marsh habitat
- Reduce disturbance and mortality/injury of covered species from covered activities

Drain Habitat–1. *IID will create at least 190 acres of managed marsh habitat. Within 1 year of the issuance of the incidental take permit, IID will conduct a vegetation survey of the drainage system following the protocol in Appendix B. Based on this vegetation survey, the HCP Implementation Team will determine the amount of habitat for covered species supported in the drains. The acreage required to compensate for selenium effects will be recalculated based on the results of the vegetation survey following the same methodology described in Section 3.5.2: Effects of the Covered Activities. If the acreage of habitat for covered species found in the drains through the vegetation survey plus the acreage required to compensate for selenium effects exceeds 190 acres, IID will create managed marsh habitat in an amount equal to the greater acreage up to a maximum of 652 acres. Creation of the managed marsh habitat will be phased over 15 years, with at least one-third of the total amount created within 5 years, two-thirds within 10 years, and the total amount created within 15 years of issuance of the incidental take permit.*

IID will ensure that the water used to support the managed marsh habitat is irrigation water from the LCR or is other water with the same selenium concentration as water from the LCR or that meets an EPA selenium standard for protection of aquatic life that has received a No Jeopardy determination from the USFWS, whichever is greatest.

The managed marsh habitat will be created on lands owned by IID. IID will work with the HCP IT to determine the location and characteristics of the managed marsh habitat and develop long-term management plans. IID will submit habitat creation plans to the USFWS and CDFG for approval prior to initiation of habitat creation activities. Within 1 year of completing construction of managed marsh, IID will submit long-term management plans to the USFWS and CDFG for approval. IID will provide for the management of managed marsh habitat for the term of the permit.

Under Drain Habitat–1, IID will create at least 190 acres of managed marsh habitat and up to 652 acres. The specific amount of managed marsh that IID will create will be determined through a vegetation survey completed within 1 year of issuance of the incidental take permit. Based on this survey, the HCP IT will determine the total amount of habitat for covered species in the drains and the amount of managed marsh habitat necessary to offset selenium impacts. IID will create managed marsh habitat equal to the total amount of habitat in the drains plus additional habitat based on predicted toxicity effects from increases in selenium under the water conservation and transfer program.

The quality of the created managed marsh habitat is expected to be much higher than the habitat quality of the vegetation supported in the drains. Emergent freshwater marsh units on the state and federal refuges of the Imperial Valley currently support Yuma clapper rails. For at least the first third of created habitat, it is anticipated that the managed marsh will be created and managed in a similar same manner as the USFWS and CDFG manage emergent freshwater marsh units on the refuges. Based on the current management practices, the created managed marsh habitat is expected to consist of cattail/ bulrush vegetation. Cattail/bulrush vegetation provides higher quality habitat conditions for the covered species than the vegetation in the drains. Most of the vegetation in the drains is tamarisk or common reed; only a small amount of cattail/bulrush vegetation (about 63 acres) is estimated to be in the drains. Although current information indicates that covered species could use areas dominated by common reed and tamarisk, the level of use is low relative to cattail/bulrush areas. Further, habitat in the drains occurs as a narrow strip from about 3 to 15 feet wide and therefore, consists entirely of edge habitat. While cattail/bulrush in the drains is used by some covered species, the created marsh habitat is expected to support greater use (both in number of species and number of individuals) because the habitat will be in larger blocks with less edge habitat. Species diversity increases with the size of habitat patches (Harris and Silva-Lopez 1992; Brown and Dinsmore 1986) and reproductive success can be greater in larger patches than in narrow, linear habitats. Linear habitats have a high degree of edge habitat, and predation pressure is typically greater in edge-dominated habitats than more insular habitats (Harris and Silva-Lopez 1992).

The managed marsh habitat will be created on land owned by IID. The HCP IT will determine where to locate the created managed marsh habitat. In making this determination, the HCP IT will consider factors such as:

- Location relative to other wildlife habitat and populations of covered species (e.g., refuges)
- Potential conflicts with restoration projects for the Salton Sea
- Availability of facilities to deliver water to the managed marsh habitat
- Soils
- Land value

The HCP IT will ensure that the habitat is created in the best location to maximize the long-term benefits to covered species.

IID will support the created marsh habitat with better quality water than currently occurs in the drainage system. Under this measure, IID has committed to using irrigation water from the Colorado River or water of equivalent quality with respect to selenium or water that meets the EPA selenium standard with a No Jeopardy opinion. Irrigation water from the Colorado River is the best quality water available in the Imperial Valley. The selenium concentration in the LCR has averaged about 2.1 ppb in recent years (Table 2.2.1). For comparison, the average concentration of selenium in the New and Alamo rivers and selected drains emptying into these rivers has ranged from about 4 ppb to near 10 ppb (Table 2.2.1). Thus, in addition to the better habitat quality resulting from the plant species composition and physical characteristics, the managed marsh habitat will have better water quality than the drains.

IID will manage the managed marsh or provide for its management by a third party for the term of the permit. The managed marsh will mitigate the impacts to species using drain habitat as a result of the water conservation and transfer project and O&M activities. At the end of the permit, IID will either continue the water conservation and transfer project or discontinue it. If the water conservation and transfer project is continued, then IID will have to extend incidental take authorization to cover the continued impacts associated with water conservation and transfer. It is reasonable that IID would continue to maintain the managed marsh. Alternatively, if IID discontinued the water conservation and transfer project, water quality conditions in the drains would return to pre-Project levels thus, obviating the need to continue to support the managed marsh to mitigate water quality effects.

With the termination of incidental take authorization for O&M activities at the end of the permit, IID would either have to avoid take of state and federal listed species or extend incidental take authorization. If IID elected to avoid take, there would be no need to continue to maintain the managed marsh to mitigate impacts of take associated with O&M activities. Alternatively, IID could extend its permit and continue to maintain the managed marsh habitat. Because take of covered species associated with drain habitat as a result of covered activities would cease at the end of the permit, it is not necessary or appropriate for IID to maintain managed marsh habitat in perpetuity. However, 5 years before the end of the permit (i.e., in year 70), IID will meet with the USFWS and CDFG to develop a strategy for minimizing impacts to covered species using the managed marsh habitat at the end of the permit term (See Section 5.6: End of Term of Incidental Take Authorization).

Drain Habitat–2. *IID will not dredge the river deltas between February 15 and August 31, except as necessary to prevent flooding during storm events.*

IID dredges portions of the river deltas of the New and Alamo rivers about once every 4 years to maintain flow to the sea. In conducting this dredging, IID retains the vegetation on the banks of the river channels to maintain the stability of channels. Because vegetation is retained, habitat is not affected by these dredging operations and the principal concern for covered species that may be using the deltas is disturbance or injury. By not conducting these activities between February 15 and August 31, except in emergency situations, IID will avoid the breeding periods of covered species that could be using the river deltas for nesting. This commitment will minimize the potential for take of covered species breeding in the deltas.

Drain Habitat–3. *For scheduled construction activities associated with the drainage system, before initiation of construction activities, IID will survey the construction site surveyed to determine whether any covered species are likely to breed at the site as evidenced by the occurrence of appropriate vegetation and/or surveys for covered species. If covered species are found to be potentially breeding on the project site, IID will schedule construction activities that would remove habitat to occur outside of the breeding season.*

In addition to potentially impacting suitable habitat, construction activities could disturb or injure covered species using the habitat. To minimize the potential for take of covered species from construction activities, IID will survey suitable habitat to determine if any covered species are breeding in habitat that would be impacted by the construction activities. If the surveys indicate that covered species are likely to be breeding in habitat that would be affected, IID will schedule activities that would affect the habitat to occur outside of the breeding season. Outside of the breeding season, IID could remove habitat. By scheduling construction activities that would remove habitat to occur outside of the breeding season, IID will minimize the potential to injure or disturb covered species.

3.5.5 Effects on Habitat

The approach to the Drain Habitat Conservation Strategy is to create managed marsh habitat of greater value than habitats actually affected by the covered activities. Under the Drain Habitat Conservation Strategy, an amount of managed marsh habitat equal to the total amount of habitat in the drains plus an additional amount of habitat based on predicted toxicity effects from increases in selenium under the water conservation and transfer program would be created. At least 190 acres of high-quality marsh habitat and up to 652 acres would be created within 15 years of issuance of the ITP. This habitat would be created in large blocks, and would be expected to consist of cattails, bulrush, sedges, and other emergent wetland plants, depending on the USFWS management of habitat for Yuma clapper rails on the Salton Sea NWR.

The Drain Habitat Conservation Strategy would more than double the acreage of habitat for drain-associated species. Consisting of cattails and bulrush, the created habitat also would provide substantially greater habitat value than the existing vegetation in the drains. The larger blocks of created habitat also would increase its attractiveness and value to wildlife as compared to the narrow, linear habitat of the drains.

The drains would continue to support vegetation similar in character and quantity to existing vegetation. IID has been conducting O&M activities along the drainage system for many decades and would continue these O&M activities over the term of the permit. The vegetation currently supported in the drains is a product of these maintenance activities. Although the water conservation activities could reduce the quantity and quality of water in the drains, this potential reduction is not expected to result in a substantial change in the extent and characteristics of vegetation in the drains (see Section 4.7 of the EIS/EIR). Thus, the drains would continue to support habitat and species composition at a level similar to that which currently exists in the drains, and covered species could continue to use this habitat.

IID would use water with selenium concentration low enough to avoid adverse reproductive effects to support the managed marsh habitat. The selenium concentration of water used to support the managed marsh is expected to be close to 2 ppb. This selenium concentration is considerably lower than the selenium concentration in most of the drains in the HCP area. Adverse effects from selenium toxicity would be avoided in the managed marsh and the quality of the managed marsh habitat would be further enhanced beyond that in the drains.

3.5.6 Effects on Covered Species

Covered species associated with marsh habitats known to use or potentially using habitats in the HCP area include resident breeding species, migratory breeding species, winter visitors, and transient species that may use marsh habitat during migration or other wanderings. Many of the covered species associated with marsh habitat are not likely to use vegetation within the confines of a drain to a great degree (e.g., short-eared owls, greater sandhill cranes), but would likely use the larger, more open configuration of the created marsh habitat. As such, these species would be largely unaffected by the covered activities, but would benefit from creation of high-quality marsh habitat. Even though individuals of some of the covered species could be taken as a result of the covered activities, the Drain Habitat Conservation Strategy is expected to maintain or increase the level of use of the HCP area by covered species because conditions in the drains are not expected to change substantially while the Drain Habitat Conservation Strategy will approximately double the amount of habitat. The effects of the Drain Habitat Conservation Strategy on covered species are evaluated below.

As part of the Monitoring and Adaptive Management Program (Chapter 4), IID could implement a survey or study program requiring capture of covered species. Capture of covered species constitutes take under both the federal and state ESAs. Take that occurs in association with surveys or studies conducted for this HCP is a covered activity and will be authorized under the state and federal ITPs. Any of the covered species could be taken through surveys or studies.

Studies and surveys conducted during the course of this HCP will be developed by IID in coordination with the HCP IT and will be subject to the approval of CDFG and USFWS prior to implementation. In approving the studies/surveys, the CDFG and USFWS will require capture methods that minimize the potential for death and injury of covered species. In addition, these agencies will specify the number of individuals of covered species that may be captured. Thus, the level of take authorized to occur through this mechanism will be specified on a case-by-case basis through the approval of the CDFG and USFWS.

3.5.6.1 Yuma Clapper Rail

In the HCP area, Yuma clapper rails predominantly occur on the state and federal refuges. Since 1990, the number of clapper rails counted on the Imperial WA has varied between 90 and 331, and on the Salton Sea NWR, clapper rail numbers have fluctuated between 13 and 102. Combined, the refuges in the HCP area have supported 106 to 411 clapper rails each year. Although comprehensive surveys have not been completed in areas off of the refuges, habitat availability is limited off of the refuges. Consistent with the limited habitat availability off of the refuges, the number of clapper rails reported off of the refuges has been low, ranging from 3 to 43 in surveys conducted between 1990 and 1999. Few of these sightings were in the drains and clapper rails have only been reported in three drains (Holtville Main, Trifolium No. 1, Bruchard).

Agricultural drains support limited use by clapper rails. High quality habitat for Yuma clapper rails consists of mature stands of dense or moderately dense cattails intersected by water channels. Rails breed, forage and find cover in this type of habitat. Rails have also been reported using areas of common reed although nesting is uncertain and the density is lower than in cattail marshes. The IID drainage system is estimated to contain about 63 acres of cattails. Common reed, tamarisk, and arrowweed are the predominant species of the remaining 589 acres of vegetation estimated in the drainage system. The vegetation characteristics of the drains suggest that the drains provide poor quality habitat for rails. Further, Anderson and Ohmart (1985) found the home ranges of rails to average about

18.5 acres/pair. The drains are unlikely to support a block of vegetation of this size, which further suggests that habitat in the drains is of limited quality to rails. A maximum of nine rails have been reported in two drains. Breeding has not been verified in the drains but rails have been documented to be present in surveys of drains during the breeding season.

Potential effects of the covered activities on clapper rails consist of disturbance, temporary and permanent loss of habitat, destruction of nests, and exposure to increased selenium concentrations. IID cleans about one-fifth of the drainage system each year. Thus, about 12.6 acres of cattails could be subject to drain cleaning each year. Rails inhabiting these areas could be displaced as a result of drain cleaning and if they breed in the drains, there is some potential for a nest to be lost because of the drain cleaning. To the extent that rails use common reed, a few individuals could be displaced by drain cleaning activities. Considering the poor quality of common reed habitat and availability of this vegetation in areas unaffected by covered activities (e.g., along the New or Alamo Rivers), displaced individuals would likely quickly find alternate habitat.

Drain maintenance activities and several other covered activities also have the potential to result in take of clapper rail through temporary or permanent reductions in the amount of habitat. As described in Section 3.5.2.2, various maintenance and water conservation activities have the potential to temporarily and permanently impact drain vegetation. Drain maintenance results in the temporary loss of an estimated 12.6 acres of cattail vegetation, some of which could be used by clapper rail. In total, an estimated 25.1 acres of drain vegetation of which only a few acres (estimated 2.5 acres) could be cattails would be permanently impacted. These temporary and permanent reductions in cattails in the drains could result in a minor reduction in potential habitat for Yuma clapper rail.

Rails could be exposed to slightly higher concentrations of selenium in the drains. Based on the evaluation of the effects of increased selenium concentrations, using the stilt standard, the reproductive success of rails foraging in the drains could be reduced slightly relative to existing conditions. Assuming that all of the vegetation in the drains provides potential foraging habitat for Yuma clapper rails, up to 42 acres of managed marsh habitat could be needed to offset the maximum projected decline in reproductive rate resulting from selenium concentrations in the drains at the maximum level of water conservation and transfer (see Section 3.5.2.1).

Under the HCP, IID will create at least 190 acres and up to 652 acres of managed marsh habitat. Based on the vegetation survey, IID will create at least an equivalent amount of habitat as is supported in the entire drainage system. The created habitat will be of substantially better quality for Yuma clapper rails than the habitat in the drains because it will contain preferred plant species (i.e., cattails and bulrush), have better water quality than the drains, and be configured to provide a mix of dense vegetation interspersed with open water. The created habitat is anticipated to be managed in a similar manner as emergent freshwater marsh units are managed on the refuges. The units on the refuges support the majority of the clapper rail population in the Imperial Valley. With an equivalent or greater acreage as supported in the drains, but with much higher quality, the created marsh habitat is expected to support a larger population of Yuma clapper rails than currently is supported in the drains.

Clapper rails establish territories as early as February with nesting and incubation beginning in mid-March. IID will avoid potential impacts to birds that could be using the river deltas during the breeding season by not dredging the deltas of the New or Alamo rivers after mid-February. In addition, prior to conducting scheduled construction activities in the drains, IID would survey the construction area. If covered species are found to be breeding in the construction area, IID would schedule the construction activity to occur after the breeding season. These measures will avoid and minimize the potential for destruction of nests and disturbance that could interfere with breeding behavior.

Estimates of rail densities vary widely, ranging from 0.06 to 1.26 rails/acre (Table 3.5-4). Based on these estimates, the number of rails supported by 190 acres of created marsh could range from 11 to 239 rails if all the habitat were designed for Yuma clapper rails. Probably, a smaller number of clapper rails would be supported because a portion of the marsh would be managed for other covered species (e.g., black rails). Habitat for Yuma clapper rails would continue to be available in the drains and clapper rails would be expected to persist in the drains at existing levels. Therefore, the created marsh would act to increase the amount of habitat and overall population of clapper rails in the HCP area and thereby benefit the species. With implementation of the minimization and avoidance measures, and creation of high quality managed marsh habitat, the Drain Habitat Conservation Strategy would minimize and mitigate the impact of any take of this species resulting from the covered activities. Implementation of the HCP would not jeopardize the continued existence of Yuma clapper rail.

TABLE 3.5-4
Reported Densities of Yuma Clapper Rails

Location	Density Rails/Acre[a]	Source
LCR	0.10	Anderson and Ohmart (1985)
Cienega de Santa Clara	0.36	Piest and Campoy (1998)
Cienega de Santa Clara	0.60[b]	Piest and Campoy (1998)
Topock Marsh	0.06	Smith (1975, reported in Piest and Campoy [1998])
Mittry Lake Wildlife Area	0.39	Todd (1980, reported in Piest and Campoy [1998])
Hall Island	1.26	Todd (1980, reported in Piest and Campoy [1998])

[a] Acres of cattail habitat
[b] Estimated density taking into account nonresponding birds

3.5.6.2 California Black Rail

California black rails occur in the HCP area in small numbers. In a 1989 survey for the species at the Salton Sea and surrounding areas, 13 birds were recorded at the mouth of the New River, eight were in seepage communities along the Coachella Canal, and one was found at Finney Lake. Up to 50 black rails have been reported in the wetland complex supported by seepage from the AAC between Drops 3 and 4. Black rails have not been reported to occur in the drains. Black rails are most closely associated with bulrush vegetation although they will use areas dominated by cattails. Their apparent low occurrence in the HCP area may reflect this preference for bulrush, which is not as common in the HCP area as are cattails.

California black rails could be directly or indirectly taken as a result of several covered activities. Drain maintenance activities could flush rails from drain vegetation which could constitute take as harassment or cause death or injury to individuals if as a result of being flushed from the cover of drain vegetation they are subject to predation. In the event that black rails breed in drain vegetation in the HCP area or start breeding in the HCP area over the 75-year permit term, drain maintenance activities could result in the direct destruction of nests.

On an annual basis, IID conducts drain maintenance activities on about 20 percent of the drainage system, affecting about 130 acres of vegetation. However, only a very small amount of this vegetation might be suitable for California black rails. The IID drainage system is estimated to contain about 63 acres of cattails, a species that can be used by black rails but is not preferred. If 20 percent of the estimated 63 acres of cattails are subject to drain maintenance each year, black rails could be exposed to drain maintenance activities in about 12.6 acres. Because of the limited occurrence and distribution of black rails in the HCP area, particularly in the drains, the potential for take of black rails by drain maintenance activities and the number of rails potentially affected is low.

Drain maintenance activities and several other covered activities also have the potential to result in take of black rail through temporary or permanent reductions in the amount of habitat. As described in Section 3.5.2.2, various maintenance and water conservation activities have the potential to temporarily and permanently impact drain vegetation. Drain maintenance results in the temporary loss of an estimated 12.6 acres of cattail vegetation, some of which could be used by black rail. In total, an estimated 25.1 acres of drain vegetation, of which only a few acres (estimated 2.5 acres) could be cattails, would be permanently impacted. These temporary and permanent reductions in cattails in the drains could result in a minor reduction in potential habitat for California black rail. Over the term of the permit, a few individuals could be adversely affected (e.g., killed, injured, or harmed) as a result of this reduction, but because of the low level of use of cattails by black rail, and the low level of use of drains in the HCP area by black rail, overall population-level effects would not be expected.

California black rails that forage in the drains could be exposed to increased selenium levels. Assuming that all of the vegetation in the drains provides potential foraging habitat for black rails, as was assumed for Yuma clapper rails, up to 42 acres of managed marsh habitat could be needed to offset the maximum projected decline in reproductive rate resulting from selenium concentrations in the drains at the maximum level of water conservation and transfer (see Section 3.5.2.1).

Implementation of the Drain Habitat Conservation Strategy would be expected to increase the amount and quality of habitat for black rail in the HCP area. Under the Drain Habitat Conservation Strategy, IID will create at least 190 acres of managed marsh habitat and up to 652 acres. The HCP IT will consider the specific habitat needs of black rails in developing site-specific creation and management plans for the managed marsh. The managed marsh habitat will be of better quality for black rails than the habitat affected in the drains because it would:

- Consist of one or more large blocks
- Contain preferred vegetation (bulrush)
- Have better water quality

Flores and Eddleman (1991) have suggested that California black rails are capable of rapidly colonizing new habitat. Thus, black rails could take advantage of the newly created habitat within a short period of time. Given the current low level of use of the HCP area by black rails, the high-quality habitat created under the HCP, and the rail's ability to rapidly colonize new habitats, the HCP could contribute to increasing the population and distribution of California black rails.

The few records of black rails in the HCP area include areas adjacent to the Salton Sea and the New River deltas among others. Like clapper rails, black rails breed in the early spring. Black rails have been reported using the New River delta. IID will avoid potential impacts to birds that could be nesting in this area by not dredging the deltas of the New or Alamo rivers after mid-February. In addition, prior to conducting scheduled construction activities in the drains, IID would survey the construction area. If covered species are found to be breeding in the construction area, IID would schedule the construction activity to occur after the breeding season. These measures will avoid and minimize the potential for destruction of nests and disturbance that could interfere with breeding behavior.

Few estimates are available on the naturally occurring density of California black rails in marsh habitats. Repking and Ohmart (1977) estimated the density of black rails in spring along the LCR as 0.4 to 0.6 rail/acre. At this density, the 190 acres of marsh habitat created under the HCP could support up to 114 black rails. However, because the needs of all of the covered species associated with drain habitat will be considered in designing the managed marsh, the level of use by black rails probably would not reach this maximum level. Nonetheless, with implementation of the minimization and avoidance measures, and creation of high quality managed marsh habitat, the Drain Habitat Conservation Strategy would minimize and mitigate the impact of any take of this species resulting from the covered activities. Implementation of the HCP would not jeopardize the continued existence of California black rail.

3.5.6.3 Bald Eagle

A few bald eagles (three or fewer) are regularly observed at the Salton Sea during winter. The principal potential effect of the covered activities on bald eagles is a potential decline in the availability of fish in the Salton Sea. As described in more detail in Section 3.3.5.13, a few bald eagles could be taken as a result of reduced foraging opportunities at the Salton Sea over the term of the permit. Bald eagles are not known to use the drains and because of the abundance of fish and waterfowl at the Salton Sea and adjacent refuges, the drains do not provide essential foraging habitat for bald eagles. Thus, no adverse effects to bald eagles would be expected from covered activities operating in the drainage system.

Bald eagles could benefit from the Drain Habitat Conservation Strategy. Although fish are the primary prey of bald eagles, they also prey on waterfowl. Under the Drain Habitat Conservation Strategy, at least 190 acres and up to 652 acres of marsh habitat would be created. The Imperial Valley and Salton Sea areas are heavily used by wintering and migrating waterfowl. While not target species of the HCP, the created marsh habitat would attract migrating and wintering waterfowl. As such, it would provide additional foraging opportunities for bald eagles, overall benefiting the species. If foraging opportunities became limited because of reductions in fish availability at the Salton Sea, the managed marsh habitat would provide alternate foraging habitat and thereby, mitigate potential impacts. Therefore, implementation of the HCP would not jeopardize the continued existence of bald eagles.

3.5.6.4 Bank Swallow

Bank swallows are casual visitors to the HCP area, potentially occurring in the HCP area as migrants during the spring and fall. For foraging, they are not strongly associated with any particular habitat type, although they often forage near water where insects are abundant. The covered activities are unlikely to adversely affect bank swallows because of the swallow's rare occurrence in the HCP area and broad habitat use for foraging. However, a few individuals could be taken because of changes in foraging habitat availability or quality potentially resulting from permanent or temporary reductions in drain vegetation (see Section 3.5.2.2), permanent or temporary reductions in tamarisk scrub habitat (see Section 3.4.2), or changes in the composition and amount of agricultural field habitat (see Section 3.8.2).

The Drain Habitat Conservation Strategy would contribute mitigating the impact of any take of bank swallows that could result from the covered activities. Under the Drain Habitat Conservation Strategy, at least 190 acres and up to 652 acres of marsh habitat would be created. The created marsh habitat would benefit bank swallows by increasing foraging opportunities. Loss of tamarisk scrub habitat at the Salton Sea and in the Imperial Valley would be offset through the creation / acquisition and long-term protection of native tree habitat (see Sections 3.3.4.2 and 3.4.5). By supporting more abundant and diverse insect populations than tamarisk scrub, native tree habitat would provide higher quality foraging opportunities for bank swallows. Critical to the perpetuation of agriculture field habitat in the Imperial Valley where bank swallows could forage is the reliability and availability of water. Implementation of the water conservation and transfer program and this HCP will enhance the likelihood that agriculture will remain the dominant land use in the Imperial Valley and thereby continue to provide foraging opportunities for bank swallows. In combination, these strategies would mitigate the minimal amount of take potentially occurring and would not jeopardize the continued existence of the species.

3.5.6.5 White-Faced Ibis

White-faced ibis typically nest in extensive marshes, constructing nests in tall marsh plants such as cattails and bulrushes over water. In the HCP area, white-faced ibis use tamarisk and mesquite snags in the Salton Sea for nesting in addition to marshes on the state and federal refuges and other areas adjacent to the Salton Sea. They roost at these locations as well as on private duck clubs. Habitat quality and quantity on the state and federal refuges and private duck clubs would not be affected under the HCP. It is unlikely that any ibis nest or roost in vegetation in the drains because of the species' association with extensive marshes or other isolated and protected locations for nesting. Thus, temporary or permanent loss of vegetation in the drains from the covered activities would not likely affect white-faced ibis.

White-faced ibis are known to forage in the drains (Hurlbert et al. 1997) and some individuals could be exposed to increased selenium levels. Based on the assumption that white-faced ibis forage throughout the entire drainage system, the acreage of managed marsh required to offset the maximum potential reproductive impairment attributable to exposure to selenium in the drains was calculated following the procedure in Section 3.5.2.1. This analysis showed that 160 acres of managed marsh habitat would be necessary to offset potential selenium effects under the circumstance that white-faced ibis foraged exclusively in the drains and used the entire drainage system. However, white-faced ibis appear to predominantly forage in agricultural fields. Thus, with prey from the drains comprising only a portion of the diet, the potential for ibis to experience reduced reproductive output because of increased selenium concentrations in the drains is limited.

Some nesting sites could be lost if a reduction in the elevation of the Salton Sea, exposes snags currently used by white-faced ibis. However, tamarisk stands over water would continue to be available along the New and Alamo River deltas although the deltas are disturbed every few years for channel dredging. These river maintenance activities could result in disturbance or removal of active nests and thereby result in take of a white-faced ibis. To avoid this potential for take, under the Drain Habitat Conservation Strategy dredging would not occur between February 15 and August 31, except as necessary to prevent flooding during storm events.

Under the HCP, IID would create at least 190 acres and up to 652 acres of marsh habitat. This acreage would more than compensate for the maximum acreage necessary to offset selenium effects (i.e., 160 acres). White-faced ibis would be expected to benefit from the creation of marsh habitat under the HCP. The new habitat would be created in large blocks, creating extensive, undisturbed marsh habitat preferred by white-faced ibis. Riparian trees and shrubs could be integrated with the created marsh habitat as mitigation for tamarisk scrub habitat. These features, as well as the cattail and bulrush vegetation supported in the marsh, would provide preferred nesting and roosting habitats for white-faced ibis. Considering the poor quality of habitat in the drains, and expected persistence of currently used habitat in the HCP area, the habitat created under the HCP would increase the overall amount and quality of habitat in the HCP area for this species. Implementation of the Drain Habitat Conservation Strategy would not jeopardize the continued existence of white-faced ibis.

3.5.6.6 Least Bittern

Least bitterns typically are associated with extensive cattail and bulrush marshes. In the HCP area, least bitterns nest in marsh habitats adjacent to the Salton Sea, principally on the state and federal refuges. The extent to which least bitterns use vegetation in the drains is uncertain. Least bitterns probably forage in the drains, but are not likely to nest in drain vegetation. Least bitterns typically nest in large marsh areas and the drains provide only scattered patches of emergent vegetation.

Least bitterns could be directly or indirectly taken as a result of several covered activities. Drain maintenance activities could flush bitterns from drain vegetation which could constitute take as harassment or cause death or injury to individuals if as a result of being flushed from the cover of drain vegetation they are subject to predation. In the event that bitterns breed in drain vegetation in the HCP area or start breeding in the HCP area over the 75-year permit term, drain maintenance activities could result in the direct destruction of nests.

On an annual basis, IID conducts drain maintenance activities on about 20 percent of the drainage system, affecting about 130 acres of vegetation. However, only a small amount of this vegetation likely would be suitable for least bitterns. The IID drainage system is estimated to contain about 63 acres of cattails with which bittern are typically associated. If 20 percent of the estimated 63 acres of cattails are subject to drain maintenance each year, least bittern could be exposed to drain maintenance activities in about 12.6 acres. Because of the limited occurrence and distribution of least bitterns in the HCP area, particularly in the drains, the potential for take of least bitterns by drain maintenance activities and the number of bitterns potentially affected is low.

Drain maintenance activities and several other covered activities also have the potential to result in take of least bitterns through temporary or permanent reductions in the amount of habitat. As described in Section 3.5.2.2, various maintenance and water conservation activities have the potential to temporarily and permanently impact drain vegetation. Drain maintenance results in the temporary loss of an estimated 12.6 acres of cattail vegetation, some of which could be used by least bitterns. In total, an estimated 25.1 acres of drain vegetation, of which only a few acres (estimated 2.5 acres) could be cattails, would be permanently impacted. These temporary and permanent reductions in cattails in the drains could result in a minor reduction in potential habitat for least bittern. Over the term of the permit, a few individuals could be adversely affected (e.g., killed, injured, or harmed) as a result of this reduction, but because of the low level of use of cattails by least bitterns, and the low level of use of drains in the HCP area by least bitterns, no adverse population-level effects would be expected.

Least bitterns probably forage in the drains to some degree, and individuals could be exposed to increased selenium levels. Assuming that all of the vegetation in the drains provides potential foraging habitat for least bitterns, as was assumed for Yuma clapper rails, up to 42 acres of managed marsh habitat could be needed to offset the maximum projected decline in reproductive rate resulting from selenium concentrations in the drains at the maximum level of water conservation and transfer (see Section 3.5.2.1).

Implementation of the Drain Habitat Conservation Strategy would be expected to increase the amount and quality of habitat for least bittern in the HCP area. Under the HCP, IID would create at least 190 acres and up to 652 acres of marsh habitat. The HCP IT will consider the specific habitat needs of least bitterns in developing site-specific creation and management plans for the managed marsh. The new habitat could be created in large blocks, creating the extensive, undisturbed marsh habitat preferred by least bitterns. Riparian trees and shrubs probably would be integrated with the managed marsh habitat as mitigation for tamarisk scrub habitat. These features as well as the cattail and bulrush vegetation supported in the marsh would provide preferred nesting and roosting habitats for least bitterns. Considering the poor quality of habitat in the drains, and expected persistence of currently used habitat in the HCP area, the habitat created under the HCP would increase the overall amount and quality of habitat in the HCP area for this species. Given the current low level of use of the HCP area by least bittern, the high-quality habitat created under the HCP could contribute to increasing the population and distribution of this species.

The created marsh habitat would be concentrated in one or more large blocks of marsh vegetation interspersed with open water areas. This habitat would be expected to be used by least bitterns to a greater degree and would likely support nesting by these birds. Rosenberg et al. (1991) estimated the breeding density of least bitterns in marshes of the LCR as 0.4 bird/acre. At this density, the 190 acres of created marsh habitat could support 76 least bitterns while 652 acres could support 260 bitterns. The least bittern population at the Salton Sea has been estimated at 550 birds. Thus, the managed marsh habitat created under the HCP could increase the population by 14 percent and possibly up to 47 percent if 652 acres of habitat is created. However, because the needs of all of the covered species associated with drain habitat will be considered in designing the managed marsh, the level of use by least bitterns probably would not reach this maximum level. Nonetheless, with implementation of the minimization and avoidance measures, and creation of high quality managed marsh habitat, the Drain Habitat Conservation Strategy would minimize and mitigate the impact of any take of this species resulting from the covered activities. Implementation of the HCP would not jeopardize the continued existence of California least bittern.

3.5.6.7 Fulvous Whistling-Duck

The Salton Sea area has supported up to about 200 whistling-ducks during the spring and summer, with a much smaller breeding population. In recent decades, the fulvous whistling-duck has declined in the southwestern United States, while increasing in numbers in the Southeast. Primary factors contributing to the decline of fulvous whistling-ducks in California are draining and development of marsh habitats and hunting.

Fulvous whistling-ducks nest in areas of dense cattails near the south end of the Salton Sea and forage on wetland plants and submerged aquatic vegetation in freshwater habitats that occur on the state and federal refuges and private duck clubs. Drains could provide some foraging and nesting habitat for fulvous whistling-ducks, although the quality of nesting habitat probably is limited

Fulvous whistling-ducks could be directly or indirectly taken as a result of several covered activities. Drain maintenance activities could flush ducks from drain vegetation which could constitute take as harassment or cause death or injury to individuals if as a result of being flushed from the cover of drain vegetation they are subject to predation. In the event that fulvous whistling-ducks breed in drain vegetation in the HCP area or start breeding in the HCP area over the 75-year permit term, drain maintenance activities could result in the direct destruction of nests.

On an annual basis, IID conducts drain maintenance activities on about 20 percent of the drainage system, affecting about 130 acres of vegetation. However, only a small amount of this vegetation might be suitable for fulvous whistling-ducks. The IID drainage system is estimated to contain about 63 acres of cattails, preferred nesting habitat for fulvous whistling-ducks. If 20 percent of the estimated 63 acres of cattails are subject to drain maintenance each year, the ducks could be exposed to drain maintenance activities in about 12.6 acres. Because of the limited occurrence and distribution of fulvous whistling-ducks in the HCP area, particularly in the drains, the potential for take by drain maintenance activities and the number of ducks potentially affected are low.

Drain maintenance activities and several other covered activities also have the potential to result in take of fulvous whistling-ducks through temporary or permanent reductions in the amount of habitat. As described in Section 3.5.2.2, various maintenance and water conservation activities have the potential to temporarily and permanently impact drain vegetation. Drain maintenance results in the temporary loss of an estimated 12.6 acres of cattail vegetation, some of which could be used by fulvous whistling-ducks. In total, an estimated 25.1 acres of drain vegetation of which only a few acres (estimated 2.5 acres) could be cattails would be permanently impacted. These temporary and permanent reductions in cattails in the drains could result in a minor reduction in potential habitat for fulvous whistling-ducks. Over the term of the permit, a few individuals could be adversely affected (e.g., killed, injured, or harmed) as a result of this reduction, but because of the low level of use of the drains by fulvous whistling-ducks and continued availability of habitat on the state and federal refuges where this species currently predominantly occurs, no adverse population-level effects would be expected.

Implementation of the Drain Habitat Conservation Strategy would be expected to increase the amount and quality of habitat for fulvous whistling-duck in the HCP area. Under the Drain Habitat Conservation Strategy, IID will create at least 190 acres of managed marsh habitat and up to 652 acres. The HCP IT will consider the specific habitat needs of fulvous whistling-duck in developing site-specific creation and management plans for the managed marsh. The managed marsh habitat will be of better quality for fulvous whistling-ducks than the habitat affected in the drains because it would:

- Consist of one or more large blocks
- Contain preferred vegetation
- Have better water quality

Given the current low level of use of the HCP area by fulvous whistling-ducks, the high-quality habitat created under the HCP could contribute to increasing the population and distribution of this species.

In addition to creating managed marsh habitat to compensate for potential habitat effects, prior to conducting scheduled construction activities in the drains, IID will survey the construction area. If covered species (including fulvous whistling-ducks) are found to be breeding in the construction area, IID will schedule the construction activity to occur after the breeding season. These measures will avoid and minimize the potential for destruction of nests and disturbance that could interfere with breeding behavior. With implementation of the minimization and avoidance measures, and creation of high-quality managed marsh habitat, the Drain Habitat Conservation Strategy would minimize and mitigate the impact of any take of this species resulting from the covered activities. Implementation of the HCP would not jeopardize the continued existence of fulvous whistling-ducks.

3.5.6.8 Golden Eagles

Golden eagles occur at the Salton Sea only as accidentals during the winter and spring. Much of the HCP area could be used by golden eagles for foraging; however, golden eagles are most likely to concentrate foraging activities in areas of high prey concentrations. In the HCP area, the Salton Sea and managed marsh at the state and federal wildlife refuges, as well as private duck clubs, attract abundant waterfowl populations during winter. Agricultural fields also attract waterfowl and golden eagles may forage in desert habitat as well. With the abundance of waterfowl at the Salton Sea and adjacent refuges, the potential for and level of take of golden eagles as a result of changes in drain habitat would be minimal. However, over the term of the permit, a few golden eagles could be taken as a result of changes in foraging opportunities associated with agricultural fields. Take of golden eagles could result from reductions in agricultural fields; this potential effect is evaluated in Section 3.8.6.18.

Implementation of the Drain Habitat Conservation Strategy would benefit this species and offset impacts that could result from changes in agricultural field habitat. Under the Drain Habitat Conservation Strategy, at least 190 acres and up to 652 acres of marsh habitat would be created. The Imperial Valley and Salton Sea areas are heavily used by wintering and migrating waterfowl. While waterfowl are not target species of the HCP, the created marsh habitat would attract migrating and wintering waterfowl and provide additional foraging opportunities for golden eagles. Therefore, implementation of the HCP would not jeopardize the continued existence of golden eagles.

3.5.6.9 Short-Eared Owl

Short-eared owls are rare winter visitors to the Salton Sea area, but are more common in the fall. The USFWS (1997) characterizes them as occasional visitors with normally fewer than five individuals at the Salton Sea National Wildlife Refuge (NWR). Short-eared owls forage for small mammals in open habitats such as agricultural fields and marshes.

As described in more detail in Section 3.8.6.5, over the term of the permit, a few individual short-eared owls could be taken as a result of reduced foraging opportunities in agricultural fields of the Imperial Valley. Short-eared owls are not known to use the drains and the drains do not provide essential foraging habitat. Thus, no adverse effects to short-eared owls would be expected from covered activities occurring in the drainage system.

Short-eared owls could benefit from the Drain Habitat Conservation Strategy. Under the Drain Habitat Conservation Strategy, at least 190 acres and up to 652 acres of marsh habitat would be created. This managed marsh habitat would provide additional foraging opportunities for short-eared owls, overall benefiting the species. If foraging opportunities were reduced to any extent because of changes in agricultural fields, the managed marsh habitat would provide alternate foraging habitat and thereby, mitigate potential impacts. Implementation of the HCP would not jeopardize the continued existence of short-eared owls.

3.5.6.10 Northern Harrier

Northern harriers are common fall and winter residents in the HCP area, but occur only occasionally during the spring and summer. They are not currently known to breed in the HCP area but could in the future. Northern harriers forage for small mammals typically in agricultural fields and marshes. They have been reported in surveys of agricultural drains in the Imperial Valley (Hurlbert et al. 1997).

Northern harriers could be directly or indirectly taken as a result of several covered activities associated with the drainage system. Drain maintenance activities could flush harriers from drain vegetation which could constitute take as harassment. Death or injury as a result of being flushed is unlikely. If northern harriers breed in drain vegetation in the HCP area over the 75-year permit term, drain maintenance activities could result in the direct destruction of nests. On an annual basis, IID conducts drain maintenance activities on about 20 percent of the drainage system, affecting about 130 acres of vegetation. However, only a small amount of this vegetation might be suitable for harriers such that the potential for take and level of take from drain maintenance activities is low.

Drain maintenance activities and several other covered activities also have the potential to result in take of northern harrier through temporary or permanent reductions in the amount of habitat. As described in Section 3.5.2.2, various maintenance and water conservation activities have the potential to temporarily and permanently impact drain vegetation. Drain maintenance results in the temporary disturbance of an estimated 130 acres of vegetation each year, some of which could be used by northern harriers. In total, an estimated 25.1 acres of drain vegetation could be permanently impacted. These temporary and permanent reductions in vegetation in the drains could reduce foraging and nesting opportunities for northern harriers. Over the term of the permit, a few individuals could be adversely affected (e.g., killed, injured, or harmed) as a result of this habitat reduction.

Implementation of the Drain Habitat Conservation Strategy is expected to increase the amount and quality of habitat for northern harrier in the HCP area. Under the Drain Habitat Conservation Strategy, IID will create at least 190 acres of managed marsh habitat and up to 652 acres. The managed marsh habitat will be of better quality for northern harrier than the habitat affected in the drains. The high-quality habitat created under the HCP could contribute to increasing the population and distribution of this species.

In addition to creating managed marsh habitat to compensate for potential habitat effects, prior to conducting scheduled construction activities in the drains, IID will survey the construction area. If covered species (including northern harriers) are found to be breeding in the construction area, IID would schedule the construction activity to occur after the breeding season. These measures will avoid and minimize the potential for destruction of nests and disturbance that could interfere with breeding behavior. With implementation of the minimization and avoidance measures, and creation of high quality managed marsh habitat, the Drain Habitat Conservation Strategy would minimize and mitigate the impact of any take of this species resulting from the covered activities. Implementation of the HCP would not jeopardize the continued existence of northern harriers.

3.5.6.11 Tricolored Blackbird

Tricolored blackbirds are rare in the HCP area. They occur during spring and winter (USFWS 1997b; Garrett and Dunn 1981). They are not known to breed in the HCP area although they could in the future. Tricolored blackbirds are associated with marsh habitat, principally cattail vegetation. One individual was reported during surveys of drains in the Imperial Valley (Hurlbert et al. 1997).

Tricolored blackbirds could be directly or indirectly taken as a result of several covered activities. Drain maintenance activities could flush birds from drain vegetation which could constitute take as harassment or cause death or injury to individuals if as a result of being flushed from the cover of drain vegetation they are subject to predation. In the event that tricolored blackbirds breed in drain vegetation in the HCP area over the 75-year permit term, drain maintenance activities could result in the direct destruction of nests.

On an annual basis, IID conducts drain maintenance activities on about 20 percent of the drainage system, affecting about 130 acres of vegetation. However, only a small amount of this vegetation might be suitable for tricolored blackbird. The IID drainage system is estimated to contain about 63 acres of cattails, preferred nesting habitat for tricolored blackbirds. If 20 percent of the estimated 63 acres of cattails are subject to drain maintenance each year, the blackbirds could be exposed to drain maintenance activities in about 12.6 acres. Because of the rare occurrence of tricolored blackbirds in the HCP area, particularly in the drains, the potential for take by drain maintenance activities and the number of birds potentially affected is low.

Drain maintenance activities and several other covered activities also have the potential to result in take of tricolored blackbirds through temporary or permanent reductions in the amount of habitat. As described in Section 3.5.2.2, various maintenance and water conservation activities have the potential to temporarily and permanently impact drain vegetation. Drain maintenance results in the temporary loss of an estimated 12.6 acres of cattail vegetation, some of which could be used by tricolored blackbirds. In total, an estimated 25.1 acres of drain vegetation, of which only a few acres (estimated 2.5 acres) could be cattails, would be permanently impacted. These temporary and permanent reductions in cattails in the drains could result in a minor reduction in potential habitat for tricolored blackbirds. Over the term of the permit, a few individuals could be adversely affected (e.g., killed, injured, or harmed) as a result of this reduction, but because of the low level of use of the HCP area by tricolored blackbirds, no adverse population-level effects would be expected.

Implementation of the Drain Habitat Conservation Strategy would be expected to increase the amount and quality of habitat for tricolored blackbirds in the HCP area. Under the Drain Habitat Conservation Strategy, IID will create at least 190 acres of managed marsh habitat and up to 652 acres. The managed marsh habitat will be of better quality for tricolored blackbirds than the habitat affected in the drains because it would provide large blocks that could support a nesting colony and would consist of preferred vegetation (i.e., cattails and tules). The high-quality habitat created under the HCP could encourage establishment of a nesting colony of tricolored blackbirds.

In addition to creating managed marsh habitat to compensate for potential habitat effects, prior to conducting scheduled construction activities in the drains, IID will survey the construction area. If covered species (including tricolored birds) are found to be breeding in the construction area, IID would schedule the construction activity to occur after the breeding season. These measures will avoid and minimize the potential for destruction of nests and disturbance that could interfere with breeding behavior. With implementation of the minimization and avoidance measures, and creation of high quality managed marsh habitat, the Drain Habitat Conservation Strategy would minimize and mitigate the impact of any take of this species resulting from the covered activities. Implementation of the HCP would not jeopardize the continued existence of tricolored blackbirds.

3.6 Desert Habitat Conservation Strategy

3.6.1 Amount and Quality of Habitat in the HCP Area

Desert habitat in the HCP area occurs in the rights-of-way of the AAC, East Highline and portions of the Westside Main, Thistle, and Trifolium Extension canals (see Figure 2.3-9). Table 3.6-1 shows the miles of each canal adjacent to desert habitat. IID's right-of-way along the AAC varies from about 750 to 2,000 feet wide. IID's rights-of-way on the East Highline, Westside Main, Thistle, and Trifolium Extension canals are highly variable ranging from about 80 feet to 300 feet. The canal, canal embankments, and maintenance roads take up much of the rights-of-way of these canals, such that the amount of desert habitat actually within IID's rights-of-way is limited.

TABLE 3.6-1
Miles of Canals Adjacent to Desert Habitat

Canal	Miles
All American	60
Westside Main	6
East Highline	40
Thistle	5
Trifolium Extension	10
Total	**121**

The desert habitat consists predominantly of creosote bush scrub; dune habitat occurs along the AAC where it traverses the Algodones Dunes. Some of the covered species (e.g., Algodones Dunes sunflower) could only occur in the HCP area where the AAC passes through the dunes, but most of the covered species are associated with creosote bush habitat. Habitat quality varies along the AAC and the other canals. However, O&M activities have been ongoing within the rights-of-way since the canals were constructed. As a result, much of the area within IID's right-of-way is disturbed. In addition, offroad vehicle use is common in the vicinity of the AAC and has contributed to habitat degradation.

3.6.2 Effects of the Covered Activities

Many of the covered activities have no potential to take or adversely affect covered species associated with desert habitat. These covered activities and an explanation of why species associated with desert habitat would not be impacted are listed in Table 3.6-2. The remaining covered activities have a limited potential to take a covered species as discussed below.

Covered activities with some potential to affect covered species associated with desert habitat are:

- Conveyance system operation
- Inspection activities
- Canal maintenance
- Right-of-way maintenance
- Sediment removal
- Structure maintenance
- Vegetation control
- Hydroelectric power plant maintenance

The potential for these activities to impact covered species associated with desert habitat is low and generally is limited to direct injury or mortality from being struck by motor vehicles and disturbance of covered species inhabiting desert habitat adjacent to the rights-of-way. Potential effects of these activities on covered species associated with desert habitat are described below. Burrowing owls also can inhabit desert areas and be impacted by these activities but they are addressed individually as described in Section 3.7.1.

TABLE 3.6-2
Covered Activities That Would Not Affect Covered Species Associated With Desert Habitat

Activity	Reason for No Effect
On-farm water use and conservation	On-farm water use and conservation activities would be only conducted on lands used for agricultural production. No on-farm conservation measures would be implemented on desert habitat.
System-based water conservation	System-based water conservation measures include canal lining, installation of lateral interceptors, installation of reservoirs, and seepage recovery systems. No canal lining is proposed as part of the water conservation and transfer programs for the AAC, East Highline, Westside Main, Thistle, or Trifolium extension canals. Canal sections proposed for lining are in agricultural areas of the Imperial Valley removed from desert habitat (Figure 1.7-3). Proposed locations for lateral interceptors are within agricultural areas, removed from areas supporting desert habitat (Figure 1.7-4). Reservoirs would be constructed in agricultural areas, removed from areas supporting desert habitat. Seepage recovery systems are proposed along the East Highline Canal. However, all construction required to install these systems would be conducted on the west side of the canal, and desert habitat is limited to the east side of the canal.
Drainage system operation	Drainage system operation is limited to moving water through the drains. No physical effects are encompassed by drainage system operation.
Seepage maintenance	Any actions to correct seepage problems that would occur along the AAC (excluding canal lining), East Highline, Westside Main, Thistle, or Trifolium Extension canals would be conducted on the agricultural side of the canal and therefore, would not affect covered species associated with desert habitat.
Pipeline maintenance	Because no pipelines occur on the desert side of canals, pipeline maintenance would not affect covered species associated with desert habitat.
Maintenance of New and Alamo rivers	The AAC, East Highline, Westside Main, Thistle, and Trifolium Extension canals and their rights-of-way do not intersect the New or Alamo rivers in areas supporting desert habitat.
Salton Sea dike maintenance	The AAC, East Highline, Westside Main, Thistle, and Trifolium Extension canals and their rights-of-way do not intersect the dikes at the Salton Sea.
Gravel and rock quarrying	No gravel or rock quarries occur in the rights-of-way of the AAC, East Highline, Westside Main, Thistle, or Trifolium Extension canals.
Fish hatchery operation and maintenance	The fish hatchery is not located in the rights-of-way of the AAC, East Highline, Westside Main, Thistle, or Trifolium Extension canals.
Recreational facilities	Although IID permits fishing in the AAC, East Highline, and Westside Main canals, IID has not developed nor anticipates developing recreational facilities along any of these facilities. The HCP does not address take of covered species by recreationists.

Conveyance system operation consists of moving water through the canals to meet customer and maintenance needs. These activities consists of filling, draining and moving water through the canals and therefore does not entail activities that could impact desert habitat. Potential effects to covered species from conveyance system operation are limited to the potential for individuals to be struck by vehicles as workers travel along the conveyance system. To ensure proper water deliveries, workers travel portions of the canal system on a daily and repetitive basis. Along all of the canals, vehicular travel is on the established road adjacent to the canal, and along the East Highline, Westside Main, Thistle, and Trifolium Extension, most travel is on the agricultural side of the canals. As a result, the potential for a covered species to be struck by a vehicle while conducting conveyance system operations is low.

Inspection activities consist of workers visiting structures to ensure they are working properly and make minor repairs or adjustments. Potential effects of this activity on covered species is limited to individuals being struck by a vehicle as the worker travels to structures. Inspections activities are conducted about once a month. As explained for conveyance system operations, vehicle travel occurs on established roads. Further, along the East Highline, Westside Main, Thistle, and Trifolium Extension canals, most travel is on the agricultural side of the canals where the delivery and drainage structures are located. Thus, the potential for a covered species to be struck by a vehicle while conducting inspection activities is low.

Canal maintenance consists of maintaining the seepage recovery systems adjacent to the AAC, managing the abandoned section of the AAC as an emergency channel, and maintaining the canal lining of the future AAC parallel canal. IID operates three seepage recovery systems along the AAC (one at Drop 3 and two at Drop 4). These systems are open seepage recovery systems. About once every 5 years, IID removes vegetation from these systems. Because vegetation consists of plant species typical of drain habitat and not desert plants, desert habitat would not be affected. Potential impacts consist of a minor potential for disturbance if covered species occur in adjacent areas. Because excavators move very slowly when removing vegetation (stop-and-go cycle), active individuals of the covered species likely would be able to avoid being struck by the excavator. However, some of the covered species (e.g., flat-tailed horned lizards, Colorado Desert fringe-toed lizards) could be vulnerable during inactive periods or because they become motionless when threatened (e.g., flat-tailed horned lizards). While tracking to the job site, excavators move at a very low speed (<5 mph).

After completion of the AAC Lining Project, IID anticipates managing abandoned canal section as an emergency channel. Management is expected to consist of mechanical and chemical vegetation control. These actions would be conducted at least annually. Vegetation control of the abandoned section would not result in a loss of habitat because desert habitat does not currently exist as the canal is still in use. Vegetation control and sediment removal would maintain the canal free of vegetation discouraging colonization by covered species. Even if some covered species ventured into the abandoned section, the potential for take of a covered species is minor because sediment removal and vegetation control activities would be conducted infrequently (about once a year) and the equipment used to conduct these activities is very slow moving.

The future parallel canal along the AAC will be a concrete-lined channel whereas the existing canal is earthen. Future canal maintenance activities will include repairing and replacing concrete lining. These activities are conducted in and immediately adjacent to the canal and are entirely within disturbed areas of IID’s right-of-way. No effects to habitat would occur and potential effects to covered species would be limited to a minor potential for disturbance if covered species occurred in areas adjacent to the construction work.

Right-of-way maintenance along canals adjacent to desert habitat is focused on the roads along the canals and the canal embankments. Roadways are regularly graded and watered. One grader and water truck is assigned full time to the AAC. Grading is continual along the portion of the AAC within the Imperial Valley with all of the valley portion of the AAC covered in three months. With the exception of the portion of the AAC that traverses the Algodones Dunes, for the portions of the AAC outside of the Imperial Valley, the roadway is graded about once a year. Occasionally, IID must recreate a portion of the road because of blowing sand. Roadways of the East Highline, Westside Main, Thistle, and Trifolium are graded and watered several times a year.

Along the portion of the AAC that traverses the Algodones Dunes, IID annually knocks down portions of the sand dunes, creating a flatter slope that allows sand to blow across the canal. In conducting this flattening, a dozer drags an I-beam back and forth across the peaks of the dunes to level them. The area where this activity is conducted begins at the Coachella Turnout (Sta. 1907+20) and extends to about Sidewinder Road at Pilot Knob (Sta. 1243+65), a distance of 12.56 miles. The area actually disturbed is about 50 to 75 feet wide yielding a total acreage disturbed of 76 to 114 acres. This operation begins in July every year and lasts about 6 weeks. In conjunction with flattening the dunes, the roadways along the AAC are cleared of accumulated sand. After the roads are opened up, they are immediately treated with herbicides for vegetation control. IID has been conducting these activities since the construction of the AAC in about 1945.

Grading and watering roads does not remove any habitat for covered species such that potential effects to covered species are limited to being struck by moving vehicles. However, because the equipment (graders, water trucks, dozers) used to conduct right-of-way maintenance is slow moving, the potential for a covered species to be struck is low. Along the East Highline, Westside Main, Thistle, and Trifolium, the likelihood of this impact is less because the roads along these canals are on the agricultural field side. Reconstructing and clearing the road, and flattening the dunes along the Algodones Dunes portion of the AAC could result in the removal of a covered plant species, if any covered plants colonized the area.

Right-of-way maintenance also includes embankment maintenance. At times material from the canal embankment washes down the embankment. A dozer is used to reshape the outside of the canal embankments. The East Highline, Westside Main, Thistle, and Trifolium Extension canals do not have embankments such that the activity is limited to the AAC. Along the AAC, the need for embankment maintenance is very spotty and irregular. About once every 10 years, an area requires reshaping.

Reservoir maintenance is generally the same as canal maintenance. Vegetation is controlled around the reservoir, embankments are graded, groomed and stabilized about every 5 years. Occasionally, concrete lining is repaired or replaced. No reservoirs currently exist on the AAC. Two reservoirs on the East Highline Canal and one on the Westside Main Canal occur adjacent to desert habitat (see Figure 2.3-5). Maintenance activities are focused on the reservoir embankments and do not enter adjacent areas where desert habitat and associated species could occur.

Structure maintenance on canals consists of servicing, repairing and replacing structures required to deliver water to customers as well as controlling vegetation around the structures to maintain access. Table 3.6-3 summarizes the type and number of structures on the AAC, East Highline, Westside Main, Thistle, and Trifolium Extensions. Because only a portion of the

Westside Main, Thistle, and Trifolium Extension canals are adjacent to desert habitat, only a portion of the structures listed in Table 3.6-3 occur in areas where the canal is adjacent to desert.

TABLE 3.6-3
Structures on the AAC, East Highline, Westside Main, Thistle, and Trifolium Extension canals.

	Canals[a]				
Structure	**AAC**	**EHL**	**WSM**	**Thistle**	**TriExt**
Bridges	0	15	12	0	1
Check	7	25	49	60	29
Control structure	0	2	4	0	0
Crossing (road, rail, drain, delivery)	11	2	49	39	31
Drop structure	5	0	0	0	0
Flume	0	1	2	0	0
Gate	28	68	148	101	57
Heading	28	76	55	0	0
Hydropower facility	5	0	0	0	0
Overpass	1	0	0	0	0
Pump	4	14	4	2	2
Reservoir inlet	0	1	1	0	0
Siphon	1	0	5	0	6
Spill gate	3	0	4	5	6
Total	**93**	**204**	**333**	**207**	**132**

[a] AAC = All American Canal; EHL = East Highline Canal; WSM = Westside Main Canal; TriExt = Trifolium Extension

Routine activities associated with structure maintenance consist of making minor repairs and adjustments and maintaining the area around the structure free of vegetation. Vegetation is tightly controlled around structures such that habitat never develops for covered species. The routine maintenance activities are conducted in proximity to the structures and within the area maintained clear of vegetation such that covered species are very unlikely to occur in the area. Traveling to the structure to conduct maintenance activities has a minor potential to take a covered species, as explained for conveyance system operations and inspection activities.

Over the 75-year permit term, IID anticipates replacing all of the structures along the canals at least once. For major structures such as hydropower generation facilities, an area up to 20 acres in size can be disturbed by the construction. However, the area disturbed in replacing a facility would be the same as when the facility was originally installed and all construction would be within IID's right-of-way. Thus, removal of previously undisturbed desert vegetation is not anticipated. Replacement of large facilities could disturb covered species if they inhabit areas adjacent to the construction area or covered species could be injured if they entered the construction area.

Vegetation control along these canals consists of chaining within the prism of the canal. In chaining, a tractor traveling along the road adjacent to the canal drags a chain on the inside of the canal prism. Because the tractor remains on an established road and all work is conducted within the canal prism, there are no effects to desert vegetation. Potential effects to covered species associated with desert habitat are limited to being struck by the vehicle. However, the potential for this effect is low because the tractor moves very slowly such that individuals would be able to avoid the vehicle. The outer embankments of the AAC are maintained free of vegetation through regular grading as described under right-of-way maintenance. No vegetation control is conducted on the desert side of the East Highline, Westside Main, Thistle, or Trifolium Extension canals.

Hydroelectric power plant maintenance consists of controlling vegetation around the hydroelectric facility. Potential effects of this activity are the same as described for structure maintenance.

3.6.3 Approach and Biological Goals

In the HCP area, desert habitat only occurs in the right-of-way of the AAC, adjacent to the East Highline Canal and adjacent to sections of the Westside Main Canal, Thistle, and Trifolium Extension. The primary covered activities with the potential to affect species associated with desert habitat are the O&M activities associated with the canals and to a more limited degree the hydroelectric facilities on the AAC. As briefly summarized above, covered activities have the potential to affect covered species by directly killing or injuring an individual (primarily resulting from motor vehicles) or from disturbance. IID also could conduct construction activities to replace or rehabilitate facilities or install new facilities. Construction could kill, injure, or disturb individuals of covered species, or indirectly affect covered species through changes in habitat quality or quantity.

The approach to the Desert Habitat Conservation Strategy is to implement a program to minimize the potential for take of covered species during O&M activities. If construction activities are required within the rights-of-way during the term of the permit, additional measures would be implemented to minimize the potential for take and to compensate for any decrease in habitat quality or availability. The biological goal of the Desert Habitat Conservation Strategy is to avoid and minimize death or physical injury of individuals of the covered species, and to improve habitat contiguity and persistence to compensate for changes in habitat quality or quantity caused by construction activities.

3.6.4 Desert Habitat Mitigation and Management Measures

The mitigation and management measures described below are the specific actions that IID will undertake to fulfill the goals of the Desert Habitat Conservation Strategy. The key elements of the conservation strategy are as follows:

- Implement a worker education program
- Implement interim measures to avoid and minimize the potential for take of covered species during O&M and construction activities
- Refine avoidance and minimization measures based on species surveys and adaptive management program

- Conduct surveys to determine the occurrence of covered species in the right-of-way
- Protect habitat outside of the right-of-way when construction activities reduce the quality or availability of habitat

Desert Habitat–1. *IID will implement a worker education program. Workers conducting O&M activities along the AAC, East Highline, Westside Main, Thistle, or Trifolium Extension canals will be required to attend a worker education program to ensure proper implementation of the HCP measures addressing desert habitat. Workers will be instructed on the requirements of the HCP within six months of issuance of the incidental take permit. The worker education program will be conducted at least annually to ensure instruction of new employees and as a refresher. For new workers, IID will ensure that they are informed of and understand the requirements of the HCP prior to conducting O&M activities either individually or through the annual education program.*

The worker education program will instruct workers on the identification and habitat association of covered species using desert habitat. Pictures of the different habitat types will be included in the manual with a list of covered species potentially occurring in each habitat type. Activities with the potential to affect covered species inhabiting desert habitat and the practices to follow to minimize potential adverse effects to these species will be explained (see Desert Habitat–2). Workers will be instructed on procedures approved by the HCP IT for moving covered species in the event that a covered species is found during O&M activities and is in imminent danger from covered activities. Workers will be required to report any observations of dead or injured individuals of the covered species or when they relocate an individual (see Desert Habitat–2 and –3).

A worker education manual will be prepared by IID with the concurrence of USFWS and CDFG within 1 year of issuance of the incidental take permit. The manual will be distributed to each person conducting O&M activities along the AAC, East Highline, Westside Main, Thistle, or Trifolium canals. The manual will include a photograph/drawing of each covered species associated with desert habitat and brief information on its identification. As information of the occurrence and distribution of covered species along the AAC, East Highline, Westside Main, Thistle, and Trifolium Extension canals becomes available through the survey program (see Desert Habitat–4), it will be added to the manual. The manual will also summarize the HCP's requirements for O&M activities for easy reference. The HCP IT will review the manual annually for 3 consecutive years and every 5 years thereafter, and update it as appropriate.

The primary concern for covered species using desert habitat relates to O&M activities. The effectiveness of avoidance and minimization measures (Desert Habitat–2) will depend on workers being familiar with the covered species and understanding the requirements of the HCP with respect to these species. A worker education program is critical to ensuring that measures are implemented properly.

Desert Habitat–2. *IID will conduct O&M activities in accordance with the following measures.*

- *Workers will be instructed to be alert to the occurrence of covered species in roadways while driving and to avoid hitting individuals at all times.*
- *Prior to moving a parked vehicle, workers will check around and underneath the vehicle for covered species. If a covered species is found in harm's way and is moving, it will be allowed to move away from the vehicle on its own accord before the vehicle is moved. If the individual is not moving, the worker will relocate the individual to a nearby safe location following procedures outlined in the worker education program.*

- *Workers will be familiarized with covered plants species and instructed to avoid injuring or uprooting plants.*
- *Workers will properly dispose of garbage in closed containers to minimize raven attraction.*
- *Workers will not be permitted to bring pets to the work site.*
- *IID will restrict O&M activities to previously disturbed areas within the right-of-way along the existing AAC, the future parallel canal, East Highline and portions of the Westside Main, Thistle, and Trifolium Extension canals where the canals are adjacent to native desert habitat.*
- *O&M will include periodic removal of vegetation from the maintenance roads and canal embankments to prevent establishment of vegetation that could attract covered species.*

These practices are interim measures and may be modified over the term of the permit based on survey results and through the adaptive management and monitoring program (see Desert Habitat–4 and Chapter 4). The HCP IT will review these measures annually for 3 consecutive years (years 2, 3, and 4 after permit issuance) and at least every 5 years thereafter, and may adjust the measures as long as the adjustments do not increase the total cost of implementing the HCP.

For covered species of reptiles, a primary concern for O&M activities is the potential for motor vehicle traffic to strike individuals as they are crossing the road or basking on the road surface. Reptiles also will seek out the shade created by parked vehicles. Because of these behaviors, reptiles are vulnerable to being killed or injured from motor vehicles. Covered mammalian and amphibian species also are at risk of being struck by motor vehicles. Through the first two measures, the potential for covered species to be impacted by motor vehicles will be reduced.

For construction activities in areas inhabited by desert species such as desert tortoise, the USFWS typically requires that motor vehicles travel at 20 mph or less within the construction area and on roads accessing the construction site. Its effectiveness has not been demonstrated but this measure is believed to allow drivers to spot and avoid animals that are crossing or basking on the road. In conducting O&M activities, it is not practicable for IID to restrict vehicles to 20 mph or less along canals adjacent to desert habitat. The AAC is about 80 miles long and is adjacent to desert habitat for 60 miles. The East Highline Canal is about 40 miles long. Workers need to be able to travel the length of these canals to operate, inspect, maintain and repair structures along these canals as quickly as possible. Given the length of the canal AAC and East Highline, traveling the length of either canal and returning would take a full day if a 20 mph speed limit was enforced. This limit would significantly impair IID’s ability to maintain and operate its conveyance system and therefore is not practicable to include in the avoidance and minimization measures for O&M. In addition, along portions of the AAC, road conditions prevent traveling at high speeds, and in some locations road conditions are such that traveling at 20 mph or less is prudent. Also, there is currently a 40 mph speed limit imposed for safety along the AAC.

Garbage that is not properly disposed of can attract avian and mammalian predators (e.g., ravens and coyotes) and increase the local abundance of predators. These predators could prey on covered species and could become a substantial mortality agent for some species. For example, predation by ravens on eggs and young is a considerable concern for desert tortoise populations. By properly disposing of garbage, IID will avoid attracting predators and increasing predator populations that could result in detrimental levels of predation on covered species along and adjacent to the AAC, East Highline, and Westside Main canals.

Previously disturbed areas in the rights-of-way along the AAC, East Highline, Westside Main Canal, Thistle, and Trifolium Extension canals provide poor habitat quality for the covered species. Plants are not likely to become established in areas continuously disturbed. Covered plants would not be expected to occur in these routinely disturbed areas and covered animals would not be expected to occur because habitat would not develop. By restricting activities to disturbed areas, IID will further reduce the potential to directly injure a covered species. In addition, impacts to desert habitat would be avoided and no changes in habitat availability or quality for the covered species would occur.

Desert Habitat – 3. *IID will implement the following measures while conducting scheduled construction activities within its rights-of-way along the AAC, East Highline, and portions of the Westside Main, Thistle, and Trifolium Extension canals containing native desert habitat. Scheduled construction activities are structure maintenance activities (see Table 3.6-3) and canal lining, excluding the Proposed AAC Canal Lining Project (Reclamation and IID 1994).*

- *Where practicable, IID will limit construction activities, including vehicle travel, in the rights-of-way of the AAC and future parallel canal, the East Highline Canal, and the Westside Main Canal to previously disturbed areas.*
- *Staging areas will be situated on the agricultural side of the canal except where the canal is not bordered by agricultural areas.*
- *Prior to initiating construction activities, the HCP Implementation Biologist will conduct a habitat survey of the construction area and adjacent areas. Based on the habitat conditions and species survey information, the biologist will determine which covered species are likely to occur in or immediately adjacent to the construction area. IID will implement the species-specific minimization and avoidance measures contained in Appendix C for the species identified by the biologist.*
- *A biological monitor will be onsite during construction activities or exclusion fencing will be erected to keep covered species out of the construction area following clearance surveys, if conducted (see Appendices C and H).*
- *If a covered animal species occurs on the project site during construction, construction activities adjacent to the individual's location will be halted and the individual allowed to move away from the construction area on its own accord. If the individual is not moving, the biological monitor or other trained worker will relocate it to a nearby safe location outside of the construction area.*
- *The construction area will be clearly flagged prior to the start of construction activities and all construction activities will be confined to the demarcated area. To the extent practicable, the construction area will be situated and demarcated to avoid habitat for covered species.*
- *After completion of the construction activities, IID will restore any native vegetation temporarily impacted by the construction. If native desert vegetation would be temporarily impacted by construction, prior to the start of construction activities, IID will develop a vegetation restoration and management plan in conference with the HCP IT. The vegetation restoration and management plan will describe: (1) the amount and species composition of the vegetation that would be impacted, (2) the actions that IID will take to restore the disturbed area, (3) the criteria for assessing the success of the restoration, (4) the actions that will be undertaken if the success criteria are not achieved, and (5) long-term management actions. For native desert vegetation permanently lost, IID will mitigate in accordance with Desert Habitat–5.*

- *A speed limit of 20 miles/hour will be maintained on the construction site, staging areas, and storage areas.*
- *No pets will be permitted on the construction site.*
- *Prior to moving a parked vehicle, the ground around and under the vehicle will be inspected for covered species. If an individual of a covered species is found and is moving, it will be allowed to move away from the vehicle on its own accord. If it is not moving, it may be removed and relocated to a nearby safe location following the procedures outlined in the worker education program.*

For a particular construction project, IID may implement alternative measures or modify the standard or species-specific avoidance and minimization practices if agreed to by the USFWS and CDFG. In addition, the standard and species-specific avoidance and minimization practices may be modified over the term of the permit based on survey results and through the adaptive management and monitoring program (see Desert Habitat–4, Desert Habitat–5, and Chapter 4). The HCP IT will review these measures annually for three consecutive years (years 2, 3, and 4 following permit issuance) and at least every five years thereafter, and may adjust the measures as long as the adjustments do not increase the cost of implementation.

IID may undertake various construction activities along the AAC, East Highline Canal, and portions of the Westside Main, Thistle, and Trifolium Extension canals adjacent to native desert habitat during the term of permit. The specific location of this construction is not currently known and the specific effects on species associated with desert habitat cannot be determined. With this measure, IID commits to determine the effects of a construction project on habitat for covered species and to take actions to avoid and/or mitigate potential effects to covered species as a result of construction activities.

Covered species could be injured or disturbed by construction activities. The actions that IID will implement under Desert Habitat–3 are typical practices required by CDFG and USFWS to avoid and minimize impacts to listed species during construction projects. The measures are designed to minimize the potential for death or injury of covered species during construction and to compensate for any reduction in the quality or quantity of habitat for covered species.

Desert Habitat–4. *Within one year of the issuance of the incidental take permit, IID will initiate a baseline survey of its rights-of-way on the AAC, the East Highline Canal, and the portions of the Westside Main, Thistle, and Trifolium Extension canals adjacent to desert habitat to determine the occurrence and location of covered species. The baseline surveys will be conducted for three consecutive years. The worker education manual (see Desert Habitat–1) will be revised to include a habitat map and map(s) of known locations of each of the covered species within the rights-of-way of these canals. The surveys will be repeated at least every five years and the worker education manual updated as necessary to accurately portray the occurrence and distribution of covered species within IID's right-of-way. The interval for repeating the surveys and updating the manual may be lengthened if agreed to by IID, USFWS, and CDFG. The HCP IT will develop the specific survey protocols.*

Most of the covered activities that will occur in the rights-of-way of the AAC, East Highline, Westside Main, Thistle, and Trifolium Extension canals are O&M activities. These O&M activities are focused on maintaining access roads to the canal and associated facilities clear of vegetation and accessible by equipment, and maintaining the structural integrity and capacity of canals. O&M activities generally do not involve disturbance of native desert habitat and are concentrated in previously disturbed areas. Because most of the covered activities occurring in the right-of-way would not affect habitat quality or quantity, the primary concern for covered species is the potential for covered species to be injured by equipment operation.

By knowing where covered species occur along the canals adjacent to native desert habitat, IID can better educate its workforce to avoid and minimize the potential to injure a covered animal species during O&M activities. Further, IID will be able to design and schedule construction activities to avoid and minimize impacts to covered animal species.

The greatest threat to covered plant species is the potential for the plants to be injured or uprooted by equipment. By surveying the rights-of-way and educating the workforce on procedures to follow in areas supporting covered plants, the potential for covered plants to be impacted will be minimized or avoided. Information on the location of covered plant species will also be used to design and carry out construction activities in a manner that avoids or minimizes direct impacts to covered plant species. By repeating the surveys over the term of the permit and educating workers to recognize covered plant species, plants that colonize new locations will be similarly protected.

The baseline surveys described in Chapter 4 will fulfill the obligation to survey for covered species within three years. The same survey protocol and methods will be followed in conducting the subsequent recurring surveys.

Desert Habitat–5. *If desert habitat used by covered species would be permanently lost as a result of O&M or construction activities, IID will determine the amount of habitat lost and acquire, or grant a conservation easement on land at a 1:1 ratio for the acreage impacted within 1 year of the removal of the habitat. IID will not permanently remove more than 100 acres of native desert habitat and/or tamarisk scrub habitat over the term of the permit. Tamarisk scrub habitat would be mitigated in accordance with Tree Habitat–1.*

- *Land to be acquired or subject to the conservation easement will have (1) known use by covered species that use the impacted areas or (2) be situated adjacent to areas of occupied habitat and support suitable habitat for the covered species that use the impacted habitat, and (3) is deemed to have long term viability as habitat for covered species based on its patch size, connectivity or location to other conserved habitat. IID will work with the HCP IT to identify a property to acquire or cover with a conservation easement. IID will place a conservation easement on this acquired land or otherwise provide for the protection of the property in perpetuity. With the approval of USFWS and CDFG, which approval shall not be unreasonably withheld, IID may transfer the land to a third party who agrees to and is authorized to manage the land for habitat conservation purposes. If IID transfers the land to a third party, IID will establish an endowment fund adequate to provide for the management of the land in perpetuity.*
- *Within 1 year of recording a conservation easement, IID will prepare and submit to the USFWS and CDFG for approval a management plan for acquired land and lands it owns that are subject to a conservation easement that describes how the property will be managed to maintain its suitability for the covered species. The management plan will describe the actions that IID will take to maintain the ecological functions of the acquired habitat. While the specific management needs will vary depending on the property acquired, considerations for the management plan include:*

- *Measures to control human access (e.g., fencing, signage)*
- *Frequency at which land will be visited to assess maintenance/management needs*
- *Types of maintenance action (e.g., removing garbage, repairing fences)*
- *Vegetation management practices (e.g., prescribed burning, removal of exotic plants)*

IID will provide for the management of the property in perpetuity.

If habitat used by covered species will be permanently lost, IID will acquire and preserve other desert habitat and ensure that it is managed for desert habitat values in perpetuity. This measure is derived from the Biological Opinion for the AAC Lining Project in which desert habitat is to be acquired and transferred to Bureau of Land Management if habitat for the flat-tailed horned lizard is affected (USFWS 1996). The Biological Opinion specified a 1:1 ratio because desert habitat quality along the AAC is low. Only minor amounts of desert habitat, if any, occurs in the rights-of-way of the East Highline and Westside Main canals and what habitat does occur is disturbed, providing only low quality habitat. IID would employ a similar measure to mitigate impacts to covered species associated with desert habitat potentially resulting from construction projects in the rights-of-way of the AAC, East Highline Canal or portions of the Westside Main Canal adjacent to desert habitat.

3.6.5 Effects on Habitat

Desert habitat only occurs in the HCP area adjacent to the AAC, along the eastern edge of the East Highline Canal and along the western edge of portions of the Westside Main, Thistle, and Trifolium Extension canals. The covered activities that would occur in the rights-of-way of these canals primarily consist of O&M activities. Under the Desert Habitat Conservation Strategy, IID would limit these activities to previously disturbed areas. Thus, the amount and quality of desert habitat in the HCP area would not be expected to change. The Desert Habitat Conservation Strategy also includes provisions to preserve desert habitat off site in the event that covered activities do result in the loss or degradation of desert habitat. Offsite compensation areas would be identified in coordination with the USFWS and CDFG, ensuring that any acquired areas would benefit the covered species.

3.6.6 Effects on Covered Species

Most of the covered activities occurring in the rights-of-way of canals adjacent to desert habitat would not affect habitat quality or quantity, and the primary concern is the potential for covered species to be injured by equipment used for O&M activities. As a result, the Desert Habitat Conservation Strategy focuses on minimizing the potential for covered species to be injured by activities along canals adjacent to desert habitat. However, the strategy includes provisions to protect habitat if IID’s activities remove native desert vegetation. Because little or no change in the quality or availability of habitat, and few incidences of take of covered species are expected as a result of the covered activities, no adverse effects to covered species associated with desert habitat would be expected. Rather, by minimizing the potential for take of covered species and ensuring that any habitat lost or degraded by the covered activities is mitigated, implementation of the Desert Habitat Conservation Strategy would offset the impacts to the covered species associated with desert habitat. The effects of implementing the Desert Habitat Conservation Strategy on each of the covered species associated with desert habitat is provided below.

As part of the Monitoring and Adaptive Management Program (Chapter 4), IID could implement a survey or study program requiring capture of covered species. Capture of covered species constitutes take under both the federal and state ESAs. Take that occurs in association with surveys or studies conducted for this HCP is a covered activity and will be authorized under the state and federal ITPs. Any of the covered species could be taken through surveys or studies.

Studies and surveys conducted during the course of this HCP will be developed by IID in coordination with the HCP IT and will be subject to the approval of CDFG and USFWS prior to implementation. In approving the studies/surveys, the CDFG and USFWS will require capture methods that minimize the potential for death and injury of covered species. In addition, these agencies will specify the number of individuals of covered species that may be captured. Thus, the level of take authorized to occur through this mechanism will be specified on a case-by-case basis through the approval of the CDFG and USFWS.

3.6.6.1 Desert Tortoise

Desert tortoise have the potential to occur in creosote bush scrub habitat within the rights-of-way of the AAC and East Highline Canal. About 60 miles of the AAC is adjacent to desert habitat. For about 10 miles, however, the AAC traverse the Algodones Dunes which do not provide potentially suitable habitat for desert tortoises. The East Highline Canal is adjacent to desert habitat that is potentially suitable for desert tortoises for about 40 miles. This habitat is marginal for the species because the diversity and abundance of perennial and annual grasses upon which it feeds is relatively low, and the area is subject to ongoing disturbance associated with canal maintenance activities and offroad recreational vehicle use. Although the HCP area is within this species' known range, desert tortoises have not been reported in the vicinity of the AAC or East Highline Canal.

Several covered activities have the potential to directly or indirectly take desert tortoises. The primary mechanism through which IID's activities could result in take of a desert tortoises is vehicle strikes during O&M or construction activities. IID workers drive along the canals on a daily basis to perform O&M and construction activities and desert tortoises could be struck by vehicles. Tortoises also will seek the shade under parked vehicles and could be injured when a parked vehicle is moved. Along the East Highline Canal, most vehicle travel is on the agricultural side of the canal where IID's facilities are located. Desert tortoises would not be expected to occur on the agricultural side of the canal and therefore the potential for take of tortoises through vehicle strikes along the East Highline Canal is minimal. Because vehicle traffic along the AAC occurs in areas adjacent to desert habitat, the potential for tortoises to be impacted is greater than along the East Highline Canal, although the potential for and magnitude of take is expected to be low, given the apparent low level of use of the HCP area by desert tortoises.

In addition to potentially being struck by vehicles as workers travel along the canals, performance of other O&M activities could impact desert tortoise. Roadways along the AAC are graded annually and along the East Highline several times a year. Vegetation control is conducted regularly on the canal embankments of the AAC and is anticipated to be conducted annually along the abandoned portion of the AAC in the future. The potential for desert tortoises to be struck by vehicles during the conduct of these activities is low because the vehicles performing these activities travel at a very slow speed such that desert tortoises would be able to move out of harm's way. Vegetation control is not conducted on the desert side of the East Highline Canal, and therefore the potential for desert tortoises to be impacted by vegetation control or embankment grading is further reduced. Because IID tightly controls vegetation on its canals such that suitable habitat conditions for desert tortoises do not develop, vegetation control activities would not be expected to adversely affect desert tortoises through habitat changes.

Over the term of the permit, IID anticipates replacing all of the structures along the AAC and East Highline Canal at least once. Construction to replace structures and potentially install canal lining could result in take of a desert tortoise through removal of habitat, destruction of burrows or strikes by equipment used during construction. Over the term of the permit, scheduled construction activities will not permanently remove more than 100 acres of native desert habitat. Only a portion of this habitat would be potentially suitable for desert tortoises and given this species' low level of use of the HCP area, the potential for and extent of take occurring as a result of habitat reduction is low.

Under the Desert Habitat Conservation Strategy, IID would implement measures to avoid and minimize the potential for desert tortoises to be killed or injured during O&M (Desert Habitat –2) and scheduled construction activities (Desert Habitat–3). Key avoidance measures for O&M activities include:

- Restricting activities to previously disturbed areas where use by covered species including desert tortoises is limited
- Taking actions to reduce the possibility that desert tortoises are struck by vehicles (e.g., checking under parked vehicles prior to moving the vehicle)
- Maintaining roads and embankments free of vegetation to discourage use by covered species including desert tortoises

For scheduled construction activities, IID will conduct preconstruction surveys to determine if desert tortoises occur within the construction area and implement practices to remove tortoises (e.g., conduct clearance surveys, excavate burrows) from the construction site and discourage use of site during construction activities (e.g., erect exclusion fencing). The requirements Desert Habitat–2 and –3 were derived from avoidance and minimization measures typically required by the USFWS and CDFG for desert tortoises and other special-status desert species. For scheduled construction activities, IID also will implement species-specific measures for desert tortoises (see Appendix C) consistent with the avoidance and minimization measures typically required by the USFWS and CDFG for construction activities. In combination, the practices for O&M and construction activities will minimize the potential for desert tortoises to be killed or injured as a result of these activities.

Scheduled construction activities could permanently remove up to 100 acres of native desert habitat and temporarily disturb a limited amount of native desert habitat, some of which could be habitat for desert tortoises. To offset impacts to desert tortoises potentially resulting from removal of native desert habitat, IID will restore native desert habitat that is temporarily disturbed during construction. By restoring the disturbed habitat, IID will reinstate the area's habitat values for the covered species, including desert tortoise. For habitat disturbed by construction activities that cannot be restored in situ, IID will acquire and protect in perpetuity native desert habitat at a 1:1 ratio for the acreage of habitat permanently lost because of construction. The habitat to acquire will be identified in consideration of which covered species use the habitat that is lost and will be managed for the benefit of covered species in perpetuity. The HCP IT will be actively involved in identifying properties for acquisition and the USFWS and CDFG must approve properties that IID proposes for acquisition to fulfill the requirements of Desert Habitat–5. It is anticipated that the HCP IT will recommend and the USFWS and CDFG will approve acquisition of properties that provide the greatest possible value to the covered species impacted by the construction activities in terms of the property's habitat value and location to other important areas for the species.

The HCP area provides only marginal habitat quality for desert tortoises and the species' occurrence in the HCP area is low. As a result of this low level of use and with implementation of minimization measures, the potential for and extent of take of desert tortoises from O&M and construction activities is very low. With the long-term protection and management of native desert habitat, impacts to desert tortoises from reduced habitat would be offset. With the very low level of potential take and measures to offset take that could occur, implementation of the HCP would not jeopardize the continued existence of the species.

3.6.6.2 Colorado Desert Fringe-Toed Lizard

Suitable habitat for the Colorado Desert fringe-toed lizard in the HCP area occurs where the AAC traverses the Algodones Dunes and the Sand Fields in East Mesa. The AAC is adjacent to the Algodones Dunes for about 10 miles and the Sand Fields for about 20 miles. Colorado Desert fringe-toed lizards have been reported in surveys along this portion of the AAC (Reclamation and IID 1994).

Several covered activities have the potential to directly or indirectly take Colorado Desert fringe-toed lizards. The primary mechanism through which IID's activities could result in take of a lizard is vehicle strikes during O&M or construction activities. IID workers drive along the AAC on a daily basis to perform O&M and construction activities and Colorado Desert fringe-toed lizards could be struck by vehicles. The risk to this species is limited to the 10-mile section of the AAC that traverses the Algodones Dunes and approximately 20-mile sections that traverses the Sand Fields. These lizards also may seek the shade under parked vehicles and could be injured when the vehicle is moved.

In addition, to potentially being struck by vehicles as workers travel along the canals, performance of other O&M activities could impact Colorado Desert fringe-toed lizards. Roadways along the AAC are graded annually. Vegetation control is conducted regularly on the canal embankments of the AAC and is anticipated to be conducted annually along the abandoned portion of the AAC in the future. Every 5 years, IID also removes vegetation from three seepage recovery systems adjacent to the AAC and lizards basking on the roadway could be struck by the excavator. The potential for Colorado Desert fringe-toed lizard to be struck by vehicles during the conduct of these activities is low because the vehicles travel at a very slow speed such that individuals would be able to move out of harm's way. However, during periods when these lizards are inactive, they are vulnerable.

Along the portion of the AAC that traverses the Algodones Dunes, IID annually knocks down portions of the sand dunes, creating a flatter slope that allows sand to blow across the canal. In conducting this flattening, a dozer drags an I-beam back and forth across the peaks of the dunes to level them. The area where this activity is conducted begins at the Coachella Turnout (Sta. 1907+20) and extends to about Sidewinder Road at Pilot Knob (Sta. 1243+65), a distance of 12.56 miles. The area actually disturbed is about 50 to 75 feet wide yielding a total acreage disturbed of 76 to 114 acres. This acreage represents less than 0.1 percent of the 150,000 acres of the Algodones Dunes that provide habitat for this species. Colorado Desert fringe-toed lizards could be taken during the course of these activities.

Over the term of the permit, IID anticipates replacing all of the structures along the AAC. Construction to replace structures could result in take of a Colorado Desert fringe-toed lizard through removal of habitat or being struck by equipment used during construction. Over the term of the permit, scheduled construction activities will not permanently remove more than 100 acres of native desert habitat. Impacted habitat would be distributed along the entire length of the AAC as well as along those sections of the East Highline, Westside Main, Thistle, and Trifolium canals that are adjacent to desert habitat. Potential habitat for Colorado Desert fringe-toed lizards in the HCP area is limited to the 30 miles of the AAC in the Algodones Dunes and Sand Fields. Thus, the potential loss of habitat for Colorado Desert fringe-toed lizard would be considerably less than 100 acres.

Under the Desert Habitat Conservation Strategy, IID would implement measures to avoid and minimize the potential for Colorado Desert fringe-toed lizards to be killed or injured during O&M (Desert Habitat–2) and scheduled construction activities (Desert Habitat–3). Key avoidance measures for O&M activities include:

- Restricting activities to previously disturbed areas where use by covered species including Colorado Desert fringe-toed lizards is expected to be limited
- Taking actions to reduce the possibility that lizards are struck by vehicles (e.g., checking under parked vehicles prior to moving the vehicle)

For scheduled construction activities, IID will conduct preconstruction surveys to determine if Colorado Desert fringe-toed lizards occur within the construction area. If this species is found in the construction area or is likely to occur IID will implement species-specific measures for Colorado Desert fringe-toed lizards in addition to those required under Desert Habitat–3 (See Appendix C). Minimization and avoidance practices include identifying and remove lizards from the construction site (e.g., conducting clearance surveys, examining trenches prior to filling, conducting hourly inspections when surface temperatures exceed 30ºC) and discouraging and/or monitoring use of the site by lizards during construction activities (e.g., erecting exclusion fencing, maintaining a biological monitor onsite). The requirements Desert Habitat–2 and –3 and in Appendix C were derived from avoidance and minimization measures typically required by the USFWS and CDFG for Colorado Desert fringe-toed lizards and other special-status desert species. In combination, the practices for O&M and construction activities will minimize the potential for Colorado Desert fringe-toed lizards to be killed or injured as a result of these activities.

Scheduled construction activities could permanently remove up to 100 acres of native desert habitat. To offset impacts to Colorado Desert fringe-toed lizard potentially resulting from removal of native desert habitat, IID will acquire and protect in perpetuity native desert habitat at a 1:1 ratio for the acreage of habitat permanently lost because of construction. The habitat to acquire will be identified in consideration of which covered species use the habitat that is lost and will be managed for the benefit of covered species in perpetuity. The HCP IT will be actively involved in identifying properties for acquisition and the USFWS and CDFG must approve properties that IID proposes for acquisition to fulfill the requirements of Desert

Habitat–5. It is anticipated that the HCP IT will recommend and the USFWS and CDFG will approve acquisition of properties that provide the greatest possible value to the covered species impacted by the construction activities in terms of the property's habitat value and location to other important areas for the species.

Covered activities conducted by IID have the potential to take Colorado Desert fringe-toed lizards in the immediate vicinity of he AAC. Habitat for Colorado Desert fringe-toed lizard in the HCP area constitutes a small portion of the habitat for this species in the Algodones Dunes. Under the HCP, IID will implement measures to minimize and avoid take of Colorado Desert fringe-toed lizards and compensate for any habitat reductions. IID has been conducting O&M and construction activities along the AAC for several decades and given the presence of fringe-toed lizards in areas adjacent to the AAC, the species appears capable of coexisting with IID's ongoing activities. Implementation of the HCP would serve to further reduce and offset impacts and therefore would not jeopardize the continued existence of Colorado Desert fringe-toed lizard.

3.6.6.3 Western Chuckwalla

Western chuckwallas are associated with the Sonoran Creosote Bush Scrub plant community, but within this community it is restricted to areas with large rocks, boulders, or rocky outcrops, usually on slopes. Within the HCP area, creosote bush scrub is found within portions of the rights-of-way of the AAC, East Highline, Westside Main, Thistle, and Trifolium Extension canals. However, most of this the habitat is of marginal quality for western chuckwallas because it generally lacks rocky features. The most likely place for this species to occur in the HCP area is along the AAC near the LCR where the canal passes through a rocky canyon. Thus, use of the HCP area by this species is believed to be very low and restricted to a small area.

Several covered activities have the potential to directly or indirectly take western chuckwallas. The primary mechanism through which IID's activities could result in take of a chuckwalla is vehicle strikes during O&M or construction activities. IID workers drive along the AAC on a daily basis to perform O&M and construction activities and chuckwallas could be struck by vehicles. Western chuckwallas also may seek the shade under parked vehicles and could be injured when the vehicle is moved. The risk to this species is low because suitable habitat for this species adjacent to the IID's canals is believed to be restricted to a small area along the AAC.

In addition, to potentially being struck by vehicles as workers travel along the canals, performance of other O&M activities could impact western chuckwallas. Roadways along the AAC are graded annually. Vegetation control is conducted regularly on the canal embankments of the AAC and is anticipated to be conducted annually along the abandoned portion of the AAC in the future. Every 5 years, IID also removes vegetation from three seepage recovery systems adjacent to the AAC and chuckwallas basking on the roadway could be struck by the excavator. The potential for chuckwallas to be struck by vehicles during the conduct of these activities is low because the vehicles travel at a very slow speed such that individuals would be able to move out of harm's way.

Over the term of the permit, IID anticipates replacing all of the structures along the AAC Construction to replace structures could result in take of a western chuckwalla through removal of habitat or being struck by equipment used during construction. Over the term of the permit, scheduled construction activities will not permanently remove more than 100 acres of native desert habitat. Impacted habitat would be distributed along the entire length of the AAC as well as along those sections of the East Highline, Westside Main, Thistle, and Trifolium canals that are adjacent to desert habitat. Potential habitat for chuckwallas is limited to a small section of the AAC. Thus, the potential loss of habitat for western chuckwallas would be considerably less than 100 acres.

Under the Desert Habitat Conservation Strategy, IID would implement measures to avoid and minimize the potential for western chuckwallas to be killed or injured during O&M (Desert Habitat–2) and scheduled construction activities (Desert Habitat–3). Key avoidance measures for O&M activities include:

- Restricting activities to previously disturbed areas where use by covered species, including chuckwallas, is expected to be limited
- Taking actions to reduce the possibility that chuckwallas are struck by vehicles (e.g., checking under parked vehicles prior to moving the vehicle)
- Maintaining roads and embankments free of vegetation to discourage use by covered species including western chuckwallas

For scheduled construction activities, IID will conduct preconstruction surveys to determine if chuckwallas occur within the construction area. If this species is found in the construction area or is likely to occur IID will implement species-specific measures for western chuckwallas in addition to those required under Desert Habitat–3 (see Appendix C). Minimization and avoidance practices include identifying and removing chuckwallas from the construction site (e.g., conducting clearance surveys, examining trenches prior to filling) and discouraging and/or monitoring use of the site by chuckwallas during construction activities (e.g., erecting exclusion fencing, maintaining a biological monitor onsite). The requirements Desert Habitat–2 and –3 and in Appendix C were derived from avoidance and minimization measures typically required by the USFWS and CDFG for other special-status reptiles associated with desert habitat (e.g., desert tortoises, fringe-toed lizards, flat-tailed horned lizards). In combination, the practices for O&M and construction activities will minimize the potential for chuckwallas to be killed or injured as a result of these activities.

Scheduled construction activities could permanently remove up to 100 acres of native desert habitat. To offset impacts to chuckwallas potentially resulting from removal of native desert habitat, IID will acquire and protect in perpetuity native desert habitat at a 1:1 ratio for the acreage of habitat permanently lost because of construction. The habitat to acquire will be identified in consideration of which covered species use the habitat that is lost and will be managed for the benefit of covered species in perpetuity. The HCP IT will be actively involved in identifying properties for acquisition and the USFWS and CDFG must approve properties that IID proposes for acquisition to fulfill the requirements of Desert Habitat–5. It is anticipated that the HCP IT will recommend and the USFWS and CDFG will approve acquisition of properties that provide the greatest possible value to the covered species impacted by the construction activities in terms of the property's habitat value and location to other important areas for the species.

The HCP area provides only marginal habitat quality for western chuckwallas and supports only a small amount of potential habitat. Thus, the species' occurrence in the HCP area is low. As a result of this low level of use and with implementation of minimization measures, the potential for and extent of take of western chuckwallas from O&M and construction activities is very low. With the long-term protection and management of native desert habitat, impacts to western chuckwallas from reduced habitat would be offset. With the very low level of potential take and measures to offset take that could occur, implementation of the HCP would not jeopardize the continued existence of the species.

3.6.6.4 Couch's Spadefoot Toad

No records of Couch's spadefoot toad exist for the HCP area, but it is within the species' range. It is uncertain if suitable habitat conditions are present in the HCP area. Couch's spadefoot toads could use native desert habitats within the right-of-way of the AAC and use seepage communities associated with the AAC or East Highline Canal for breeding. Surveys conducted under the Desert Habitat Conservation Strategy will provide information on the presence of suitable habitat and this species in the HCP area.

This species rarely occurs above ground. Up to 10 months out of the year, it remains within burrows located in friable soil associated with desert plants. Because the ground is compacted and plant cover is minimal, these toads are not likely to burrow in portions of the rights-of-way where IID conducts its activities. Toads could be struck by vehicles when they move to and from breeding ponds. The potential for take and the magnitude of take of spadefoot toads in this manner is low because Couch's spadefoot toads are only active for a very brief period of time in association with rain storms (less than one month). Although the potential for take from O&M activities is low, IID will implement a suite of measures to minimize direct injury and mortality to covered species associated with desert habitat (Desert Habitat–2 and –3). The habitat and covered species surveys conducted under Desert Habitat–4 will provide information on the occurrence and distribution of Couch's spadefoot toads and their habitat in the HCP area. The HCP IT will use this information to improve minimization and avoidance measures as described in Chapter 4 Monitoring and Adaptive Management.

Of greater concern is the potential for construction activities to eliminate breeding ponds. Installation of seepage recovery systems on the East Highline Canal are not expected to impact Couch's spadefoot toads because the recovery systems are proposed for the west side of the canal and desert habitat occurs on the east side of the canal. Seepage communities on the east side of the East Highline Canal which are adjacent to desert habitat would not be affected by the proposed seepage recovery systems.

Along the AAC, scheduled construction activities could remove up to 100 acres of native desert habitat. Potentially, ponds suitable for breeding by Couch's spadefoot toads could occur along the AAC and some of the 100 acres of potentially impacted by construction could support breeding ponds. Potential breeding ponds will be identified as part of the baseline habitat surveys and use by spadefoot toads determined when conditions are appropriate (e.g., in association with thunderstorms).

Breeding ponds are a critical habitat feature for Couch's spadefoot toads. Because of the believed scarcity of suitable ponds and uncertainty about the number and distribution of suitable ponds in the HCP area, IID will obtain written approval from the USFWS and CDFG if it proposes to impact a breeding pond. In deciding whether to approve the request, the USFWS and CDFG will consider the availability of other breeding ponds in the HCP area and the overall status of the species. The baseline surveys will provide the information necessary for USFWS and CDFG to determine whether a breeding pond could be eliminated (e.g., number, size, and location of breeding ponds) without causing substantial adverse effects to the species.

To mitigate the impact to Couch's spadefoot toads from removal of breeding ponds, if approved by the USFWS and CDFG, IID would acquire, protect, and manage in perpetuity two breeding ponds for every pond impacted. With the requirement for IID to receive approval from the USFWS and CDFG prior to eliminating a breeding pond and the requirement to protect two ponds for every one impacted, the number of ponds that could be impacted will be limited. The long-term protection of breeding ponds in the event that a pond would be removed, would offset impacts to Couch's spadefoot toads by providing habitat for this species in perpetuity. Further, USFWS and CDFG would not approve removal of a pond if it would substantially adversely affect the species. Based on the believed low level of use of the HCP area by Couch's spadefoot toads the potential for take of this species is low. With implementation of measures to avoid and minimize impacts and strict conditions on removal of breeding ponds, implementation of the HCP would not jeopardize the continued existence of this species.

3.6.6.5 Flat-Tailed Horned Lizard

Flat-tailed horned lizards are known to occur within the HCP area and suitable habitat for the species exists along the AAC and along the western side of the Westside Main Canal in the West Mesa. Habitat for this species also occurs to the east of the East Highline Canal (BLM 1990). The species is well distributed along the AAC although this area has not been identified as a key area for the species. Flat-tailed horned lizards typically occupy sandy, desert flatlands with sparse vegetation and low plant diversity.

Several covered activities have the potential to directly or indirectly take flat-tailed horned lizards. The primary mechanism through which IID's activities could result in take of a lizard is vehicle strikes during O&M or construction activities. IID workers drive along the AAC and other canals adjacent to desert habitat on a daily basis to perform O&M and construction activities and flat-tailed horned lizards could be struck by vehicles. Along the East Highline, Westside Main, Thistle, and Trifolium Extension canals, most vehicle travel is on the agricultural side of the canal where IID's facilities are located. Flat-tailed horned lizards would not be expected to occur on the agricultural side of the canal and therefore the potential for take of lizards through vehicle strikes along these other canals is minimal. Because vehicle traffic along the AAC occurs in areas adjacent to desert habitat, the potential for lizards to be impacted is greater than along the other canals. Flat-tailed horned lizards also may seek the shade under parked vehicles and could be injured when the vehicle is moved.

In addition to potentially being struck by vehicles as workers travel along the canals, performance of other O&M activities could impact flat-tailed horned lizards. Roadways along the AAC are graded annually and those along the other canals adjacent to desert habitat are graded several times a year. Vegetation control is conducted regularly on the canal embankments of the canals and is anticipated to be conducted annually along the abandoned portion of the AAC in the future. Vegetation control is not conducted on the desert side of the other canals adjacent to desert habitat and therefore the potential for flat-tailed horned lizards to be impacted by vegetation control or embankment grading is low. Every five years, IID also removes vegetation from three seepage recovery systems adjacent to the AAC and lizards basking on the roadway could be struck by the excavator. Although these vehicles travel at a slow enough speed for flat-tailed horned lizards to avoid being struck, this lizard's response to a threat is to remain motionless. With this response, they are vulnerable to being killed or injured by machinery regardless of the speed it travels.

Along the portion of the AAC that traverses the Algodones Dunes, IID annually knocks down portions of the sand dunes, creating a flatter slope that allows sand to blow across the canal. In conducting this flattening, a dozer drags an I-beam back and forth across the peaks of the dunes to level them. The area where this activity is conducted begins at the Coachella Turnout (Sta. 1907+20) and extends to about Sidewinder Road at Pilot Knob (Sta. 1243+65), a distance of 12.56 miles. The area actually disturbed is about 50 to 75 feet wide, yielding a total acreage disturbed of 76 to 114 acres. Flat-tailed horned lizards could be taken during the course of these activities.

Over the term of the permit, IID anticipates replacing all of the structures along the AAC. Construction to replace structures could result in take of a flat-tailed horned lizard through removal of habitat or being struck by equipment used during construction. Over the term of the permit, scheduled construction activities will not permanently remove more than 100 acres of native desert habitat. Impacted habitat would be distributed along the entire length of the AAC as well as along those sections of the East Highline, Westside Main, Thistle, and Trifolium canals adjacent to desert habitat.

Under the Desert Habitat Conservation Strategy, IID would implement measures to avoid and minimize the potential for flat-tailed horned lizards to be killed or injured during O&M (Desert Habitat–2) and scheduled construction activities (Desert Habitat–3). Key avoidance measures for O&M activities include:

- Restricting activities to previously disturbed areas where use by covered species including flat-tailed horned lizards is expected to be limited
- Taking actions to reduce the possibility that lizards are struck by vehicles (e.g., checking under parked vehicles prior to moving the vehicle)
- Maintaining roads and embankments free of vegetation to discourage use by covered species including flat-tailed horned lizards

For scheduled construction activities, IID will conduct preconstruction surveys to determine if flat-tailed horned lizards occur within the construction area. If this species is found in the construction area or is likely to occur, IID will implement species-specific measures for flat-tailed horned lizards in addition to those required under Desert Habitat–3 (see Appendix C). Minimization and avoidance practices include identifying and remove lizards from the construction site (e.g., conducting clearance surveys, examining trenches prior to filling, conducting hourly inspections when surface temperatures exceed 30ºC) and discouraging and/or monitoring use of the site by lizards during construction activities (e.g., erecting exclusion fencing, maintaining a biological monitor onsite). The requirements for Desert Habitat–2 and –3 and in Appendix C were derived from avoidance and minimization measures typically required by the USFWS and CDFG for flat-tailed horned lizards and other special-status desert species. In combination, the practices for O&M and construction activities will minimize the potential for flat-tailed horned lizards to be killed or injured as a result of these activities.

Scheduled construction activities could permanently remove up to 100 acres of native desert habitat. To offset impacts to flat-tailed horned lizard potentially resulting from removal of native desert habitat, IID will acquire and protect in perpetuity native desert habitat at a 1:1 ratio for the acreage of habitat permanently lost because of construction. The habitat to acquire will be identified in consideration of which covered species use the habitat that is lost and will be managed for the benefit of covered species in perpetuity. The HCP IT will be actively involved in identifying properties for acquisition and the USFWS and CDFG must approve properties that IID proposes for acquisition to fulfill the requirements of Desert Habitat–5. It is anticipated that the HCP IT will recommend and the USFWS and CDFG will approve acquisition of properties that provide the greatest possible value to the covered species impacted by the construction activities in terms of the property's habitat value and location to other important areas for the species.

Covered activities conducted by IID have the potential to take flat-tailed horned lizards in the immediate vicinity of the several canals. Under the HCP, IID will implement measures to minimize and avoid take of flat-tailed horned lizards and compensate for habitat reductions. IID has been conducting O&M and construction activities along the AAC and other canals for several decades and given the continued presence of flat-tailed horned lizards in areas adjacent to IID's canals, the species appears capable of coexisting with IID's ongoing activities. Habitat loss to urban development and recreation, such as off-highway vehicle use, is the principal threat to species persistence (Zeiner et al. 1988). Implementation of the HCP which would serve to further reduce impacts attributable to IID's activities would not jeopardize the continued existence of flat-tailed horned lizards.

3.6.6.6 Harris' Hawk

Cottonwood and mesquite trees that could provide potential nesting habitat for Harris' hawks occur in a few isolated seepage areas along the AAC, principally between Drops 3 and 4. Because of the limited amount of potential habitat for this species in the HCP area, its occurrence in the HCP area is very low.

The potential for Harris' hawks to be disturbed or injured as a result of the covered activities is low. Harris' hawks are probably most likely to occur in the HCP area in the seepage community between Drops 3 and 4 on the AAC. This community contains cottonwoods and mesquite that could be used for nesting with adjacent desert scrub, a commonly used habitat for foraging. O&M activities would not affect this community and no construction activities affecting that seepage area are anticipated under this HCP. Scheduled construction activities could remove up to 100 acres of native desert habitat. The most common habitat adjacent to the AAC and the other canals that abut desert habitat is creosote scrub. This habitat is not suitable for nesting habitat by Harris' hawk but could be used for foraging. Potentially an individual Harris' hawk could be taken because of reduced foraging habitat. If any of the 100 acres of native desert habitat potentially removed because of construction contains mesquite trees, nesting birds could be impacted. This potential impact is considered remote given the scarcity of nesting opportunities along the AAC and other canals.

Under the Tamarisk Scrub Habitat Conservation Strategy and Desert Habitat Conservation Strategy, IID will survey areas that would be disturbed during construction to determine whether any covered species, including Harris' hawk, are breeding in habitat that would be disturbed. Removal of habitat will be avoided until after the breeding season and native tree or desert habitat created or acquired to compensate for habitat that is permanently lost. These measures will minimize and mitigate any take of Harris' hawk as a result of construction activities. As explained under Section 3.4.6.11, the Tamarisk Scrub Habitat Conservation Strategy could benefit Harris' hawks through the creation / acquisition and long-term protection of native tree habitat. With the take minimization measures and compensation for take potentially resulting from reduced habitat, implementation of the HCP would not jeopardize the continued existence of Harris' hawks.

3.6.6.7 Loggerhead Shrike

In the HCP area, habitat for loggerhead shrikes consists mainly of agricultural fields, although the species could also use desert habitats within rights-of-way of the AAC, East Highline, Westside Main, Thistle, and Trifolium Extension nesting and foraging. O&M activities within the rights-of-way of these canals could disturb loggerhead shrike nesting in desert habitat within the rights-of-way. The potential for disturbance and adverse effects from disturbance is low because O&M activities are restricted to previously disturbed areas, principally roads, and are not conducted immediately adjacent to potential habitat. Also, O&M activities conducted along these canals consist of vegetation control, roadway grading, and embankment maintenance. In conducting these activities, equipment is moved progressively along the canal such that it would not be in one location for an extended period of time where it could cause prolonged disturbance.

Scheduled construction activities could remove up to 100 acres of native desert habitat, some of which could be used by loggerhead shrike. Construction activities could displace individuals and result in take if displaced birds were unable to find alternate habitat or were exposed to other hazards (e.g., predation). If shrikes were nesting in habitat removed by construction, take could occur through nest destruction.

Under the Desert Habitat Conservation Strategy, IID will limit O&M activities to previously disturbed areas. With this restriction, IID will avoid reducing habitat for loggerhead shrikes and minimize the potential for disturbance or injury of individuals from O&M activities. For construction activities, IID will implement species-specific measures to avoid and minimize potential impacts to loggerhead shrike, such as surveying for potential nesting habitat in and near the construction site, establishing buffers around nests, and prohibiting construction between February 1 through July 31, or until young have fledged (see Appendix C). Removal of habitat where loggerhead shrike are breeding would be conducted outside of the breeding season to avoid destroying nests and killing or injuring young. Native desert habitat would mitigated through the acquisition and protection of habitat at a 1:1 ratio for the impacted acreage.

As described in more detail under the Agricultural Field Habitat Conservation Strategy (see Section 3.8.6.14), the Drain, Tamarisk Scrub, Salton Sea, Desert Habitat, and Agricultural Field Habitat Conservation Strategy all would contribute to providing habitat for loggerhead shrikes over the term of the permit. In combination, these strategies would mitigate any take of loggerhead shrikes potentially occurring and would not jeopardize the continued existence of the species.

3.6.6.8 Le Conte's Thrasher

The creosote bush scrub community in the AAC right-of-way and adjacent to the East Highline, Westside Main, Thistle, and Trifolium Extension canals provides potential habitat for the Le Conte's thrasher. The species is reported as an extirpated breeder at the Salton Sea NWR (USFWS 1997), but breeding pairs have been observed in desert scrub habitat east of the Coachella Canal, suggesting the potential for it to occur in desert scrub habitat within the AAC and East Highline Canal right-of-way. The primary reason for species decline is habitat loss attributable to degradation, fragmentation, agricultural conversion, urbanization, oil and gas development, fire, and over-grazing.

O&M activities within the rights-of-way of these canals could disturb Le Conte's thrashers nesting in desert habitat within the rights-of-way. The potential for disturbance and adverse effects from disturbance is low because O&M activities are restricted to previously disturbed areas, principally roads, and are not conducted immediately adjacent to potential habitat. Also, O&M activities conducted along these canals consist of vegetation control, roadway grading and embankment maintenance. In conducting these activities, equipment is moved progressively along the canal such that it would not be in one location for an extended period of time where it could cause prolonged disturbance.

Scheduled construction activities could remove up to 100 acres of native desert habitat, some of which could be used by Le Conte's thrashers. Construction activities could displace individuals and result in take if displaced birds were unable to find alternate habitat or were exposed to other hazards (e.g., predation). Because of the abundance of desert habitat in areas surrounding the HCP area and the small amount of habitat that would be permanently impacted by construction activities (up to 100 acres) over the term of the permit, the amount of take potentially occurring from displacement of individuals as habitat is removed would be minimal. However, if thrashers were nesting in habitat removed by construction, take could occur through nest destruction.

Under the Desert Habitat Conservation Strategy, IID will limit O&M activities to previously disturbed areas. With this restriction, IID will avoid reducing habitat for Le Conte's thrashers and minimize the potential for disturbance or injury of individuals from O&M activities. For construction activities, IID will implement species-specific measures to avoid and minimize potential impacts to Le Conte's thrashers such as surveying for potential nesting habitat in and near the construction site, establishing buffers around nests, and prohibiting construction until young have fledged (see Appendix C). Removal of habitat where Le Conte's thrashers are breeding would be conducted outside of the breeding season to avoid destroying nests and killing or injuring young. Permanent removal of native desert habitat would be mitigated through the acquisition and long-term protection of habitat at a 1:1 ratio for the impacted acreage.

Implementation of the HCP measures would minimize and mitigate the impact of take of Le Conte's thrashers that could result from the covered activities and would not jeopardize the continued existence of this species. Based on: (1) the small amount of habitat potentially impacted, (2) the availability of habitat in and around the HCP area, and (3) implementation of measures to minimize take of thrashers, the potential for take and the magnitude of take of Le Conte's thrashers as a result of the covered activities is low. Acquisition and long-term protection and management of native desert habitat would provide high-quality habitat for

Le Conte's thrashers in perpetuity. This long-term protection of native habitat would ensure the availability of nesting, roosting and foraging habitat for Le Conte's thrashers. With the take minimization measures and compensation for take potentially resulting from reduced habitat, implementation of the HCP would not jeopardize the continued existence of Le Conte's thrashers.

3.6.6.9 Crissal Thrasher

The crissal thrasher occupies dense thickets of shrubs or low trees in desert riparian and desert wash habitats. Limited stands of mesquite, willow, and cottonwoods found in seepage areas of the AAC or adjacent to the East Highline could provide habitat for the species. The species is resident to Imperial, Coachella, and Borrego Valleys. Breeding pairs have been observed along the Alamo River and near the towns of Niland and Brawley (USGS Breeding Bird Surveys), and across from the mission wash flume 3 miles north-northeast of Bard and in areas around the Laguna Dam. Removal of mesquite brushland for agricultural production and introduction of tamarisk are the primary causes of population reductions, followed by habitat degradation and disturbance from offroad vehicle activity.

O&M activities within the rights-of-way of these canals disturb crissal thrashers nesting in desert habitat within the rights-of-way. The potential for disturbance and adverse effects from disturbance is low because O&M activities are restricted to previously disturbed areas, principally roads, and are not conducted immediately adjacent to potential habitat. Also, O&M activities conducted along these canals consist of vegetation control, roadway grading and embankment maintenance. In conducting these activities, equipment is moved progressively along the canal such that it would not be in one location for an extended period of time where it could cause prolonged disturbance.

Scheduled construction activities could remove up to 100 acres of native desert habitat, some of which could be used by crissal thrashers. Construction activities could displace individuals and result in take if displaced birds were unable to find alternate habitat or were exposed to other hazards (e.g., predation). Because of the abundance of desert habitat in areas surrounding the HCP area and the small amount of habitat that would be permanently impacted by construction activities (up to 100 acres) over the term of the permit, the amount of take potentially occurring from displacement of individuals as habitat is removed would be minimal. However, if thrashers were nesting in habitat removed by construction, take could occur through nest destruction.

Under the Desert Habitat Conservation Strategy, IID will limit O&M activities to previously disturbed areas. With this restriction, IID will avoid reducing habitat for crissal thrasher and minimize the potential for disturbance or injury of individuals from O&M activities. For construction activities, IID will implement species-specific measures to avoid and minimize potential impacts to crissal thrasher such as surveying for potential nesting habitat in and near the construction site, establishing buffers around nests, and prohibiting construction until young have fledged (see Appendix C). Removal of habitat where crissal thrashers are breeding would be conducted outside of the breeding season to avoid destroying nests and killing or injuring young. Permanent removal of native desert habitat would be mitigated through the acquisition and long-term protection of habitat at a 1:1 ratio for the impacted acreage.

Implementation of the HCP measures would minimize and mitigate the impact of take of crissal thrashers that could result from the covered activities and would not jeopardize the continued existence of this species. Based on: (1) the small amount of desert habitat potentially impacted, (2) the availability of habitat in and around the HCP area, and (3) implementation of measures to minimize take of thrashers, the potential for take and the magnitude of take of crissal thrashers as a result of the covered activities in desert habitat is low. Acquisition and long-term protection and management of native desert habitat would provide high quality habitat for crissal thrashers in perpetuity. This long-term protection of native habitat would ensure the availability of nesting, roosting and foraging habitat for crissal thrashers. With the take minimization measures and compensation for take potentially resulting from reduced habitat, implementation of the HCP would not jeopardize the continued existence of crissal thrashers. Creation / acquisition of native tree habitat under the Tamarisk Scrub Habitat Conservation Strategy (see Section 3.4.6.12) and Salton Sea Conservation Strategy would further ensure the availability of habitat for this species in the HCP area.

3.6.6.10 Golden Eagle

Golden eagles occur in the HCP only as accidentals during the winter and spring. Much of the HCP area could be used by golden eagles for foraging; however, golden eagles are most likely to concentrate foraging activities in areas of high prey concentrations. In the HCP area, the Salton Sea and managed marsh at the state and federal wildlife refuges, as well as private duck clubs, attract abundant waterfowl populations during winter. Agricultural fields also attract waterfowl and golden eagles may forage in desert habitat as well. With the abundance of waterfowl at the Salton Sea and adjacent refuges, the potential for and level of take of golden eagles as a result changes in desert habitat would be minimal. However, over the term of the permit, a few golden eagles could be taken as a result of changes in foraging opportunities associated with agricultural fields. Take of golden eagles could result from reductions in agricultural fields; this potential effect is evaluated in Section 3.8.6.18.

Scheduled construction activities could remove up to 100 acres of native desert habitat, some of which could be used by golden eagle for foraging. Under the Desert Habitat Conservation Strategy, IID will acquire and protect native desert habitat to compensate for permanent loss of desert habitat. The long-term protection of native desert habitat would provide long-term certainty for golden eagles of the availability of foraging opportunities. In combination with the Drain (see Section 3.5.6.12) and Agricultural Field Habitat (see Section 3.8.6.18) Conservation Strategies, the minimal amount of take of golden eagles occurring from the covered activities in the HCP area would be mitigated, and implementation of the HCP would not jeopardize the continued existence of the species.

3.6.6.11 Elf Owl

The elf owl population in California has declined to low levels, such that it currently is only known from a few locations along the LCR and some isolated locations in Riverside County. Given the low population size and limited distribution, it is very unlikely that elf owls would occur in the HCP area. Thus, the potential for take of elf owls is very low.

The potential for elf owl to be disturbed or injured as a result of the covered activities is also low. The seepage community along the AAC between Drops 3 and 4 is the most likely place where elf owls would occur in the HCP area given its closer proximity to the LCR than the

Imperial Valley and the presence of adjacent desert scrub habitat. For nesting, elf owls appear to prefer forest habitat bordering desert habitat, conditions that exist in this seepage community. No construction activities affecting that seepage area are anticipated under this HCP.

Scheduled construction activities could remove up to 100 acres of native desert habitat. The most common habitat adjacent to the AAC and the other canals that abut desert habitat is creosote scrub. This habitat is not suitable for nesting habitat by elf owls but could be used for foraging. Potentially an individual elf owl could be taken because of reduced foraging habitat. Some of the 100 acres of native desert habitat potentially removed because of construction could be suitable for nesting by elf owls yielding a possibility of impacts to nesting birds. This potential impact is considered remote given the scarcity of nesting opportunities along the AAC and other canals adjacent to desert habitat.

Under the Tamarisk Scrub Habitat Conservation Strategy and Desert Habitat Conservation Strategy, IID will survey areas that would be disturbed during construction to determine if any covered species, including elf owls, are breeding in habitat that would be disturbed. Removal of habitat will be avoided until after the breeding season and native tree or desert habitat created or acquired to compensate for habitat that is permanently lost. These measures will minimize and mitigate any take of elf owls as a result of construction activities. As explained under Section 3.4.6.14, the Tamarisk Scrub Habitat Conservation Strategy could benefit elf owls through the creation/acquisition and long-term protection of native tree habitat. With the take minimization measures and compensation for take potentially resulting from reduced habitat, implementation of the HCP would not jeopardize the continued existence of elf owls.

3.6.6.12 Prairie Falcon

Prairie falcons are rare migrants in the HCP area; about 30 migrants occur in the valley each year (IID, 1994). Foraging habitat for prairie falcons in the HCP area consists of desert habitat, agricultural fields, and the shoreline of the Salton Sea. This species predominantly preys on small birds.

The covered activities are unlikely to adversely affect prairie falcons because of the low level of use of the HCP area by this species and its broad habitat use for foraging. However, a few individuals could be taken because of changes in foraging habitat availability or quality potentially resulting from permanent or temporary reductions in drain vegetation (see Section 3.5.2.2), permanent or temporary reductions in tamarisk scrub habitat (see Section 3.4.2), permanent reduction in desert habitat (see Desert Habitat–5), or changes in the composition and amount of agricultural field habitat (see Section 3.8.2). Although the ecology of the Salton Sea will change as the salinity of the sea increases, shorebirds would be expected to continue to use the sea and adjacent habitats.

The minimal amount of potential take would be mitigated by implementation of the Salton Sea, Tamarisk Scrub Habitat, Drain Habitat, Desert Habitat, and Agricultural Field Habitat conservation strategies. Loss of tamarisk scrub habitat at the Salton Sea and in the Imperial Valley would be offset through the creation/acquisition and long-term protection of native tree habitat (see Sections 3.3.4.2 and 3.4.5). By attracting a variety of songbirds, native tree habitat would provide higher quality foraging opportunities for prairie falcons. Critical to the perpetuation of agriculture field habitat in the Imperial Valley where prairie falcon could forage is the reliability and availability of water. Implementation of the water conservation and transfer program and this HCP will enhance the likelihood that agriculture will remain the dominant land use in the Imperial Valley and thereby continue to provide foraging opportunities for prairie falcons. The Drain Habitat Conservation Strategy also would contribute to mitigating the impact of any take of prairie falcons that could occur by increasing foraging opportunities through creation of managed marsh habitat. At maximum, 100 acres of desert habitat would be permanently impacted. Under the Desert Habitat Conservation Strategy, native desert habitat would be acquired, protected, and managed in perpetuity for covered specie to offset reductions in desert habitat. In combination, these strategies would mitigate the minimal amount of take potentially occurring and would not jeopardize the continued existence of the species.

3.6.6.13 Nelson’s Bighorn Sheep

Bighorn sheep are known to use desert scrub habitat, however, their occurrence in the HCP area is unlikely given the lack of adjacent mountainous regions for use as escape and breeding habitat, and high level of human activity in the project area. Nelson’s bighorn sheep occur in the Chocolate Mountains and Little Pichacho Mountains (CDFG 1999b).

The primary mechanism through which the covered activities could impact Nelson’s bighorn sheep is through removal of desert habitat. Scheduled construction activities could remove up to 100 acres of native desert habitat. Depending on the location of this habitat, a portion could be used by Nelson’s bighorn sheep. Potentially a few individual bighorn sheep could be taken as a result of reduced foraging habitat in the HCP area over the term of the permit. However, because of the low level of use of the HCP area by bighorn sheep, the potential for and level of take would be very low. Permanent removal of native desert habitat would be mitigated through the acquisition and long-term protection and management of habitat at a 1:1 ratio for the impacted acreage.

Implementation of the HCP measures would minimize and mitigate the impact of take of Nelson’s bighorn sheep that could result from the covered activities and would not jeopardize the continued existence of this species. Based on: (1) the low level of use of the HCP area by bighorn sheep, (2) the small amount of habitat potentially impacted, and (3) the availability of habitat in and around the HCP area, the potential for take and the magnitude of take of Nelson’s bighorn sheep as a result of the covered activities is very low. Acquisition and long-term protection and management of native desert habitat would provide high-quality habitat for bighorn sheep in perpetuity. With this long-term protection of habitat, implementation of the HCP would not jeopardize the continued existence of Nelson’s bighorn sheep.

3.6.6.14 Peirson’s Milk-Vetch

Habitat for Peirson's milk-vetch in the HCP area is limited to the AAC right-of-way where the AAC crosses the Algodones Dunes. This species has been found along the AAC where the canal traverses the Algodones Dunes (USFWS 1996b).

The only O&M activity likely to impact Peirson’s milk-vetch is the canal maintenance IID conducts along the portion of the AAC that traverses the Algodones Dunes. IID annually knocks down portions of the sand dunes, creating a flatter slope that allows sand to blow across the canal. In conducting this flattening, a dozer drags an I-beam back and forth across the peaks of the dunes to level them. The area where this activity is conducted begins at the Coachella Turnout (Sta. 1907+20) and extends to about Sidewinder Road at Pilot Knob (Sta. 1243+65), a distance of 12.56 miles. The area actually disturbed is about 50 to 75 feet wide yielding a total acreage disturbed of 76 to 114 acres. This acreage represents less than 0.1 percent of the 150,000 acres of the Algodones Dunes that provide habitat for this species. Peirson’s milk-vetch could be uprooted as a result of this activity. The remaining O&M activities are restricted to previously disturbed areas (i.e., roadways and canal embankments) where Peirson’s milk-vetch would not be expected to occur because these areas consist of well compacted soil that is not suitable for this species.

Over the term of the permit, IID anticipates replacing all of the structures along the AAC. Construction to replace structures could remove Peirson’s milk-vetch. Over the term of the permit, scheduled construction activities will not permanently remove more than 100 acres of native desert habitat. Impacted habitat would be distributed along the entire length of the AAC as well as along those sections of the East Highline, Westside Main, Thistle, and Trifolium canals that are adjacent to desert habitat. Potential habitat for Peirson’s milk-vetch in the HCP area is limited to the 10 miles of the AAC in the Algodones Dunes. Thus, the potential loss of habitat for Peirson’s milk-vetch would be considerably less than 100 acres.

Under the Desert Habitat Conservation Strategy, IID would implement measures, both general and plant-specific, to avoid and minimize impacts from O&M and construction activities. For O&M activities, workers would be instructed to restrict activities to previously disturbed areas so as to minimize intrusions into dune habitats where this species could occur. For construction, specific measures include preconstruction surveys, prohibiting surface disturbance within a prescribed radius of the species if it is found within the construction area, and transplanting individuals if impacts are unavoidable and transplanting is deemed appropriate by USFWS and CDFG (see Appendix C for a full listing of measures). General measures include familiarizing workers with covered plant species they are likely to encounter within the right-of-way and instructing them to avoid injuring or uprooting plants. IID also will restore any native vegetation temporarily impacted by construction and compensate for unavoidable and permanent impacts to vegetation by acquiring or granting a conservation easement on land at a 1:1 ratio for the acreage impacted.

Covered activities conducted by IID have the potential to take Peirson’s milk-vetch in the immediate vicinity of the AAC. Habitat for Peirson’s milk-vetch in the HCP area constitutes a small portion of the total habitat for this species in the Algodones Dunes. Under the HCP, IID will implement measures to minimize and avoid take of individual plants, transplant individuals if take cannot be avoided, and compensate for reductions in suitable habitat. IID has been conducting O&M and construction activities along the AAC for several decades and given the continued presence of this plant in areas adjacent to the AAC, the species appears capable of coexisting with IID’s ongoing activities. Implementation of the HCP would serve to further reduce and offset impacts and would not jeopardize the continued existence of Peirson’s milk-vetch.

3.6.6.15 Algodones Dunes Sunflower

Habitat for Algodones Dunes sunflower in the HCP area is limited to the AAC right-of-way where the AAC crosses the Algodones Dunes. This subspecies occurs where the AAC traverses the Algodones Dunes. The Algodones Dunes sunflower is naturally limited throughout its range by the availability of suitable dune habitat and is considered to be rare throughout its range. The main distribution of populations is within the Algodones Dunes system and, secondarily, in the Yuma dunes in Arizona. These stands are not large in numbers of individuals, but they are significant in maintaining genetic flow between populations in California and Arizona.

The only O&M activity with the potential to impact Algodones Dunes sunflower is the canal maintenance IID conducts along the portion of the AAC that traverses the Algodones Dunes. IID annually knocks down portions of the sand dunes, creating a flatter slope that allows sand to blow across the canal. In conducting this flattening, a dozer drags an I-beam back and forth across the peaks of the dunes to level them. The area where this activity is conducted begins at the Coachella Turnout (Sta. 1907+20) and extends to about Sidewinder Road at Pilot Knob (Sta. 1243+65), a distance of 12.56 miles. The area actually disturbed is about 50 to 75 feet wide yielding a total acreage disturbed of 76 to 114 acres. This acreage represents less than 0.1 percent of the 150,000 acres of the Algodones Dunes that provide habitat for this species. Algodones Dunes sunflower could be uprooted as a result of this activity. The remaining O&M activities are restricted to previously disturbed areas (i.e., roadways and canal embankments) where Algodones Dunes sunflower would not be expected to occur, because these areas consist of well-compacted soil that is not suitable for this species.

Over the term of the permit, IID anticipates replacing all of the structures along the AAC. Construction to replace structures could remove Algodones Dunes sunflower. Over the term of the permit, scheduled construction activities will not permanently remove more than 100 acres of native desert habitat. Impacted habitat would be distributed along the entire length of the AAC as well as along those sections of the East Highline, Westside Main, Thistle, and Trifolium canals that are adjacent to desert habitat. Potential habitat for Algodones Dunes sunflower in the HCP area is limited to the 10 miles of the AAC in the Algodones Dunes. Thus, the potential loss of habitat for Algodones Dunes sunflower would be considerably less than 100 acres.

Under the Desert Habitat Conservation Strategy, IID would implement measures, both general and plant-specific, to avoid and minimize impacts from O&M and construction activities. For O&M activities, workers would be instructed to restrict activities to previously disturbed areas so as to minimize intrusions into dune habitats where this species could occur. For construction, specific measures include preconstruction surveys, prohibiting surface disturbance within a prescribed radius of the species if it is found within the construction area, and transplanting individuals if impacts are unavoidable and transplanting is deemed appropriate by USFWS and CDFG (see Appendix C for a full listing of measures). General measures include familiarizing workers with covered plant species they are likely to encounter within the right-of-way and instructing them to avoid injuring or uprooting plants. IID also will restore any native vegetation temporarily impacted by construction and compensate for unavoidable and permanent impacts to vegetation by acquiring or granting a conservation easement on land at a 1:1 ratio for the acreage impacted.

Covered activities conducted by IID have the potential to take Algodones Dunes sunflower in the immediate vicinity of the AAC. Habitat for Algodones Dunes sunflower in the HCP area constitutes a small portion of the total habitat for this species in the Algodones Dunes. Under the HCP, IID will implement measures to minimize and avoid take of individual plants, transplant individuals if take cannot be avoided and to compensate for reductions in suitable habitat. IID has been conducting O&M and construction activities along the AAC for several decades and given the continued presence of this plant in areas adjacent to the AAC, the species appears capable of coexisting with IID’s ongoing activities. Therefore, implementation of the HCP which would serve to further reduce impacts and would not jeopardize the continued existence of Algodones sunflower.

3.6.6.16 Wiggin’s Croton

Habitat for Wiggin’s croton in the HCP area is limited to the right-of-way of the AAC where it crosses the Algodones Dunes. Several populations of the species have been found in and near the AAC right-of-way, and results of a 1993 survey by IID and Reclamation indicated occurrences of this species within the high dunes system as well as isolated populations in the smaller dunes.

The only O&M activity with the potential to impact Wiggin's croton is the canal maintenance IID conducts along the portion of the AAC that traverses the Algodones Dunes. IID annually knocks down portions of the sand dunes, creating a flatter slope that allows sand to blow across the canal. In conducting this flattening, a dozer drags an I-beam back and forth across the peaks of the dunes to level them. The area where this activity is conducted begins at the Coachella Turnout (Sta. 1907+20) and extends to about Sidewinder Road at Pilot Knob (Sta. 1243+65), a distance of 12.56 miles. The area actually disturbed is about 50 to 75 feet wide yielding a total acreage disturbed of 76 to 114 acres. This acreage represents less than 0.1 percent of the 150,000 acres of the Algodones Dunes that provide habitat for this species. Wiggin’s croton could be uprooted as a result of this activity. The remaining O&M activities are restricted to previously disturbed areas (i.e., roadways and canal embankments) where Wiggin’s croton would not be expected to occur because these areas consist of well compacted soil that is not suitable for this species.

Over the term of the permit, IID anticipates replacing all of the structures along the AAC. Construction to replace structures could remove Wiggin’s croton. Over the term of the permit, scheduled construction activities will not permanently remove more than 100 acres of native desert habitat. Impacted habitat would be distributed along the entire length of the AAC as well as along those sections of the East Highline, Westside Main, Thistle, and Trifolium canals that are adjacent to desert habitat. Potential habitat for Wiggin’s croton in the HCP area is limited to the 10 miles of the AAC in the Algodones Dunes. Thus, the potential loss of habitat for Wiggin’s croton would be considerably less than 100 acres.

Under the Desert Habitat Conservation Strategy, IID would implement measures, both general and plant-specific, to avoid and minimize impacts from O&M and construction activities. For O&M activities, workers would be instructed to restrict activities to previously disturbed areas so as to minimize intrusions into dune habitats where this species could occur. For construction, specific measures include preconstruction surveys, prohibiting surface disturbance within a prescribed radius of the species if it is found within the construction area, and transplanting individuals if impacts are unavoidable and transplanting is deemed appropriate by USFWS and CDFG (see Appendix C for a full listing of measures). General measures include familiarizing workers with covered plant species they are likely to encounter within the right-of-way and instructing them to avoid injuring or uprooting plants. IID also will restore any native vegetation temporarily impacted by construction and compensate for unavoidable and permanent impacts to vegetation by acquiring or granting a conservation easement on land at a 1:1 ratio for the acreage impacted.

Covered activities conducted by IID have the potential to take Wiggin's croton in the immediate vicinity of the AAC. Habitat for Wiggin's croton in the HCP area constitutes a small portion of the total habitat for this species in the Algodones Dunes. Under the HCP, IID will implement measures to minimize and avoid take of individual plants, transplant individuals if take cannot be avoided and to compensate for reductions in suitable habitat. IID has been conducting O&M and construction activities along the AAC for several decades and given the continued presence of this plant in areas adjacent to the AAC, the species appears capable of coexisting with IID's ongoing activities. Therefore, implementation of the HCP which would serve to further reduce impacts and would not jeopardize the continued existence of Wiggin's croton.

3.6.6.17 Giant Spanish Needle

In California, giant Spanish needle species is restricted to southeastern Imperial County, where it is primarily found in the Algodones Dunes System. Habitat for the species in the HCP area occurs in the right-of-way of the AAC where the AAC traverses the Algodones Dunes and this species has been found within the AAC right-of-way. The giant Spanish needle is not considered to be endangered, but the species is under potential threat from military activities; offroad vehicle use, habitat degradation, direct impacts resulting from infrastructure improvements (highways and utilities), and quarry and stockpile operations.

The only O&M activity with the potential to impact giant Spanish needle is the canal maintenance IID conducts along the portion of the AAC that traverses the Algodones Dunes. IID annually knocks down portions of the sand dunes, creating a flatter slope that allows sand to blow across the canal. In conducting this flattening, a dozer drags an I-beam back and forth across the peaks of the dunes to level them. The area where this activity is conducted begins at the Coachella Turnout (Sta. 1907+20) and extends to about Sidewinder Road at Pilot Knob (Sta. 1243+65), a distance of 12.56 miles. The area actually disturbed is about 50 to 75 feet wide yielding a total acreage disturbed of 76 to 114 acres. This acreage represents less than 0.1 percent of the 150,000 acres of the Algodones Dunes that provide habitat for this species. Giant Spanish needle could be uprooted as a result of this activity. The remaining O&M activities are restricted to previously disturbed areas (i.e., roadways and canal embankments) where giant Spanish needle would not be expected to occur because these areas consist of well compacted soil that is not suitable for this species.

Over the term of the permit, IID anticipates replacing all of the structures along the AAC. Construction to replace structures could remove giant Spanish needle. Over the term of the permit, scheduled construction activities will not permanently remove more than 100 acres of native desert habitat. Impacted habitat would be distributed along the entire length of the AAC as well as along those sections of the East Highline, Westside Main, Thistle, and Trifolium canals that are adjacent to desert habitat. Potential habitat for giant Spanish needle in the HCP area is limited to the 10 miles of the AAC in the Algodones Dunes. Thus, the potential loss of habitat for giant Spanish needle would be considerably less than 100 acres.

Under the Desert Habitat Conservation Strategy, IID would implement measures, both general and plant-specific, to avoid and minimize impacts from O&M and construction activities. For O&M activities, workers would be instructed to restrict activities to previously disturbed areas so as to minimize intrusions into dune habitats where this species could occur. For construction, specific measures include preconstruction surveys, prohibiting surface disturbance within a prescribed radius of the species if it is found within the construction area, and transplanting individuals if impacts are unavoidable and transplanting is deemed appropriate by USFWS and CDFG (see Appendix C for a full listing of measures). General measures include familiarizing workers with covered plant species they are likely to encounter within the right-of-way and instructing them to avoid injuring or uprooting plants. IID also will restore any native vegetation temporarily impacted by construction and compensate for unavoidable and permanent impacts to vegetation by acquiring or granting a conservation easement on land at a 1:1 ratio for the acreage impacted.

Covered activities conducted by IID have the potential to take giant Spanish needle in the immediate vicinity of the AAC. Habitat for giant Spanish needle in the HCP area constitutes a small portion of the total habitat for this species in the Algodones Dunes. Under the HCP, IID will implement measures to minimize and avoid take of individual plants, transplant individuals if take cannot be avoided, and compensate for reductions in suitable habitat. IID has been conducting O&M and construction activities along the AAC for several decades and given the continued presence of this plant in areas adjacent to the AAC, the species appears capable of coexisting with IID’s ongoing activities. Therefore, implementation of the HCP which would serve to further reduce impacts and would not jeopardize the continued existence of giant Spanish needle.

3.6.6.18 Sand Food

The sand food is a perennial root parasite that occurs on sand dunes or in sandy areas in association with creosote scrub at elevations below 650 feet above sea level. Habitat for the species in the HCP area is restricted to the right-of-way of the AAC where it crosses the Algodones Dunes. The species was observed near the proposed AAC parallel canal during 1994 surveys. This species is considered rare throughout its range, and is limited by the availability of suitable habitat and host plants, both of which have been reduced in extent or degraded by various land uses, including military and recreational vehicular activities, bulldozing and clearing of native dune vegetation, agriculture, and invasion of dunes by nondune species.

The only O&M activity with the potential to impact sand food is the canal maintenance IID conducts along the portion of the AAC that traverses the Algodones Dunes. IID annually knocks down portions of the sand dunes, creating a flatter slope that allows sand to blow across the canal. In conducting this flattening, a dozer drags an I-beam back and forth across the peaks of the dunes to level them. The area where this activity is conducted begins at the Coachella Turnout (Sta. 1907+20) and extends to about Sidewinder Road at Pilot Knob (Sta. 1243+65), a distance of 12.56 miles. The area actually disturbed is about 50 to 75 feet wide yielding a total acreage disturbed of 76 to 114 acres. This acreage represents less than 0.1 percent of the 150,000 acres of the Algodones Dunes that provide habitat for this species. Sand food could be uprooted as a result of this activity. The remaining O&M activities are restricted to previously disturbed areas (i.e., roadways and canal embankments) where sand food would not be expected to occur because these areas consist of well compacted soil that is not suitable for this species.

Over the term of the permit, IID anticipates replacing all of the structures along the AAC Construction to replace structures could remove sand food. Over the term of the permit, scheduled construction activities will not permanently remove more than 100 acres of native desert habitat. Impacted habitat would be distributed along the entire length of the AAC as well as along those sections of the East Highline, Westside Main, Thistle, and Trifolium canals that are adjacent to desert habitat. Potential habitat for sand food in the HCP area is limited to the 10 miles of the AAC in the Algodones Dunes. Thus, the potential loss of habitat for sand food would be considerably less than 100 acres.

Under the Desert Habitat Conservation Strategy, IID would implement measures, both general and plant-specific, to avoid and minimize impacts from O&M and construction activities. For O&M activities, workers would be instructed to restrict activities to previously disturbed areas so as to minimize intrusions into dune habitats where this species could occur. For construction, specific measures include preconstruction surveys, prohibiting surface disturbance within a prescribed radius of the species if it is found within the construction area, and transplanting individuals if impacts are unavoidable and transplanting is deemed appropriate by USFWS and CDFG (see Appendix C for a full listing of measures). Because it is parasitic on creosote bush, individual sand food plants would need to be transplanted along with its host plant. General measures include familiarizing workers with covered plant species they are likely to encounter within the right-of-way and instructing them to avoid injuring or uprooting plants. IID also will restore any native vegetation temporarily impacted by construction and compensate for unavoidable and permanent impacts to vegetation by acquiring or granting a conservation easement on land at a 1:1 ratio for the acreage impacted.

Covered activities conducted by IID have the potential to take sand food in the immediate vicinity of the AAC. Habitat for sand food in the HCP area constitutes a small portion of the total habitat for this species in the Algodones Dunes. Under the HCP, IID will implement measures to minimize and avoid take of individual plants, transplant individuals if take cannot be avoided, and compensate for reductions in suitable habitat. IID has been conducting O&M and construction activities along the AAC for several decades and given the continued presence of this plant in areas adjacent to the AAC, the species appears capable of coexisting with IID’s ongoing activities. Therefore, implementation of the HCP would serve to further reduce impacts and would not jeopardize the continued existence of sand food.

3.7 Species-Specific Conservation Strategies

3.7.1 Burrowing Owls

Burrowing owls commonly inhabit the earthen banks of agricultural canals and drains in the HCP area. Drain and canal maintenance activities have the potential to affect burrowing owls. These routine activities can trap owls in their burrows or injure individuals. Construction activities such as reservoir construction and canal structure projects can adversely affect burrowing owls in similar ways. If concentrated near an occupied burrow, construction activities also can disturb owls and potentially lead to nest abandonment.

Although individual owls can be at risk to injury or disturbance, maintenance activities are ultimately beneficial to owls. Burrowing owls require sparsely vegetated areas with friable soil suitable for burrowing by burrowing mammals. Drain and canal maintenance activities create these conditions as vegetation is removed and friable soils are maintained. The high availability of suitable burrow locations provided by the drains and canals, adjacent to foraging habitat provided by the agricultural fields contributes to the maintenance of a high population of owls in the Imperial Valley. As such, the Burrowing Owl Conservation Strategy focuses on continuing the activities that provide suitable habitat conditions for burrowing owls, while minimizing the potential to take individuals. The overall biological goal of the Burrowing Owl Conservation Strategy is to maintain a self-sustaining population of burrowing owls across the current range of the owl encompassed by the HCP area. The specific objective is to maintain adequate burrow availability and community parameters (e.g., burrowing mammals, foraging habitat), to the extent that IID can influence these parameters, at levels to support the initial distribution and relative abundance of owls on lands covered by the HCP and affected by the covered activities. The specific actions that IID will undertake to achieve this objective are detailed below. These measures apply throughout the HCP area, including the rights-of-way of the AAC, East Highline, and Westside Main Canals.

Owl–1. *IID will implement a worker education program. Workers responsible for drain cleaning or conveyance system maintenance will be required to attend a worker education program to ensure proper implementation of the HCP measures addressing burrowing owls. Workers will be instructed on the requirements of the HCP within six months of issuance of the incidental take permit. The worker education program will be conducted at least annually to ensure instruction of new employees and as a refresher. For new workers, IID will ensure that they are informed of and understand the HCP requirements prior to conducting drain cleaning or conveyance system maintenance activities either individually or through the annual education program.*

- *The worker education program will instruct workers on the identification and habitat use of burrowing owls. Workers will be instructed to exercise care when operating in areas inhabited by burrowing owls so as to avoid injuring owls. Workers will be required to report any observations of dead or injured burrowing owls.*

- *The worker education program also will provide instruction on drain cleaning procedures required by the HCP (see Owl–2 and Owl–3) and procedures for conducting conveyance system maintenance (see Owl–4 and Owl–5). A worker education manual will be prepared and distributed to each person conducting drain cleaning or conveyance system maintenance activities. The manual will include a photograph/drawing of a burrowing owl and brief information on its identification. The manual also will summarize the HCP's requirements for drain cleaning and conveyance system maintenance for easy reference. Concurrence of the manual will be gained from the USFWS and CDFG. The manual will be reviewed annually and updated as appropriate.*

The primary concern for burrowing owls relates to O&M activities. The effectiveness of avoidance and minimization measures (Owl–2, Owl–3, Owl–4, and Owl–5) will depend on workers being able to recognize burrowing owls and understand the requirements of the HCP with respect to burrowing owls. A worker education program is critical to ensuring that measures are implemented properly and the benefits to burrowing owls are realized.

Owl–2. *Immediately prior to initiating drain or canal cleaning operations, the equipment operator will make a visual inspection of banks to identify burrows in the section to be cleaned. The equipment operator will look for burrows from the side of the drain/canal opposite the side where the equipment will be operated. The location of burrows will be indicated with paint or other temporary method for reference during drain cleaning. All burrows of suitable size for burrowing owls will be identified and avoidance measures followed regardless of use by burrowing owls. In conducting drain/canal cleaning,*

- *The operator will avoid collapsing or filling burrows.*
- *The operator will exercise care in removing sediment from the drain/canal and depositing spoils on the bank so as to avoid moving the excavator bucket directly over a burrow.*

The HCP Implementation Biologist and maintenance workers will work together to develop standard operating procedures for drain and canal cleaning. The standard operating procedures will be developed within one year of issuance of the incidental take permit and refined and updated based on monitoring results (see Chapter 4). Workers will be instructed in the standard operating procedures through the worker education program (Owl–1).

To minimize the potential for drain and canal cleaning activities to impact individual owls, the workers conducting this maintenance will inspect areas to be cleaned and avoid burrows during their cleaning operations. The primary concern for drain and canal cleaning activities is the potential for an occupied burrow to be filled or collapsed resulting in entrapment of owls in the burrow. Drain and canal cleaning activities have the potential to fill or collapse burrows if vegetation and soil are removed in the immediate vicinity of the burrow or if sediment falls from the bucket as the excavator operator swings the bucket from the drain bottom to the drain bank. Under this measure, these potential effects will be avoided or minimized. All burrows, regardless of occupancy by owls, will be treated in this manner, thus avoiding impacts to owls inhabiting the burrows at the time of drain or canal cleaning and maintaining the availability of burrows for future use.

As part of the worker education program (Owl–1), workers will be instructed on the identification of owls and their burrows as well as standard operating procedures for drain and canal cleaning developed under Owl–2. The worker education program will ensure that workers can identify burrows suitable for burrowing owls, understand the requirements under Owl–2, and know the proper techniques for cleaning drains and canals in areas supporting burrowing owls.

Owl–3. *When grading spoils from drain or canal cleaning, the soil to be graded will first be rolled away from the channel and broken up into small clods and slowly rolled back towards the channel. Care will be taken to not roll the soil back down the slope.*

When drains and canals are cleaned, the spoils are deposited on the roadway adjacent to the drain or canal. After the spoils have dried, they are graded to a level surface. Owls inhabiting burrows in the drain bank can be trapped in their burrow if the spoils are allowed to roll down the drain bank and block the burrow entrances. This measure reduces the potential for this impact to occur. Workers conducting the drain or canal cleaning will be instructed (Owl–1) in the appropriate techniques for grading spoils as part of the worker education program.

Owl–4. *Burrows in drain and canal banks will be left undisturbed where they do not compromise the integrity of the channel embankment or channel lining. When burrows must be filled to maintain the integrity of the channel, the corrective actions will be conducted during October through February. Prior to filling a burrow, the HCP Implementation Biologist will ensure that owls are not present in the burrow by using one of the techniques detailed in Appendix D.*

In the HCP area, burrowing owls often inhabit burrows in canal banks behind concrete lining on the canals. If burrows become large, they can weaken the concrete lining or the canal embankment and ultimately cause lining failures and leaks in the canal. Similarly, drain embankments can be weakened by burrows. IID fills in burrows to prevent the development of leaks and more costly repairs as part of its O&M activities on the conveyance and drainage system. Under this measure, IID will allow burrows to persist in canal and drain banks as long as they do not jeopardize the integrity of the lining or embankment. As part of the worker education program (Owl–1), workers will be instructed on the conditions under which a burrow poses a threat to a channel's integrity and when burrows do not pose a threat and, therefore, are to be left undisturbed. Through this measure, IID will reduce impacts of conveyance and drainage system maintenance activities on owls and burrow availability, and promote persistence of burrowing owls in the HCP area.

Owl–5. *Prior to replacing facilities or constructing new facilities, workers will coordinate with the HCP Implementation Biologist. Replacement and construction of facilities consists of installing system-based water conservation measures, rerouting drains and canals, replacing concrete lining on canals, conducting seepage maintenance, and replacing structures. The workers will inform the biologist of the location and type of work required and work with the biologist to schedule the work. The biologist will determine if burrows occupied by burrowing owls would be filled or collapsed by the required work. If occupied burrows would be affected, the work will be scheduled to occur during October through February. Prior to conducting the work, the HCP Implementation Biologist will ensure that owls are not present in the burrow by using one of the techniques detailed in Appendix D. If no occupied burrows are found, the burrows will be made inaccessible to owls and work can proceed at any time.*

In the HCP area, burrowing owls often inhabit burrows in canal embankments or in association with structures required to convey irrigation and drainage water. Sections of concrete lining need to be replaced to prevent or repair leaks and to maintain the smooth flow of water. When leaks occur, embankments need to be cored and new material added to repair the embankment. Structures need to be replaced periodically to maintain proper functioning of the conveyance and drainage systems. Burrows can be filled in conducting these actions and owls occupying burrows in these areas can be killed or injured.

Other covered activities that could fill or collapse burrows and impact owls are:

- Installation of canal lining
- Installation of lateral interceptors and reservoirs
- Installation of seepage recovery systems
- Canal rerouting
- Drain rerouting

As explained below, these activities are expected to have only minor effects on burrowing owls.

About 537 miles of IID's canal system are currently unlined. IID could pursue lining the unlined portions of the conveyance system during the permit term. Although lining the remaining unlined portions of the canal system could displace many owls, only 1.74 miles of canals currently have been identified for lining under the water conservation and transfer program. Rosenberg and Haley (2001) estimated the density of burrowing owls in Imperial Valley at 4.7 pairs/mile. Based on this estimate, lining 1.74 miles of canal could displace 16 owls (8 pairs) and temporarily reduce burrow availability. After the lining is completed, burrowing mammals would be expected to create new burrows along the newly lined canal and replace any burrows impacted during the lining process.

Lateral interceptors and reservoirs would be installed in agricultural fields (see Figure 1.7-5). Burrows used by burrowing owls are located along drains and canals, rather than within an agricultural field. Because the new interceptors and canals would be located in agricultural fields, the potential for impacts to burrowing owls is low. Construction of these new features could increase nesting opportunities for burrowing owls because additional canals (i.e., the lateral interceptors) would be constructed. Construction of the entire lateral interceptor system identified (see Table 1.7-3) would result in about 72 additional miles of canals. As burrows are created by burrowing mammals in the new canals, burrow availability for owls would increase.

Seepage recovery systems are contemplated along the East Highline Canal. Areas where seepage recovery systems would be installed probably provide poor habitat conditions for burrowing owls. The areas proposed for seepage recovery systems contain moist soils because of the seepage and most support dense vegetation (see Figure 2.3-6). These characteristics are not conducive to burrowing owls and no owls were observed in May 2001 when the proposed locations where visited. Thus, impacts to burrowing owls from installation of seepage recovery systems are expected to be low.

On average, IID reroutes about 0.25 mile of canal and about 0.2 mile of drains every year. In rerouting a canal or drain, the existing drain or canal is abandoned and a new drain or canal constructed. Abandonment of a canal or drain could result in the loss of burrows for owls. Assuming a density of 4.7 pairs/miles (Rosenberg and Haley 2001), about four owls (two pairs) could be displaced by drain and canal rerouting each year. Drain and canal rerouting would not result in a permanent loss of habitat for owls. The newly constructed drain or canal sections would replace the habitat lost from abandoning canal or drain sections.

Under this measure, the HCP Implementation Biologist and workers will work closely to ensure that owls are removed from the work area prior to the start of activities and repairs are scheduled to avoid the owl's breeding period. Thus, through this measure, IID will minimize the potential for take of owls by these activities.

Owl–6. *IID will not change its current drain and canal maintenance techniques to techniques that are not compatible with burrowing owls. IID will not implement any drain and canal maintenance techniques that may affect burrowing owl habitat beyond those currently employed without receiving concurrence from USFWS and CDFG that the new techniques are compatible with the maintenance of burrowing owl habitat.*

Currently, IID's drain and canal maintenance activities create suitable habitat conditions for burrowing owls. Burrowing owls require sparsely vegetated areas with friable soil suitable for burrowing. Drain and canal maintenance activities create ideal locations for burrows because vegetation is removed and friable soils are maintained through embankment maintenance. As long as IID continues to follow existing practices for maintaining the drains and canals, these features will continue to provide suitable habitat conditions for burrowing mammals that create burrows for owls. However, during the 75-year permit term, new technologies or practices for drain and canal maintenance could be developed that are not compatible with burrowing mammals or burrowing owls. Incompatible practices include those that would eliminate friable soil or sparsely vegetated conditions along the canals or drains. By committing not to employ techniques that would reduce the availability or suitability of drains and canals for burrowing mammals, IID will perpetuate the conditions that make the HCP area favorable for burrowing owls. In the event that alternative drain and canal maintenance techniques or technologies become available during the term of the permit, IID will seek concurrence from USFWS and CDFG that the new techniques are compatible with maintaining habitat for burrowing mammals and burrowing owls. This will give IID the opportunity to take advantage of more efficient techniques and technologies in the future and provide USFWS and CDFG with the ability to ensure that maintenance techniques remain compatible with the biological objectives for burrowing owls.

Owl–7. *IID will conduct a relative abundance and distribution survey for the entire HCP area (see Chapter 4). After the entire HCP area has been surveyed once (i.e., after 5 years), IID will conduct a demographic study of burrowing owls in the HCP area. The demographic study will continue for 12 to 15 years. The HCP IT will develop the study design and duration for the demographic study in consultation with a statistician.*

IID has been delivering water to farmers in the Imperial Valley and maintaining its drainage and conveyance system for over 75 years. The Imperial Valley supports one of the highest densities of burrowing owls and supports much higher densities than in nearby native desert habitat (Rosenberg and Haley 2001). These observations suggest that the high density of burrowing owls is a consequence of agriculture in combination with IID's drainage and conveyance system operation and maintenance. The burrowing owl population has persisted in the Imperial Valley for many years. Agriculture and IID's activities have made positive contributions to this persistence.

With this measure, IID will conduct a demographic study to assess the status of the burrowing owl population in the HCP area. Under the demographic study, several areas within the HCP area will be intensively studied. The specific areas will be identified following results of the first complete relative abundance and distribution survey (see Chapter 4). The HCP Implementation Team will develop the final study design to develop a life table and annual growth rate (λ). The results of the demographic study will be used in the monitoring and adaptive management program (see Chapter 4).

Owl–8. *For activities that would permanently eliminate burrows suitable for burrowing owls as determined by the HCP Implementation Biologist, IID will determine if owls are currently using burrows that would be impacted. If owls are not using burrows that would be impacted, the burrows will be made inaccessible to owls and the activity may proceed at any time. If owls are using burrows that would be impacted, IID will conduct the activity during October through February and prior to the start of the activity, the HCP Implementation Biologist will ensure that owls are not present in the burrows using one of the methods described in Appendix D. For every impacted burrow regardless of whether owls are currently using the burrows, IID will install two replacement burrows in areas deemed appropriate by the HCP IT.*

Covered activities with the potential to permanently eliminate burrows include:

- Converting an open drain into a pipeline drain
- Constructing control houses as part of facility automation
- Developing facilities to support fishing, wildlife viewing, picnicking, and related activities at IID facilities

Most of IID’s drainage system consists of open drains. Burrowing owls commonly inhabit the inside banks of the drain. At a farmer’s request, IID will install a pipeline to carry drain water thereby allowing the farmer to use the land occupied by the drain. Installing a pipeline to carry drain water eliminates existing burrows in the drain banks and prohibits the development of burrows in the future. Very little of the drainage system is in pipes, and minimal additional piping of drains is anticipated over the term of the permit.

As part of its system improvements, IID will automate operation of various structures. Automation includes construction of a control house and a surrounding gravel access and parking area. Less than a 1-acre area is disturbed for construction of these facilities. If burrows occur in the footprint of the control house and access/parking areas, they would be permanently lost as burrowing mammals could not recreate burrows within the footprint. In this event, the loss of burrows would be mitigated according to Owl–8. However, construction of control houses is not anticipated to eliminate burrows or to impact burrowing owls because: (1) IID will have flexibility in the exact location of the facilities and therefore will be able to avoid areas inhabited by owls, and (2) the facilities will be located outside of the embankments of the canals and drains and thereby avoid where most of the owl burrows occur.

Construction of recreational facilities also could result in the permanent loss of burrows. IID does not currently plan to construct additional recreational facilities but could do so over the term of the HCP. Potential new recreational facilities would be associated with IID’s facilities and would consist of very small structures such as picnic tables, information kiosks, and restroom facilities. Furthermore, IID would have flexibility in locating new facilities or projects and would locate and design recreational facilities so as to avoid impacts to owls. If new recreational facilities cannot be situated to avoid owl burrows, the loss of burrows would be mitigated according to Owl–8.

Under this measure, IID commits to taking actions to avoid, minimize, and compensate the potential effects to burrowing owls from activities that could reduce the availability of burrows. If occupied burrows will be impacted, IID will conduct the activities outside of the breeding season and remove owls from the burrows that would be impacted prior to initiating the activities. IID also will create two replacement burrows for every impacted burrow as recommended in the CDFG Staff Report on Burrowing Owl Mitigation (CDFG 1995). The availability of suitable burrows is generally believed to be a limiting factor for burrowing owls although burrow availability as a limiting factor has not been investigated in the Imperial Valley. By replacing burrows that would be impacted, IID will provide alternate habitat for displaced owls. Burrowing owls are known to use artificial nest burrows at the Salton Sea NWR (Gervais et al. 2000), so owls would be expected to colonize replacement burrows created by IID.

Owl–9. *IID will implement a farmer and public education program on burrowing owls. Periodically, IID will include information on burrowing owls in water bills to farmers. The materials will provide information on the ecology and habitat use of burrowing owls, the benefits to farmers of burrowing owls in controlling agricultural pests, and farm management practices that are beneficial and detrimental to burrowing owls. IID also will make materials on burrowing owls available to the public and will take advantage of opportunities to conduct public outreach programs on burrowing owls. These materials will be prepared and distribution initiated within 1 year of issuance of the incidental take permit.*

In addition to the canals and drains maintained by IID, burrowing owls inhabit burrows along delivery ditches on private agricultural lands and use agricultural fields for foraging. By educating farmers on the benefits of burrowing owls in controlling agricultural pests and of farm management practices that are beneficial to owls, IID will contribute to the overall maintenance of burrowing owls in the HCP area. Educating the public also will contribute to maintenance of burrowing owls. For example, in Florida, Milsap and Bear (2000) found a decrease in nest failures due to harassment following implementation of a burrowing owl education program in the public schools.

3.7.1.1 Effects on Burrowing Owls

Haug et al. (1993) reported that burrowing owls have declined in abundance throughout most of their range. In the western states, 54 percent of 24 jurisdictions reported burrowing owl populations decreasing, and there were no reported increases. More recent analyses suggest that burrowing owl populations in western and midwestern portions of North America have been increasing (Sheffield 1997). Based on breeding bird survey data, the burrowing owl population in the midwestern and western portion of the United States has increased about 2 percent during 1980 to 1994. During the same period, the western states showed a 4.2 percent increase, with the population in California increasing by 6.3 percent.

The trend in burrowing owl populations in California estimated from breeding bird surveys contrasts with findings of DeSante and Ruhlen (1995). They reported the results of surveys for burrowing owls conducted throughout California except for the Great Basin and desert areas during 1991 to 1993. The surveys indicated a 37 to 60 percent decrease in the number of breeding groups since the early 1980s with the burrowing owl being extirpated from several counties (i.e., Marin, San Francisco, Santa Cruz, Napa Ventura, and coastal San Luis Obispo) and nearly extirpated from several additional counties (i.e., Sonoma, Orange, and coastal Monterey). Development is believed to have been the primary cause of the extirpation and decline of burrowing owls in these counties. However, they also found a nonsignificant increase in the number of pairs of burrowing owls of 3.1 percent between 1991 and 1992 and a significant increase in the number of pairs of 19 percent between 1992 and 1993. DeSante and Ruhlen (1995) attributed their results to losses of small breeding groups, but increases in the size of large breeding groups.

Burrowing owls occur at a very high density in the Imperial Valley. The density of burrowing owls in Imperial County surpasses that of any other single county (Reclamation and SSA 2000). A high density of burrowing owls also was noted in the late 1960s (Coulombe 1971). An estimated 6,429 pairs of burrowing owls inhabit the Imperial Valley representing 69 percent of the estimated total population in California (Shuford et al. 1999). This population level translates into a density of about 236 pairs per 60 square miles (DeSante and Ruhlen 1995). For comparison, the average density of burrowing owls in other lowland areas in California was estimated at 11.9 pairs per 60 square miles (DeSante and Ruhlen 1995).

The reasons for the very high density of burrowing owls in the Imperial Valley have not been determined. In the Imperial Valley, insects are the primary prey of burrowing owls (Coulombe 1971, Rosenberg et al. 2000) suggesting that the year-round agriculture in Imperial Valley could result in the area providing a consistently high biomass of insects. IID’s extensive drain and canal system also could play a role in maintaining a high burrowing owl density in the Imperial Valley. Burrowing owls are dependent on burrows created by other agents. Rosenberg and Haley (2001) identified water seepage, muskrats, and gophers as the primary agents creating burrows used by burrowing owls in the Imperial Valley. Some burrows used by burrowing owls were formed by round-tailed ground squirrels. The banks of the canals and drains are maintained clear of vegetation, creating suitable conditions for burrow construction by burrowing mammals and owls commonly inhabit canal and drain banks. Hurlbert (1997) found the greatest number of burrowing owls along drains with the least amount of vegetation, although burrowing owls were present along all of the drains surveyed.

Drain and canal maintenance activities can pose a risk to burrowing owls, such as trapping owls in their burrows. In conducting mechanical vegetation control in drains, an excavator, operated from the drain bank, is used to scrape vegetation from the side and bottom of the drain in the channel bottom. Canal embankments are maintained free of vegetation by chaining, disking, side scraping, and use of Roundup®, Rodeo®, and Direx®.

Under the HCP, IID will implement a worker education program and commit to precautions to reduce the potential for owls to be injured during maintenance operations. Although individuals could be affected by drain and canal embankment maintenance activities, the population in the Imperial Valley is expected to remain at its currently high density for several reasons. First, burrowing owls occur at high densities in the Imperial Valley concurrently with drain and canal maintenance activities and the Imperial Valley has supported a high density of burrowing owls for several decades (Coulombe 1971; DeSante and Ruhlen 1995). Second, Hurlbert (1997) found a greater number of owls along drains with little vegetation suggesting that drain maintenance activities that clear vegetation could overall be beneficial to burrowing owls. Drain banks and canal embankments free of vegetation are favorable to burrowing owls because they provide suitable burrowing locations as well as potentially reduce predation risk by eliminating cover for predators and edges where predators often forage (Warnock and James 1997). Third, IID only cleans about one-fifth of its drain system a year and drain maintenance is focused in areas with accumulations of vegetation or sediment, areas less likely to support large numbers of burrowing owls than bare banks. Thus, in any given year, most burrowing owls would be unaffected by drain maintenance activities. All of these factors suggest that existing drain maintenance practices are consistent with the persistence of burrowing owls in the Imperial Valley.

IID currently maintains canal and drain embankments free of vegetation through a combination of mechanical and chemical methods. These methods create barren banks that attract burrowing mammals that subsequently create burrows that burrowing owls use. While it is currently anticipated that IID will continue to use these methods for drain and canal maintenance, new technology or techniques could be developed in the future. Under the HCP, IID will commit to not changing drain and canal maintenance practices in a manner that would render canal and drain embankments unsuitable for burrowing mammals and burrowing owls. By not employing drain or canal maintenance practices that are incompatible with burrowing owls, IID will ensure that suitable conditions for burrows persist in the HCP area for the term of the permit.

3.7.2 Desert Pupfish

Desert pupfish have become established in many of the drains constructed and maintained by IID that discharge directly via gravity into the Salton Sea. Although IID routinely maintains adequate drainage in these channels by removing vegetation and sediment, these drains provide the habitat conditions (e.g., water quality, food source, and aquatic vegetation) necessary to support pupfish. IID's maintenance activities, while likely necessary to maintain the habitat characteristics necessary to support pupfish, have the potential to result in the incidental take of pupfish. In addition, implementation of water conservation projects has the potential to change water quality in the drains occupied by pupfish and to adversely affect pupfish. The potential effects of each of the covered activities on desert pupfish is presented in Table 3.7-1.

The biological goal of the desert pupfish conservation strategy is to maintain viable populations of desert pupfish in the HCP area. This will be accomplished by maintaining or increasing pupfish habitat in IID's drains relative to the current levels (i.e., no net loss) and to minimizing the potential for IID's drain maintenance and construction activities, and the water conservation program to result in the incidental take of desert pupfish. As previously described, this goal is augmented and supported by the Salton Sea measures designed to maintain connectivity among drain populations of pupfish and to promote recovery by establishing additional population refugium.

TABLE 3.7-1
Potential Effects of Covered Activities on Desert Pupfish

Activity	Potential Effects (Positive and Negative)
Water Use and Conservation	
Combined effects of on-farm and system-based water conservation	Water conservation would reduce flow in the drains. However, water elevation in the portion of the drains occupied by pupfish is near level and not controlled by flow. A decrease in flow to these portions of the drain would reduce water velocity but not water height or the wetted area of the drain. Water conservation would result in increased concentration of selenium in the drains, which could result in impairment of pupfish reproduction.
Combined effects of fallowing to conserve water	Fallowing to conserve water would reduce flow in drains; however, water quality (e.g., selenium concentrations) would not be affected. Because pupfish habitat in the drains is not controlled by flow and water quality would not change, water conservation through fallowing would not likely affect pupfish.
Installation of on-farm water conservation features	On-farm water conservation practices would be constructed within agricultural fields or their margins and therefore would not likely affect drain habitat or pupfish.
Installation of System-based Water Conservation Features	
Canal lining and piping	Canal lining or piping results in modifications to canals with no physical changes to the pupfish drains. Therefore, canal lining or piping would not likely affect desert pupfish.
Construction of new canals	New canals would be constructed through agricultural fields and would tie into the existing canal system. Modifications, if any, to drains would occur where a crossing was necessary for the canal and one did not already exist. The drains occupied by pupfish are located in the terminal portion of the drain system, downstream of the last delivery gate. Therefore, it is unlikely that new canals would be constructed in areas occupied by desert pupfish.
Lateral interceptors	Lateral interceptors would be constructed in agricultural fields but would cross some drains. The construction of lateral interceptors is not anticipated in the portions of drains occupied by pupfish.
Reservoirs	IID could construct up to 100 reservoirs 1 to 10 acres in size, and encompassing up to 1,000 acres. These reservoirs would be on agricultural lands or barren lands and would not impact drain habitat or pupfish. Farmers are expected to construct 1- to 2-acre reservoirs to better regulate irrigation water. These reservoirs would be installed in agricultural fields and would not impact drain habitat or pupfish.
Seepage recovery systems	Seepage recovery systems are proposed along the East Highline Canal. Desert pupfish do not inhabit areas along the East Highline Canal and would not be affected by seepage recovery systems.
Operation and Maintenance	
Conveyance system operation	Conveyance system operation is limited to moving water through the canals to meet maintenance and customer needs. Other than the filling, draining and moving water through the canals, no physical effects are encompassed by conveyance system operation. No effects to drain habitat or desert pupfish would be expected.

TABLE 3.7-1
Potential Effects of Covered Activities on Desert Pupfish

Activity	Potential Effects (Positive and Negative)
Drainage System Operation	
Rerouting or constructing new drains	IID reroutes or constructs about 2 miles of drains every 10 years. Newly constructed drains that discharge directly to the Salton Sea could increase habitat for desert pupfish. Rerouting drains would not change the amount of pupfish drain habitat; however, rerouting drains could result in the temporary reduction in vegetation in the drains during the period between abandonment of the old drain and when vegetation develops in the rerouted drain. Pupfish drains represent a small fraction (0.009) of the drainage system. If pupfish drains were rerouted in proportion to the overall drainage system, approximately 750 feet of pupfish drain would be rerouted over the 75-year term.
Piping drains	Over the 75-year term IID anticipates that about 50 miles of open drains would be pipelined, with an annual average of 0.67 mile of drain piping. Assuming pupfish drains would be piped in proportion to the overall drainage system, about 0.45 mile of pupfish drain would be piped. All pupfish habitat within drains converted to pipes would be lost.
Inspection activities	Potential effects of inspection activities would be limited to a minor potential for disturbance of covered species if they occur in the vicinity of structures at the time of inspection. Because pupfish habitat in the drains only occurs in the terminal portion of the system downstream of the last check, inspection activities likely would be restricted to only one location (i.e., the check structure) on each pupfish drain.
Canal lining maintenance	Canal lining maintenance consists of repairing the concrete lining of canals only with no physical changes to drains. Therefore, canal lining maintenance would not likely affect drain habitat or desert pupfish habitat.
Right-of-way maintenance Embankment maintenance Erosion maintenance	Along drains, right-of-way maintenance, including embankment and erosion maintenance is conducted in association with vegetation control/sediment removal along drains. Potential impacts to pupfish resulting from these activities are encompassed by those described under vegetation control.
Seepage maintenance	Seepage maintenance is conducted only along the canal system. Therefore, seepage maintenance would not likely affect drain habitat or desert pupfish.
Structure maintenance	IID estimates that about 100 drainage structures would be replaced each year throughout the drainage system. On average, less than one drain structure would be replaced each year in drains occupied by pupfish. Pupfish in the vicinity of the maintenance could be disturbed or injured if they remained in near the construction site.
Pipeline maintenance	Drain pipelines primarily occur in farm fields while conveyance system pipelines occur through developed areas. Neither of these areas support desert pupfish.
Reservoir maintenance	Reservoirs are located on the conveyance system. Desert pupfish are not associated with reservoirs; thus they would not be affected by reservoir maintenance.
Sediment removal	IID removes sediment from about 20 percent of the drains annually (about 3 miles of drains potentially occupied by desert pupfish). Sediment removal temporarily reduces vegetation in the drains, increases turbidity, and disrupts the drain substrate. Sediment removal activities in the pupfish drains have the potential to disturb or injure pupfish that are unable to avoid the equipment or that find the drain temporarily uninhabitable.

TABLE 3.7-1
Potential Effects of Covered Activities on Desert Pupfish

Activity	Potential Effects (Positive and Negative)
Vegetation control	Vegetation control along canals focuses on removing moss and algae, and has little potential to affect desert pupfish in the drains. Desert pupfish are not expected to use canals because of the lack of vegetation, deep water, presence of predators, and high water velocity. Along drains, mechanical and chemical methods are used to control vegetation. Mechanical and chemical control of vegetation is conducted in association with sediment removal described above. Periodic removal of vegetation from the drains, specifically moss and algae, could adversely affect pupfish through temporarily reducing foraging habitat.
New and Alamo river maintenance	IID dredges the deltas of the New and Alamo rivers about once every four years. Desert pupfish are not believed to use the New and Alamo river deltas; thus, pupfish would not be affected by the dredging operations.
Salton Sea dike maintenance	Salton Sea dike maintenance activities consist of replacing riprap, grooming embankments and repairing damaged sections of the dikes. Pupfish are not believed to inhabit the Salton Sea in areas adjacent to the dikes; thus dike maintenance is not expected to affect pupfish.
Gravel and rock quarrying	Gravel and rock quarries do not occur in drains or immediately adjacent pupfish habitat. Thus, quarrying would not affect desert pupfish.
Fish hatchery operation and maintenance	The fish hatchery is a developed facility and does not support habitat for desert pupfish.
Recreational facilities	Because new recreational facilities would not be constructed in the drain prism, construction of recreational facilities would not be expected to affect desert pupfish. The HCP does not cover take of covered species by recreationists.

The specific goals of the desert pupfish strategy will be achieved by implementing measures that:

- Ensure that IID will operate and maintain its drainage system in a manner that will maintain current levels of pupfish drain habitat
- Minimize the effects of potential increases in the concentration of selenium and possible other contaminants in the drainage system resulting from water conservation
- Enhance the potential for increasing the amount of pupfish habitat in areas exposed as the Salton Sea recedes
- Examine the efficacy of modifying drain maintenance activities to reduce the potential for take of pupfish and adjust maintenance activities based on the findings
- Avoid or minimize the potential for take of pupfish by IID construction activities

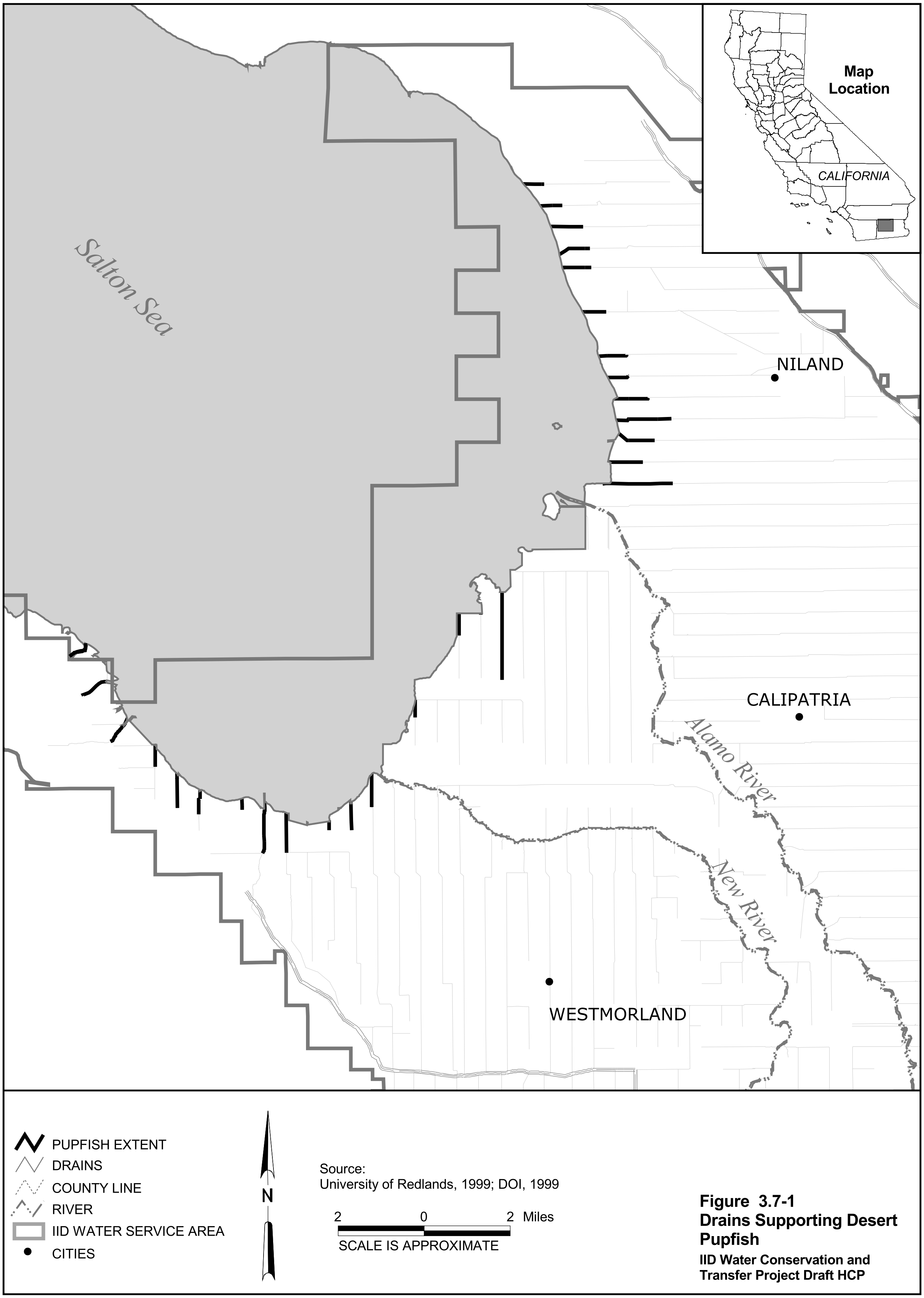
Pupfish–1. *IID will operate and maintain its existing drainage system in a manner that will maintain the amount of potential pupfish drain habitat currently available expressed as linear channel distance (i.e., no net loss of pupfish drain habitat). Currently available pupfish habitat will be defined as the portion of all IID drains and their tributaries that discharge directly to the sea from the downstream side of the first check. IID will continue to maintain at least that amount of pupfish habitat for the duration of the term of the ITPs. IID's obligation for maintaining current levels of pupfish habitat may be reduced if the HCP IT determines that portions of the defined drain sections do not contain suitable pupfish habitat.*

Various surveys conducted by CDFG and others have recorded the presence of desert pupfish in many of IID's drains that discharge directly to the Salton Sea and their tributaries (Sutton 1999). Although not native habitat, the drains provide aquatic habitat that supports pupfish and contributes to the persistence of pupfish populations in the Imperial Valley. Desert pupfish use of habitat within the drains that discharge into the Salton Sea likely is influenced by flow, water quality, vegetation, and possibly the disturbance regime established by IID's drain maintenance activities. Pupfish populations also are influenced by interactions with exotic species. Implementation of the water conservation program has the potential to influence these factors and to adversely affect the quality of pupfish habitat in the drains.

Under this measure, IID will help ensure that the amount of drain habitat currently available to pupfish will remain unchanged relative to current conditions. IID will accomplish this by operating and maintaining its drainage system in a manner that will encourage continued use of the drains by pupfish. Although the presence of pupfish in and among these drains is sporadic and variable, all drain segments extending upstream from their direct connection with Salton Sea to the first check (Figure 3.7-1) were considered potential habitat for the purpose of this measure. Based on this definition, IID's drainage system supports 13.8 miles of drain potentially used by desert pupfish.

Pupfish–2. *IID will operate and maintain its drain channels in a manner that minimizes the effects of water conservation on water quality. Based on the findings of studies to determine the effects of selenium on pupfish conducted by the USFWS or others, IID will work with the HCP Implementation Team to determine within 2 years of completion of studies the best means for managing its drain channels to minimize potential selenium effects on pupfish. If the studies are not completed within 10 years, IID and the HCP IT will use available information to determine the best means for managing its drain channels to minimize potential selenium effects on pupfish. Measures to be adopted by IID may include: splitting combined drain channels (drain/operational water) to improve water quality; providing limited biological treatment, including use of discharge from managed marsh mitigation habitat; and consolidating channels and blending flows, and could be implemented on all of the pupfish drains if necessary.*

Selenium is a naturally occurring constituent of Colorado River water that is concentrated in drain water by evaporation and transpiration in the Imperial Valley prior to discharge into the Salton Sea. Implementation of the water conservation project has the potential to influence the concentration of selenium and other contaminants in the drains occupied by desert pupfish. Under an option where fallowing is used as the mechanism for conserving water, selenium concentrations are projected to decrease on average in the pupfish drains from a baseline concentration of 4.8 ppb to 4.61 ppb (see Water Quality section of the IID *Water Conservation and Transfer Project Draft EIR/EIS*). However, water conservation options



Source:
University of Redlands, 1999; DOI, 1999

Figure 3.7-1
Drains Supporting Desert Pupfish
IID Water Conservation and Transfer Project Draft HCP

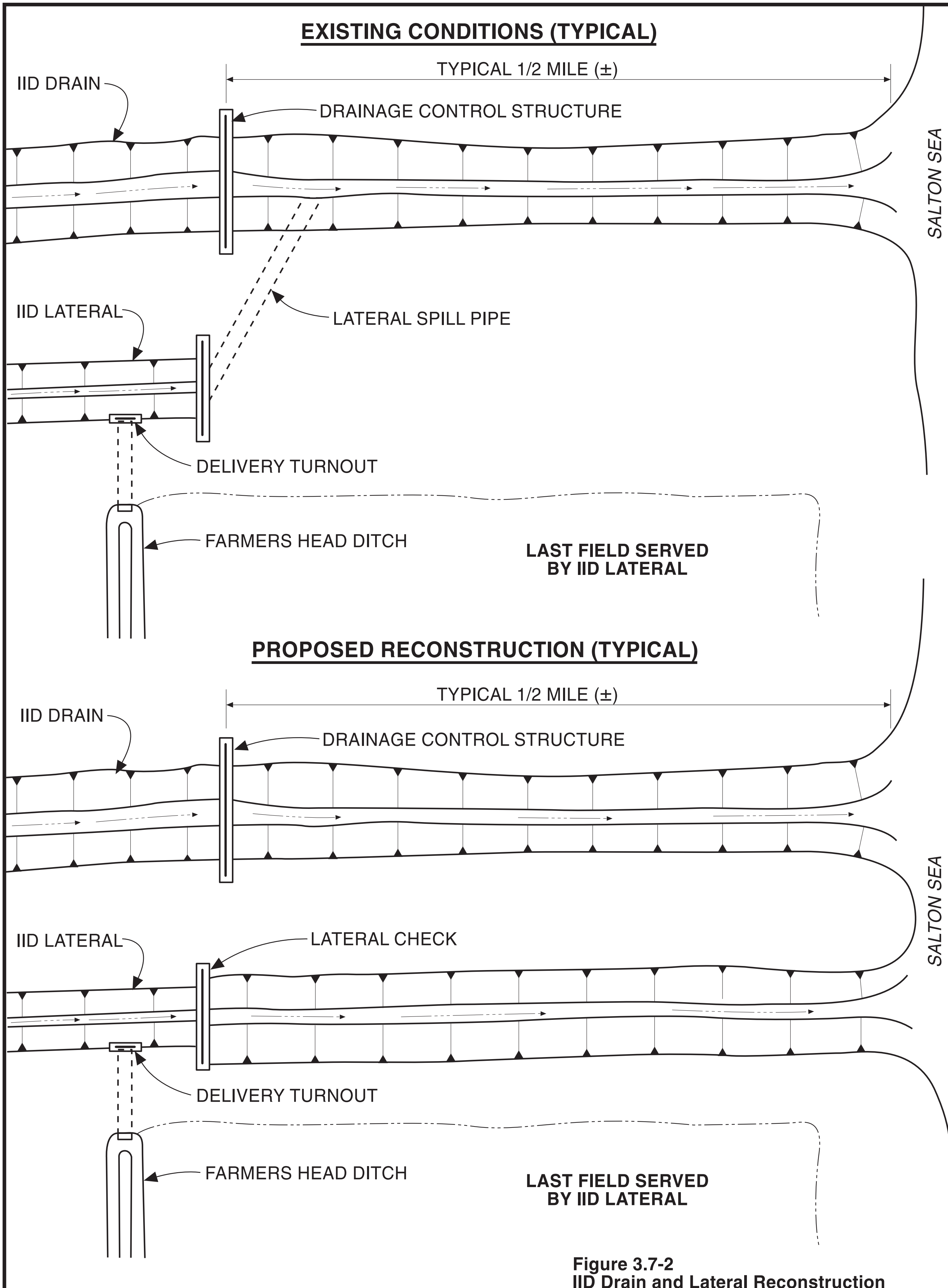
that incorporate only on-farm conservation and system improvements are projected to increase the annual average concentration of selenium from 4.8 ppb up to 6.69 ppb.

The effects of elevated selenium concentrations on pupfish reproduction and survival have not been directly assessed, and the USFWS currently is funding a study to evaluate the effects of selenium on desert pupfish. Other future studies might also evaluate the potential effects of selenium on pupfish and identify important concentration thresholds. This measure is intended to avoid or minimize the potential for increased selenium concentrations in the drains induced by water conservation to result in the incidental take of desert pupfish.

IID will monitor selenium concentrations in pupfish drains (see Section 4.6.2.1). Upon determination (as a result of the USFWS selenium study or other studies) of the effects of selenium on desert pupfish reproduction and survival, IID will work with the HCP IT to develop and implement practices to minimize the potential for incidental take of pupfish. IID has several options for reducing the selenium concentration in the drains. These practices could include splitting combined drain channels (drain / operational water) to improve water quality (Figure 3.7-2), providing limited biological treatment, including use of discharge from managed marsh mitigation habitat, and consolidating channels and blending flows. Fallowing also could be used to minimize potential increases in selenium resulting from water conservation measures.

Pupfish–3. *IID will increase the amount of potential pupfish drain habitat (expressed as linear channel distance) over the term of the HCP. This will be accomplished as the Sea recedes by extending or modifying existing IID drains, creating additional drain channels, connecting pumped drains directly to the Sea, or by maintaining the suitability of naturally created drain channels. IID's financial obligation for creating and managing additional pupfish habitat will be based on the anticipated costs necessary to double the amount of pupfish habitat in the IID drains. The design, configuration, and management of these areas will be developed jointly by the HCP Implementation Team and IID, and will be developed in consideration of the specific physical characteristics of pupfish habitat (e.g., water depth and velocity, and channel width) and water quality (e.g., turbidity and selenium concentration). IID will continue to maintain and manage created pupfish habitats for the duration of the term of the ITPs, except where maintenance or management is in conflict with the objectives of the Salton Sea Restoration Project. IID will work with the HCP IT to implement this measure.*

IID's commitment to maintain (no net loss) and manage potential pupfish drain habitat in the Imperial Valley (Pupfish–1) is intended to help ensure the persistence of pupfish populations in the Imperial Valley over the term of the HCP. The requirements of Pupfish–3 focus on maintaining current habitat in those drains that discharge directly to the Salton Sea. Under various water conservation scenarios, including no action, the surface elevation of the Salton Sea is expected to decline. As the Sea recedes, land that is currently inundated will become exposed. IID's drainage system is dependent upon gravity flow to the sea, and as the sea recedes, additional channels will be created or developed to convey drain water to the sea. IID will take advantage of the opportunity to augment the availability of pupfish habitat as the Salton Sea recedes and drains are extended. As presently projected, reductions in water surface elevation at the Sea would expose areas over which drain water will flow to the sea. Under this measure, IID will work with the HCP IT to determine the best means for facilitating and managing these drain extensions. Options for managing these channel extensions could include allowing drain water flowing from the current discharge locations to create natural channels to



NOTE: FIGURE IS NOT TO SCALE.

Figure 3.7-2
IID Drain and Lateral Reconstruction
IID Water Conservation and Transfer Project Draft HCP

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the sea or designing and actively creating channels. Channels allowed to extend naturally likely would meander over the exposed seabed, and should support conditions favorable for occupation by pupfish. However, some level of maintenance (e.g., vegetation control) likely would be required to retain the suitability of the habitat. Designed and constructed channels might be preferred or used in combination with unmanaged created channels.

In addition to the extension of drains that currently discharge to the Sea via gravity flow, a reduction of Sea elevation will allow IID to link directly to the Sea several large drains that are currently pumped (e.g., Vail Cut-Off and Pumice drains). These drains currently do not allow for movement of pupfish into the drain from the Sea. Connecting these drains directly to the Sea would provide pupfish with access to those pumped drains. Since gravity drains require less cleaning than pumped drains, more vegetative re-growth would be allowed to occur in these drains after they are opened to the Salton Sea. In addition, connection to the Sea would help prevent isolation of population segments.

IID's commitment to work with the HCP IT to actively increase pupfish habitat in areas exposed by a receding Sea will be limited by the total HCP budget. IID's financial obligation for creating and managing additional pupfish habitat will be based on the anticipated costs necessary to double the amount of pupfish habitat that currently exists in the IID drains. The HCP IT will have discretion over how the creation of additional pupfish habitat will be designed and managed. The HCP IT also will be allowed to allocate portions of the pupfish habitat budget to conducting studies to better define appropriate means for creating and managing pupfish habitat.

Pupfish–4. *IID, in coordination with the HCP IT, will develop an appropriate protocol for monitoring pupfish presence in drains maintained by IID and in drain channels constructed under Pupfish–3. In developing an appropriate protocol, the HCP IT may confer with outside scientists and/or contract with researchers to specifically study alternative monitoring approaches. The HCP IT and IID will prepare a detailed protocol for monitoring pupfish presence within 5 years of issuance of the ITPs. If the HCP IT is not able to develop a protocol within 5 years, IID will use the prevailing method for surveying for the presence of desert pupfish.*

Several measures outlined in the pupfish strategy (Pupfish–1 and –3) assume that maintaining potential habitat will ensure continued use by pupfish. Although factors beyond IID's control could influence the persistence of pupfish in the drains (e.g., competition with exotic species), routine monitoring of pupfish presence will be necessary to confirm continued use and to develop information useful in adaptively adjusting the creation and management of habitat in the future. To date, reliable techniques for capturing or monitoring pupfish populations have not been developed. Capture using baited minnow traps has been successful in demonstrating presence; however, trapping has proven to be unreliable in documenting absence. In consideration of the limitations of existing techniques, the intent of this measures is to develop an appropriate protocol for monitoring pupfish presence in drains maintained by IID and in drain channels constructed under Pupfish–3. Under this measure, the HCP IT also will develop a detailed monitoring plan to document pupfish presence in the drains (see Section 4.6.2.1). If the HCP IT cannot develop a more appropriate survey protocol, IID will use the prevailing survey method for desert pupfish.

Pupfish–5. *Within 3 years of completion of Pupfish–4, IID will initiate a study to evaluate the potential effect of routine drain maintenance on pupfish occupying the drains and to determine the efficacy of modifying maintenance practices to avoid or minimize potential take. The specific requirements of the studies will be developed by the HCP IT. In the event that the HCP IT can determine, based on the findings of the evaluation, that modification of the maintenance practices would minimize impacts to pupfish, IID will modify its maintenance practices, if practicable. Modifications in drain maintenance practices could include the timing of sediment and vegetation removal, the direction in which the drains are cleaned (i.e., upstream or downstream), and the manner in which sediment is removed from the channel (e.g., one side only).*

Desert pupfish use of habitat within the drains that discharge into the Salton Sea is influenced by flow, water quality, vegetation, and possibly the disturbance regime established by IID's drain maintenance activities. Pupfish populations also are influenced by interactions with exotic species. IID's ongoing maintenance activities and implementation of the water conservation program have the potential to influence these factors and to adversely affect the quality of pupfish habitat in the drains. While the continued long-term persistence of pupfish in IID's drains suggests that IID's drain maintenance practices (see Chapter 1 description of covered activities) are compatible with pupfish, it is possible that modification of these practices could reduce the potential for maintenance activities to take pupfish. Under this measure, IID will initiate a program to examine the effects of current drain maintenance practices on pupfish and adjust its practices based on the results of the study and the recommendations of the HCP IT. Potential modifications in drain maintenance practices could include the timing of sediment and vegetation removal, the direction in which the drains are cleaned (i.e., upstream or downstream), and the manner in which sediment is removed from the channel (e.g., one side only).

Pupfish–6. *For construction activities (i.e., in-channel modifications) that directly affect pupfish drains, IID will gradually dewater the affected drain segment in a manner that will encourage the downstream movement of pupfish out of the affected area before construction. IID will ensure that a person qualified to capture and handle pupfish and that meets the approval of the USFWS and CDFG will be present during the dewatering process to salvage and transport any pupfish stranded in the affected portion of the drain. Prior to conducting construction activities that could result in the stranding of pupfish, IID will work with the HCP IT to develop guidelines for relocating fish. Salvaged fish will be transported to a safe location downstream of the construction site or to a location determined by the HCP Implementation Team.*

Over the term of the HCP, IID anticipates that various construction activities (e.g., reservoir construction, wetland project construction, and mitigation habitat creation) might be located in areas adjacent to drains that support desert pupfish. Although it is likely that IID will have sufficient flexibility in the siting of these construction projects to avoid impacts to desert pupfish in most situations, it is reasonable to assume that it may become necessary for IID to engage in construction activities that could affect pupfish during the term of the HCP. This measure provides a process to help ensure that potential take of desert pupfish associated with these activities is minimized. Construction activities that require the dewatering or removal of drain sections have the potential to strand pupfish if access to downstream habitat is blocked or if pupfish are not given adequate time to move out of the affected site. To avoid this potential, IID will dewater the affected portion of the drain channel in a manner that allows for the downstream movement of fish out of the construction site. IID will have a person qualified to capture and handle pupfish at the construction site during the dewatering of the drain to salvage any pupfish that do not move downstream. Salvaged pupfish will be transported and released immediately downstream of the construction site or to an alternative location specified by the HCP Implementation Team.

3.7.2.1 Effects on Desert Pupfish

Implementation of the desert pupfish conservation strategy would provide an overall benefit to desert pupfish occupying drains in the HCP area. Under the conservation strategy, the amount of habitat relative to current conditions would be maintained (Pupfish–1) or increased (Pupfish–3), and the potential for adverse effects on desert pupfish resulting from the water conservation project would be avoided or minimized (Pupfish–2). The results of the studies that will be carried out under measure Pupfish–5 are expected to further benefit pupfish by providing the information necessary for IID to manage its drainage system in a manner that reduces the potential for incidental take and that encourages the continued persistence of pupfish in the Imperial Valley. Moreover, the possible reconfiguration of existing drains and creation of additional habitat is expected to significantly augment existing pupfish habitat in the Imperial Valley.

3.7.3 Razorback Sucker

Razorback suckers are known to occur in the All American and East Highline Canal systems. This species has also been found in an IID reservoir near Niland. The population in Imperial County is believed to be composed of old members of a dwindling, nonreproductive, remnant stock (Tyus 1991; Minckley et al. 1991). No recruitment of wild-spawned fish occurs.

Razorback suckers in the HCP area are isolated from the main razorback sucker population in the Colorado River and its tributaries. Because they are isolated from the main population and are not known to be reproducing, razorback suckers in the HCP area are not contributing to the overall razorback sucker population. As a result, loss of these individuals would have no effect on the razorback sucker population. Although take of individual razorback suckers in the IID canals system would not impact the species' population, IID will implement measures to minimize mortality of suckers as a result of canal dewatering.

Razorback Suckers–1. *IID will ensure that a person qualified to capture and handle razorback suckers and that meets the approval of the USFWS and CDFG will be present during the dewatering of main canals (All-American, Westside Main, East Highline, or Central Main) or reservoirs on these four canals. Any razorback suckers stranded in the affected portion of the canal will be salvaged. Salvaged fish will be transported to the Colorado River. The HCP IT will develop a procedure for salvaging and returning fish to the Colorado River consistent with other procedures for handling razorback suckers.*

This measure was derived from measures for razorback suckers required by the USFWS in the Biological Opinion for the AAC Lining Project (USFWS 1996). By salvaging any razorback suckers found in the main canals and associated reservoirs when they are dewatered and returning these fish to the LCR, loss of these could be avoided. If left in the canal system when the canal is dewatered, any suckers in the canal would certainly be lost. Under this measure, fish will be salvaged and returned to the LCR where they could contribute to the overall population.

3.8 Agricultural Field Habitat Conservation Strategy

3.8.1 Amount and Quality of Habitat in the HCP Area

Irrigated agricultural land is the dominant land cover type in the Imperial Valley, and comprises most of the HCP area. Foraging is the predominant use of agricultural fields by covered species although they are also used as resting habitats (Shuford et al. 2000). IID's Service Area encompasses approximately 500,000 acres of irrigated agriculture. The amount and types of crops grown in the HCP area varies from year-to-year and different species use different crop types. Despite this variability, a few crop types appear to be preferred by the covered species. These crops are:

- Alfalfa
- Sudan grass
- Bermuda grass
- Wheat

Historically, alfalfa has been a predominant crop in the Imperial Valley, comprising about 27 to 43 percent of the agricultural acreage (Figure 3.8-1). In contrast, the amount of Sudan grass and Bermuda grass only recently has become a significant crop in the HCP area (Figures 3.8-1 and 3.8-2). In the 1970s both of these crops comprised less than 1 percent of the agricultural acreage in the Imperial Valley, but in recent years, both have exceeded 10 percent of the agricultural acreage in the valley.

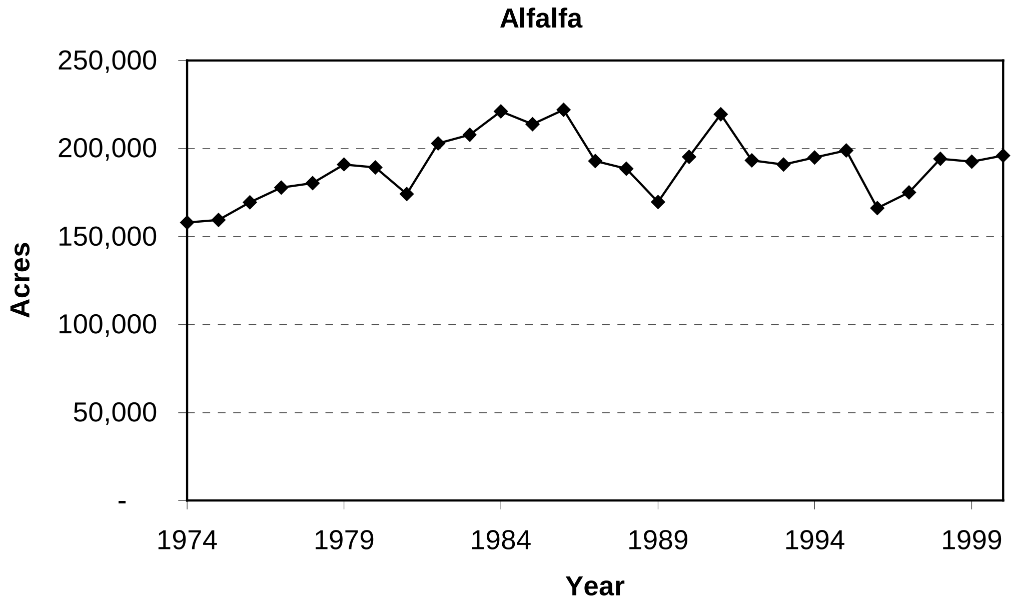
3.8.2 Effects of the Covered Activities

The acreage fallowed and resultant effects on covered species will be revised based on the revised salton sea conservation strategy.

Over the term of the permit, covered species using agricultural fields in the Imperial Valley could be directly affected by some of the covered activities. Many of the activities covered by the HCP consist of activities conducted by IID to maintain and operate its conveyance and drainage systems. These O&M activities are limited to IID's rights-of-way that are adjacent to but not within agricultural fields. As such they have very limited potential to impact a covered species. The primary activities covered by the HCP with a potential to affect species using agricultural fields are:

- Conversion of land owned by IID that is currently in agricultural production to other covered activities (e.g., creation of managed marsh habitat)
- Various construction activities that could occur in or adjacent to agricultural fields
- Water conservation measures implemented on farms, including fallowing

In addition to these activities, depending on the Salton Sea approach followed, changes in the amount of agricultural field habitat could result from implementation of the HCP as well. Table 3.8-1 summarizes the potential effects of the covered activities on species associated with agricultural field habitat. Additional discussion of those activities with the potential to affect covered species using agricultural fields is provided following the table.



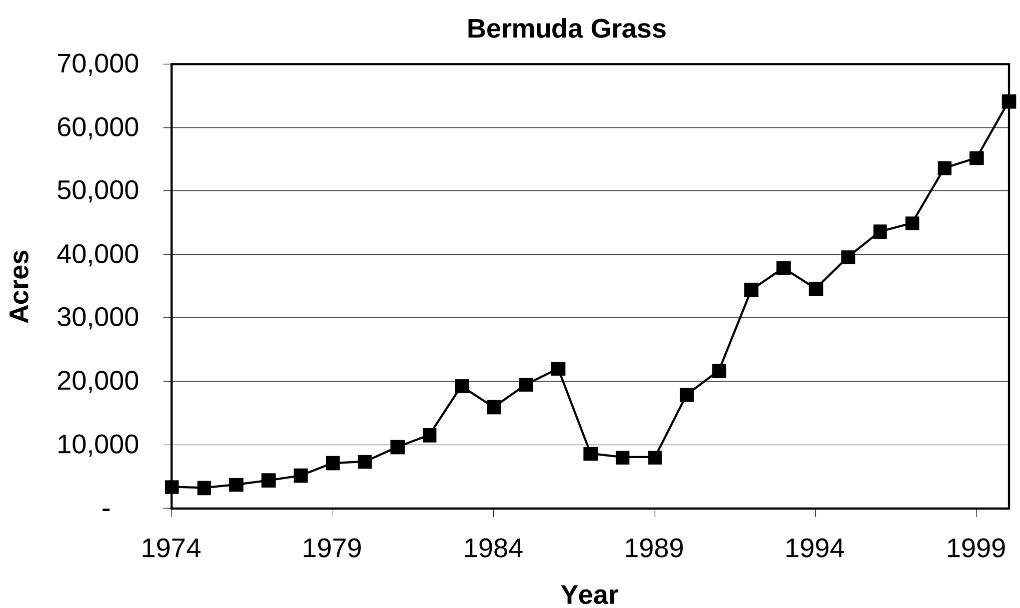
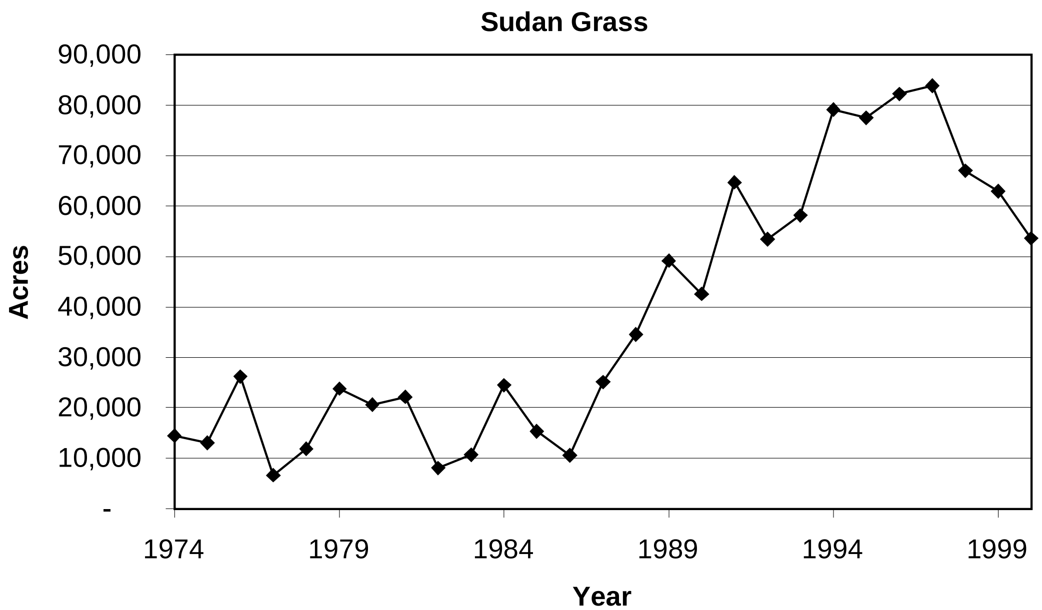


FIGURE 3.8-1
Historic Acreages of Alfalfa and Bermuda Grass in the Imperial Valley.



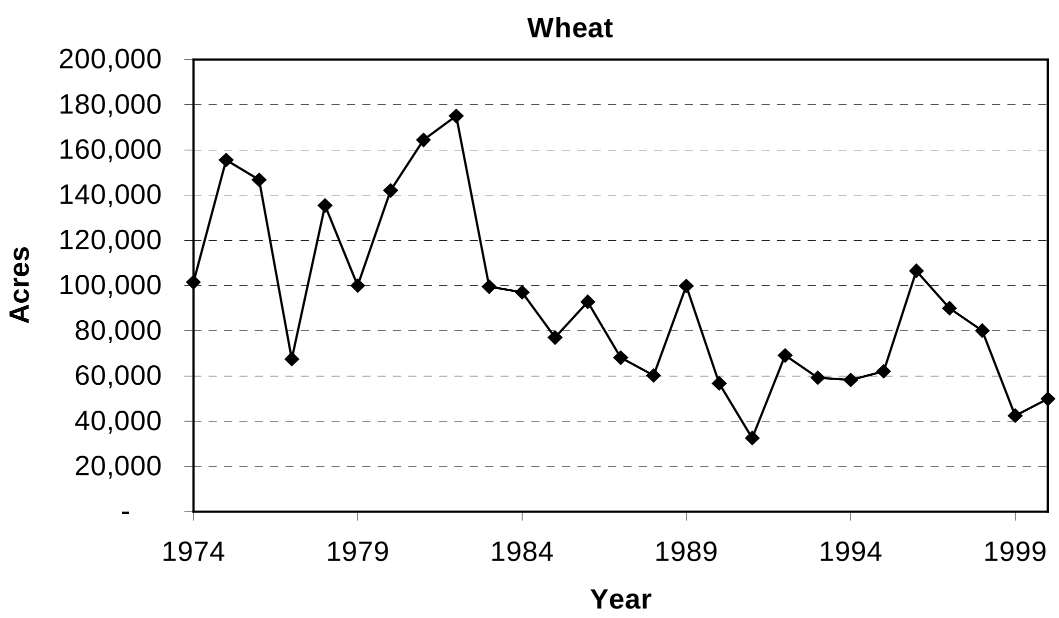


FIGURE 3.8-2
Historic Acreages of Sudan Grass and Wheat in the Imperial Valley

TABLE 3.8-1
Potential Effects of Covered Activities on Covered Species Associated With Agricultural Field Habitat

Activity	Potential Effects (Positive and Negative)
Water Use and Conservation	
Combined effects of on-farm and system-based water conservation	Combined effects relate to changes in the water quantity and quality in the drains, changes in salinity in the Salton Sea and changes in the water surface elevation at the Salton Sea. Agricultural fields would not be affected by these changes.
Installation of on-farm water conservation features	Installation and operation of on-farm water conservation features could affect covered species using agricultural field habitat through disturbance as features are installed, and reduction in the amount of agricultural field habitat. Installation of tailwater return systems could result in up to 12,500 acres of agricultural land being converted to tailwater ponds. No effects to covered species from long-term changes in irrigation techniques are expected.
Fallowing	If used for water conservation, fallowing would reduce the amount of land in agricultural production by up to 50,000 acres and could change the availability of foraging habitat for covered species.
Installation of System-Based Water Conservation Features	
Canal lining and piping	Because canal lining activities would be performed within IID's right-of-way, no changes in the amount of agricultural field habitat would occur. Disturbance to most covered species using field adjacent to canals during the lining process would not be expected because lining would be conducted when the adjacent fields are not being irrigated. Thus, covered species would not be expected to be in areas adjacent to the construction.
Construction of new canals	IID anticipates constructing about 0.25 mile of canal each year. Because new canals would likely cross agricultural fields, about 2 acres of agricultural field habitat could be removed each year.
Lateral interceptors	IID could install 16 lateral interceptor systems. The canal and reservoirs comprising these systems predominantly would be located in agricultural fields. About 1,480 acres of agricultural field habitat could be lost if all of the systems were constructed.
Reservoirs	IID currently does not have any reservoirs in design, but anticipates constructing up to 100 reservoirs during the 75-year permit term. These reservoirs would be 1 to 10 acres in size, with a capacity ranging from about 5 to 30 acre-feet (AF). It is anticipated that most of these reservoirs would be located in agricultural fields. Up to 1,000 acres of agricultural field habitat could be lost from reservoir construction.
	In addition to reservoirs constructed and operated by IID, farmers could construct small regulating reservoirs to facilitate the conservation of water. These 1- to 2-acre reservoirs would be constructed to better regulate irrigation water applied to fields and to settle suspended solids prior to introduction into drip irrigation systems. IID anticipates that these reservoirs could be used on up to 50 percent of the agricultural land in its service area. A single reservoir services about 80 acres of land. About 3,000 of these reservoirs could be constructed, potentially resulting in the loss of about 6,000 acres of agricultural land.
Seepage recovery systems	Seepage recovery systems would be installed adjacent to but not within agricultural fields. Thus, no change in the amount of agricultural field habitat would occur. There would be a minor potential for disturbance of covered species using adjacent agricultural fields during construction activities.

TABLE 3.8-1
Potential Effects of Covered Activities on Covered Species Associated With Agricultural Field Habitat

Activity	Potential Effects (Positive and Negative)
Operation and Maintenance	
Conveyance system operation	Conveyance system operation is limited to moving water through the canals to meet maintenance and customer needs. Other than the filling, draining and moving water through the canals, no physical effects are encompassed by conveyance system operation.
Drainage System Operation	
Rerouting or constructing new drains	IID reroutes or constructs about 2 miles of drains every 10 years. With a standard drain right-of-way, of about 80 feet, about 19 acres of agricultural field habitat could be impacted every 10 years.
Piping drains	Over the 75-year term IID anticipates that about 50 miles of open drains would be pipelined. If the land formerly occupied by the open drain is farmed, an additional 485 acres of agricultural habitat could be supported as drains are piped.
Inspection activities	Potential effects of inspection activities would be limited to a minor potential for disturbance of covered species if they occur in the vicinity of structures at the time of inspection.
Canal lining maintenance Right-of-way maintenance Embankment maintenance Erosion maintenance Seepage maintenance Structure maintenance Pipeline maintenance Reservoir maintenance Sediment removal Vegetation control	These activities are limited to IID's rights-of-way along the canals and drains and around reservoirs. Because they do not extend into adjacent agricultural fields, they would not result in changes in the amount of agricultural field habitat. Effects are limited to a minor potential to disturb covered species using agricultural fields adjacent to the drain, canal or reservoir where the maintenance is being conducted.
New and Alamo river maintenance	River maintenance activities occur in and immediately adjacent to the river channels. Because river maintenance activities do not extend into adjacent agricultural fields, they would not result in changes in the amount of agricultural field habitat. No disturbance to agricultural field habitat species would be expected.
Salton Sea dike maintenance	Salton Sea dike maintenance activities consist of replacing riprap, grooming embankments and repairing damaged sections of the dikes. Because the maintenance activities would occur on the sea side of the dikes, no change in habitat would occur with these activities and no disturbance of covered species would be expected.
Gravel and rock quarrying	Quarries are not located in or immediately adjacent to agricultural fields. Therefore, no impacts to covered species using agricultural fields would occur from quarrying.
Fish hatchery operation and maintenance	The fish hatchery is a developed facility and does not contain habitat for covered species associated with agricultural fields.
Recreational facilities	New recreational facilities would be developed within IID's rights-of-way and therefore would not affect agricultural field habitat. Effects to covered species are limited to a minor potential to disturb covered species using agricultural fields adjacent to the rights-of-way. The HCP does not cover take of covered species by recreationists.

TABLE 3.8-1
Potential Effects of Covered Activities on Covered Species Associated With Agricultural Field Habitat

Activity	Potential Effects (Positive and Negative)
HCP/EIS/EIR mitigation	The Drain Habitat Conservation Strategy includes construction of managed marsh. If located on agricultural lands, up to 652 acres of agricultural fields would be converted to managed marsh.
	The Salton Sea Conservation Strategy includes supplying water to the Sea to maintain salinity below 60 ppt until 2030. Fallowing could be used to generate this water which would reduce the amount of agricultural field habitat. The acreage of land fallowed would depend on the method used to conserve water for transfer as described below.
Land use changes	IID leases out about 1,169 acres of land for agricultural production. IID could convert this land to another use (e.g., managed marsh) resulting in a reduction in the amount of agricultural land.

The HCP covers conversion of land owned by IID from agricultural production to other covered uses (e.g., creation of managed marsh habitat). It does not cover other landowners that convert their lands to nonagricultural uses. Fallowing is considered an agricultural land use and fallowing by landowners in the IID service area is covered by this HCP. IID owns about 6,600 acres of land in the irrigated portion of the Imperial Valley and about 6,100 acres of land adjacent to the Salton Sea. About 1,167 acres of land leased from IID is in agricultural production (see Table 1.7-5). This land represents about 0.2 percent of the irrigated lands in the HCP area. Thus, even if all of IID land in agricultural production was converted to another use, agricultural field habitat would remain abundant in the HCP area.

System improvements that could eliminate some agricultural field habitat are construction of new canals, installation of lateral interceptors, and construction of new reservoirs. These activities could remove about 8,630 acres of agricultural field habitat over the term of the permit. Relative to the entire irrigated area of Imperial Valley that covers about 500,000 acres, this potential loss constitutes about 1.7 percent of the agricultural land. Because construction would not occur in agricultural fields under active production, the potential for disturbance of covered species using this habitat would be minor.

Farmers in the IID service area could implement a variety of measures to conserve water, including the following:

- Installing tailwater return systems
- Dividing fields into level basins
- Installing drip irrigation systems
- Shortening furrows/border strips
- Narrowing border strips
- Implementing cutback irrigation
- Laser leveling fields
- Changing field slopes to improve water distribution uniformity
- Employing cascading tailwater systems

Installation of tailwater return systems could result in a small amount of land being taken out of production to accommodate a tailwater pond. Tailwater ponds typically have about a 3-to-4 acre-feet (AF) capacity and cover 1 to 2 acres. Assuming an average farm size of 80 acres, a 2-acre tailwater return pond could eliminate about 2.5 percent of the area from agricultural production. If all farms installed tailwater systems, a 2.5 percent reduction in farmed area throughout the Imperial Valley would amount to about 12,500 acres. Farmers typically locate tailwater return ponds in the least productive portions of their fields particularly areas that are farmed irregularly such that the actual loss in agricultural field habitat likely would be less than 12,500 acres in the extreme case that all farms installed tailwater return systems. Tailwater return systems are installed when no crops are being produced, typically during the summer. Because they would be installed when no crops were being grown on the field, the potential for disturbance to covered species would be limited.

Operation of a tailwater return system requires pumping water from the tailwater pond back up to the field head. In the Imperial Valley, farmers usually use diesel-powered pumps because they are less expensive to operate. However, some farmers could use electric pumps, requiring IID to erect additional power lines to provide power to the pumps. Although the additional power lines would be short, up to 0.5 mile, and distributed throughout the valley, they could result in take, if covered bird species fly into the power lines.

Installing drip irrigation systems would require a minor amount of temporary ground disturbance, resulting in a minor potential for disturbance of covered species. Installations of drip systems would occur between crops; therefore, no temporary or permanent changes in the amount of agricultural field habitat would occur.

The remaining water conservation techniques require reconstruction / recontouring of an agricultural field. Covered species using agricultural field habitat could be disturbed during the reconstruction / recontouring. However, because reconstruction / recontouring would be conducted when no crops are being grown on the field, the potential for disturbance to covered species is limited. No change in the amount of agricultural field habitat would occur as a result of reconstruction / recontouring of agricultural fields to achieve water conservation.

While farmers would implement various water conservation practices, these practices are not expected to change irrigation practices in a manner that would reduce habitat suitability for covered species. A given crop consumes a certain amount of water. This consumptive use would not change with water conservation and a given crop would need to be irrigated at the same frequency as under existing irrigation practices. The water conservation techniques would reduce the amount of tailwater (i.e., surface water that runs off the field), not the amount of water consumed by the crops. Also, with the exception of drip irrigation systems, the water conservation techniques improve the efficiency of a surface irrigation practice, rather than change how the crop is irrigated. For example, tailwater return systems collect and store water from a flood irrigated field for use in subsequent flood irrigations. The improved efficiencies would be manifested as a reduction in the amount of water leaving the field as tailwater.

In addition to the water conservation measures discussed above, fallowing could be used to conserve water for transfer and in complying with the Inadvertent Overrun Policy. Fallowing could reduce the acreage of irrigated agriculture available in the HCP area at any one time. If only fallowing was used to generate 300 KAF of conserved water, about 50,000 acres of land would be needed. To comply with the IOP, an average of 9,800 acres of land would need to be fallowed. Combined, these acreages represents about 12 percent of the irrigated area within the IID Service Area. Even with this reduction, agricultural field habitat would remain abundant in the IID Service Area, consisting of about 440,000 acres remaining in agricultural production.

It is anticipated that farmers will participate in the water conservation program for variable periods of time. Some farmers may enroll one or two fields for only one year while others may enter into longer term agreements. Regardless of the duration and method of water conservation, this HCP covers removal and cessation of water conservation practices. If fallowing is used to conserve water for transfer or to comply with the IOP, agricultural fields could be fallowed and returned to production several times over the term of the permit. Because most of covered species associated with agricultural fields in the HCP area are attracted fields in active production, the acreage of agricultural field habitat could fluctuate between the existing level of about 500,000 acres and 440,000 acres with use of fallowing to achieve all water conservation.

Some farmers that install tailwater return systems could convert tailwater ponds back to agricultural production after their conservation agreements with IID ended. In the Imperial Valley, tailwater ponds are maintained free of vegetation (see Figure 1.7-2b). While covered species may be attracted to the ponds to drink or bathe, given the lack of vegetation no covered species would be expected to nest or shelter at the ponds. Conversion of 12,500 acres of tailwater pond back to agricultural production would not be expected to impact covered species.

The Salton Sea Conservation Strategy entails generating mitigation water such the salinity of the Salton Sea would remain below 60 ppt until 2030. The amount of land that would need to be fallowed would depend on how water for transfer was conserved. If fallowing was used to generate all of the 300 KAFY of water for transfer, then about 25,000 acres of land would need to be fallowed for mitigation water. Under this scenario, a total of 75,000 acres of land would be fallowed. If on-farm and system-based measures were used to conserve 300 KAFY of water for transfer, then about 75,000 acres of land would be need to be fallowed for mitigation water. After 2030 when mitigation water would no longer be supplied to the Sea, fallowed land could be returned to agricultural production.

The acreages presented above of agricultural field habitat potentially affected under the water conservation and transfer programs represent worst-case estimates for each of the covered activities and are not additive. For example, farms that fallowed land to achieve water conservation would not install tailwater return systems. The ultimate amount of agricultural land that could be taken out of production to implement the water conservation and transfer programs is uncertain because it would be influenced by the mix of water conservation measures that are implemented. Nonetheless, any change in the amount of agricultural land would be within the ranges presented above.

3.8.3 Approach and Biological Goals

The biological goal of the agricultural field conservation strategy is to maintain agriculture as the primary economic enterprise in IID's Service Area to continue to provide foraging habitat for covered species associated with agricultural field habitat. This goal is to be achieved by implementing the water conservation and transfer programs for the IID/SDCWA Water Transfer Agreement and the QSA, and this HCP. Species that exploit agricultural habitats would continue to be supported with implementation of water conservation and transfer programs and HCP because successful implementation of these programs would encourage continued agricultural production.

3.8.4 Agricultural Field Habitat Strategy

Agriculture is the primary economic enterprise within IID's service area. Agriculture in the Imperial Valley is dependent upon a secure right to divert and use Colorado River water for irrigation purposes and an efficient system of drainage. IID holds very senior water rights under priorities 3, 6, and 7 of the Seven Party Agreement, which allocates California's share of Colorado River water among California entitlement holders. For years, however, other California water agencies, including the QSA parties, have challenged the amount and use of Colorado River water diverted by IID under its senior water rights. IID also has been required to develop a conservation program, and specifically to consider water transfers, as a result of SWRCB regulatory proceedings in the 1980s, as set forth in Decision 1600 (1984) and Order 88-20 (1988).

A couple of key objectives of the IID/SDCWA Transfer Agreement include: (1) implementation of a water conservation and transfer program without impairing IID's historic senior-priority water rights, in a manner consistent with state and federal law, and (2) providing a means of financing conservation measures, including environmental and other implementation costs. Thus, the water transfer program is intended to protect and preserve IID's water rights and the feasibility and economic viability of agriculture production within IID's service area. In addition, the QSA will settle, by consensual agreement, longstanding disputes among the QSA parties regarding the priority and use of Colorado River water by IID, and it will confirm IID's right to implement the water transfers specified in the QSA. Thus, the QSA will enhance the certainty and reliability of Colorado River water supplies available to IID and will assist IID in meeting demands for water for agricultural use, thus facilitating continued agricultural production.

As explained in Chapter 1, the purpose and need for the HCP stems from IID's requirement for long-term regulatory certainty in committing to the IID/SDCWA Transfer Agreement and QSA. Long-term no-surprises assurances regarding FESA compliance measures and costs are needed by IID to commit to the long-term investment obligations of the IID/SDCWA Transfer Agreement and QSA. Thus, incidental take authorization and unlisted species assurances is integral to implementing the water transfer programs, which in turn are critical to ensuring that agriculture will continue to be the primary land use in the Imperial Valley.

With a few exceptions, the covered species that use agricultural fields in the Imperial Valley would probably not occur in the Imperial Valley in the absence of agriculture. Before the cultivation of the Imperial Valley, desert habitat predominated and supported wildlife species associated with this habitat. With agricultural production, the Imperial Valley attracted wildlife capable of exploiting this new resource and with a tolerance for regular human activity. The continued use of the Imperial Valley by these species depends primarily upon the perpetuation of agricultural production. The regulatory certainty provided by the incidental take authorization and assurances obtained with implementation of the HCP, combined with implementation of the water transfer programs would increase the likelihood that agricultural production will remain the predominant land use in the HCP area.

Although the primary concern for covered species associated with agricultural field habitat is the persistence of agriculture in the Imperial Valley, a potential for covered bird species to be killed or injured by powerlines associated with pumps for tailwater return systems was identified. Under the HCP, IID will implement the following measure to minimize this potential impact.

Agriculture–1. *If IID builds additional power lines to provide power to pumps to run tailwater return systems, IID will install markers (e.g., flagging, balls, discs) in accordance with industry standards for reducing bird strikes on the new power lines to alert birds to the presence of the power lines.*

In implementing the water conservation and transfer program, IID may fallow land it owns to conserve water. Implementation of the following measure is anticipated to enhance the habitat value of fallowed lands as foraging habitat for covered species. Cover crops would provide food resources and cover for small mammals and insects while ridge tilling would make soil invertebrates more accessible to insectivores.

Agriculture–2. *IID will plant cover crops on or ridge till all lands that it currently owns and fallows to conserve water in order to maintain foraging opportunities for covered species. Cover crops will be planted during the first year the land is fallowed and will be replanted at a frequency necessary to maintain a layer of plant material on the soil. IID will work with the HCP IT to select appropriate cover crop types.*

3.8.5 Effects on Habitat

3.8.5.1 Direct Effects of the Covered Activities

Implementation of the water conservation and transfer programs could result in a reduction in the amount of land in agricultural production at any one time. The amount of agricultural land affected would depend on the mix of water conservation techniques. To conserve water for transfer, fallowing could result in up to 50,000 acres of agricultural land being taken out of active production for one or more seasons. Other conservation techniques would result in a substantially smaller reduction in the acreage of agricultural land. With the exception of the HCP measures for the Salton Sea, other covered activities would have only minor effects on the amount of agricultural land. As described previously, depending on the approach selected for the Salton Sea, up to 75,000 acres of agricultural land could be taken out of production for fallowing for mitigation water or for 5,000 acres of ponds.

3.8.5.2 Changes in Cropping Patterns

The crops grown in the Imperial Valley are based on the decisions of individual farmers. Current and anticipated market prices are an important consideration for the farmers in deciding which crops to grow. As a result, the types and amount of crops grown fluctuate from year-to-year as is illustrated by the types and acreages of crops grown in the IID from 1974 to 2000 (Appendix E).

Historically, IID's water deliveries to farmers have ranged from about 2.4 MAFY to 3.4 MAFY, a range of 1 MAFY. Under the water conservation and transfer programs, up to 300 KAFY would be conserved. This level of water conservation is within the range of historic variability in IID's annual deliveries to farmers. Because of weather (hot), soil types (high clay content) and irrigation water quality (salinity), certain crops grow better than others in this environment and as a result, it is expected that the same crop mix will continue to be grown into the future. Thus, cropping patterns in the future would be expected to be within the range of historic variability.

3.8.6 Effects on Covered Species

Covered species potentially using agricultural field habitats in the HCP area include resident breeding species, migratory breeding species, short-term residents during winter or migration, and transient species that occur in the HCP area irregularly during migration or other wanderings. The effects of implementing the HCP on covered species associated with agricultural field habitat are evaluated below.

3.8.6.1 Mountain Plover

Mountain plover is a common winter visitor to the Salton Sea Basin. The Imperial Valley has one of the mountain plover's largest wintering populations in the Pacific Flyway. During February 1999 surveys, 2,486 individuals were counted in the valley. This number represents about half of the California population and about one quarter of the North American population.

Installation of water conservation measures in agricultural fields have a minor potential to affect mountain plovers. On-farm conservation measures would be installed when crops were not being grown, primarily in the summer. Mountain plovers only occur in the HCP area during the winter and therefore, would not be in the area when this work was being conducted. Construction in agricultural fields required for other covered activities such as creation of managed marsh habitat or system-based conservation measures could occur during the winter when plovers are in the HCP area. These activities could flush birds if the construction occurred in areas used by mountain plovers for foraging which could constitute take as harassment or cause death or injury to individuals if as a result of being flushed they are subject to predation. Given the large amount of agricultural habitat available (about 500,000 acres), a relatively small number of plovers (about 2,500 birds), and limited amount of disturbance spread out over the term of the permit (e.g., disturbance of up to 652 acres to create the managed marsh, construction on 8,630 acres for system improvements), the likelihood of these activities occurring coincident with mountain plovers is low. As such, the potential for and extent of take would be minimal.

In the Imperial Valley, mountain plovers are strongly associated with agricultural fields. Recent studies have found mountain plovers to most frequently use grazed alfalfa, and burned Bermuda grass fields. They have also been reported to forage in plowed fields and sprouting grain fields during the winter. Depending on the water conservation measures and Salton Sea approach implemented the amount of agricultural land in production could be reduced by about 15 percent. Potentially, a few individual plovers could be taken as a result of reduced foraging habitat in the HCP area. However, as explained below, no adverse population-level effects would be expected.

Plover abundance in the Imperial Valley does not appear to be related to the availability of preferred crop types. Bermuda grass currently is one of the most commonly used crop types by plovers. The acreage of Bermuda grass was very low in the 1970s but is currently abundant (Figure 3.8-1). During this same period, the relative abundance of mountain plovers showed no discernable trend (Figure 3.8-3). These data suggest that foraging habitat availability is not limiting and that a potential reduction in agricultural acreage typically would not impact the population of mountain plovers that winters in the HCP area.

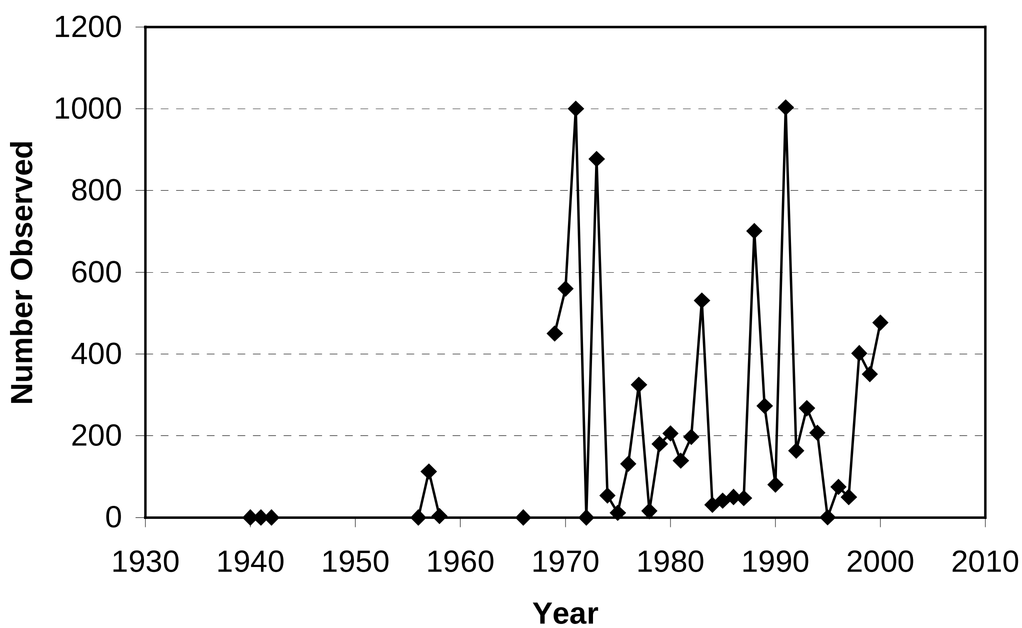


FIGURE 3.8-3
Christmas Bird Count Results for the Salton Sea (South End) for Mountain Plovers

Plovers also show an affinity for grazed alfalfa. Sheep graze alfalfa in the Imperial Valley from October through March, approximately the period when mountain plovers are in the valley. As with crops, the number of sheep grazed in the valley (Figure 3.8-4) and hence the acreage of alfalfa grazed varies from year to year. Like Bermuda grass, mountain plover relative abundance appears unrelated to the level of sheep grazing, and hence the acreage of grazed alfalfa. Further, the amount of grazed alfalfa is not expected to change as a result of the water conservation and transfer programs. The Imperial Valley provides important winter range for sheep. As long as there is a demand for winter pasture, sheep grazing will continue in the Imperial Valley. Implementation of the water conservation programs would not change the demand for winter range. Therefore, the current availability of grazed alfalfa would not change because of the water transfer project and no adverse effects to the mountain plover population would occur.

FIGURE 3.8-4
Number of Sheep Grazed in the Imperial Valley

Preliminary research also suggests that plovers avoid fields being irrigated with sprinklers; the reasons for this pattern are uncertain. Implementation of the water conservation and transfer programs would not change the level of use of sprinklers for irrigation in the Imperial Valley. Sprinkler systems are primarily used to germinate seed and for cooling of young crops planted in late summer; use of sprinklers for irrigation is limited. The need to use sprinklers for germination and cooling would continue with implementation of the water conservation and transfer programs. Use of sprinklers would not increase because it is not a favorable irrigation method in desert environments due to high evaporative losses.

The Imperial Valley appears to be an important overwintering area for mountain plovers, and this species' winter habitat requirements apparently are compatible with and provided by agricultural fields. The greatest potential threat to wintering habitat for mountain plover would be conversion of agricultural lands to nonagricultural uses, particularly urban land uses. Critical to the perpetuation of agriculture in the Imperial Valley is the reliability and availability of water. Implementation of the water conservation and transfer program and this HCP will enhance the likelihood that agriculture will remain the dominant land use in the Imperial Valley. In addition, IID would plant a cover crop or ridge till lands that it owns and fallows which would make insects accessible for mountain plover. By enhancing the probability that wintering habitat will continue to be supported in the HCP area and by implementing measures for fallowed lands to enhance insect availability, the HCP would mitigate the minimal amount of take potentially occurring and would not jeopardize the continued existence of the species.

3.8.6.2 Swainson's Hawk

Swainson's hawks are occasional visitors to the Salton Sea area during their spring and fall migrations. They are not known to breed in the HCP area. For foraging, Swainson's hawks frequent agricultural fields. In other parts of its range, the Swainson's hawk frequents alfalfa fields and lightly grazed pasture. Similar types of agricultural fields likely are used in the Imperial Valley.

Installation of water conservation measures in agricultural fields would not be expected to affect Swainson's hawks. On-farm conservation measures would be installed when crops were not being grown, primarily in the summer. Swainson's hawks only occur in the HCP area during the spring and fall and therefore, would not be in the area when this work would be conducted. Construction in agricultural fields required for other covered activities such as creation of managed marsh habitat or system-based conservation measures could occur during periods when Swainson's hawks are in the HCP area. The occurrence of these activities in agricultural fields would not affect foraging by Swainson's hawks. These hawks typically forage by spotting prey while flying and then diving to capture the prey. Because they often forage in association with operating farm equipment, they would not be disturbed by construction activities.

Depending on the water conservation measures and Salton Sea approach implemented, the amount of agricultural land in production could be reduced by about 15 percent. Potentially over the term of the permit a few individual Swainson's hawks could be taken as a result of reduced foraging habitat in the HCP area. Few Swainson's hawks occur in the HCP area and those that do occur are there for only brief periods during their spring or fall migrations. The USFWS (1997) characterizes them as occasional visitors with normally fewer than five individuals each season (spring and fall) at the Salton Sea NWR. Swainson's hawks commonly use alfalfa fields. In the Imperial Valley, the acreage of alfalfa has varied from about 158,000 to 222,000 (i.e., 27 to 43 percent of the agricultural land in the Imperial Valley). Because of the small numbers of hawks, the limited time period that they occur in the HCP area and the abundance of agriculture fields, the potential for and extent of take of Swainson's hawks expected from changes in the amount of agricultural land anticipated under this HCP would be minimal and would not substantially affect this species' population.

The minimal amount of potential take would be mitigated by implementation of the Tamarisk Scrub Habitat Conservation Strategy as well as the Agricultural Field Habitat Conservation Strategy. The greatest potential threat to foraging habitat for Swainson's hawks in the HCP area would be conversion of agricultural lands to nonagricultural uses, particularly urban land uses. Critical to the perpetuation of agriculture in the Imperial Valley is the reliability and availability of water. Implementation of the water conservation and transfer program and this HCP will enhance the likelihood that agriculture will remain the dominant land use in the Imperial Valley, and thereby continue to provide foraging opportunities for Swainson's hawks. In addition, IID would plant a cover crop on at least some of the lands that it owns and fallows which would attract small mammals on which Swainson's hawks prey. The Tamarisk Scrub Habitat Conservation Strategy could increase the accessibility of foraging habitat quality by providing perch sites near to foraging areas (see Section 3.4.6.4). In combination, these strategies would mitigate the minimal amount of take potentially occurring and would not jeopardize the continued existence of the species.

3.8.6.3 Greater Sandhill Crane

Installation of on-farm water conservation measures in agricultural fields would not be expected to affect greater sandhill cranes. On-farm conservation measures would be installed when crops were not being grown, primarily in the summer. Sandhill cranes only occur in the HCP area during the winter and therefore, would not be in the area when this work was being conducted.

Construction in agricultural fields required for other covered activities such as creation of managed marsh habitat or system-based conservation measures could occur during periods when sandhill cranes are in the HCP area. Construction activities have the potential to flush birds if the construction occurred in or adjacent to areas used by sandhill cranes for foraging which could constitute take as harassment or cause death or injury to individuals (e.g., if the flushed crane collided with a power line). Given the large amount of agricultural habitat available (about 500,000 acres), a relatively small number of cranes (200 to 300 birds), and limited amount of disturbance spread out over the term of the permit (e.g., disturbance of up to 652 acres to create the managed marsh, construction on 8,630 acres for system improvements), the likelihood of these activities occurring coincident with greater sandhill cranes is low. As such, the potential for and extent of take would be minimal.

Small numbers (up to 300 individuals) of greater sandhill cranes winter in the Imperial Valley. Depending on the water conservation measures implemented, the amount of agricultural land in production could be reduced by about 15 percent. Potentially over the term of the permit a few individual sandhill crane could be taken as a result of reduced foraging habitat in the HCP area. Wintering birds feed in irrigated croplands and pastures. Grains such as wheat, sorghum, barley, oats are important winter foods. The acreage of wheat in the Imperial Valley has fluctuated from 32,500 to about 175,000 acres. Sorghum, barley, and oats are minor commercial crops in the Imperial Valley. Cranes have continued to winter in the Imperial Valley through this wide fluctuation in the amount of wheat. The magnitude of the potential change in the total amount of agricultural land is within the range of variability in wheat and only a portion of fallowed agricultural land, if any, would consist of crops used by cranes. Further, the state and federal refuges plant cereal grains such as wheat, rye, and barley that provide foraging opportunities for cranes. Because of the small numbers of cranes, the abundance of agricultural fields, and management of lands on the refuges for grain, the potential for and extent of take of greater sandhill crane expected from changes in the amount of agricultural land anticipated under this HCP would be minimal and would not substantially affect this species' population.

The minimal amount of potential take would be mitigated by implementation of the Drain Habitat Conservation Strategy as well as the Agricultural Field Habitat Conservation Strategy. The greatest potential threat to foraging habitat for greater sandhill crane in the HCP area would be conversion of agricultural lands to nonagricultural uses, particularly urban land uses. Critical to the perpetuation of agriculture in the Imperial Valley is the reliability and availability of water. Implementation of the water conservation and transfer program and this HCP will enhance the likelihood that agriculture will remain the dominant land use in the Imperial Valley and thereby continue to provide foraging opportunities for sandhill crane. The Drain Habitat Conservation Strategy also could provide foraging habitat and protected roost sites (see Section 3.5.6.3). In combination, these strategies would mitigate the minimal amount of take potentially occurring and would not jeopardize the continued existence of the species.

3.8.6.4 Bank Swallow

Bank swallows are casual visitors to the HCP area, potentially occurring in the HCP area as migrants during the spring and fall. For foraging, they are not strongly associated with any particular habitat type, although they often forage near water where insects are abundant. The covered activities are unlikely to adversely affect bank swallows because of the swallow's rare occurrence in the HCP area and broad habitat use for foraging. However, a few individuals could be taken because of changes in foraging habitat availability or quality potentially resulting from permanent or temporary reductions in drain vegetation (see Section 3.5.2.2), permanent or temporary reductions in tamarisk scrub habitat (see Section 3.4.2), or changes in the composition and amount of agricultural field habitat.

The minimal amount of potential take would be mitigated by implementation of the Drain Habitat Conservation Strategy as well as the Agricultural Field Habitat Conservation Strategy. Critical to the perpetuation of agricultural field habitat in the Imperial Valley where bank swallows could forage is the reliability and availability of water. Implementation of the water conservation and transfer program and this HCP will enhance the likelihood that agriculture will remain the dominant land use in the Imperial Valley and thereby continue to provide foraging opportunities for bank swallows. Loss of tamarisk scrub habitat at the Salton Sea and in the Imperial Valley would be offset through the creation/acquisition and long-term protection of native tree habitat (see Sections 3.3.4.2 and 3.4.5). By supporting more abundant and diverse insect populations than tamarisk scrub, native tree habitat would provide higher quality foraging opportunities for bank swallow. The Drain Habitat Conservation Strategy also would contribute to mitigating the impact of any take of bank swallows that could occur by increasing foraging opportunities through creation of managed marsh habitat (see Section 3.5.6.7). In combination, these strategies would mitigate the minimal amount of take potentially occurring and would not jeopardize the continued existence of the species.

3.8.6.5 Short-Eared Owl

Short-eared owls are rare winter visitors to the Salton Sea area, but are more common in the fall. Still, the number of owls occurring in the HCP area is small. The USFWS (1997) characterizes them as occasional visitors with normally fewer than five individuals at the Salton Sea NWR. Short-eared owls forage for small mammals in open habitats such as agricultural fields and marshes.

Short-eared owls are not expected to be affected by installation of water conservation measures in agricultural fields. On-farm conservation measures would be installed when crops were not being grown, primarily in the summer. Short-eared owls only occur in the HCP area during the fall and winter, and therefore, would not be in the area when this work was being conducted. Construction in agricultural fields required for other covered activities such as creation of managed marsh habitat or system-based conservation measures could occur during fall or winter. The occurrence of these activities in agricultural fields are unlikely to affect foraging by short-eared owls because owls primarily hunt at night when construction activities would not be occurring.

Depending on the water conservation measures implemented the amount of agricultural land in production could be reduced by about 15 percent. Potentially, over the term of the permit, a few individual short-eared owls could be taken as a result of reduced foraging habitat in the HCP area. Only a few short-eared owls use the HCP area as wintering habitat and migrants would only occur in the HCP area for brief periods of time. Short-eared owls commonly forage in alfalfa fields but also use pasture, marshes, and probably other grass-type crops such as wheat, Sudan grass, and Bermuda grass. In the Imperial Valley, the acreage of alfalfa has varied from about 158,000 to 222,000 (i.e., 27 to 43 percent of the agricultural land in the Imperial Valley). Because of the small numbers of owls and the abundance of agriculture fields, the potential for and extent of take of short-eared owls expected from changes in the amount of agricultural land anticipated under this HCP would be minimal and would not substantially affect this species' population.

The minimal amount of potential take would be mitigated by implementation of the Drain Habitat Conservation Strategy as well as the Agricultural Field Habitat Conservation Strategy. The greatest potential threat to foraging habitat for short-eared owls in the HCP area would be conversion of agricultural lands to nonagricultural uses, particularly urban land uses. Critical to the perpetuation of agriculture in the Imperial Valley is the reliability and availability of water. Implementation of the water conservation and transfer program and this HCP will enhance the likelihood that agriculture will remain the dominant land use in the Imperial Valley and thereby continue to provide foraging opportunities for short-eared owls. Short-eared owls also forage in marsh habitat. Through the creation of 190 to 652 acres of managed marsh habitat, the Drain Habitat Conservation Strategy could increase foraging habitat for short-eared owl. In combination, these strategies would mitigate the minimal amount of take potentially occurring and would not jeopardize the continued existence of the species.

3.8.6.7 Aleutian Canada Goose

Aleutian Canada geese occur in the HCP area as fall migrants and winter residents where they forage in the wetland areas around the Salton Sea and in the agricultural fields throughout the Imperial Valley. The primary overwintering area for this subspecies is in the San Joaquin Valley of California and use of the HCP area is limited.

Installation of on-farm water conservation measures in agricultural fields would not be expected to affect Aleutian Canada geese. On-farm conservation measures would be installed when crops were not being grown, primarily in the summer. Canada geese only occur in the HCP area during the fall and winter and therefore, would not be in the area when this work was being conducted. Construction in agricultural fields required for other covered activities such as creation of managed marsh habitat or system-based conservation measures could occur during periods when geese are in the HCP area. Construction activities could flush birds if the construction occurred in or adjacent to areas used by Aleutian Canada geese for foraging which could constitute take as harassment or cause death or injury to individuals (e.g., if the flushed crane collided with a power line). Given the large amount of agricultural habitat available (about 500,000 acres), small number of Aleutian Canada geese, and limited amount of disturbance spread out over the term of the permit (e.g., disturbance of up to 652 acres to create the managed marsh, construction on 8,630 acres for system improvements), the likelihood of these activities occurring coincident with Aleutian Canada geese is low. As such, the potential for and extent of take would be minimal.

Depending on the water conservation measures implemented the amount of agricultural land in production could be reduced by about 15 percent. Potentially over the term of the permit a few individual Aleutian Canada geese could be taken as a result of reduced foraging habitat in the HCP area. Wintering birds are attracted to grain fields. In the Imperial Valley, grains are commercially produced but also are grown on the refuges specifically to provide forage for wintering geese. With management of the refuges for geese and the overall abundance of agricultural fields in the Imperial Valley, the potential for and extent of take of Aleutian Canada geese expected from changes in the amount of agricultural land anticipated under this HCP would be minimal and would not substantially affect this species' population.

The minimal amount of potential take would be mitigated by implementation of the Drain Habitat Conservation Strategy as well as the Agricultural Field Habitat Conservation Strategy. The greatest potential threat to foraging habitat for Aleutian Canada geese in the HCP area would be conversion of agricultural lands to nonagricultural uses, particularly urban land uses. Critical to the perpetuation of agriculture in the Imperial Valley is the reliability and availability of water. Implementation of the water conservation and transfer program and this HCP will enhance the likelihood that agriculture will remain the dominant land use in the Imperial Valley, and thereby continue to provide foraging opportunities for Canada geese. The Drain Habitat Conservation Strategy also could provide foraging habitat and protected roost sites (see Section 3.5.6.4). In combination, these strategies would mitigate the minimal amount of take potentially occurring and would not jeopardize the continued existence of the species.

3.8.6.8 Ferruginous Hawk

Ferruginous hawks regularly occur in the Imperial Valley in small numbers during the winter. This species forages in agricultural fields for small mammals such as rabbits, ground squirrels, and mice. Ferruginous hawks would be expected to forage in a wide variety of crop types as long as prey were abundant and accessible.

Installation of water conservation measures in agricultural fields would not be expected to affect ferruginous hawks. On-farm conservation measures would be installed when crops were not being grown, primarily in the summer. Ferruginous hawks only occur in the HCP area during winter and therefore, would not be in the area when this work would be conducted. Construction in agricultural fields required for other covered activities such as creation of managed marsh habitat or system-based conservation measures could occur when ferruginous hawks are in the HCP area. Ferruginous hawks might avoid foraging in areas where construction is occurring. Given the abundance of foraging habitat in the HCP area, individuals would be expected to be able to find alternative foraging locations.

Depending on the water conservation measures implemented, the amount of agricultural land in production could be reduced by about 15 percent. Potentially over the term of the permit a few individual ferruginous hawks could be taken as a result of reduced foraging habitat in the HCP area. Few ferruginous hawks occur in the HCP area. Even with a 15 percent reduction, the Imperial Valley would support about 425,000 acres of agricultural field habitat. Much of this acreage is expected to consist of crops favorable to foraging by ferruginous hawks (e.g., alfalfa). Given the small number of hawks and large amount of potential habitat, the potential for and extent of take of ferruginous hawk expected from changes in the amount of agricultural land anticipated under this HCP would be minimal and would not substantially affect this species' population.

The minimal amount of potential take would be mitigated by implementation of the Agricultural Field Habitat Conservation Strategy. The greatest potential threat to foraging habitat for ferruginous hawk in the HCP area would be conversion of agricultural lands to nonagricultural uses, particularly urban land uses. Critical to the perpetuation of agriculture in the Imperial Valley is the reliability and availability of water. Implementation of the water conservation and transfer program and this HCP will enhance the likelihood that agriculture will remain the dominant land use in the Imperial Valley and thereby continue to provide foraging opportunities for ferruginous hawks. In addition, IID would plant a cover crop on at least some of the lands that it owns and fallows which would attract small mammals on which ferruginous hawks prey. By enhancing the probability that wintering habitat will continue to be supported in the HCP area and by implementing measures for fallowed lands to enhance small mammal abundance, the HCP would mitigate the minimal amount of take potentially occurring and would not jeopardize the continued existence of the species.

3.8.6.9 Western Snowy Plover

Western snowy plovers are year-round breeding residents and winter migrants at the Salton Sea. The Salton Sea supports the largest wintering population of snowy plovers in the interior western United States and one of only a few key breeding populations in interior California (Shuford et al. 1999). For foraging, snowy plovers use the shoreline of the Salton Sea, primarily concentrated on sandy beaches or alkali flats along the western and southern shorelines. They also could forage in agricultural fields in the valley.

Foraging birds could be displaced if construction activities to install on-farm or system-based conservation measures or create managed marsh were conducted in fields where the birds were foraging which could constitute take as harassment or cause death or injury to individuals if as a result of being flushed they are subject to predation. Given the large amount of agricultural habitat available (about 500,000 acres), relatively small number of plovers (about 200 birds), and limited amount of disturbance spread out over the term of the permit (e.g., disturbance of up to 652 acres to create the managed marsh, construction on 8,630 acres for system improvements), the likelihood of these activities occurring coincident with snowy plovers is low. As such, the potential for and extent of take would be minimal.

Depending on the water conservation measures and Salton Sea approach implemented, the amount of agricultural land in production could be reduced by about 15 percent. Potentially a few individual plovers could be taken as a result of reduced foraging habitat in the HCP area. However, snowy plovers appear to prefer foraging at the Salton Sea and agricultural field habitat would remain abundant in the HCP area. As a result, the potential for and extent of take of snowy plovers expected from changes in the amount of agricultural land anticipated under this HCP would be minimal.

The minimal amount of potential take would be mitigated by implementation of the Agricultural Field Habitat Conservation Strategy. The greatest potential threat to the continued availability of agricultural field habitat in the HCP area would be conversion of agricultural lands to nonagricultural uses, particularly urban land uses. Critical to the perpetuation of agriculture in the Imperial Valley is the reliability and availability of water. Implementation of the water conservation and transfer program and this HCP will enhance the likelihood that agriculture will remain the dominant land use in the Imperial Valley and thereby continue to provide foraging opportunities for snowy plovers. In addition, IID would plant a cover crop or ridge till lands that it owns and fallows which would make insects accessible for snowy plovers. By enhancing the probability that wintering habitat will continue to be supported in the HCP area and by implementing measures for fallowed lands to enhance insect availability, the HCP would mitigate the minimal amount of take potentially occurring and would not jeopardize the continued existence of the species.

3.8.6.10 Black Tern

Black terns are common at the Salton Sea during the spring, summer and fall; they rarely occur at the Sea during the winter (USFWS 1997b). The Salton Sea watershed is thought to be the most important staging area for black terns in the Pacific Flyway (Shuford et al. 1999). In addition to the Salton Sea, black terns are common summer residents and migrants in Imperial Valley with up to about 10,000 individuals foraging over irrigated agricultural fields at some times (Shuford et al. 1999).

Installation of water conservation measures in agricultural fields and construction of system-based conservation measures or managed marsh would not be expected to affect black terns. Black terns are attracted to agricultural fields during irrigations when insects are displaced and are easy to capture. Construction activities would not be conducted while the fields were being irrigated and therefore would not affect black terns.

Depending on the water conservation measures implemented the amount of agricultural land in production could be reduced by about 15 percent. Potentially a few individual terns could be taken as a result of reduced foraging habitat in the HCP area. Even with a 15 percent reduction, the Imperial Valley would support about 425,000 acres of agricultural field habitat. Because of the abundance of agricultural field habitat, the potential for and extent of take of black terns expected from changes in the amount of agricultural land anticipated under this HCP would be minimal and would not substantially affect this species' population.

The minimal amount of potential take would be mitigated by implementation of the Drain Habitat Conservation Strategy as well as the Agricultural Field Habitat Conservation Strategy. The greatest potential threat to perpetuation of agricultural field habitat where black terns can forage in the HCP area is conversion of agricultural lands to nonagricultural uses, particularly urban land uses. Critical to the perpetuation of agriculture in the Imperial Valley is the reliability and availability of water. Implementation of the water conservation and transfer program and this HCP will enhance the likelihood that agriculture will remain the dominant land use in the Imperial Valley, and thereby continue to provide foraging opportunities for black terns. The availability and quality of marshes for breeding is the primary factor affecting the population size (USFWS 1999). Under the Drain Habitat Conservation Strategy, 190 to 652 acres of managed marsh habitat would be created that could provide nesting opportunities as well as foraging habitat. In combination, these strategies would mitigate the minimal amount of take potentially occurring and would not jeopardize the continued existence of the species.

3.8.6.11 Northern Harrier

Northern harriers are common fall and winter residents in the HCP area but occur only occasionally during the spring and summer. Throughout California, harriers commonly use agricultural fields, particularly alfalfa and pasture, in addition to native habitats such as native grasslands and marshes.

Installation of water conservation measures in agricultural fields would not be expected to affect northern harriers. On-farm conservation measures would be installed when crops were not being grown, primarily in the summer. Harriers predominantly occur in the HCP area during fall and winter and therefore, their occurrence in the area when this work would be conducted would be minimal. Construction in agricultural fields required for other covered activities such as creation of managed marsh habitat or system-based conservation measures could occur when northern harriers are in the HCP area. However, the occurrence of these activities in agricultural fields also would not be expected to affect foraging by northern harriers. Northern harriers might avoid foraging in areas where construction is occurring, but given the abundance of foraging habitat in the HCP area, individuals would be expected to be able to find alternative foraging locations.

Depending on the water conservation measures implemented the amount of agricultural land in production could be reduced by about 15 percent. Potentially over the term of the permit a few individual northern harriers could be taken as a result of reduced foraging habitat in the HCP area. Even with a 15 percent reduction, the Imperial Valley would support about 425,000 acres of agricultural field habitat. The abundance of agricultural field habitat is probably not a limiting factor for northern harriers in the Imperial Valley. Rather, the availability of breeding areas and habitat conditions at breeding areas probably have a much greater influence on the number of harriers wintering in the Imperial Valley (see e.g., Remsen 1978). Given the abundance of agricultural fields, the potential for and extent of take of harrier expected from changes in the amount of agricultural land anticipated under this HCP would be minimal and would not substantially affect this species' population.

The minimal amount of potential take would be mitigated by implementation of the Drain Habitat Conservation Strategy as well as the Agricultural Field Habitat Conservation Strategy. The greatest potential threat to foraging habitat for northern harrier in the HCP area would be conversion of agricultural lands to nonagricultural uses, particularly urban land uses. Critical to the perpetuation of agriculture in the Imperial Valley is the reliability and availability of water. Implementation of the water conservation and transfer program and this HCP will enhance the likelihood that agriculture will remain the dominant land use in the Imperial Valley and thereby continue to provide foraging opportunities for northern harrier. This species also forages in marsh habitat. Through the creation of 190 to 652 acres of managed marsh habitat, the Drain Habitat Conservation Strategy could increase foraging habitat for northern harrier. In combination, these strategies would mitigate the minimal amount of take potentially occurring and would not jeopardize the continued existence of the species.

3.8.6.12 Fulvous Whistling-Duck

The Salton Sea area has supported a population as high as about 200 whistling-ducks during the spring and summer, with a much smaller breeding population. They forage in marshes and irrigated agricultural field. In the Imperial Valley, alfalfa, corn, and grain fields could be used by whistling-ducks for foraging.

Installation of water conservation measures in agricultural fields and construction of system-based conservation measures or managed marsh have a minor potential to disturb fulvous whistling-ducks. These ducks could forage on grain remaining on fields after harvest. If construction occurred in or adjacent to fields where whistling-ducks were foraging, some individuals could be disturbed which could constitute take as harassment or cause death or injury to individuals (e.g., if the flushed ducks collided with a power line or were subject to predation). Given the large amount of agricultural habitat available (about 500,000 acres), relatively small number of whistling-ducks (up to 200 birds), and limited amount of disturbance spread out over the term of the permit (e.g., disturbance of up to 652 acres to create the managed marsh, construction on 8,630 acres for system improvements), the likelihood of these activities occurring coincident with fulvous whistling-ducks is low. As such, the potential for and extent of take would be minimal.

Fulvous whistling-ducks are not expected to be affected by the potential reduction in agricultural field habitat with implementation of the water conservation and transfer programs. As noted above, the HCP area supports a small population. The ducks predominantly use marshes and agricultural fields on the state and federal refuges. Thus, the reduction in agricultural fields potentially occurring with implementation of the water conservation and transfer programs and HCP would not be expected to adversely affect the whistling-duck population. The Drain Habitat Conservation Strategy would increase the amount of managed marsh habitat and mitigate the impact of any take of fulvous whistling-ducks caused by the covered activities (see Section 3.5.6.11).

3.8.6.13 White-Tailed Kite

White-tailed kites can occur in the HCP area throughout the year but in small numbers. The highest number of kites reported in one year in the Christmas Bird Count (1940 to 2000) was 10. The USFWS (1997) characterizes them as occasional visitors with normally fewer than five individuals each season (spring, fall, and winter) at the Salton Sea NWR. Their current breeding status in the HCP area is uncertain. They have bred in the HCP area previously, but have not been verified to breed there recently. White-tailed kites typically forage in agricultural fields and are known to roost in Bermuda grass fields.

Installation of water conservation measures in agricultural fields and construction of system-based conservation measures or managed marsh are unlikely to disturb white-tailed kites. In foraging, white-tailed kites hover in search of prey and then drop down to capture prey. White-tailed kites might avoid foraging in areas where construction is occurring. Given the abundance of foraging habitat in the HCP, individuals would be expected to be able to find alternative foraging locations. While white-tailed kites roost in Bermuda grass fields, construction activities would not be expected to affect roosting kites. Construction would not be conducted in fields in active agricultural production and therefore kites would not be expected to roost in areas subject to construction.

Depending on the water conservation measures implemented the amount of agricultural land in production could be reduced by about 15 percent. Potentially over the term of the permit a few individual white-tailed kites could be taken as a result of reduced foraging habitat in the HCP area. A small number of white-tailed kites occur in the HCP area. White-tailed kites forage in alfalfa, Sudan grass and Bermuda grass fields in the Imperial Valley. In the Imperial Valley, the acreage of alfalfa has varied from about 158,000 to 222,000 (i.e., 27 to 43 percent of the agricultural land in the Imperial Valley). Sudan grass and Bermuda grass currently collectively comprise about 25 percent of agricultural land in the valley. Thus, greater than 50 percent of the agricultural area provides potential foraging habitat. Because of the small numbers of kites and the abundance of agriculture fields, the potential for and extent of take of white-tailed kite expected from changes in the amount of agricultural land anticipated under this HCP would be minimal.

The minimal amount of potential take would be mitigated by implementation of the Tamarisk Scrub Habitat Conservation Strategy and Agricultural Field Habitat Conservation Strategy. The greatest potential threat to foraging habitat for white-tailed kites in the HCP area would be conversion of agricultural lands to nonagricultural uses, particularly urban land uses. Critical to the perpetuation of agriculture in the Imperial Valley is the reliability and availability of water. Implementation of the water conservation and transfer program and this HCP will enhance the likelihood that agriculture will remain the dominant land use in the Imperial Valley and thereby continue to provide foraging opportunities for white-tailed kites. In addition, IID would plant a cover crop on at least some of the lands that it owns and fallows which would attract small mammals on which white-tailed kites prey. The Tamarisk Scrub Habitat Conservation Strategy would increase the availability of nesting habitat and could contribute to white-tailed kites resuming breeding in the HCP area in the future (see Section 3.4.6.8). In combination, these strategies would mitigate the minimal amount of take potentially occurring and would not jeopardize the continued existence of the species.

3.8.6.14 Loggerhead Shrike

In the HCP area, loggerhead shrikes are associated with agricultural fields, as well as desert habitat. Shrikes use agricultural fields for foraging. Vegetation along agricultural drains, fence posts, and other natural and manmade structures along the margins of fields provide perch sites from which loggerhead shrikes forage. Drain vegetation also could support nesting. Tamarisk throughout the HCP area also could provide perching, roosting. and nesting opportunities although the level of use of tamarisk by loggerhead shrikes is uncertain.

IID has and will continue to conduct O&M activities of the drains. The vegetation currently supported in the drains is a product of these maintenance activities and use of this habitat by loggerhead shrike would occur in light of these activities. Although water conservation activities could reduce the amount and quality of water in the drains, this potential reduction is not expected to result in a substantial change in the extent and characteristics of vegetation in the drains. Thus, the drains would continue to provide perching, roosting, and nesting opportunities for loggerhead shrike at a level similar to existing conditions.

Several covered activities have the potential to directly or indirectly take loggerhead shrikes. Drain maintenance activities could flush loggerhead shrikes from drain vegetation which could constitute take as harassment or cause death or injury to individuals if as a result of being flushed from the cover of drain vegetation they are subject to predation. If loggerhead shrikes nest in drain vegetation, drain maintenance activities could destroy nests or disturb nesting birds.

On an annual basis, IID conducts drain maintenance activities on about 20 percent of the drainage system, affecting about 130 acres of vegetation. Some this vegetation could be used by loggerhead shrikes. With 80 percent of the drain vegetation undisturbed each year and considering IID would be actively cleaning only a fraction of the 20 percent of the drainage system during the breeding season, the potential for take and the level of take resulting from impacts to nesting birds (e.g., nest destruction) by drain maintenance activities is relatively low.

Drain maintenance activities and several other covered activities also have the potential to result in take of loggerhead shrikes through temporary or permanent reductions in the amount of tamarisk scrub habitat. As shown in Table 3.4-3, various maintenance and water conservation activities have the potential to temporarily impact about 43.2 acres of tamarisk scrub habitat and permanently impact about 65.5 acres. In addition, a reduction in the water surface elevation of the Salton Sea resulting from water conservation could impact up to 2,642 acres of tamarisk scrub habitat adjacent to the Salton Sea. These reductions in tamarisk scrub habitat could reduce nesting and perching opportunities for loggerhead shrikes if the habitat is located adjacent to suitable foraging habitat. Over the term of the permit, a few individuals could be adversely affected (e.g., killed, injured, or harmed) as a result of this reduction, but because of the abundance of tamarisk scrub in the HCP area (more than 7,500 acres), no adverse population-level effects would be expected.

Various construction activities anticipated by IID have the potential to remove tamarisk scrub habitat that could be used by loggerhead shrikes. Construction activities could displace individuals and result in take if displaced birds were unable to find alternate habitat or were exposed to other hazards (e.g., predation). Because of the abundance of tamarisk scrub habitat in the HCP area (more than 7,500 acres) and small amount of habitat that would be permanently impacted by construction activities (about 65 acres) over the term of the permit, the amount of take potentially occurring from displacement of individuals as habitat is removed would be minimal. If loggerhead shrikes nest in the HCP area, construction activities could result in the destruction of nests during habitat removal.

Under both the Tamarisk Scrub Habitat and Drain Habitat Conservation Strategy, IID will survey for covered species prior to conducting scheduled construction activities. If covered species, including loggerhead shrikes, are found breeding in habitat that would be impacted by the construction, IID will schedule the construction to occur outside the breeding season. These measures will avoid and minimize potential take of nesting birds.

Construction activities to install on-farm or system-based water conservation techniques or managed marsh have a minor potential to affect shrikes. These activities could result in disturbance if shrikes are nesting in vegetation adjacent to construction activities. The potential for this effect is considered very low. The type of equipment used to install the systems (e.g., excavators, graders, dozers) is the same type of equipment that IID uses in conducting its O&M activities. Also, workers are routinely working in and adjacent to the fields. Thus, shrikes nesting adjacent to agricultural fields are probably accustomed to construction equipment and human activity.

Depending on the water conservation measures implemented the amount of agricultural land in production could be reduced by about 15 percent. Shrikes forage on a wide variety of prey, including insects, small birds, mice, reptiles, and spiders. With this broad diet, food availability is probably not limiting such that the potential for and extent of take of loggerhead shrikes expected from changes in the amount of agricultural land anticipated under this HCP would be minimal.

Potential take of loggerhead shrikes resulting from the covered activities would be avoided, minimized and mitigated through the Salton Sea Habitat Conservation Strategy, Tamarisk Scrub Habitat Conservation Strategy, Drain Habitat Conservation Strategy, Desert Habitat Conservation Strategy, and Agricultural Field Habitat Conservation Strategy. Under the Salton Sea and Tamarisk Scrub Habitat Conservation Strategies, native tree habitat will be created or acquired and preserved to compensate for reductions in the this habitat and thereby offset lost habitat value for loggerhead shrikes. Up to 652 acres of managed marsh will be created under the Drain Habitat Conservation Strategy. As provided for under the monitoring and adaptive management program, the composition of this habitat can be adjusted by the HCP IT to better accommodate the habitat needs of species found in the drains during baseline surveys. Thus, to the extent that loggerhead shrikes currently use the drains, their habitat needs would be considered in developing the managed marsh. This habitat will serve to mitigate impacts potentially resulting from drain maintenance activities on 130 acres each year and permanent loss 25 acres of drain vegetation from construction activities. The Desert Habitat Conservation Strategy also avoids and minimizes impacts to nesting birds and compensates for habitat reductions (see Section 3.6.6.7). Finally, the Agricultural Field Habitat Strategy provides for the long-term persistence of foraging habitat for loggerhead shrikes by enhancing the probability that agriculture will remain the predominant land use in the HCP area. In combination, these strategies would mitigate any take of loggerhead shrikes potentially occurring and would not jeopardize the continued existence of the species.

3.8.6.15 Long-Billed Curlew

Long-billed curlews are common, year-round residents in the HCP area but with a large wintering population (Shuford et al. 2000). The number of birds in the Imperial Valley and at the Salton Sea varies throughout the year. Shuford et al. (2000) reported a total of 5,593 individuals in December 1999 during a survey for mountain plovers that covered about 60 percent of the Imperial Valley. The highest count of long-billed curlews in the HCP area was nearly 7,500 birds in August 1995 (Shuford et al. 1999). It is not known to breed in the

HCP area (Shuford et al. 1999). In the Imperial Valley, long-billed curlews predominantly forage in agricultural fields during irrigations that increase the availability of insects. Curlews also forage on mudflats at the Salton Sea.

Installation of water conservation measures in agricultural fields and construction of system-based conservation measures or managed marsh would not be expected to affect long-billed curlews. Curlews are attracted to agricultural fields during irrigations when insects are displaced and are easy to capture. Construction activities would not be conducted while the fields were being irrigated and therefore would not affect long-billed curlews.

While farmers would implement various water conservation practices, these practices are not expected to change irrigation practices in a manner that would reduce habitat suitability for long-billed curlews. Curlews commonly forage in alfalfa fields and typically are attracted to these fields during irrigations. They tend to follow the advancing water and prey on insects displaced by the water. Under the water conservation and transfer project, surface irrigations would continue and thereby continue to provide conditions favorable to foraging by curlews. The improved efficiencies under the water conservation and transfer project would be manifested as a reduction in the amount of water leaving the field as tailwater.

Use of drip irrigation would change the manner in which fields are irrigated and potentially adversely affect foraging habitat quality for curlews. However, curlews concentrate foraging activities in alfalfa and drip irrigation is not an effective or efficient method for irrigating alfalfa. Therefore, drip irrigation would not be expected to be used to irrigate alfalfa and no adverse effects to foraging habitat availability of quality for long-billed curlews would result.

Depending on the water conservation measures implemented the amount of agricultural land in production could be reduced by about 15 percent. Potentially over the term of the permit a few individual long-billed curlews could be taken as a result of reduced foraging habitat in the HCP area. Even with a 15 percent reduction, the Imperial Valley would still support about 425,000 acres of agricultural field habitat. Because of the abundance of agricultural field habitat, it is unlikely that the amount of agricultural fields limits the population of long-billed curlews in the Imperial Valley. The availability of and quality of breeding habitat in the species’ breeding range is believed to have been a primary cause of the species decline and is still a primary concern for this species. Given that it is unlikely that agricultural fields are limiting the level of use of the HCP area by long-billed curlews, the potential for and extent of take of long-billed curlews from changes in the amount of agricultural land anticipated under this HCP would be minimal.

The minimal amount of potential take would be mitigated by implementation the Agricultural Field Habitat Conservation Strategy. The greatest potential threat to foraging habitat for long-billed curlew in the HCP area would be conversion of agricultural lands to nonagricultural uses, particularly urban land uses. Critical to the perpetuation of agriculture in the Imperial Valley is the reliability and availability of water. Implementation of the water conservation and transfer program and this HCP will enhance the likelihood that agriculture will remain the dominant land use in the Imperial Valley and thereby continue to provide foraging opportunities for long-billed curlews. By enhancing the probability that habitat will continue to be supported in the HCP area, the HCP would mitigate the minimal amount of take potentially occurring and would not jeopardize the continued existence of the species.

3.8.6.16 White-Faced Ibis

White-faced ibis occur in the HCP area throughout the year but are most abundant in the winter. The HCP area supports a large wintering population of white-faced ibis. More than 24,000 ibis were recorded at the Salton Sea in 1999, representing about 50 percent of the California population. Agricultural fields are used extensively by ibis for foraging. Alfalfa appears to be the most commonly used crop type, although others such as wheat also are visited.

Installation of on-farm water conservation measures in agricultural fields would not be expected to affect white-faced ibis. On-farm conservation measures would be installed when crops were not being grown, primarily in the summer. The majority of the white-faced ibis using the HCP area occur in the area in the winter, with only a small breeding population. Thus, most of the birds would not be in the area when this work was being conducted. Impacts to ibis present during the summer also would not be expected because ibis forage in agricultural fields during irrigations and on-farm systems would not be installed when fields were being irrigated. For the same reason, construction in agricultural fields required for other covered activities such as creation of managed marsh habitat or system-based conservation measures would not affect ibis.

While farmers would implement various water conservation practices, these practices are not expected to change irrigation practices in a manner that would reduce habitat suitability for white-faced ibis. Ibis commonly forage in alfalfa fields and typically are attracted to these fields during irrigations. They tend to follow the advancing water and prey on insects displaced by the water. Under the water conservation and transfer project, surface irrigations would continue and thereby continue to provide conditions favorable to foraging by ibis. The improved efficiencies under the water conservation and transfer project would be manifested as a reduction in the amount of water leaving the field as tailwater.

Use of drip irrigation would change the manner in which fields are irrigated and potentially adversely affect foraging habitat quality for ibis. However, ibis concentrate foraging activities in alfalfa, and drip irrigation is not an effective or efficient method for irrigating alfalfa. Therefore, drip irrigation would not be expected to be used to irrigate alfalfa and no adverse effects to foraging habitat availability of quality for white-faced ibis would result.

Depending on the water conservation measures implemented the amount of agricultural land in production could be reduced by about 15 percent. Potentially over the term of the permit a few individual white-faced ibis could be taken as a result of reduced foraging habitat in the HCP area. Even with a 15 percent reduction, the Imperial Valley would still support about 425,000 acres of agricultural field habitat. This reduction in agriculture field habitat is not likely to affect white-faced ibis. Loss of marsh habitat and pesticides in breeding areas are believed to be the primary factors contributing to earlier declines in white-faced ibis, rather than conditions on wintering areas (Remsen 1987).

The number of white-faced ibis wintering in the Imperial Valley has increased substantially in the 1990s (Figure 3.8-5). Over the same period, the acreage of alfalfa showed no trend, but rather fluctuated within its historic range. These findings suggest that the population of white-faced ibis wintering in the Imperial Valley is not limited by the amount of foraging habitat (i.e., alfalfa). Given that the amount of agricultural land is not likely determining the size of the ibis population using the Imperial Valley, the potential for and extent of take of white-faced ibis from changes in the amount of agricultural land anticipated under this HCP would be minimal.

The minimal amount of potential take would be mitigated by implementation of the Drain Habitat Conservation Strategy as well as the Agricultural Field Habitat Conservation Strategy. The greatest potential threat to foraging habitat for white-faced ibis in the HCP area would be conversion of agricultural lands to nonagricultural uses, particularly urban land uses. Critical to the perpetuation of agriculture in the Imperial Valley is the reliability and availability of water. Implementation of the water conservation and transfer program and this HCP will enhance the likelihood that agriculture will remain the dominant land use in the Imperial Valley and thereby continue to provide foraging opportunities for white-faced ibis. The Drain Habitat Conservation Strategy also could provide foraging and nesting habitat and protected roost sites (see Section 3.5.6.8). In combination, these strategies would mitigate the minimal amount of take potentially occurring and would not jeopardize the continued existence of the species.

3.8.6.17 Peregrine Falcon

Peregrine falcons are rare visitors to the HCP area. No cliffs or tall buildings that could provide nesting sites for peregrine falcons occur in the project area, thus use of the project area by peregrine falcons is limited to foraging. They have been observed foraging at managed marsh habitats of the Salton Sea NWR where they prey on wintering and migrating waterfowl. They may also prey on shorebirds and waterfowl at the Salton Sea and in agricultural fields.

Installation of water conservation measures in agricultural fields would not be expected to affect peregrine falcons because of this species’ low level of use of the HCP area. Peregrine falcons might avoid foraging in areas where construction is occurring but given the abundance of foraging habitat in the HCP area, individuals would be expected to be able to find alternative foraging locations.

Depending on the water conservation measures implemented the amount of agricultural land in production could be reduced by about 15 percent. Potentially over the term of the permit a few individual peregrine falcons could be taken as a result of reduced foraging habitat in the HCP area. Few peregrine falcons occur in the HCP area. Even with a 15 percent reduction, the Imperial Valley would support about 425,000 acres of agricultural field habitat. Considering the small number of falcons and large amount of potential habitat, the potential for and extent of take of peregrine falcons from changes in the amount of agricultural land anticipated under this HCP would be minimal and would not substantially affect this species’ population.

The minimal amount of potential take would be mitigated by implementation of the Agricultural Field Habitat Conservation Strategy and the Drain Habitat Conservation Strategy (see Section 3.5.6.6). The greatest potential threat to the continued availability of agricultural fields as foraging habitat in the HCP area would be conversion of agricultural lands to nonagricultural uses, particularly urban land uses. Critical to the perpetuation of agriculture in the Imperial Valley is the reliability and availability of water. Implementation of the water conservation and transfer program and this HCP will enhance the likelihood that agriculture will remain the dominant land use in the Imperial Valley and thereby continue to provide foraging opportunities for peregrine falcon. The Drain Habitat Conservation Strategy also would contribute to maintaining foraging habitat for peregrine falcons by providing habitat for waterfowl. In combination, these strategies would mitigate the minimal amount of take potentially occurring and would not jeopardize the continued existence of the species.

3.8.6.18 Golden Eagle

Golden eagles occur at the Salton Sea only as accidentals during the winter and spring. Much of the HCP area could be used by golden eagles for foraging; however, golden eagles are most likely to concentrate foraging activities in areas of high prey concentrations. In the HCP area, the Salton Sea and managed marsh at the state and federal wildlife refuges, as well as private duck clubs, attract abundant waterfowl populations during winter. Agricultural fields also attract waterfowl and golden eagles may forage in desert habitat as well.

Installation of water conservation measures in agricultural fields would not be expected to affect golden eagles because of this species' rare occurrence in the HCP area. Golden eagles might avoid foraging in areas where construction is occurring but given the abundance of foraging habitat in the HCP area, individuals would be expected to find alternative foraging locations.

Depending on the water conservation measures implemented the amount of agricultural land in production could be reduced by about 15 percent. Potentially over the term of the permit a few individual golden eagles could be taken as a result of reduced foraging habitat in the HCP area. Few golden eagles occur in the HCP area. Even with a 15 percent reduction, the Imperial Valley would support about 425,000 acres of agricultural field habitat. Considering the small number of golden eagles and large amount of potential habitat, the potential for and extent of take of golden eagles from changes in the amount of agricultural land anticipated under this HCP would be minimal and would not substantially affect this species' population.

The minimal amount of potential take would be mitigated by implementation of the Agricultural Field, Drain (see Section 3.5.6.12), and Desert Habitat Conservation Strategies (see Section 3.6.6.10). The greatest potential threat to the continued availability of agricultural fields as foraging habitat in the HCP area would be conversion of agricultural lands to nonagricultural uses, particularly urban land uses. Critical to the perpetuation of agriculture in the Imperial Valley is the reliability and availability of water. Implementation of the water conservation and transfer program and this HCP will enhance the likelihood that agriculture will remain the dominant land use in the Imperial Valley and thereby continue to provide foraging opportunities for golden eagles. Under the Desert Habitat Conservation Strategy reductions in habitat would be mitigated through acquisition and protection of native desert habitat which would provide foraging opportunities for golden eagle over the long term. The Drain Habitat Conservation Strategy also would contribute to maintaining foraging habitat for golden eagles by providing habitat for waterfowl. In combination, these strategies would mitigate the minimal amount of take potentially occurring and would not jeopardize the continued existence of the species.

3.9 Other Covered Species

Of the 96 species covered by this HCP, the USFWS and CDFG identified 25 species for which existing information on the ecology and distribution in the HCP area is limited or that might not occur in the HCP area. These species are listed in Table 3.9-1. The approach to covering these species is to implement a research program to better understand the presence, distribution, and ecological requirements of these species in the HCP area. Based on the results of the research program, IID will implement measures to avoid, minimize, and mitigate the impacts of any take of these activities resulting from the covered activities.

TABLE 3.9-1
Covered Species Addressed Separately from the Habitat-Based and Species-Specific Conservation Strategies

Cheeseweed moth lacewing	Western small-footed myotis	Yuma hispid cotton rat
Andrew's dune scarab beetle	Occult little brown bat	Jacumba little pocket mouse
Colorado River toad	Southwestern cave myotis	Banded gila monster
Lowland leopard frog	Yuma myotis	Flat-seeded spurge
Mexican long-tongued bat	Western mastiff bat	Orcutt's aster
California leaf-nosed bat	Pocketed free-tailed bat	Foxtail cactus
Pallid bat	Big free-tailed bat	Munz's cactus
Pale western big-eared bat	Colorado River hispid cotton rat	Orocopia sage
Spotted bat		

3.9.1 Measures for the Other Covered Species

Other Species–1. *IID will implement a study program for the species listed in Table 3.9-1 in the HCP area. IID will work with the HCP IT to define the specific surveys and studies to be conducted. Within three years of issuance of the ITPs, IID will submit a detailed description of the study program to the USFWS and CDFG for approval. IID will implement the studies within 1 year of approval by the USFWS and CDFG.*

To ensure that appropriate and effective conservation measures are implemented for these species, IID will implement a study program designed by the HCP IT to determine the specific occurrence and habitat requirements of these species in the HCP area. The study program will determine the distribution of the covered species listed in Table 3.9-1 in the HCP area. For those species determined to occur in the HCP area, the study program also will provide information on their specific habitat requirements in the HCP. This information will be used in developing appropriate avoidance, minimization and mitigation measures (see Other Species–2).

Other Species–2. *Prior to completion of the study program, IID will implement the species-specific avoidance, minimization and mitigation measures contained in Appendix H. Within six months of completion of the study program or discrete species-specific components of the study program, the HCP IT will meet to review the results. Based on the results of the study program, the HCP IT will*

- *Assess the potential effects of the covered activities on each of the species listed in Table 3.9-1*
- *Recommend measures to avoid, minimize, and mitigate the impacts of the covered activities as necessary to meet the issuance criteria for state and federal incidental take permits*
- *Develop compliance and effectiveness monitoring and adaptive management programs*
- *Identify any additional studies necessary to develop measures to meet the issuance criteria*

IID will prepare a report that describes the results of the studies, the impacts of the covered activities on the covered species, and proposes avoidance, minimization, and mitigation measures for those impacts. IID will submit the report to the USFWS and CDFG for approval of the measures. IID will implement revised measures immediately upon approval by the USFWS and CDFG.

Prior to completion of the study program or species-specific components of the study program, the HCP IT will annually review the results of the study program. Based on this review the HCP IT may recommend adjustments to the avoidance, minimization, and mitigation measures contained in Appendix H. IID will submit an annual report of the study results and the proposed interim measures to the USFWS and CDFG for approval. IID will implement revised measures immediately upon approval by the USFWS and CDFG.

With the information gained through Other Species–1, the HCP IT will be able to better define the potential impacts to these species from IID’s covered activities. This information also will be important to refining measures to avoid, minimize, and mitigate potential effects of the covered activities on the covered species listed in Table 3.9-1. In the interim, prior to completion of the species-specific study programs, IID will implement the avoidance, minimization, and mitigation measures contained in Appendix H. The final measures to be implemented will be developed in coordination with the USFWS and CDFG as part of the HCP IT and will be subject to their approval. Figure 3.9-1 illustrates the process for implementing the study program, using the information obtained in the study program to develop avoidance and mitigation measures, and obtaining approval from the USFWS and CDFG for the measures.

3.9.2 Effects to the Other Covered Species

Implementation of Other Species–1 and –2 will provide an overall benefit to these covered species for two principal reasons. First, the habitat requirements and distribution of these species are poorly understood. The information gained through the study program will make a substantial contribution to understanding these species. This information will be valuable in developing management strategies for these species in other portions of their ranges and thereby contribute to the conservation of these species beyond the limits of the HCP area.

Second, under the HCP, IID is committing to implementing measures to avoid, minimize, and mitigate potential effects of covered activities on these species. In the absence of these measures, any adverse effects of the covered activities to these species would continue.

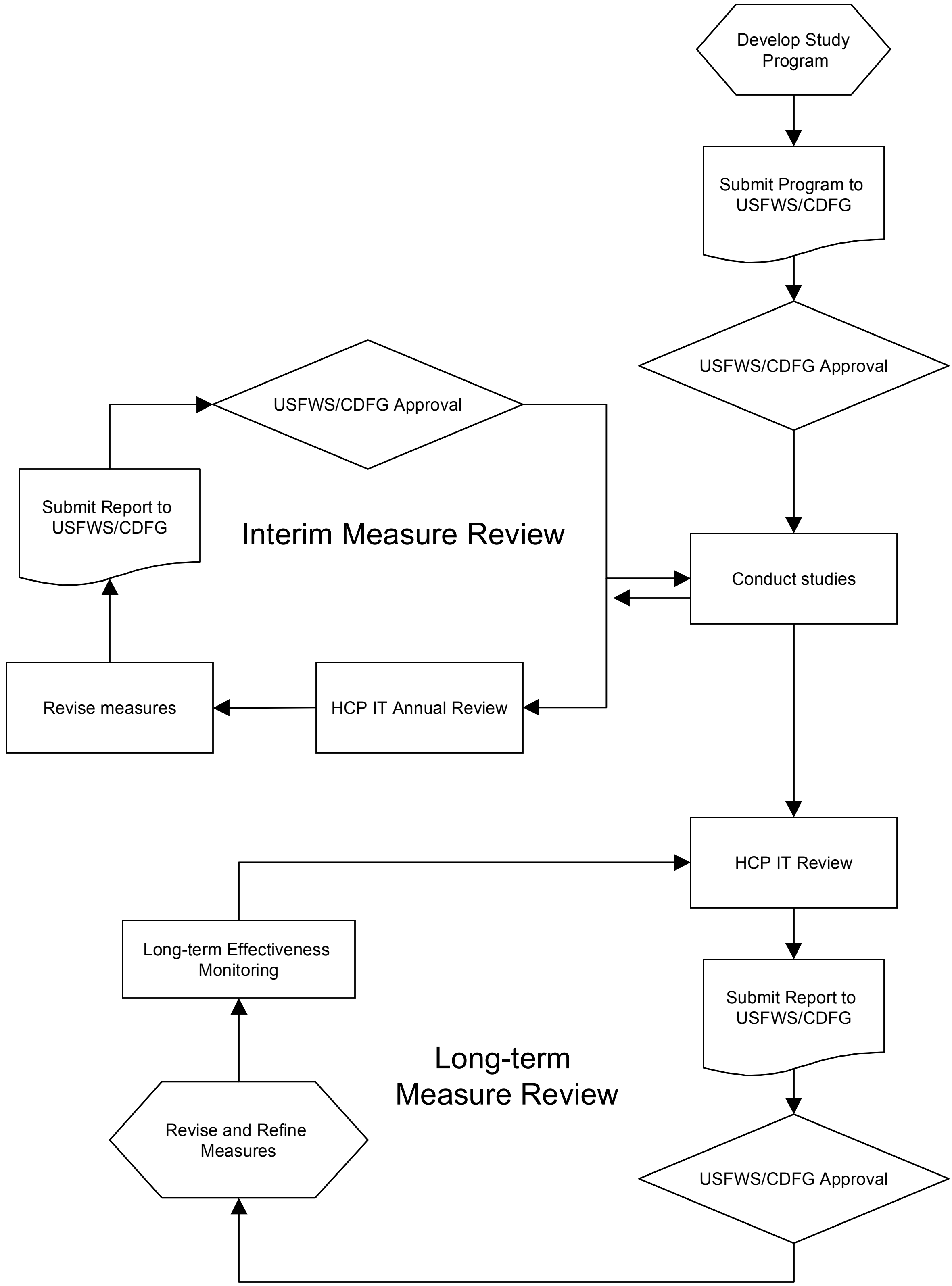


Figure 3.9-1
Process for Refining Measures for the Other Covered Species

Because none of the covered species in Table 3.9-1 are currently listed, they are afforded minimal to no protection under state or federal law. An individual species could receive protection in the future if it was listed. However, it is uncertain whether any of these covered species would be listed in the future. Also, protection afforded by listing of one of the covered species would extend only to the species actually listed. The remaining covered species would remain vulnerable. The certainty that protective measures would be implemented over an extended period of time (75 years) would provide a long-term benefit to these species in the HCP area, contribute to improved management elsewhere, and possibly prevent the need to list them in the future.

As part of the Monitoring and Adaptive Management Program (Chapter 4), IID could implement a survey or study program requiring capture of covered species. Capture of covered species constitutes take under both the federal and state ESAs. Take that occurs in association with surveys or studies conducted for this HCP is a covered activity and will be authorized under the state and federal ITPs. Any of the covered species could be taken through surveys or studies.

Studies and surveys conducted during the course of this HCP will be developed by IID in coordination with the HCP IT and will be subject to the approval of CDFG and USFWS prior to implementation. In approving the studies/surveys, the CDFG and USFWS will require capture methods that minimize the potential for death and injury of covered species. In addition, these agencies will specify the number of individuals of covered species that may be captured. Thus, the level of take authorized to occur through this mechanism will be specified on a case-by-case basis through the approval of the CDFG and USFWS.

3.9.2.1 Cheeseweed Moth Lacewing

This species is rarely observed in the field. Although infrequently observed, the moth lacewing may exist at many undocumented sites throughout the arid southwest region of the United States. The larval stage is associated with creosote bush. All collections of mature larvae and egg cases have produced specimens that were found inhabiting the root mass of this plant (USBR, 1996). The creosote bush scrub community is widespread throughout the nonirrigated areas of the Sonoran Desert. This habitat type surrounds the Salton Sea between the higher rock hillsides and the more saline desert saltbrush community. Suitable habitat likely exists in the HCP area in desert habitats adjacent to the AAC; however, no emergence sites have been documented for this area (USBR, 1996).

The primary mechanism through which the covered activities could result in take of cheeseweed moth lacewings is construction activities in desert scrub habitats that remove existing creosote bushes. Over the term of the permit, IID anticipates replacing all of the structures along the AAC and East Highline Canal at least once. Construction to replace structures and potentially install canal lining could result in take of a cheesweed moth lacewing through removal of creosote bushes. Over the term of the permit, scheduled construction activities will not permanently remove more than 100 acres of native desert habitat. Only a portion of this habitat would consist of creosote bushes and be potentially suitable for cheeseweed moth lacewings.

Under the Desert Habitat Conservation Strategy, IID would restrict O&M to previously disturbed areas and conduct regular vegetation control in disturbed areas to inhibit establishment creosote bushes (Desert Habitat–2). Similarly, IID would restrict scheduled construction activities to previously disturbed areas to the extent possible (Desert Habitat–3). Collectively, these measures would minimize the potential that IID's activities would remove a creosote bush that was inhabited by cheeseweed moth lacewings or that provide potential habitat. For all scheduled construction activities, the construction site would be surveyed to determine the occurrence of native desert habitat. To avoid impacts to the cheeseweed moth lacewing, creosote shrubs will be avoided during construction if possible (Appendix H). If shrubs cannot be avoided, and they are known or suspected to be inhabited by cheeseweed moth lacewings, IID will work with CDFG and USFWS to transplant the shrubs or acquire and protect suitable habitat in accordance with Desert Habitat–5. Through these measures, impacts to cheeseweed moth lacewing would be avoided or appropriately mitigated.

In addition to these measures, as part of the Other Species Conservation Strategy, IID would implement a study program to better understand the ecology and distribution of this species. Based on the results of the study program, the HCP IT would review the avoidance, minimization, and mitigation strategy for the cheeseweed moth lacewing and recommend adjustments if necessary to improve the effectiveness of the measures.

Covered activities conducted by IID have the potential to take cheeseweed moth lacewings in the immediate vicinity of the AAC and other canals adjacent to desert habitat (Trifolium Extension, Thistle, Westside Main, and East Highline). Cheeseweed moth lacewings have not been observed within the HCP area and have been only infrequently observed in other areas. Habitat for the lacewing in the HCP area constitutes a small portion of the total availability of creosote shrub habitat in the region. A maximum of 100 acres of native desert habitat, some of which could be inhabited by cheeseweed moth lacewings, could be affected. With implementation of the Desert Habitat Conservation Strategy measures and species-specific measures, implementation of the HCP would avoid, minimize, and mitigate potential impacts to this species and would not jeopardize its continued existence.

3.9.2.2 Andrew's Dune Scarab Beetle

The Andrew's dune scarab beetle is endemic to the creosote bush scrub habitats of the Algodones Dunes in Imperial County, California. This species inhabits both surface and subsurface sand, utilizing the wet sand interface as protection from heat of the day. This beetle specifically inhabits troughs of loose drifting sand between the dunes. Suitable habitat for Andrew's dune scarab beetles in the HCP area occurs in the right-of-way of the AAC for the 10 miles that the AAC traverses the Algodones Dunes.

The only O&M activity with the potential to impact to Andrew's dune scarab beetles is the canal maintenance IID conducts along the portion of the AAC that traverses the Algodones Dunes. IID annually contours portions of the sand dunes, creating a flatter slope that allows sand to blow across the canal. In conducting this flattening, a bulldozer drags an I-beam back and forth across the peaks of the dunes to level them. The area where this activity is conducted begins at the Coachella Turnout (Sta. 1907+20) and extends to about Sidewinder Road at Pilot Knob (Sta. 1243+65), a distance of 12.56 miles. The area actually disturbed is about 50 to 75 feet wide yielding a total acreage disturbed of 76 to 114 acres. This acreage represents less than 0.1 percent of the 150,000 acres of the Algodones Dunes that could provide habitat for this species. Andrew's dune scarab beetles could be crushed or displaced by this activity. The remaining O&M activities are restricted to previously disturbed areas (i.e., roadways and canal embankments) where Andrew's dune scarab beetles would not be expected to occur because these areas consist of well compacted soil that is not suitable for this species.

Over the term of the permit, IID anticipates replacing all of the structures along the AAC. Construction to replace these structures could remove dune scarab beetles. Over the term of the permit, scheduled construction activities will not permanently remove more than 100 acres of native desert habitat. Impacted habitat would be distributed along the entire length of the AAC as well as along those sections of the East Highline, Westside Main, Thistle, and Trifolium canals that are adjacent to desert habitat. Because potential habitat for Andrew's dune scarab beetles in the HCP area is limited to the 10 miles of the AAC in the Algodones Dunes, the potential loss of habitat for Andrew's dune scarab beetles would be considerably less than 100 acres.

Under the Desert Habitat Conservation Strategy, IID would restrict O&M to previously disturbed areas (Desert Habitat–2). Similarly, IID would restrict scheduled construction activities to previously disturbed areas to the extent possible (Desert Habitat–3). Collectively, these measures would minimize the potential that IID's activities would impact dune beetles. For scheduled construction activities, IID would survey the construction site if reliable survey methods are available to determine if the site was used by dune beetles (Appendix H). If dune beetles were found, IID would configure the construction activities to avoid occupied areas to the extent possible. If dune habitat would be permanently lost, IID would acquire and protect dune habitat in accordance with Desert Habitat–5. Through these measures, impacts to Andrew's dune scarab beetles would be minimized, avoided, or appropriately mitigated.

In addition to these measures, as part of the Other Species Conservation Strategy, IID would implement a study program to better understand the ecology and distribution of this species. Based on the results of the study program, the HCP IT would review the avoidance, minimization, and mitigation strategy for the Andrew's dune scarab beetle and recommend adjustments if necessary to improve the effectiveness of the measures.

Covered activities conducted by IID have the potential to take Andrew's dune scarab beetles in the immediate vicinity of the AAC where the canal crosses the Algodones Dunes. Habitat for dune scarab beetles in the HCP area constitutes a small portion of the total habitat for this species in the Algodones Dunes. Under the HCP, IID would implement measures to minimize and avoid take of Andrew's dune scarab beetles and to compensate for reductions in suitable habitat. Therefore, implementation of the HCP which would serve to further reduce potential impacts and would not jeopardize the continued existence of Andrew's dune scarab beetles.

3.9.2.3 Colorado River Toad

Colorado River toads are found in a variety of desert and semiarid habitats including brushy desert with creosote bush and mesquite washes, semiarid grasslands, and woodlands. It is semiaquatic and usually associated with large, permanent, or semipermanent streams. It is occasionally found near small springs, temporary rain pools, human-made canals, and irrigation ditches. Primary breeding habitat for the Colorado River toad is moderately large streams, but it is also known to breed in temporary rain pools, and human-made watering holes and irrigation ditches.

In the HCP area, native desert habitats are restricted to along the AAC, East Highline Canal, and sections of the Westside Main, Thistle, and Trifolium Extension canals. These toads could use desert washes near these canals or seepage communities that occur in some locations along these canals. Agricultural drains have the potential to be used by these toads, and the toads could use areas adjacent to the New and Alamo rivers, although their use of tamarisk has not been determined. In general, however, Colorado River toads would be expected to occur along the AAC closer to the Colorado River rather than in the Imperial Valley portions of the HCP area. Surveys conducted under the Conservation Strategy for the 25 other covered species (Other Species–1) will provide information on the presence of suitable habitat and occurrence of this species throughout the HCP area.

Several covered activities have the potential to directly or indirectly take Colorado River toads. Vehicle strikes during O&M or construction activities could result in take of toads. If Colorado River toads are using the drains as habitat, direct impacts to eggs, larvae, or adults could occur during drain maintenance activities. On an annual basis, IID conducts drain maintenance activities on about 20 percent of the drainage system, affecting about 130 acres of vegetation. However, only a small amount of this vegetation likely would be suitable for Colorado River toads.

Of greater concern is the potential for construction activities to eliminate breeding ponds. Installation of seepage recovery systems on the East Highline Canal are not expected to impact Colorado River toads because the recovery systems are proposed for the west side of the canal and desert habitat occurs on the east side of the canal. Further, the seepage communities adjacent to the west side of the East Highline do not support standing water that these toads require for breeding. Seepage communities on the east side of the East Highline Canal which are adjacent to desert habitat would not be affected by the proposed seepage recovery systems.

Scheduled construction activities along the canals adjacent to desert habitat would not remove more than 100 acres of native desert habitat (Desert Habitat–5). Potentially, ponds suitable for breeding by Colorado River toads could occur along the AAC and some of the 100 acres potentially impacted by construction could support breeding ponds. As part of the habitat surveys that could be conducted for Desert Habitat Conservation Strategy (see Section 4.4.1.1) and the species-specific study program that would be implemented as part of the Other Species Conservation Strategy, potential breeding ponds for this species would be identified.

Breeding ponds are a critical habitat feature for Colorado River toads. Because of the believed scarcity of suitable ponds and uncertainty about the number and distribution of suitable ponds in the HCP area, IID will obtain written approval from the USFWS and CDFG if it proposes to impact a breeding pond. In deciding whether to approve the request, the USFWS and CDFG will consider the availability of other breeding ponds in the HCP area and the overall status of the species. The baseline surveys will provide the information necessary for USFWS and CDFG to determine if a breeding pond could be eliminated (e.g., number, size, and location of breeding ponds) without causing substantial adverse effects to the species.

To mitigate the impact to Colorado River toads from removal of breeding ponds, if approved by the USFWS and CDFG, IID would acquire, protect and manage in perpetuity two breeding ponds for every pond impacted. With the requirement for IID to receive approval from the USFWS and CDFG prior to eliminating a breeding pond and the requirement to protect two ponds for every one impacted, the number of ponds that could be impacted would be limited. The long-term protection of breeding ponds in the event that a pond would be removed would offset impacts to Colorado River toads by providing habitat for this species in perpetuity. Further, USFWS and CDFG would not approve removal of a pond if it would substantially adversely affect the species. Based on the believed low level of use of the HCP area by Colorado River toads, the potential for take of this species is low.

Drain maintenance activities and several other covered activities also have the potential to result in take of Colorado River toads through temporary or permanent reductions in the amount of drain habitat. As described in Section 3.5.2.2, various maintenance and water conservation activities have the potential to temporarily and permanently impact drain vegetation. In total, an estimated 25.1 acres of drain vegetation could be permanently impacted. These temporary and permanent reductions in drain habitat could result in a minor reduction in potential habitat for Colorado River toads. It is unknown whether Colorado River toads currently use the drains.

Under the HCP, IID will create at least 190 acres and up to 652 acres of managed marsh habitat (Drain Habitat–1). The created habitat will be of equal or better quality for Colorado River toads because it would have better water quality than the drains, and could be configured to provide more suitable habitat conditions than provided in the drains. Based on the results of the species-specific study program for Colorado River toads, the HCP IT could configure a portion of the managed marsh habitat specifically to provide habitat for this species. At the HCP IT's discretion and with approval from the USFWS and CDFG, Colorado River toads could be introduced into the managed marsh which would encourage the establishment of another population of this species. To the extent that IID's drainage system currently provides habitat for Colorado River toads, habitat would continue to be available in the drains with implementation of the HCP. Therefore, the created marsh would act to increase the amount of habitat for Colorado River toads in the HCP area and thereby benefit the species. Implementation of the minimization and avoidance measures, and creation of high quality managed marsh habitat, would minimize and mitigate the impact of any take of this species resulting from the covered activities. Implementation of the HCP would not jeopardize the continued existence of Colorado River toads.

3.9.2.4 Lowland Leopard Frog

The lowland leopard frog has not been found in surveys in California since 1965 (Clarkson and Rorabaugh 1989, USFWS 1999) and is considered extirpated from southeastern California. Lowland leopard frogs have the potential to occur in the proposed project area in the future as a result of additional introductions or migration from reintroduced populations.

Lowland leopard frogs are generally associated with small streams and marshes that support emergent vegetation. In the HCP area, suitable habitat could occur in the wetlands on the state and federal refuges and wetlands adjacent to the Salton Sea. The New and Alamo rivers probably do not provide suitable habitat conditions due to their large size. However, portions of the agricultural drainage system that support cattails could provide suitable conditions.

If lowland leopard frogs are using the drains as habitat, direct impacts to eggs, larvae, or adults could occur during drain maintenance activities. On an annual basis, IID conducts drain maintenance activities on about 20 percent of the drainage system, affecting about 130 acres of vegetation. However, only a small amount of this vegetation might be suitable for lowland leopard frogs. Drain maintenance activities and several other covered activities also have the potential to result in take of lowland leopard frogs through temporary or permanent reductions in the amount of drain habitat. As described in Section 3.5.2.2, various maintenance and water conservation activities have the potential to temporarily and permanently impact drain vegetation. In total, an estimated 25.1 acres of drain vegetation could be permanently impacted. These temporary and permanent reductions in drain habitat could result in a minor reduction in potential habitat for lowland leopard frogs.

Under the HCP, IID will create at least 190 acres and up to 652 acres of managed marsh habitat (Drain Habitat–1). The created habitat will be of equal or better quality for lowland leopard frogs because it will contain preferred vegetation (i.e., cattails) and have better water quality than the drains. Based on the results of the species-specific study program for lowland leopard frogs, the HCP IT could configure a portion of the managed marsh habitat specifically to provide habitat for this species. At the HCP IT's discretion and with approval from the USFWS and CDFG, lowland leopard frogs could be introduced into the managed marsh which would encourage the establishment of another population of this species. To the extent that IID's drainage system currently provides habitat, potential habitat for lowland leopard frogs would continue to be available in the drains with implementation of the HCP. Therefore, the created marsh would act to increase the amount of habitat for lowland leopard frogs in the HCP area and thereby benefit the species. Limitation of maintenance activities to a small fraction of the drain habitat on an annual basis, and creation of high-quality managed marsh habitat, would minimize and mitigate the impact of any take of this species resulting from the covered activities. Implementation of the HCP would not jeopardize the continued existence of lowland leopard frogs.

3.9.2.5 Mexican Long-Tongued Bat

The Mexican long-tongued bat occurs in a variety of habitats, ranging from arid scrub habitats to mixed oak-conifer forests (Arroyo-Cabrales et al. 1987) and semidesert grasslands (Cryan and Bogan 2000). It favors desert canyons with riparian vegetation. A variety of roost sites are used, including caves, mines, buildings, and trees. Most roost sites are located near a water source and near areas of riparian vegetation (Cryan and Bogan 2000). Caves, mines, and probably buildings are used as nursery sites. This species forages in desert and montane riparian, desert scrub, desert succulent shrub, and pinyon-juniper habitats.

Desert scrub is widespread throughout the nonirrigated areas of the Sonoran Desert. This habitat type surrounds the Salton Sea between the higher rock hillsides and the more saline desert saltbrush community. Succulent shrubs comprise a minor component of the vegetation community such that foraging habitat for Mexican long-tongued bats could be limited. The only portion of the HCP area that supports desert scrub habitat is in the rights-of-way of the AAC, East Highline Canal, and portions of the Westside Main, Thistle, and Trifolium Extension Canals. Where succulents occur along these canals, long-tongued bats may find suitable foraging conditions. A few areas along the AAC support cottonwoods and other trees that could provide roosting sites.

Potential impacts of IID's covered activities on this species relate principally to removal of foraging or roosting habitat. Under the Desert Habitat Conservation Strategy, IID would restrict O&M to previously disturbed areas (Desert Habitat–2). Similarly, IID would restrict scheduled construction activities to previously disturbed areas to the extent possible (Desert Habitat–3). Collectively, these measures would minimize the potential that IID's activities would impact foraging or roosting habitat for these bats.

Over the term of the permit, IID anticipates replacing all of the structures along the AAC. Construction to replace these structures could remove foraging habitat which could result in take of Mexican long-tongued bats. Under Desert Habitat–5, IID has committed to permanently remove no more than 100 acres of native desert habitat. Potentially impacted habitat would be distributed throughout the entire length of the AAC as well as along those sections of the East Highline, Westside Main, Thistle, and Trifolium canals that are adjacent to desert habitat. Potential habitat for long-tongued bats in the HCP area is limited to areas of desert scrub habitat supporting succulents. Thus, the potential loss of foraging habitat for Mexican long-tongued bats would be considerably less than 100 acres and would not be expected to substantially affect foraging opportunities for this species.

As part of the species-specific study program implemented under Other Species–1, foraging habitat for this species in the HCP area would be determined. Prior to the start of construction activities, IID would determine if foraging habitat for long-tongued bats occurs within the construction area and would be impacted by construction activities. If construction impacts to foraging habitat cannot be avoided, IID would consult with CDFG and USFWS to identify other areas of suitable foraging habitat. The baseline surveys (Other Species–1) would provide the information necessary for USFWS and CDFG to determine which areas provide suitable foraging habitat for Mexican long-tongued bats. IID would mitigate for permanent loss of foraging for Mexican long-tongued bats by acquiring or granting a conservation easement on other suitable foraging habitat within the immediate vicinity of identified roost sites at a 3:1 ratio for the acreage impacted.

Day and night roosts are important habitat features for Mexican long-tongued bats. Because of the scarcity of suitable roosting sites and uncertainty about the number and distribution of suitable roosts in the HCP area, IID would obtain written approval from the USFWS and CDFG if it proposes to impact a roosting site. In deciding whether to approve the request, the USFWS and CDFG would consider the availability of other roosting sites in the HCP area and the overall status of the species. The baseline surveys (Other Species–1) would provide the information necessary for USFWS and CDFG to determine whether a roosting site could be eliminated without causing substantial adverse effects to the species. No impacts to maternity roosts would be authorized.

To mitigate the impact to Mexican long-tongued bats from removal of roosting sites, if approved by the USFWS and CDFG, IID would acquire, protect, and manage in perpetuity one roosting site for every roost site eliminated. With the requirement for IID to receive approval from the USFWS and CDFG prior to eliminating a roost site and the requirement to protect one roost site for every one eliminated, the number of roost sites that could be impacted would be limited. The long-term protection of roosting sites, in the event that a site would be removed, would offset impacts to Mexican long-tongued bats by providing roost sites for this species in perpetuity. Further, USFWS and CDFG would not approve removal of a roost site if it would substantially adversely affect the species. Based on the expected low level of use of the HCP area by Mexican long-tongued bats, the potential for take of this species is low. This assumption will be evaluated as part of the Other Species Conservation Strategy and the HCP IT may revise the avoidance, minimization, and mitigation measures if necessary to improve the effectiveness and efficiency of the measures. Implementation of the HCP would not jeopardize the continued existence of Mexican long-tongued bats.

3.9.2.6 California Leaf-Nosed Bat

California leaf-nosed bats occur in arid regions, using habitats such as desert scrub, alkali scrub, desert washes, riparian associations, and palm oases (Zeiner et al. 1990). The California leaf-nosed bat is known from caves, mines, and rock shelters, mostly in Sonoran desert scrub (AGFD 1997d). During winter months, the California leaf-nosed bat forms large colonies in only a few geothermally heated mines in the deserts of the Southwest (Brown and Berry 1991). This species requires warm roosts with temperatures of 80.6ºF or more due to its inability to lower its body temperature and become torpid (Bell 1985). Maternity colonies are generally located in mines with temperatures that reach 80.6º to 89.6ºF. The species uses separate daytime and nighttime roosts. Day roosts are often in deeper caves or mines and occasionally in abandoned structures (Zeiner et al. 1990). Night roosts are in bridges, mines, buildings, overhangs, or other structures with overhead protection (Zeiner et al. 1990). The presence of woody riparian vegetation, such as mesquite, ironwood, and paloverde, is required in foraging areas.

California leaf-nosed bats use caves and mines as day roosts. The only mine shafts in the area occur near Hedges, at the southwestern tip of Cargo Muchacho Mountains. Plant species preferred for foraging (mesquite, paloverde, ironwood) are rare in the HCP area and restricted to scattered patches along the AAC and East Highline Canal. It is unknown whether they forage in riparian areas dominated by tamarisk.

Potential impacts of IID's covered activities on this species relate principally to removal of foraging habitat. Under the Desert Habitat Conservation Strategy, IID would restrict O&M to previously disturbed areas (Desert Habitat–2). Similarly, IID would restrict scheduled construction activities to previously disturbed areas to the extent possible (Desert Habitat–3). Collectively, these measures would minimize the potential that IID's activities would impact foraging habitat for these bats.

Over the term of the permit, IID anticipates replacing all of the structures along the AAC. Construction to replace these structures could remove foraging habitat which could result in take of California leaf-nosed bats. Under Desert Habitat–5, IID has committed to permanently remove no more than 100 acres of native desert habitat. Potentially impacted areas would be distributed along the entire length of the AAC as well as along those sections of the East Highline, Westside Main, Thistle, and Trifolium canals that are adjacent to desert habitat. Potential habitat for leaf-nosed bats in the HCP area is limited to scattered areas of along the AAC and East Highline Canal. Thus, the potential loss of foraging habitat for California leaf-nosed bats would be considerably less than 100 acres and would not be expected to substantially affect foraging opportunities for this species.

As part of the species-specific study program implemented under Other Species–1, foraging habitat for this species in the HCP area would be determined. Prior to the start of construction activities, IID would determine whether foraging habitat for California leaf-nosed bats occurs within the construction area and would be impacted by construction activities. If construction impacts to foraging habitat cannot be avoided, IID will consult with CDFG and USFWS to identify other areas of suitable foraging habitat. The baseline surveys (Other Species–1) would provide the information necessary for USFWS and CDFG to determine which areas provide suitable foraging habitat for California leaf-nosed bats. IID will mitigated for permanent loss of foraging habitat for California leaf-nosed bats by acquiring or granting a conservation easement on other suitable foraging habitat within 5 miles of identified roost sites at a 3:1 ratio for the acreage impacted.

Day and night roosts are important habitat features for California leaf-nosed bats. Because of the scarcity of suitable roosting sites and uncertainty about the number and distribution of suitable roosts in the HCP area, IID will obtain written approval from the USFWS and CDFG if it proposes to impact a roosting site. In deciding whether to approve the request, the USFWS and CDFG will consider the availability of other roosting sites in the HCP area and the overall status of the species. The baseline surveys (Other Species–1) will provide the information necessary for USFWS and CDFG to determine if a roosting site could be impacted without causing substantial adverse effects to the species. Because of the scarcity of suitable maternity roosts due to strict thermal requirements, no impacts to maternity roosts would be authorized.

To mitigate the impact to California leaf-nosed bats from impacts to roosting sites, if approved by the USFWS and CDFG, IID would acquire, protect and manage in perpetuity one day roosting site for every day roost site eliminated. With the requirement for IID to receive approval from the USFWS and CDFG prior to eliminating a roost site and the requirement to protect at least one roost site for every one eliminated, the number of roost sites that could be impacted will be limited. The long-term protection of roosting sites, in the event that a site would be removed, would offset impacts to California leaf-nosed bats by providing roost sites for this species in perpetuity. Further, USFWS and CDFG would not approve impacts to a roost site if it would substantially adversely affect the species. Based on the expected low level of use of the HCP area by California leaf-nosed bats, the potential for take of this species is low. This assumption will be evaluated as part of the Other Species Conservation Strategy and the HCP IT may revise the avoidance, minimization, and mitigation measures if necessary to improve the effectiveness and efficiency of the measures. Implementation of the HCP would not jeopardize the continued existence of California leaf-nosed bats.

3.9.2.7 Pallid Bat

The pallid bat is most often found in arid, low-elevation habitats, including grasslands, shrublands, woodlands, and forests. Day roosts include caves, crevices, mines, trees, and buildings. Night roosts are generally in more open sites and are near day roosts. Horizontal crevices with stable temperatures are preferred day roosts in summer; vertical crevices with fluctuating temperatures are preferred during cooler periods. Pallid bats primarily forage on ground-dwelling arthropods, such as scorpions, crickets, and grasshoppers but also take large moths. Foraging occurs in and among vegetation as well as on the ground surface.

Pallid bats are well adapted to human environments and frequently use buildings, bridges, and trees as roosts. Thus, they could roost throughout the HCP area. Foraging may also occur throughout the HCP area in any habitat where insect prey is abundant, including agricultural areas, wetlands, riparian areas, canals drains, and desert scrub. As part of the species-specific study program implemented under Other Species–1, foraging habitat for this species in the HCP area would be determined.

Potential impacts of IID's covered activities on this species relate principally to removal of foraging habitat or roosting sites. Under the Desert Habitat Conservation Strategy, IID would restrict O&M to previously disturbed areas (Desert Habitat–2). Similarly, IID would restrict scheduled construction activities to previously disturbed areas to the extent possible (Desert Habitat–3) and would not remove more than 100 acres of native desert habitat (Desert Habitat–5). Permanent loss of desert habitat would be mitigated by acquisition and long-term protection of native desert habitat. Under the Tamarisk Scrub Habitat Conservation Strategy, permanent removal of habitat would be mitigated by creation / acquisition and long-term protection of native tree habitat. Collectively, these measures would minimize and offset potential impacts to pallid bats resulting from impacts to foraging habitat.

Drain maintenance activities could result in a temporary or permanent loss of foraging habitat used by pallid bats. On an annual basis, IID conducts drain maintenance activities on about 20 percent of the drainage system, affecting about 130 acres of vegetation. Some of this vegetation might be suitable foraging habitat for pallid bats. Since pallid bats also forage over agricultural lands, fallowing could result in a loss of foraging habitat. Given the abundance of agricultural habitat in the HCP area, individuals would be expected to be able to find alternative foraging locations.

Under the HCP, IID will create at least 190 acres and up to 652 acres of managed marsh habitat (Drain Habitat–1). The created habitat would be of better quality than would be affected during drain maintenance. Further, the drains would continue to support vegetation similar to existing conditions and foraging habitat for pallid bats would continue to be available. Therefore, the created marsh would act to increase the amount of foraging habitat for pallid bats in the HCP area and thereby benefit the species.

Day and night roosts are important habitat features for the pallid bat. Over the term of the permit, IID anticipates conducting various construction activities which could remove roost sites for pallid bats. Because of the scarcity of suitable roosting sites and uncertainty about the number and distribution of suitable roosts in the HCP area, IID will obtain written approval from the USFWS and CDFG if it proposes to impact a roosting site. In deciding whether to approve the request, the USFWS and CDFG will consider the availability of other roosting sites in the HCP area and the overall status of the species.

To mitigate the impact to pallid bats from removal of roosting sites, IID would replace every roost site eliminated with a suitable roost (approved by CDFG and USFWS) in the immediate vicinity. With the requirement for IID to receive approval from the USFWS and CDFG prior to replacing a roost site and the requirement to replace one roost site for every one eliminated, the number of roost sites that could be impacted will be limited. The long-term protection of roosting sites would offset impacts to pallid bats by providing roost sites for this species in perpetuity. Further, USFWS and CDFG would not approve removal of a roost site if it would substantially adversely affect the species.

Avoidance, minimization and compensation for effects to foraging habitat and avoidance and compensation for impacts to roost sites would minimize and mitigate the impact of any take of this species resulting from the covered activities. Implementation of the HCP would not jeopardize the continued existence of pallid bats.

3.9.2.8 Pale Western Big-Eared Bat

Pale western big-eared bats can be found in a variety of habitats but are most commonly associated with Mojave mixed scrub (e.g., sagebrush, sagebrush-grassland, blackbrush, and creosote-bursage) and lowland riparian communities. Separate day and night roosts are used. Day roosts are in caves, mines, or tunnels. Hibernation roosts are cold, but stay above freezing (Zeiner et al. 1990) and must be quiet and undisturbed. Maternity roosts are generally located in mines and caves. The determining factor for maternity roost site selection may be temperature related. In California, maternity roosts are generally warm; the species appears to select the warmest available sites, some of which reach 30°C (86°F) (Pierson et al. 1991). Night roosts may be in buildings or other structures. Separate hibernation and maternity roosts are often used. Foraging takes place over desert scrub, riparian habitats, or open water within 15 miles of the roost sites.

Pale western big-eared bats use caves and mines for roosting. No mine shafts occur in the HCP area. Pale western big-eared bats could forage throughout the HCP area, although they probably would concentrate foraging activities along the LCR, Salton Sea, New and Alamo rivers, agricultural drains, and water conveyance canals, given this species' association with water. Tall trees, bridges, and buildings could be used as night roosting sites.

Potential impacts of IID's covered activities on this species relate principally to removal of foraging habitat or roosting sites. Under the Desert Habitat Conservation Strategy, IID would restrict O&M to previously disturbed areas (Desert Habitat–2). Similarly, IID would restrict scheduled construction activities to previously disturbed areas to the extent possible (Desert Habitat–3) and would not remove more than 100 acres of native desert habitat (Desert Habitat–5). Permanent loss of desert habitat would be mitigated by acquisition and long-term protection of native desert habitat. Under the Tamarisk Scrub Habitat Conservation Strategy, permanent removal of habitat would be mitigated by creation / acquisition and long-term protection of native tree habitat. Collectively, these measures would minimize and offset potential impacts to pale western big-eared bats resulting from impacts to foraging habitat.

Drain maintenance activities could result in a temporary or permanent loss of foraging habitat used by pale western big-eared bats. On an annual basis, IID conducts drain maintenance activities on about 20 percent of the drainage system, affecting about 130 acres of vegetation. Some of this vegetation might be suitable foraging habitat for pale western big-eared bats.

Under the HCP, IID will create at least 190 acres and up to 652 acres of managed marsh habitat (Drain Habitat–1). The created habitat would be of better quality than would be affected during drain maintenance. Further, the drains would continue to support vegetation similar to existing conditions and foraging habitat for pallid bats would continue to be available. Therefore, the created marsh would act to increase the amount of foraging habitat for pale western big-eared bats in the HCP area and thereby benefit the species.

The species-specific study program for the pale western big-eared bat will determine which areas are important as roosts, and foraging grounds in the HCP area. If any of the covered activities under the HCP would result in permanent loss of roost sites or important foraging habitat, IID would protect other roosts or foraging habitat at a 1:1 ratio. Based on the expected low level of use of the HCP area by pale western big-eared bats, the potential for take of this species is low. This assumption will be evaluated as part of the Other Species Conservation Strategy and the HCP IT may revise the avoidance, minimization, and mitigation measures if necessary to improve the effectiveness and efficiency of the measures. Implementation of the HCP would not jeopardize the continued existence of this species.

3.9.2.9 Spotted Bat

Spotted bats have been found foraging in many different habitats, especially in arid or ponderosa pine forests, and marshlands. The habitat requirements and preferences of this species are varied and not well understood. Roost site localities are poorly known. This species is thought to use crevices and cracks in cliff faces, and occasionally caves and buildings, for roost sites. Roosts are often in the vicinity of open water.

Spotted bats could use much of the proposed project area since this species appears to be associated generally with open habitats. Foraging may be concentrated along waterways, such as the Salton Sea, New and Alamo Rivers, large canals, and agricultural drains. Potentially, spotted bats could roost at gravel quarries, highway bridges, or in buildings.

Day and night roosts are important habitat features for the spotted bat. Over the term of the permit, IID anticipates various construction activities. Construction to replace these structures could remove roost sites for spotted bats. Because of the scarcity of suitable roosting sites and uncertainty about the number and distribution of suitable roosts in the HCP area, IID will obtain written approval from the USFWS and CDFG if it proposes to impact a roosting site. In deciding whether to approve the request, the USFWS and CDFG will consider the availability of other roosting sites in the HCP area and the overall status of the species.

To mitigate the impact to spotted bats from removal of roosting sites, IID would replace every roost site eliminated with a suitable roost (approved by CDFG and USFWS) in the immediate vicinity. With the requirement for IID to receive approval from the USFWS and CDFG prior to replacing a roost site and the requirement to replace one roost site for every one eliminated, the number of roost sites that could be impacted will be limited. The long-term protection of roosting sites would offset impacts to spotted bats by providing roost sites for this species in perpetuity. Further, USFWS and CDFG would not approve removal of a roost site if it would substantially adversely affect the species.

Construction to replace structures along the AAC could remove foraging habitat and result in take of spotted bats. Under Desert Habitat–5, IID has committed to permanently remove no more than 100 acres of native desert habitat. This constitutes a very small amount of the available foraging habitat. Thus, the potential loss of foraging habitat for spotted bats would be considerably less than 100 acres and would not be expected to substantially affect foraging opportunities for this species.

Drain maintenance activities could result in a temporary or permanent loss of foraging habitat used by spotted bats in the drains. On an annual basis, IID conducts drain maintenance activities on about 20 percent of the drainage system, affecting about 130 acres of vegetation. Some of this vegetation might be suitable foraging habitat for spotted bats. Under the HCP, IID will create at least 190 acres and up to 652 acres of managed marsh habitat (Drain Habitat–1). The created habitat will be of better quality than that affected through drain maintenance. Further foraging habitat for spotted bats would continue to be available in the drains. Therefore, the created marsh would act to increase the amount of foraging habitat for spotted bats in the HCP area and thereby benefit the species.

The species-specific study program for spotted bats will identify areas that are important as roosts, and foraging grounds in the HCP area. If any of the covered activities under the HCP would result in permanent loss of roosts or important foraging habitat, IID would protect other roosts or foraging habitat at a 1:1 ratio. Based on the expected low level of use of the HCP area by spotted bats, the potential for take of this species is low. This assumption will be evaluated as part of the Other Species Conservation Strategy and the HCP IT may revise the avoidance, minimization, and mitigation measures if necessary to improve the effectiveness and efficiency of the measures. Implementation of the HCP would not jeopardize the continued existence of spotted bats.

3.9.2.10 Western Small-Footed Myotis

The small-footed myotis occurs in a wide variety of habitats, primarily in relatively arid, open stands in forests, woodlands, and brushy uplands near water. The small-footed myotis can be found roosting in caves, buildings, crevices, and under loose bark. Occasionally, it will also roost under bridges. Hibernation takes place in caves and mines. Summer roosts are in crevices, cracks, holes, under rocks, and in buildings. Areas adjacent to the Salton Sea and along the New and Alamo Rivers, agricultural drains, and possibly the water conveyance canals may be used for foraging. Because this species uses a wide variety of natural and man-made structures for roosts, suitable roost sites could occur throughout the proposed project area.

Day and night roosts are important habitat features for the western small-footed myotis. Over the term of the permit, IID anticipates various construction activities that could remove a roost site for small-footed myotis. Because of the scarcity of suitable roosting sites and uncertainty about the number and distribution of suitable roosts in the HCP area, IID will obtain written approval from the USFWS and CDFG if it proposes to impact a roosting site. In deciding whether to approve the request, the USFWS and CDFG will consider the availability of other roosting sites in the HCP area and the overall status of the species.

To mitigate the impact to western small-footed myotis from removal of roosting sites, IID would replace every roost site eliminated with a suitable roost (approved by CDFG and USFWS) in the immediate vicinity. With the requirement for IID to receive approval from the USFWS and CDFG prior to replacing a roost site and the requirement to replace one roost site for every one eliminated, the number of roost sites that could be impacted will be limited. The long-term protection of roosting sites would offset impacts to small-footed myotis by providing roost sites for this species in perpetuity. Further, USFWS and CDFG would not approve removal of a roost site if it would substantially adversely affect the species.

Various construction activities anticipated by IID have the potential to remove tamarisk scrub habitat that could be used during foraging by western small-footed myotis. Because of the abundance of tamarisk scrub habitat in the HCP area (over 7,500 acres) and small amount of habitat the would be permanently impacted by construction activities over the term of the permit, the amount of take potentially occurring from displacement of individuals as habitat is removed would be minimal.

Native tree habitat would be created or acquired, and preserved to replace any tamarisk scrub habitat that would be permanently lost as a result of the construction activities (see Tree Habitat–1 and –2). As part of the Salton Sea Habitat Conservation Strategy, native tree habitat also would be created or acquired, and preserved if a net loss of tamarisk scrub habitat occurs within the shoreline strand or adjacent wetlands. Consisting of native plant species, the created or acquired habitat would be expected to provide better habitat quality for western small-footed myotis than the tamarisk scrub that would be lost. The creation or acquisition of native tree habitat under Tree Habitat–1 and –2 and Salton Sea–3 would offset any reduction in habitat value for small-footed myotis resulting from reductions in the amount of tamarisk scrub, thus mitigating the impact of take potentially resulting from changes in habitat.

The species-specific study program for small-footed myotis could show that other areas in the HCP area are important as roosts, or foraging grounds. If the covered activities would result in the permanent loss of roost sites or important foraging habitat, IID would protect other roosts or foraging habitat at a 1:1 ratio. Based on the expected low level of use of the HCP area by western small-footed myotis, the potential for take of this species is low. This assumption will be evaluated as part of the Other Species Conservation Strategy and the HCP IT may revise the avoidance, minimization, and mitigation measures if necessary to improve the effectiveness and efficiency of the measures. Implementation of the HCP would not jeopardize the continued existence of this species.

3.9.2.11 Occult Little Brown Bat

The occult little brown bat occurs in a variety of habitats, including ponderosa pine forests, oak-pine woodlands (near water), and along permanent water or in riparian forests in some desert areas. It is usually closely associated with open water sources, such as rivers, ponds, or reservoirs (Hoffmeister 1986). It roosts in hollows in living or dead trees, under rocks or wood, or sometimes in buildings or mines (NMDGF 1997). This species seems to prefer human structures to natural ones for maternity roosts, and may use mines or caves for hibernation. Separate day, night, hibernation, and nursery roosts are used.

The Salton Sea, lakes, wetlands, rivers, canals, and agricultural drains may provide suitable foraging habitat for this species. Because this species uses a wide variety of natural and man-made structures for roosts, suitable roost sites could occur throughout the HCP area.

Day and night roosts are important habitat features for occult little brown bats. Over the term of the permit, IID anticipates conducting various construction activities that could remove roost sites for little brown bats. Because of the scarcity of suitable roosting sites and uncertainty about the number and distribution of suitable roosts in the HCP area, IID will obtain written approval from the USFWS and CDFG if it proposes to impact a roosting site. In deciding whether to approve the request, the USFWS and CDFG will consider the availability of other roosting sites in the HCP area and the overall status of the species. Because of the scarcity of suitable maternity roosts, no impacts to maternity roosts would be authorized.

To mitigate the impact to occult little brown bats from removal of roosting sites, IID would replace every roost site eliminated with a suitable roost (approved by CDFG and USFWS) in the immediate vicinity. With the requirement for IID to receive approval from the USFWS and CDFG prior to replacing a roost site and the requirement to replace one roost site for every one eliminated, the number of roost sites that could be impacted will be limited. The long-term protection of roosting sites would offset impacts to little brown bats by providing roost sites for this species in perpetuity. Further, USFWS and CDFG would not approve removal of a roost site if it would substantially adversely affect the species.

The species-specific study program for the little brown bat could identify specific areas that are important as roosts, or foraging grounds. If a covered activity would result in the permanent loss of roosts or important foraging areas, IID would protect other roosts or foraging habitat at a 1:1 ratio. Based on the expected low level of use of the HCP area by occult little brown bats, the potential for take of this species is low. This assumption will be evaluated as part of the Other Species Conservation Strategy and the HCP IT may revise the avoidance, minimization, and mitigation measures if necessary to improve the effectiveness and efficiency of the measures. Implementation of the HCP would not jeopardize the continued existence of this species.

3.9.2.12 Southwestern Cave Myotis

The southwestern cave myotis prefers arid habitats dominated by creosote bush, paloverde, brittlebrush, cactus, and desert riparian. Roosts are typically in caves or mines, but buildings and bridges have also been used. Dense, linear stands of mesquite, salt cedar, and catclaw acacia bordering the still water of oxbow ponds are considered optimal foraging areas (Vaughan 1959; Hoffmeister 1986). Hibernation caves have high humidity, often with standing or running water and little air movement. This species uses temporary night roosts. Nursery colonies are in the hibernation cave or another cave. Occasionally, other sites, such as bridges, are used. Optimal sites are relatively warm, with little human disturbance.

This species may have been extirpated from the HCP area by agricultural practices and habitat conversion (USFWS 1999). The extensive stands of salt cedar bordering the Alamo and New rivers could provide foraging habitat for this species. Some agricultural drains that support tamarisk and common reed could also provide suitable foraging habitat. Bridges and buildings throughout the area could be used as temporary roosting sites.

Potential impacts of IID’s covered activities on this species relate principally to removal of foraging or roosting habitat. Under the Desert Habitat Conservation Strategy, IID would restrict O&M to previously disturbed areas (Desert Habitat–2). Similarly, IID would restrict scheduled construction activities to previously disturbed areas to the extent possible (Desert Habitat–3). Collectively, these measures would minimize the potential that IID’s activities would impact foraging or roosting habitat for these bats.

Over the term of the permit, IID anticipates replacing all of the structures along the AAC. Construction to replace these structures could remove foraging habitat which could result in take of southwestern cave myotis. Under Desert Habitat–5, IID has committed to permanently remove no more than 100 acres of native desert habitat. Potentially impacted habitat would be distributed throughout the entire length of the AAC as well as along those sections of the East Highline, Westside Main, Thistle, and Trifolium canals that are adjacent to desert habitat. Potential habitat for southwestern cave myotis in desert areas proposed for construction is limited to areas of desert dry wash woodland along the AAC and East Highline Canal. Thus, the potential loss of foraging habitat for southwestern cave myotis would be considerably less than 100 acres and would not be expected to substantially affect foraging opportunities for this species.

Various construction activities anticipated by IID have the potential to remove tamarisk scrub habitat that could be used during foraging by southwestern cave myotis. Construction activities could displace individuals and result in take if displaced bats were unable to find alternate habitat. Because of the abundance of tamarisk scrub habitat in the HCP area (over 7,500 acres) and small amount of habitat the would be permanently impacted by construction activities over the term of the permit, the amount of take potentially occurring from displacement of individuals as habitat is removed would be minimal.

As part of the species-specific study program implemented under Other Species–1, foraging habitat for this species in the HCP area will be determined. Prior to the start of construction activities, IID would determine if foraging habitat for cave myotis occurs within the construction area and would be impacted by construction activities. If construction impacts to foraging habitat cannot be avoided, IID will consult with CDFG and USFWS to identify other areas of suitable foraging habitat. The baseline surveys (Other Species–1) will provide the information necessary for USFWS and CDFG to determine which areas provide suitable foraging habitat for cave myotis. IID will compensate for permanent loss of foraging for cave myotis by acquiring or granting a conservation easement on other suitable foraging habitat within the immediate vicinity of identified roost sites at a 3:1 ratio for the acreage impacted.

The species-specific study program could identify important roost areas or habitats other than Desert Dry Wash that are important as foraging grounds. If a covered activity would remove an important roost or foraging habitat, IID would replace the roost or habitat through acquisition or creation at a 1:1 ratio. Based on the expected low level of use of the HCP area by southwestern cave myotis, the potential for take of this species is low. This assumption will be evaluated as part of the Other Species Conservation Strategy and the HCP IT may revise the avoidance, minimization and mitigation measures if necessary to improve the effectiveness and efficiency of the measures. Implementation of the HCP would not jeopardize the continued existence of southwestern cave myotis.

3.9.2.13 Yuma Myotis

The Yuma myotis prefers cliffs and rocky walls near desert scrub, pinyon-juniper woodlands, and other open woodlands and forests. Like many bat species, it is closely tied to an open water source for foraging and drinking. The Yuma myotis roosts in narrow crevices in rock, bridges, buildings, and occasionally mines (Hoffmeister 1986). Preferred roosting habitats, however, are buildings and abandoned cliff swallows' mud nests. Separate daytime and night roosts are used.

The canals, rivers, lakes, and streams throughout the proposed project area offer suitable foraging habitat for the Yuma myotis. This species is relatively tolerant of human activity and may roost in houses, under bridges, or in other natural and man-made structures throughout the proposed project area.

Day and night roosts are important habitat features for Yuma myotis. Over the term of the permit, IID anticipates conducting various construction activities that could remove roost sites for Yuma myotis. Because of the scarcity of suitable roosting sites and uncertainty about the number and distribution of suitable roosts in the HCP area, IID will obtain written approval from the USFWS and CDFG if it proposes to impact a roosting site. In deciding whether to approve the request, the USFWS and CDFG will consider the availability of other roosting sites in the HCP area and the overall status of the species.

To mitigate the impact to Yuma myotis from removal of roosting sites, IID would replace every roost site eliminated with a suitable roost (approved by CDFG and USFWS) in the immediate vicinity. With the requirement for IID to receive approval from the USFWS and CDFG prior to replacing a roost site and the requirement to replace one roost site for every one eliminated, the number of roost sites that could be impacted will be limited. The long-term protection of roosting sites would offset impacts to Yuma myotis by providing roost sites for this species in perpetuity. Further, USFWS and CDFG would not approve removal of a roost site if it would substantially adversely affect the species.

The species-specific study program for the Yuma myotis will identify areas that are important as roosts, or foraging grounds in the HCP area. If any of the covered activities under the HCP would result in permanent loss of roost sites or important foraging habitat, IID would protect other roosts or foraging habitat at a 1:1 ratio. Based on the expected low level of use of the HCP area by Yuma myotis, the potential for take of this species is low. This expectation will be evaluated as part of the Other Species Conservation Strategy and the HCP IT may revise the avoidance, minimization, and mitigation measures if necessary to improve the effectiveness and efficiency of the measures. Implementation of the HCP would not jeopardize the continued existence of Yuma myotis.

3.9.2.14 Western Mastiff Bat

Mastiff bats favor rugged, rocky areas in Sonoran Desert scrub habitats, where suitable crevices are available for day roosts (AGFD 1996). They inhabit crevices in cliff faces, high buildings, trees, and tunnels (Zeiner et al. 1990). Western mastiff bats forage in open areas, generally over mesquite as far as 25 miles from roost sites (Vaughan 1959; Jameson and Peeters 1988). Mastiff bats roost singly or in small colonies, sometimes with other bat species; several alternate day roosts may be used (Zeiner et al. 1990). Movement among different roost sites is thought to be influenced by temperature, as well as human disturbance (AGFD 1996). No roost sites have been identified in the HCP area.

Western mastiff bats are generally associated with open desert habitats near unobstructed waterways. In the HCP area, these types of habitats occur adjacent to the Salton Sea and along the All American, East Highline, and Westside Main Canals. The availability of suitable roost sites in the HCP area is unknown. Gravel quarries near the Salton Sea could provide roost sites as could a few rocky areas adjacent to the AAC. Other types of potential roost sites in the HCP area include bridges, buildings, and trees.

Potential impacts of IID's covered activities on this species relate principally to removal of foraging habitat. Under the Desert Habitat Conservation Strategy, IID would restrict O&M to previously disturbed areas (Desert Habitat–2). Similarly, IID would restrict scheduled construction activities to previously disturbed areas to the extent possible (Desert Habitat–3). Collectively, these measures would minimize the potential that IID's activities would impact foraging habitat for these bats.

Over the term of the permit, IID anticipates replacing all of the structures along the AAC. Construction to replace these structures could remove foraging habitat and result in take of western mastiff bats. Under Desert Habitat–5, IID has committed to permanently remove no more than 100 acres of native desert habitat. Potentially impacted areas would be distributed along the entire length of the AAC as well as along those sections of the East Highline, Westside Main, Thistle, and Trifolium canals that are adjacent to desert habitat. Potential foraging habitat for western mastiff bats in areas of proposed construction is limited to scattered areas of desert dry wash woodland along the AAC and East Highline Canal. Thus, the potential loss of foraging habitat for western mastiff bats due to construction would be considerably less than 100 acres and would not be expected to substantially affect foraging opportunities for this species.

As part of the species-specific study program implemented under Other Species–1, foraging habitat for this species in the HCP area will be determined. Prior to the start of construction activities, IID would determine whether foraging habitat for western mastiff bats occurs within the construction area and would be impacted by construction activities. If construction impacts to foraging habitat cannot be avoided, IID will consult with CDFG and USFWS to identify other areas of suitable foraging habitat. The baseline surveys (Other Species–1) will provide the information necessary for USFWS and CDFG to determine which areas provide suitable foraging habitat for western mastiff bats. IID will mitigate unavoidable and permanent impacts to western mastiff bats by acquiring or granting a conservation easement on other suitable foraging habitat within 25 miles of identified roost sites at a 3:1 ratio for the acreage impacted.

The species-specific study program for the western mastiff bat could identify other areas that are important as roosts or foraging grounds. If a covered activity would result in the permanent loss of a roost site or important foraging habitat, IID would protect other roosts or foraging habitat at a 1:1 ratio. Based on the expected low level of use of the HCP area by western mastiff bats, the potential for take of this species is low. This assumption will be evaluated as part of the Other Species Conservation Strategy and the HCP IT may revise the avoidance, minimization and mitigation measures if necessary to improve the effectiveness and efficiency of the measures. Implementation of the HCP would not jeopardize the continued existence of western mastiff bats.

3.9.2.15 Pocketed Free-Tailed Bat

The pocketed free-tailed bat prefers arid lowlands, especially desert canyons, dominated by creosote bush or chaparral vegetation. Habitats used include pinyon-juniper woodlands, desert scrub, desert succulent shrub, desert riparian, desert wash, alkali desert scrub, Joshua tree, and palm oasis. This species prefers rock crevices in cliffs as roosting sites. The pocketed free-tailed bat reproduces in rock crevices, caverns, or buildings, and primarily feeds on moths and beetles.

Creosote scrub habitat is found in areas adjacent to the Salton Sea and along the AAC, Coachella, and Westside Main Canals. Areas along the New and Alamo Rivers and along larger drainages and canals may also provide foraging habitat. The availability of suitable roost sites in the proposed project area is unknown. Gravel quarries near the Salton Sea could provide suitable roost sites.

Over the term of the permit, IID anticipates replacing all of the structures along the AAC. Construction to replace these structures could remove foraging habitat which could result in take of pocketed free-tailed bats. Under the Desert Habitat Conservation Strategy, IID would restrict O&M to previously disturbed areas (Desert Habitat–2). Similarly, IID would restrict scheduled construction activities to previously disturbed areas to the extent possible (Desert Habitat–3) and would not remove more than 100 acres of native desert habitat (Desert Habitat–5). Permanent loss of desert habitat would be mitigated by acquisition and long-term protection of native desert habitat. Collectively, these measures would minimize and offset potential impacts to pocketed free-tailed bats resulting from impacts to foraging habitat.

Foraging habitat for pocketed free-tailed bats will be identified as part of the species-specific study program. If construction impacts to foraging habitat cannot be avoided, IID will consult with CDFG and USFWS to identify other areas of suitable foraging habitat. The study program (Other Species–1) will provide the information necessary for USFWS and CDFG to determine which areas provide suitable foraging habitat for pocketed free-tailed bats. IID will mitigate the permanent loss of foraging habitat for free-tailed bats by acquiring or granting a conservation easement on other suitable foraging habitat within the immediate vicinity of identified roost sites at a 3:1 ratio for the acreage impacted.

Day and night roosts are an important habitat feature for pocketed free-tailed bats. Because of the scarcity of suitable roosting sites and uncertainty about the number and distribution of suitable roosts in the HCP area, IID will obtain written approval from the USFWS and CDFG if it proposes to impact a roosting site. In deciding whether to approve the request, the USFWS and CDFG will consider the availability of other roosting sites in the HCP area and the overall status of the species. The species-specific study program (Other Species–1) will provide the information necessary for USFWS and CDFG to determine whether a roosting site could be eliminated without causing substantial adverse effects to the species. No impacts to maternity roosts would be authorized.

To mitigate the impact to pocketed free-tailed bats from removal of roosting sites, if approved by the USFWS and CDFG, IID would acquire, protect, and manage in perpetuity one roosting site for every roost site eliminated. With the requirement for IID to receive approval from the USFWS and CDFG prior to eliminating a roost site and the requirement to protect one roost site for every one eliminated, the number of roost sites that could be impacted will be limited. The long-term protection of roosting sites in the event that a site would be removed, would offset impacts to pocketed free-tailed bats by providing roost sites for this species in perpetuity. Further, USFWS and CDFG would not approve removal of a roost site if it would substantially adversely affect the species. Based on the expected low level of use of the HCP area by pocketed free-tailed bats, the potential for take of this species is low. This expectation will be evaluated as part of the Other Species Conservation Strategy and the HCP IT may revise the avoidance, minimization, and mitigation measures if necessary to improve the effectiveness and efficiency of the measures. Implementation of the HCP would not jeopardize the continued existence of pocketed free-tailed bats.

3.9.2.16 Big Free-Tailed Bat

Big free-tailed bats generally inhabit rugged rocky habitats, although a wide range of habitats, including desert scrub, woodlands, and evergreen forests, are visited during foraging and migration (Navo 1998b). Roosts are usually in buildings, caves, and rock crevices. Desert scrub, agricultural fields, wetlands, lakes, rivers, canals, and drainages where insects are abundant could provide suitable foraging habitat for migrating bats. Big free-tailed bats are known to migrate through the HCP area during the spring and fall (USFWS 1997). No roost sites are known to occur in the HCP area.

Over the term of the permit, IID anticipates replacing all of the structures along the AAC. Construction to replace these structures could remove foraging habitat which could result in take of big free-tailed bats. Under the Desert Habitat Conservation Strategy, IID would restrict O&M to previously disturbed areas (Desert Habitat–2). Similarly, IID would restrict scheduled construction activities to previously disturbed areas to the extent possible (Desert Habitat–3) and would not remove more than 100 acres of native desert habitat (Desert Habitat–5). Permanent loss of desert habitat would be mitigated by acquisition and long-term protection of native desert habitat. Collectively, these measures would minimize and offset potential impacts to big free-tailed bats resulting from impacts to foraging habitat.

As part of the species-specific study program implemented under Other Species–1, foraging habitat for big free-tailed bats in the HCP area will be identified. Prior to the start of construction activities, IID would determine if foraging habitat for big free-tailed bats occurs within the construction area and would be impacted by construction activities. If construction impacts to foraging habitat cannot be avoided, IID will consult with CDFG and USFWS to identify other areas of suitable foraging habitat. The baseline surveys (Other Species–1) will provide the information necessary for USFWS and CDFG to determine which areas provide suitable foraging habitat for big free-tailed bats. IID will mitigate for permanent loss of foraging habitat for free-tailed bats by acquiring or granting a conservation easement on other suitable foraging habitat within the immediate vicinity of identified roost sites at a 3:1 ratio for the acreage impacted.

While day and night roosts are an important habitat feature for big free-tailed bats, no roost sites are known to occur in the HCP area. Because of the scarcity of suitable roosting sites and uncertainty about the number and distribution of suitable roosts in the HCP area, IID will obtain written approval from the USFWS and CDFG if it proposes to impact a roosting site. In deciding whether to approve the request, the USFWS and CDFG will consider the availability of other roosting sites in the HCP area and the overall status of the species. The baseline surveys (Other Species–1) will provide the information necessary for USFWS and CDFG to determine whether a roosting site could be eliminated without causing substantial adverse effects to the species. No impacts to maternity roosts would be authorized.

To mitigate the impact to big free-tailed bats from removal of roosting sites, if approved by the USFWS and CDFG, IID would acquire, protect, and manage in perpetuity one roosting site for every roost site eliminated. With the requirement for IID to receive approval from the USFWS and CDFG prior to eliminating a roost site and the requirement to protect one roost site for every one eliminated, the number of roost sites that could be impacted will be limited. The long-term protection of roosting sites in the event that a site would be removed, would offset impacts to big free-tailed bats by providing roost sites for this species in perpetuity. Further, USFWS and CDFG would not approve removal of a roost site if it would substantially adversely affect the species. Based on the expected low level of use of the HCP area by big free-tailed bats, the potential for take of this species is low. This expectation will be evaluated as part of the Other Species Conservation Strategy and the HCP IT may revise the avoidance, minimization, and mitigation measures if necessary to improve the effectiveness and efficiency of the measures. Implementation of the HCP would not jeopardize the continued existence of big free-tailed bats.

3.9.2.17 Colorado River Hispid Cotton Rat

This species primarily occurs in grassland and mixed grassland/scrub habitats but may also occur in agricultural fields. It is most common in grassland and cropland habitats near water (Fleharty and Mares 1973; Kaufman and Fleharty 1974), including grass-forb understories in early successional stages of other habitats (McClenaghan and Gaines 1978). Tall, dense grass is preferred. Potential habitat for this species is widespread throughout the HCP area. Irrigated agricultural fields of alfalfa, wheat, sudangrass, and sugar beets provide suitable habitat for the cotton rat. Many drainages and ditches adjacent to agricultural fields include dense patches of common reed, a habitat known to be used by this species.

Colorado River hispid cotton rats could use the drains as habitat, but direct impacts to nests or adults could occur during drain maintenance activities. IID conducts annual drain maintenance activities on about 20 percent of the drainage system, affecting about 130 acres of vegetation. However, only a small amount of this vegetation likely would be suitable for hispid cotton rats. Drain maintenance activities and several other covered activities also have the potential to result in take of cotton rats through temporary or permanent reductions in the amount of drain habitat. As described in Section 3.5.2.2, various maintenance and water conservation activities have the potential to temporarily and permanently impact drain vegetation. In total, an estimated 25.1 acres of drain vegetation could be permanently impacted. These temporary and permanent reductions in drain habitat could result in a minor reduction in potential habitat for hispid cotton rats.

Under the HCP, IID will create at least 190 acres and up to 652 acres of managed marsh habitat (Drain Habitat–1). Based on the results of the species-specific study program, the HCP IT could configure a portion of the managed marsh habitat specifically to provide habitat for this species. Alternatively, at the HCP IT's recommendation and with the approval of the USFWS and CDFG, IID could acquire agricultural land adjacent to the managed marsh or elsewhere and manage the property to provide foraging habitat. Habitat would remain available in the drains; thus, the managed marsh or adjacent agricultural habitat would serve to increase the availability of habitat for this species in the HCP area.

Since hispid cotton rats also forage on agricultural lands, fallowing could result in a loss of foraging habitat. Potentially a few individual rats could be taken as a result of reduced foraging habitat in the HCP area. However, because of the abundance of foraging habitat in the HCP area, no adverse population-level effects would be expected.

Take resulting from drain maintenance could temporarily reduce the size of the hispid cotton rat population. However, because cotton rats are prolific breeders, the population would be expected to rebound quickly. In addition, if Colorado River cotton rats occur in the HCP area, then they have colonized and persisted in the HCP area coincident with IID maintenance practices. As O&M practices for drain maintenance would not change substantially under the HCP, it is anticipated that the persistence of the Colorado River hispid cotton rat population would not be adversely affected by continuation of these practices. Limitation of maintenance activities to a small fraction of the drain habitat annually, and creation / maintenance of habitat for this species would minimize and mitigate the impact of any take of this species resulting from the covered activities. In addition, based on the results of the species-specific study program, the HCP IT may revise the avoidance, minimization, and mitigation measures if necessary to improve the effectiveness and efficiency of the measures. Implementation of the HCP would not jeopardize the continued existence of Colorado River hispid cotton rats.

3.9.2.18 Yuma Hispid Cotton Rat

Hispid cotton rats occupy moist, grassy habitats where they cut runways through the grass. Hispid cotton rats have been reported from habitats vegetated with common reed, arrowweed, and cattails. Agricultural fields, especially Bermuda grass farms, also provide habitat (Hoffmeister 1986). Hispid cotton rats eat many grasses and forbs and are more vegetarian than most native mice (Jameson and Peeters 1988). Yuma hispid cotton rats prefer tall, dense grasses close to water. The AAC may serve as a dispersal corridor for cotton rats to move from the LCR into the Imperial Valley.

Potentially suitable habitat for the Yuma hispid cotton rat is abundant throughout the proposed project area. Irrigated agricultural fields of Bermuda grass, alfalfa, wheat, sudangrass, and sugar beets provide suitable habitat for the cotton rat. Many drainages and ditches adjacent to agricultural fields include dense patches of cattails, arrowweed, and common reeds.

Yuma hispid cotton rats could use the drains as habitat, but direct impacts to nests or adults could occur during drain maintenance activities. IID conducts annual drain maintenance activities on about 20 percent of the drainage system, affecting about 130 acres of vegetation. However, only a small amount of this vegetation likely would be suitable for hispid cotton rats. Drain maintenance activities and several other covered activities also have the potential to result in take of cotton rats through temporary or permanent reductions in the amount of drain habitat. As described in Section 3.5.2.2, various maintenance and water conservation activities have the potential to temporarily and permanently impact drain vegetation. In total, an estimated 25.1 acres of drain vegetation could be permanently impacted. These temporary and permanent reductions in drain habitat could result in a minor reduction in potential habitat for hispid cotton rats.

Under the HCP, IID will create at least 190 acres and up to 652 acres of managed marsh habitat (Drain Habitat–1). Based on the results of the species-specific study program, the HCP IT could configure a portion of the managed marsh habitat specifically to provide habitat for this species. Alternatively, at the HCP IT’s recommendation and with the approval of the USFWS and CDFG, IID could acquire agricultural land adjacent to the managed marsh or elsewhere and manage the property to provide foraging habitat. Habitat would remain available in the drains; thus, the managed marsh or adjacent agricultural habitat would serve to increase the availability of habitat for this species in the HCP area.

Since hispid cotton rats also forage on agricultural lands, fallowing could result in a loss of foraging habitat. Potentially a few individual rats could be taken as a result of reduced foraging habitat in the HCP area. However, because of the abundance of foraging habitat in the HCP area, no adverse population-level effects would be expected.

Take resulting from drain maintenance could temporarily reduce the size of the hispid cotton rat population. However, because cotton rats are prolific breeders, the population would be expected to rebound quickly. In addition, if Yuma hispid cotton rats occur in the HCP area, then they have colonized and persisted in the HCP area coincident with IID maintenance practices. As O&M practices for drain maintenance would not change substantially under the HCP, it is anticipated that the persistence of the Yuma hispid cotton rat population would not be adversely affected by continuation of these practices. Limitation of maintenance activities to a small fraction of the drain habitat on an annual basis, and creation/maintenance of habitat for this species would minimize and mitigate the impact of any take of this species resulting from the covered activities. In addition, based on the results of the species-specific study program, the HCP IT may revise the avoidance, minimization, and mitigation measures if necessary to improve the effectiveness and efficiency of the measures. Implementation of the HCP would not jeopardize the continued existence of Yuma hispid cotton rats.

3.9.2.19 Jacumba Little Pocket Mouse

Habitat requirements for the Jacumba little pocket mouse are not well understood, but it is known to occupy sandy habitats on the desert floor. Preferred habitats include desert riparian, desert scrub, desert wash, and sagebrush. Little pocket mice generally dwell in burrows and may stay underground for up to five months in winter. Sandy soils are preferred for burrowing (Hall 1946), but burrows are also found on gravel washes and on stony soils (Beatley 1976; Miller and Stebbins 1964).

Desert scrub habitats occur in the HCP area only within the rights-of-way of AAC, Westside Main, East Highline, Thistle, and Trifolium Extension canals. No native desert riparian habitat occurs in the HCP area because tamarisk has invaded riparian areas of the New and Alamo Rivers. It is uncertain whether Jacumba little pocket mice would use these areas.

The primary mechanism through which the covered activities could result in take of Jacumba little pocket mice is construction activities in desert habitats. Over the term of the permit, IID anticipates replacing all of the structures along the canals adjacent to desert habitat. Construction to replace structures and potentially install canal lining could result in take of Jacumba little pocket mice through reduction in habitat or directly if mice were in burrows disturbed by construction. Over the term of the permit, scheduled construction activities will not permanently remove more than 100 acres of native desert habitat.

Under the Desert Habitat Conservation Strategy, IID would restrict O&M to previously disturbed areas (Desert Habitat–2). Similarly, IID would restrict scheduled construction activities to previously disturbed areas to the extent possible (Desert Habitat–3). Collectively, these measures would minimize the potential that IID’s activities to impact little pocket mice. For all scheduled construction activities, the construction site would be surveyed to determine the occurrence of native desert habitat. Through Desert Habitat–5, IID would mitigate removal of native desert habitat through acquisition and protection of other habitat. Collectively, through these measures, impacts to Jacumba little pocket mice would be avoided or appropriately mitigated.

In addition to these measures, as part of the Other Species Conservation Strategy, IID would implement a study program to better understand the ecology and distribution of this species. Based on the results of the study program, the HCP IT would review the avoidance, minimization, and mitigation strategy for the Jacumba little pocket mouse and recommend adjustments if necessary to improve the effectiveness and efficiency of the measures.

Covered activities conducted by IID have the potential to take Jacumba little pocket mice in the immediate vicinity of the AAC and other canals adjacent to desert habitat (Trifolium Extension, Thistle, Westside Main, and East Highline). This species has not been observed within the HCP area. The HCP area contains only a small portion of the total availability of habitat in the region. A maximum 100 acres of native desert habitat, some of which could be inhabited by Jacumba little pocket mice, could be impacted. With implementation of the Desert Habitat Conservation Strategy measures and species-specific measures, implementation of the HCP would avoid, minimize, and mitigate potential impacts to this species and would not jeopardize its continued existence.

3.9.2.20 Banded Gila Monster

The banded Gila monster is uncommon in a variety of desert woodland and scrub habitats, principally in desert mountain ranges. This lizard prefers the lower slopes of rocky canyons and arroyos but is also found on desert flats among scrub and succulents. It seems to prefer slightly moist habitats in canyons, arroyos, and washes. The Gila monster uses the burrows of other animals and may construct its own. Gila monsters may also require areas with exposure to the sun and moisture. This species seems to occur in areas that are moister than surrounding areas. Most of the HCP area is agricultural land and offers no habitat for the banded Gila monster. The only potential habitat for this species occurs in a few limited areas along the AAC, but the quality of this habitat is poor.

Several covered activities have the potential to directly or indirectly take Gila monsters. The primary mechanism through which IID’s activities could result in take of a gila monster is vehicle strikes during O&M or construction activities. IID workers drive along the AAC on a daily basis to perform O&M and construction activities, and Gila monsters could be struck by vehicles. Gila monsters also may seek the shade under parked vehicles and could be injured when the vehicle is moved. The risk to this species is very low because the area along the AAC is near major highways and areas heavily used for off-highway recreation and the area is unlikely to support this species.

Over the term of the permit, IID anticipates replacing all of the structures along the canals adjacent to desert habitat. Construction to replace structures and potentially install canal lining could result in take of a Gila monster through reduction in habitat or directly if Gila monsters were in burrows or rock piles disturbed by construction. Over the term of the permit, scheduled construction activities will not permanently remove more than 100 acres of native desert habitat.

Under the Desert Habitat Conservation Strategy, IID would restrict O&M to previously disturbed areas (Desert Habitat–2). Similarly, IID would restrict scheduled construction activities to previously disturbed areas to the extent possible (Desert Habitat–3). Collectively, these measures would minimize the potential that IID's activities to impact banded Gila monsters. For all scheduled construction activities, the construction site would be surveyed to determine the occurrence of native desert habitat. Through Desert Habitat–5, IID would mitigate removal of native desert habitat through acquisition and protection of other habitat. Collectively, through these measures, impacts to banded Gila monsters would be avoided or appropriately mitigated.

For scheduled construction activities, IID will conduct preconstruction surveys to determine if Gila monsters occur within the construction area. If this species is found in the construction area or is likely to occur, IID will implement species-specific measures. Minimization and avoidance practices include identifying and removing Gila monsters from the construction site (e.g., conducting clearance surveys, examining trenches prior to filling) and discouraging and/or monitoring use of the site by Gila monsters during construction activities (e.g., erecting exclusion fencing, maintaining a biological monitor onsite). In combination, the practices for O&M and construction activities will minimize the potential for Gila monsters to be killed or injured as a result of these activities.

In addition to these measures, as part of the Other Species Conservation Strategy, IID would implement a study program to better understand the ecology and distribution of this species. Based on the results of the study program, the HCP IT would review the avoidance, minimization, and mitigation strategy for the banded Gila monster and recommend adjustments if necessary to improve the effectiveness and efficiency of the measures.

The banded Gila monster is not known to occur in the proposed project area, and lack of suitable habitat makes the presence of this species unlikely. With implementation of minimization measures, the potential for and extent of take of Gila monsters from O&M and construction activities is very low. Implementation of the HCP would not jeopardize the continued existence of the species.

3.9.2.21 Flat-Seeded Spurge

The flat-seeded spurge is an annual herb found on sandy flats, dunes, and in creosote bush scrub. The only portion of the HCP area that supports this plant community is the right-of-way of IID along the AAC.

Over the term of the permit, IID anticipates replacing all of the structures along the AAC. Construction to replace structures could remove flat-seeded spurge. Over the term of the permit, scheduled construction activities will not permanently remove more than 100 acres of native desert habitat. Impacted habitat would be distributed along the entire length of the AAC as well as along those sections of the East Highline, Westside Main, Thistle, and Trifolium canals that are adjacent to desert habitat. Potential habitat for flat-seeded spurge in the HCP area is limited to the creosote bush scrub in the IID right-of-way along the AAC. Thus, the potential loss of habitat for flat-seeded spurge would be considerably less than 100 acres.

Under the conservation strategy for the 25 other covered species, IID would implement measures, both general and plant-specific, to avoid and minimize impacts from O&M and construction activities. For O&M activities, workers would be instructed to restrict activities to previously disturbed areas so as to minimize intrusions into creosote bush habitats where this species could occur. For construction, specific measures include preconstruction surveys, prohibiting surface disturbance within a prescribed radius of the species if it is found within the construction area, and transplanting individuals if impacts are unavoidable and transplanting is deemed appropriate by USFWS and CDFG (see Appendix H). General measures include familiarizing workers with covered plant species they are likely to encounter within the right-of-way and instructing them to avoid injuring or uprooting plants. IID also will mitigate removal of plants if they cannot be avoided by acquiring or granting a conservation easement on land at a 1:1 ratio for the acreage impacted.

Covered activities conducted by IID have the potential to take flat-seeded spurge in the immediate vicinity of the AAC. Habitat for flat-seeded spurge in the HCP area constitutes a small portion of the total habitat for this species in the region. Under the HCP, IID will implement measures to minimize and avoid take of individual plants, transplant individuals if take cannot be avoided, and compensate for reductions in suitable habitat. Implementation of the HCP would serve to further reduce and offset potential impacts and would not jeopardize the continued existence of flat-seeded spurge.

3.9.2.22 Orcutt's Aster

Orcutt's aster occurs primarily in Sonoran creosote scrub habitats in rocky canyons and sandy washes at elevations between 65 and 1,200 feet. Generally, this species has been observed in areas with little shrub cover. This species is associated with creosote scrub. The only portion of the HCP area that supports this plant community is the right-of-way of IID along the AAC.

Over the term of the permit, IID anticipates replacing all of the structures along the AAC. Construction to replace structures could remove Orcutt's aster. Over the term of the permit, scheduled construction activities will not permanently remove more than 100 acres of native desert habitat. Impacted habitat would be distributed along the entire length of the AAC as well as along those sections of the East Highline, Westside Main, Thistle, and Trifolium canals that are adjacent to desert habitat. Potential habitat for Orcutt's aster in the HCP area is limited to the creosote bush scrub in the IID right-of-way along the AAC. Thus, the potential loss of habitat for Orcutt's aster would be considerably less than 100 acres.

Under the conservation strategy for the 25 other covered species, IID would implement measures, both general and plant-specific, to avoid and minimize impacts from O&M and construction activities. For O&M activities, workers would be instructed to restrict activities to previously disturbed areas so as to minimize intrusions into creosote bush habitats where this species could occur. For construction, specific measures include preconstruction surveys, prohibiting surface disturbance within a prescribed radius of the species if it is found within the construction area, and transplanting individuals if impacts are unavoidable and transplanting is deemed appropriate by USFWS and CDFG (see Appendix H). General measures include familiarizing workers with covered plant species they are likely to encounter within the right-of-way and instructing them to avoid injuring or uprooting plants. IID also will mitigate removal of plants if they cannot be avoided by acquiring or granting a conservation easement on land at a 1:1 ratio for the acreage impacted.

Covered activities conducted by IID have the potential to take Orcutt's aster in the immediate vicinity of the AAC. Habitat for Orcutt's aster in the HCP area constitutes a small portion of the total habitat for this species in the region. Under the HCP, IID will implement measures to minimize and avoid take of individual plants, transplant individuals if take cannot be avoided, and compensate for reductions in suitable habitat. Implementation of the HCP would serve to further reduce and offset potential impacts and would not jeopardize the continued existence of Orcutt's aster.

3.9.2.23 Foxtail Cactus

The foxtail cactus occurs in both sandy and rocky areas but seems to prefer heavy, rocky soils with decomposing granite or basalt. Potential habitat occurs in the creosote scrub habitat along the AAC and Coachella Canal and potentially in scrub habitat adjacent to the Salton Sea between the higher rock hillsides and the more saline desert saltbrush community.

Over the term of the permit, IID anticipates replacing all of the structures along the AAC. Construction to replace structures could remove foxtail cactus. Over the term of the permit, scheduled construction activities will not permanently remove more than 100 acres of native desert habitat. Impacted habitat would be distributed along the entire length of the AAC as well as along those sections of the East Highline, Westside Main, Thistle, and Trifolium canals that are adjacent to desert habitat. Potential habitat for foxtail cactus in the areas proposed for construction is limited to the creosote bush scrub in the IID right-of-way along the AAC. Thus, the potential loss of habitat for foxtail cactus would be considerably less than 100 acres.

Under the conservation strategy for the 25 other covered species, IID would implement measures, both general and plant-specific, to avoid and minimize impacts from O&M and construction activities. For O&M activities, workers would be instructed to restrict activities to previously disturbed areas so as to minimize intrusions into creosote bush habitats where this species could occur. For construction, specific measures include preconstruction surveys, prohibiting surface disturbance within a prescribed radius of the species if it is found within the construction area, and transplanting individuals if impacts are unavoidable and transplanting is deemed appropriate by USFWS and CDFG (see Appendix H). General measures include familiarizing workers with covered plant species they are likely to encounter within the right-of-way and instructing them to avoid injuring or uprooting plants. IID also will mitigate removal of plants if they cannot be avoided by acquiring or granting a conservation easement on land at a 1:1 ratio for the acreage impacted.

Covered activities conducted by IID have the potential to take foxtail cactus in the immediate vicinity of the AAC. Habitat for foxtail cactus in the HCP area constitutes a small portion of the total habitat for this species in the region. Under the HCP, IID will implement measures to minimize and avoid take of individual plants, transplant individuals if take cannot be avoided, and compensate for reductions in suitable habitat. Implementation of the HCP would serve to further reduce and offset potential impacts and would not jeopardize the continued existence of foxtail cactus.

3.9.2.24 Munz's Cactus

Munz's cactus grows at elevations between 500 and 2,000 feet in sandy or gravelly soils found in washes and along canyon walls associated with creosote scrub. The only portion of the HCP area that supports this plant community is the right-of-way of IID along the AAC.

Over the term of the permit, IID anticipates replacing all of the structures along the AAC. Construction to replace structures could remove Munz's cactus. Over the term of the permit, scheduled construction activities will not permanently remove more than 100 acres of native desert habitat. Impacted habitat would be distributed along the entire length of the AAC as well as along those sections of the East Highline, Westside Main, Thistle, and Trifolium canals that are adjacent to desert habitat. Potential habitat for Munz's cactus in the HCP area is limited to the creosote bush scrub in the IID right-of-way along the AAC. Thus, the potential loss of habitat for Munz's cactus would be considerably less than 100 acres.

Under the conservation strategy for the 25 other covered species, IID would implement measures, both general and plant-specific, to avoid and minimize impacts from O&M and construction activities. For O&M activities, workers would be instructed to restrict activities to previously disturbed areas so as to minimize intrusions into creosote bush habitats where this species could occur. For construction, specific measures include preconstruction surveys, prohibiting surface disturbance within a prescribed radius of the species if it is found within the construction area, and transplanting individuals if impacts are unavoidable and transplanting is deemed appropriate by USFWS and CDFG (see Appendix H). General measures include familiarizing workers with covered plant species they are likely to encounter within the right-of-way and instructing them to avoid injuring or uprooting plants. IID also will compensate for removal of plants if they cannot be avoided by acquiring or granting a conservation easement on land at a 1:1 ratio for the acreage impacted.

Covered activities conducted by IID have the potential to take Munz's cactus in the immediate vicinity of the AAC. Habitat for Munz's cactus in the HCP area constitutes a small portion of the total habitat for this species in the region. Under the HCP, IID will implement measures to minimize and avoid take of individual plants, transplant individuals if take cannot be avoided, and compensate for reductions in suitable habitat. Implementation of the HCP would serve to further reduce and offset potential impacts and would not jeopardize the continued existence of Munz's cactus.

3.9.2.25 Orocopia Sage

Orocopia sage occurs in creosote bush scrub, in desert dry washes, on alluvial fans, and woodlands at lower elevations. Potential habitat occurs only in the creosote scrub and dune habitats along the AAC.

Over the term of the permit, IID anticipates replacing all of the structures along the AAC. Construction to replace structures could remove Orocopia sage. Over the term of the permit, scheduled construction activities will not permanently remove more than 100 acres of native desert habitat. Impacted habitat would be distributed along the entire length of the AAC as well as along those sections of the East Highline, Westside Main, Thistle, and Trifolium canals that are adjacent to desert habitat. Potential habitat for Orocopia sage in the HCP area is limited to the creosote bush scrub and dune habitats along the AAC. Thus, the potential loss of habitat for Orocopia sage would be considerably less than 100 acres.

Under the conservation strategy for the 25 other covered species, IID would implement measures, both general and plant-specific, to avoid and minimize impacts from O&M and construction activities. For O&M activities, workers would be instructed to restrict activities to previously disturbed areas so as to minimize intrusions into creosote bush and dune habitats where this species could occur. For construction, specific measures include preconstruction surveys, prohibiting surface disturbance within a prescribed radius of the species if it is found within the construction area, and transplanting individuals if impacts are unavoidable and transplanting is deemed appropriate by USFWS and CDFG (see Appendix H). General measures include familiarizing workers with covered plant species they are likely to encounter within the right-of-way and instructing them to avoid injuring or uprooting plants. IID also will compensate for removal of plants if they cannot be avoided by acquiring or granting a conservation easement on land at a 1:1 ratio for the acreage impacted.

Covered activities conducted by IID have the potential to take Orocopia sage in the immediate vicinity of the AAC. Habitat for Orocopia sage in the HCP area constitutes a small portion of the total habitat for this species in the region. Under the HCP, IID will implement measures to minimize and avoid take of individual plants, transplant individuals if take cannot be avoided, and compensate for reductions in suitable habitat. Implementation of the HCP would serve to further reduce and offset potential impacts and would not jeopardize the continued existence of Orocopia sage.

CHAPTER 4

Monitoring and Adaptive Management

Monitoring the effectiveness of the conservation measures and ensuring compliance with the terms of the conservation program are mandatory elements of a Habitat Conservation Plan (HCP). The U.S. Fish and Wildlife Service (USFWS) elaborated on monitoring and adaptive management requirements for HCPs in its 5-Point Policy Guidance (64 *FR* 11485). The USFWS identifies two types of monitoring required for HCPs: (1) Effects and Effectiveness Monitoring and (2) Compliance Monitoring. Effectiveness monitoring entails collecting data that can be used to determine the effects of permitted actions on covered species and evaluating the effectiveness of the conservation program in achieving the biological goals and objectives. Key information to be obtained through monitoring includes the level of incidental take resulting from the permitted activities, and the biological conditions generated through the conservation program. Compliance monitoring verifies that the permittee is carrying out the terms and conditions of the HCP, and the accompanying permit and Implementation Agreement.

In its 5-Point Policy Guidance, the USFWS clarifies the need for and role of adaptive management in HCPs. An adaptive management strategy is not required for all HCPs. However, it is considered essential for HCPs that cover species for which there are significant biological data or information gaps. To be effective, an adaptive management strategy should:

- Identify the areas of uncertainty and the specific questions to be answered to resolve the uncertainty
- Identify alternative conservation strategies
- Integrate a monitoring program that is able to detect changes or provide information necessary to evaluate the operating conservation program
- Specify feedback loops for adjusting the conservation program if necessary

The following outlines the Imperial Irrigation District's (IID) strategy for demonstrating compliance with the terms of the HCP, monitoring the effectiveness of the HCP, and adaptively modifying the conservation program.

4.1 Salton Sea

4.1.1 Compliance Monitoring

4.1.1.1 Piscivorous Birds

Implementation of Salton Sea–1 of the Salton Sea Conservation Strategy requires the use of water to augment inflows to the Salton Sea to offset the inflow reduction resulting from the water conservation and transfer program. The amount of water allowed to flow to the Sea would be calculated annually based on the proportion of water conservation methods (i.e., efficiency conservation and direct water fallowing) used to generate water for transfer. IID will submit annual reports to the USFWS and the California Department of Fish and Game (CDFG) showing the results of the annual calculation, the total amount of water conserved and transferred, and the total amount of water discharged to the Salton Sea for the preceding year.

4.1.1.2 Desert Pupfish Connectivity

In the event that salinity in the Salton Sea becomes too high to support pupfish, IID agreed under Salton Sea–2 to actively provide connectivity among the populations of pupfish occupying drains. The appropriate methods for accomplishing this objective and the specific details of the program will be defined by the HCP Implementation Team (IT), in consideration of the specific circumstances at the time the measure is implemented. Compliance with this measure will be documented through the reporting requirements outlined in the detailed plan developed by IID and the HCP IT, and approved by USFWS and CDFG (see Salton Sea–2; Chapter 3).

4.1.1.3 Tamarisk Scrub Shoreline Strand

Under Salton Sea–3, IID will monitor tamarisk scrub adjacent to the Salton Sea and acquire land supporting existing native tree habitat or create native tree habitat to mitigate a net reduction in the amount of tamarisk scrub adjacent to the Salton Sea attributable to water conservation and transfer. Compliance with these commitments will be monitored through the reporting requirements (see Section 4.1.4.3 of this chapter). The HCP IT also will be actively involved in developing restoration plans, habitat creation plans and identifying properties for acquisition. Through the reporting requirements and involvement of the HCP IT, the USFWS and CDFG will be able to monitor IID's compliance with Salton Sea–3.

4.1.2 Effectiveness Monitoring

4.1.2.1 Piscivorous Bird Measures

Under Salton Sea–1, water would be allowed to flow to the Sea to offset inflow reductions caused by implementation of the water conservation and transfer project. This measure would effectively avoid impacts on piscivorous birds at the Sea. Therefore, effectiveness monitoring is not required.

4.1.2.2 Desert Pupfish Connectivity

The effectiveness of providing connectivity among pupfish populations in the drains will be incorporated into the detailed plan prepared by IID for accomplishing this objective (see measure Salton Sea–2 in Chapter 3).

4.1.2.3 Tamarisk Scrub Shoreline Strand

The objective of this component of the Salton Sea Conservation Strategy is to ensure no net loss of habitat value for species associated with tamarisk scrub. Under Salton Sea–3, following cessation of Salton Sea–1, IID will conduct a baseline survey and periodic subsequent surveys to quantify net changes in the total amount of tamarisk in shoreline strand and adjacent wetland dominated by tamarisk. Areas adjacent to the Salton Sea that are dominated by tamarisk would be mapped using the most appropriate technology (e.g., aerial photography and satellite imagery). For each area delineated, the total percent coverage by tamarisk, percent coverage by live tamarisk and the percent coverage by dead tamarisk will be categorized following the California Native Plant Society's cover classes (Table 4.1-1). Following completion of the habitat surveys, a geographic information system (GIS) of the habitat data will be developed. A map showing the areas and percent coverage of tamarisk scrub adjacent to the Salton Sea will be prepared.

TABLE 4.1-1
Vegetation Cover Classes of the California Native Plant Society

Cover Class	Canopy Closure (percent)
1	≤ 1
2	> 1 to 5
3	>5 to 25
4	> 25 to 50
5	>50 to 75
6	> 75 to 100

IID will follow the same process for conducting the subsequent surveys. IID will revisit areas that have been mapped and characterized and determine if there have been changes in the percent coverage and/or the boundaries of each area. IID will revise the patch boundaries and percent coverage categorizations as appropriate. In addition to revisiting mapped areas, IID will acquire recent (no greater than 1 year old) Digital Orthophoto Quarter Quadrangles (DOQQs) or aerial photographs and review them to determine if tamarisk has colonized new areas. If the photographs indicate that tamarisk has colonized new areas, IID will delineate and characterize the areas using the same methods as for the baseline surveys. The GIS will be updated accordingly. IID will submit a report of the results of the baseline and subsequent surveys to the USFWS and CDFG within six months of completing the surveys. Information to include in the report is described in Section 4.1.4.3.

As specified in Salton Sea–3, if the monitoring shows less than 2,642 acres of live tamarisk, IID will mitigate difference in acreage by either acquiring land that supports existing native tree habitat or creating native tree habitat. If IID acquires native tree habitat, IID will work with the HCP IT to identify properties and obtain approval from the USFWS and CDFG prior to acquisition.

If IID elects to create native tree habitat, IID will work with the HCP IT to develop a habitat creation plan (see Salton Sea–3). The mitigation ratios specified in Salton Sea–3 were derived from the relative habitat value of potentially impacted habitat (i.e., tamarisk scrub and mixed communities) relative to the habitat value expected in the created habitat. Specifically, the objective of the created habitat is to provide a relative habitat value of about 20 or greater. Cottonwood-willow habitat of types II, III, IV and honey mesquite habitat of types III and IV provide about this relative habitat value. The characteristics of these structural types are summarized in Table 3.4-4. The habitat creation plan will be designed to achieve the characteristics of these structural types. To ensure the desired structural characteristics are achieved, the habitat creation plan also will include specific vegetation monitoring requirements, criteria to assess success, and the actions that IID will take if the success criteria are not met. Typical success criteria for created habitats include the survival, species composition, size, and density of plants. The types of actions typically taken if the success criteria are not met include installing new plants to replace plants that have died, conducting weed control, and adjusting irrigation practices.

4.1.3 Adaptive Management Program

4.1.3.1 Piscivorous Bird Measures

Under Salton Sea–1, additional water would be supplied to the Sea to offset inflow reductions caused by implementation of the water conservation and transfer project. This measure would effectively avoid impacts on piscivorous birds at the Sea. Therefore, adaptive management is not required.

4.1.3.2 Desert Pupfish Connectivity

A process for making adjustments to the measures ultimately adopted for ensuring connectivity among drain populations of pupfish will be incorporated into the detailed plan prepared by IID for accomplishing this objective (see Salton Sea–2 in Chapter 3).

4.1.3.3 Tamarisk Scrub Shoreline Strand

Adaptive management will be incorporated into the habitat creation plans for the native tree habitat mitigation sites. In the habitat creation plan, success criteria and the corrective actions that IID will take in the event that the success criteria are not met will be specified. With this monitoring and adjustment based on the monitoring, IID will ensure that the native tree habitat is progressing toward the desired structural characteristics.

4.1.4 Reporting

4.1.4.1 Piscivorous Bird Measures

Implementation of Salton Sea–1 of the Salton Sea Conservation Strategy requires supplying water to augment inflows to the Salton Sea to offset the inflow reduction resulting from the water conservation and transfer program. The amount of water allowed to flow to the Sea would be calculated annually based on the proportion of water conservation methods (i.e., efficiency conservation and direct water fallowing) used to generate water for transfer. IID will submit annual reports to the USFWS and CDFG showing the results of the annual calculation, the total amount of water conserved and transferred, and the total amount of water supplied to the Salton Sea for the preceding year.

4.1.4.2 Desert Pupfish Connectivity

The reporting requirements for the measures ultimately adopted for ensuring connectivity among drain populations of pupfish will be incorporated into the detailed plan prepared by IID for accomplishing this objective (see Salton Sea–2 in Chapter 3).

4.1.4.3 Tamarisk Scrub Shoreline Strand

Under Salton Sea–3, IID will conduct a baseline survey of tamarisk scrub in shoreline strand and adjacent wetlands dominated by tamarisk, if necessary. IID will submit a report of the results of the baseline survey to the USFWS and CDFG within six months of completing the surveys. The report will include:

- A description of the survey methods
- Acreages and maps of tamarisk scrub adjacent to the Salton Sea

The raw data sheets will be made available to the USFWS and CDFG for review.

IID will repeat the surveys of tamarisk scrub every 5 years for 15 years. IID will submit reports of the results of the periodic surveys to the USFWS and CDFG within six months of completing the surveys. The reports will include:

- A description of any deviations from the established survey protocol
- Acreages and maps of tamarisk scrub adjacent to the Salton Sea
- Identification of areas where the extent of tamarisk changed (either increased or decreased)
- Quantification of any net change in the amount tamarisk scrub habitat

The raw data sheets will be made available to the USFWS and CDFG for review.

If monitoring shows a net change in the amount of tamarisk scrub, IID will create or acquire native tree habitat to mitigate net changes in the amount of tamarisk scrub. IID will not be responsible for compensating for a net reduction in the amount of tamarisk scrub that is attributable to a cause other than the water conservation and transfer program (e.g., fire, federal or state tamarisk control program, installation of actions for restoration of the Salton Sea). IID will work with the HCP IT to develop a plan to create native tree habitat or identify properties supporting native tree habitat to acquire. For lands in which it retains ownership, IID will submit a management plan to the USFWS and CDFG. IID will obtain written approval from the USFWS and CDFG prior to purchasing a property to meet the commitments of Salton Sea–3. The HCP IT may include additional reporting requirements as part of the habitat creation plans and habitat management plans.

4.2 Tamarisk Scrub Habitat

The overall goal of the Tamarisk Scrub Habitat Conservation Strategy is to provide habitat to support the species composition and seasonal occurrence of riparian-associated covered species that could use tamarisk scrub habitat in the HCP Area. This overall goal is predominantly to be accomplished by creating / acquiring and protecting native tree habitat that provides equal habitat value as the tamarisk removed by construction activities. IID may mitigate the removal of tamarisk scrub habitat by either acquiring land that supports existing native tree habitat or creating native tree habitat. The HCP IT will be actively involved in identifying properties for acquisition, developing habitat creation plans, and overseeing management of the created / acquired native tree habitat over the term of the permit.

4.2.1 Compliance Monitoring

Under Tree Habitat–1 and 2, IID will acquire land supporting existing native tree habitat or create native tree habitat to mitigate permanent loss of tamarisk scrub habitat. Compliance with these commitments will be monitored through the reporting and approval requirements described below and diagramed in Figure 4.2-1.

4.2.1.1 Preconstruction Surveys

Tree Habitat–1, 2, and 3 specify that IID will conduct preconstruction surveys to determine the amount and characteristics of vegetation that would be impacted by construction and to determine if any covered species are breeding in vegetation that would be impacted. Within six months of the issuance of the ITP, IID will develop a standard checklist for the preconstruction surveys with input from the HCP IT. Information on the preconstruction checklist will include:

- Project location
- Type of construction activity
- Approximate acreage affected during construction
- Acreage of vegetation impacted
- Vegetation characteristics (e.g., percent species composition, height, density)
- Timing and methods used to survey for covered species
- List of covered species and number of individuals observed
- Any other information deemed necessary by the HCP IT

For scheduled construction activities that would remove tamarisk scrub habitat, IID will transmit the preconstruction survey checklist to the HCP IT within one week of its completion. On an annual basis, IID will submit all of the preconstruction survey checklists completed during the preceding year to the USFWS and CDFG.

4.2.1.2 Habitat Creation and Management Plans

If IID elects to create native tree habitat, IID will work with the HCP IT to develop a habitat creation plan. The mitigation ratios specified in Tree Habitat–1 and 2 were derived from the relative habitat value of potentially impacted habitat (i.e., tamarisk scrub and mixed communities) relative to the habitat value expected in the created habitat. Specifically, the objective of the created habitat is to provide a relative habitat value of about 20 or greater (see Table 3.4-5). Cottonwood-willow habitat of types II, III, IV and honey mesquite habitat of types III and IV provide about this relative habitat value. The characteristics of these structural types are summarized in Table 3.4-4. The habitat creation plan will be designed to achieve the characteristics of these structural types. IID will submit habitat creation plans to the USFWS and CDFG for approval prior to initiating construction of the habitat.

For both created and acquired habitat, IID will work with the HCP IT to develop habitat management plans. IID will submit the habitat management plans to the USFWS and CDFG for approval.

4.2.1.3 Vegetation Monitoring

As part of the native tree habitat creation plans, the HCP IT will specify success criteria and the frequency and techniques for monitoring vegetation. Typically, success criteria for habitat creation projects consist of survival of plantings, vegetation density and structural characteristics at specified time periods. The HCP IT annually will review the vegetation monitoring data. If the vegetation has not met the success criteria, the HCP IT will identify appropriate management actions to achieve the desired characteristics. The range of management actions that IID would implement are described below under Section 4.2.3: Adaptive Management Program.

4.2.2 Effectiveness Monitoring

As a basis for assessing the effectiveness of native tree habitat, IID will monitor use of the created or acquired habitat by birds. Most of the covered species associated with tamarisk scrub occur sporadically and in low numbers in the HCP area. As a result, focusing only on

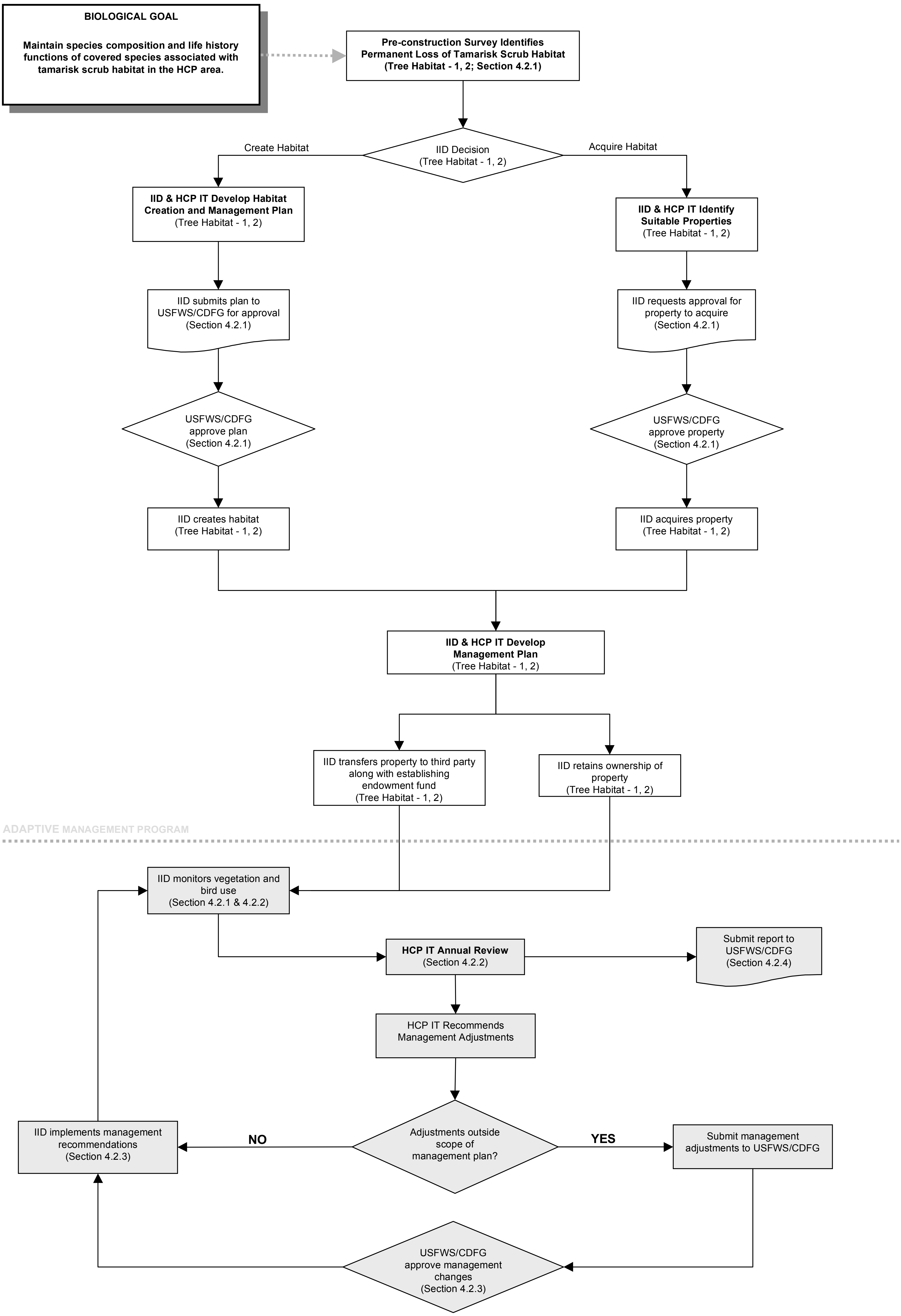


Figure 4.2-1
Tamarisk Scrub Habitat Conservation Strategy Implementation Process

covered species to determine whether the created habitat is functioning might not provide meaningful information. Thus, rather than designing the monitoring specifically to detect covered species, species use monitoring will consist of general bird surveys. All birds (both covered species and species not covered by the HCP) observed during the surveys will be recorded. Interpretation and evaluation of the monitoring results will focus on broad groups of birds (e.g., raptors, neotropical migrants) that encompass and include the covered species associated with tamarisk scrub, as indicators for the covered species.

The monitoring surveys will be designed to provide seasonal occurrence data. Point counts and/or other appropriate survey methodology will be used. The HCP IT will develop the specific requirements for monitoring bird use of the created/acquired habitat, including the survey techniques, timing of the surveys, and duration of the surveys following creation of the habitat.

The HCP IT annually will review results of bird surveys of the created/acquired native tree habitat and assess the effectiveness of the native tree habitat in meeting the biological goal of the Tamarisk Scrub Habitat Conservation Strategy. In evaluating the effectiveness of the native tree habitat and as a basis for determining whether management adjustments are appropriate, the HCP IT will consider the following:

- The species composition and seasonal occurrence of birds using created or acquired native tree habitat relative to other native tree habitats and/or tamarisk scrub in the Salton Sea Basin to the extent that survey information is available for other areas in the basin.
- The species composition and life history functions (as indicated by season of occurrence) of birds using created or acquired native tree habitat relative to that found in the baseline surveys of the drains for survey locations dominated by tamarisk.
- The species composition and life history functions (as indicated by season of occurrence) of birds using created or acquired native tree habitat relative to other native tree habitats and/or tamarisk scrub outside of the Salton Sea Basin. In interpreting the bird monitoring data from the created/acquired habitat, the HCP IT should rely on survey results from habitats in the Salton Sea Basin to the extent possible. However, because bird survey data from tree habitats in the Salton Sea Basin could be limited or unavailable, the HCP IT may consider survey results from habitats outside of the Salton Sea Basin (e.g., Lower Colorado River [LCR]) in assessing the effectiveness of the created/acquired habitat. In so doing, the HCP IT is to give careful consideration to the range of factors potentially contributing to differences in species use (e.g., geographic distribution of species, different habitat characteristics).
- The number of consecutive years individual species were reported in the created/acquired habitat.
- The trends of local (Imperial Valley) and regional populations of individual bird species or groups of species, if available.

By considering and comparing use (occurrence) of the native tree habitat by birds with that found in other tree habitats, the HCP IT will be able to assess whether the created/acquired native tree habitat is functioning. If review and consideration of the available information suggests that the native tree habitat is not meeting the goal of the Tamarisk Scrub Habitat

Conservation Strategy, the HCP IT may alter the characteristics of subsequently created or acquired native tree habitat and / or adjust management of the native tree habitat as described under Section 4.2.3: Adaptive Management Program.

4.2.3 Adaptive Management Program

A key element of the Adaptive Management Program is the involvement and oversight of the HCP IT. Although the responsibility for implementing the HCP ultimately rests with IID, the HCP IT will play an important role in guiding implementation of the HCP. Under the Tamarisk Scrub Habitat Conservation Strategy, IID has committed to create or acquire native tree habitat when scheduled construction activities would remove tamarisk scrub or native tree habitat. If IID elects to create habitat, the HCP IT will work with IID to design the habitat. Similarly, if IID elects to acquire habitat, the HCP IT will work with IID to identify suitable properties. For both acquired and created habitat, the HCP IT will oversee management of the habitat over the term of the permit. In implementing the Tamarisk Scrub Habitat Conservation Strategy (i.e., habitat design, habitat acquisition, habitat management oversight), the HCP IT will seek to optimize the habitat value of the native tree habitat for the covered species within the established budget. Thus, the HCP IT will be instrumental in the implementing the adaptive management program.

Adaptive management is incorporated into the Tamarisk Scrub Habitat Conservation Strategy in two primary areas: (1) specification of the characteristics of the native tree habitat when it is created or acquired, and (2) long-term management of the created or acquired native tree habitat. The following describes the coordination between IID and the HCP IT, how the data collected for effectiveness monitoring will be used to adjust creation and / or management of native tree habitat, and the limits to which IID will adjust creation and / or management of the native tree habitat. Figure 4.2-1 diagrams the interrelations among the vegetation and species use monitoring data, the HCP IT and IID, and creation and management of the native tree habitat.

4.2.3.1 Creation/Acquisition of Native Tree Habitat

Under the Tamarisk Scrub Habitat Conservation Strategy, IID will create or acquire native tree habitat to mitigate the removal of tamarisk resulting from scheduled construction activities. IID will work with the HCP IT to identify properties for acquisition and / or to develop site-specific habitat creation plans. For both acquired and created habitat, the HCP IT will develop site-specific management plans. The management plans will specify vegetation and bird monitoring requirements. It is anticipated that IID will create and / or acquire native tree habitat gradually over the term of the permit in association with scheduled construction activities. Thus, the HCP IT will be able to use the results of vegetation and bird monitoring of early habitat acquisitions / creations to improve the design of future habitat creations or in identifying properties for acquisition so as to provide the greatest benefit to covered species.

4.2.3.2 Management of Created/Acquired Native Tree Habitat.

The HCP IT will develop management plans for created and acquired native tree habitat. As described under Section 4.2.2: Effectiveness Monitoring, the HCP IT will annually review results of vegetation monitoring and bird surveys of the created / acquired native tree habitat and other relevant information. Based on its review and assessment of the available information, the HCP IT may recommend management actions or changes in management practices. Over the term of the permit, the HCP IT may recommend management actions that are outside the scope of the management actions identified and defined in the site-specific habitat management plans. For these management actions, IID will obtain written approval from the USFWS and CDFG prior to implementing the action.

Examples of actions that IID would take in adjusting management of the created/acquired habitat include, but are not limited to:

- Changes in irrigation practices of created/acquired native tree habitat
- Vegetation management activities (e.g., replacement of failed plantings, burning)
- Minor earth-moving activities within created habitat
- Predator control
- Invasive species control

The following actions are outside the scope of actions that IID would take in adjusting management of the native tree habitat over the term of the permit and will not be considered as part of adaptive management:

- Creation or acquisition of additional acreage of native tree habitat beyond that required under Tree Habitat–1 and 2
- Change in the location of previously created or acquired native tree habitat
- Provision of additional water to created or acquired native tree habitat
- Creation of additional water delivery infrastructure after the initial creation/acquisition of native tree habitat

4.2.4 Reporting

4.2.4.1 Habitat Creation and Management Plans

For scheduled construction activities that will remove tamarisk scrub habitat, IID will conduct preconstruction vegetation and covered species surveys. IID will transmit the preconstruction survey checklist to the HCP IT within one week of its completion. On an annual basis, IID will submit all of the preconstruction survey checklists completed during the preceding year to the USFWS and CDFG.

Where construction activities would permanently remove habitat, IID will work with the HCP IT to develop a plan to create native tree habitat or identify properties supporting native tree habitat to acquire. The habitat creation plan will include the following information:

- Location
- Planting plan (including species composition and layout)
- Grading and other construction activities
- Long-term management practices
- Vegetation and bird use monitoring

- Success criteria for the plantings and the actions that IID will take if the success criteria are not met

IID will submit habitat creation plans to the USFWS and CDFG for approval prior to initiating construction of the habitat. If IID elects to acquire native tree habitat, IID will obtain written approval from the USFWS and CDFG prior to purchasing a property to meet the commitments of Tree Habitat–1 or –2.

For created / acquired habitat, IID will work with the HCP IT to develop habitat management plans. IID will submit management plans to the USFWS and CDFG for approval. While the specific management needs will vary depending on the property acquired, considerations for the management plan include:

- Measures to control human access (e.g., fencing, signage)
- Frequency at which land will be visited to assess maintenance / management needs
- Types of maintenance action (e.g., removing garbage, repairing fences)
- Vegetation management practices (e.g., prescribed burning, removal of exotic plants)

4.2.4.2 Vegetation and Bird Monitoring of the Native Tree Habitat

IID will submit a report of the results of the vegetation monitoring of created native tree habitat to the USFWS and CDFG annually until achievement of the success criteria has been demonstrated. These annual reports will:

- Present the results of the vegetation monitoring specified by the HCP IT
- Describe the overall condition and development of the native tree habitat
- Indicate whether the success criteria have been met
- Describe recommendations from the HCP IT for creation and management of the native tree habitats and the bases for the recommendations

Following achievement of the success criteria and for acquired habitat, IID will continue to assess the condition of the native tree habitat. IID will submit annual reports that:

- Present the results of any long-term vegetation monitoring required by the HCP IT as part of the habitat management plans
- Indicate whether the success criteria are being met
- Describe recommendations from the HCP IT for management of the native tree units and the bases for the recommendations

IID will submit a report of the results of bird surveys to the USFWS and CDFG each year that the surveys are conducted as specified by the HCP IT. The report will list the species and number of individuals recorded for the current year’s survey and in each previous survey for the habitat area surveyed. The report will include the HCP IT’s assessment of the effectiveness of the native tree habitat in meeting the biological goal as described under Section 4.2.3: Adaptive Management Program. The report also will include the HCP IT’s recommendations for creation and management of the native tree units and the bases for the recommendations.

4.3 Drain Habitat

4.3.1 Baseline Covered Species Surveys

Annual surveys for the covered species will be conducted over a consecutive 3-year period to determine the occurrence, distribution, relative abundance, and breeding status of covered species using drains in the HCP area. The covered species surveys will start within 6 months of completion of the drain vegetation survey described in Appendix B. IID also will conduct two subsequent surveys for covered species in the drains in Year 7 and Year 12 following issuance of the permit. A general survey protocol for the covered species surveys is provided in Appendix F. However, the number of sample points and location of sample points for the covered species surveys will be influenced by the results of the drain vegetation survey (see Drain Habitat–1). Thus, the HCP IT will develop the final protocol for the covered species surveys following completion of the drain vegetation survey.

4.3.2 Compliance Monitoring

Under the Drain Habitat Conservation Strategy, IID will create 190 to 652 acres of managed marsh habitat with the intent to provide habitat for covered species associated with drain habitat. Compliance with this commitment will be monitored through the reporting and approval requirements. Based on the drain vegetation survey (Appendix B), the HCP IT will determine the acreage of managed marsh IID will create (Drain Habitat–1). IID will obtain written approval from the USFWS and CDFG for approval on the acreage of managed marsh to create (Figure 4.3-1). IID will submit site-specific plans for creation of the managed marsh to the USFWS and CDFG prior to construction and inform these agencies when the construction is completed (see Section 4.3.5). The HCP IT also will be actively involved in locating and designing the managed marsh habitat. Through these reporting and approval requirements and involvement of the HCP IT, the USFWS and CDFG will be able to monitor IID's compliance with the Drain Habitat Conservation Strategy measures.

As part of the development of the managed marsh habitat creation plan, the HCP IT will specify success criteria for vegetation development and the frequency and techniques for monitoring vegetation. Typically, success criteria for habitat creation projects consist of survival of plantings, vegetation density and structural characteristics at specified time periods. The HCP IT will annually review the vegetation monitoring data. If the vegetation has not met the success criteria, the HCP IT will identify appropriate management actions to achieve the desired characteristics. The range of management actions that IID would implement are described below under Section 4.3.4: Adaptive Management Program.

Under Drain Habitat–1, IID has committed to use water with the same selenium concentration as water from the lower Colorado River. In the event that EPA establishes a selenium concentration standard (that has received a "No Jeopardy" determination from USFWS) that is higher than the concentration in Colorado River water, IID may use other water sources as long as the selenium concentration in the water does not exceed the EPA standard. In no case will IID be required to provide water with a selenium concentration less than that of Colorado River water. If IID uses irrigation water from the lower Colorado River to maintain the managed marsh, it is not necessary to monitor water quality. If IID uses water other than irrigation water from the lower Colorado River, then IID will monitor the quality of the water delivered to the managed marsh to demonstrate that the water meets the selenium concentrations specified in Drain Habitat–1.

4.3.3 Effectiveness Monitoring

The biological goal of the Drain Habitat Conservation Strategy is to maintain the species composition and life history functions of covered species using drain habitat within the HCP area. The specific objectives are to:

- Create managed marsh habitat that supports covered species associated with drain habitat
- Optimize management of the created marsh habitat to support covered species associated with drain habitat over the term of the permit

To monitor the effectiveness of the managed marsh habitat in meeting these objectives, IID will monitor use of the managed marsh by covered species. The effectiveness monitoring data also will provide the basis for the adaptive management program (See Section 4.3.4: Adaptive Management Program).

Following creation of each phase of the managed marsh habitat, IID will survey the created habitat for Yuma clapper rails and California black rails, and conduct general point count surveys for the other covered species associated with drain habitat. The surveys will be conducted annually for 5 years following creation of each phase of the managed marsh. After the initial five-year survey period, IID will continue conducting the rail and point count surveys at the same frequency that clapper rail surveys are conducted on the federal wildlife refuge but no less frequently than once every five years. Currently, the federal wildlife refuge is surveyed annually for clapper rails. IID will survey for Yuma clapper rails and California black rail following the prevailing protocol (Appendix F). A general protocol for point count surveys also is provided in Appendix F. IID will work with the HCP IT to further define the specific number of points and exact timing of the point count surveys in the created managed marsh habitat.

The HCP IT annually will review results of covered species surveys and assess the effectiveness of the managed marsh in meeting the biological goal of the Drain Habitat Conservation Strategy. In evaluating the effectiveness of the managed marsh and as a basis for determining whether management adjustments are appropriate, the HCP IT will consider the following:

- The occurrence of covered species in the drains as determined by the baseline surveys of the drains and the managed marsh
- The relative abundance of covered species in the drains as determined by the baseline surveys of both the drains and the managed marsh
- The seasons when covered species use the drains as determined by the baseline surveys of the drains and managed marsh as an indicator of life history functions
- The number of consecutive years individual species were reported in the drains as determined by the baseline surveys of the drains and the managed marsh (i.e., consistency of occurrence)

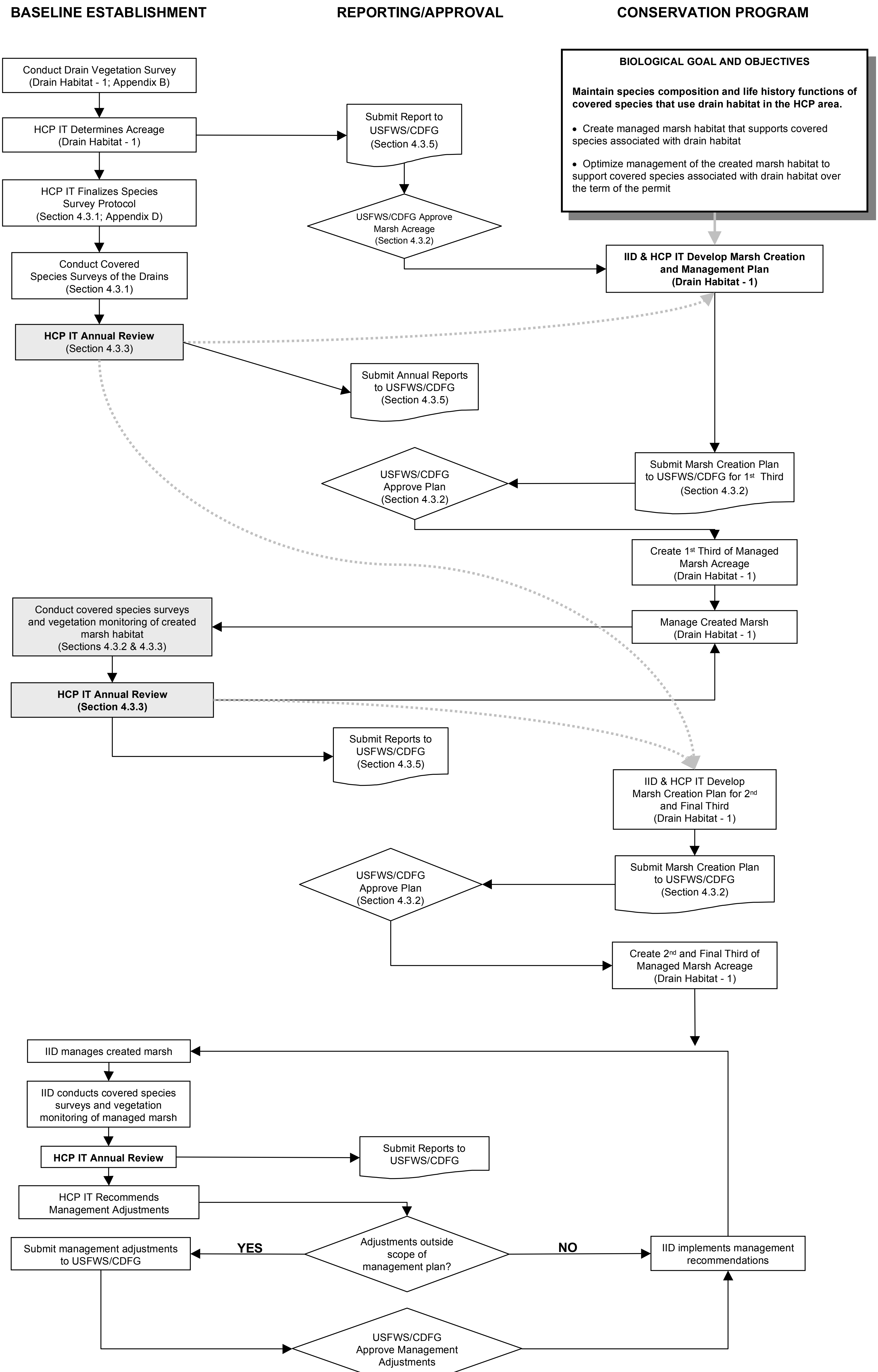


Figure 4.3-1
Drain Habitat Conservation Strategy Implementation Process

- The presence, relative abundance and seasonal use of covered species on managed marshes of the state and federal refuges, if available
- The trends of local (Imperial Valley) and regional populations of covered species, if available

By considering and comparing use (occurrence, abundance, and life history functions) of the managed marsh by covered species with that found in the drains as determined by the baseline surveys and at state and federal refuges (if available), the HCP IT will be able to assess whether the managed marsh is meeting the biological goal of the Drain Habitat Conservation Strategy. If review and consideration of the available information indicates that the managed marsh is not meeting the goal of the Drain Habitat Conservation Strategy, the HCP IT may alter the characteristics of the remaining acreage of managed marsh to be created and/or adjust management of the managed marsh as described under Section 4.3.4: Adaptive Management Program.

4.3.4 Adaptive Management Program

A key element of the Adaptive Management Program is the involvement and oversight of the HCP IT. Although the responsibility for implementing the HCP ultimately rests with IID, the HCP IT will play an important role in guiding implementation of the HCP. Under the Drain Habitat Conservation Strategy, IID has committed to creating managed marsh habitat. The HCP IT will work with IID to design the managed marsh habitat and oversee its management over the term of the permit. In designing the managed marsh and adjusting its management over the term of the permit, the HCP IT will seek to optimize the habitat value of the managed marsh for the covered species. Thus, the HCP IT will be instrumental in implementing the adaptive management program.

Adaptive management is incorporated into the Drain Habitat Conservation Strategy in two primary areas: (1) specification of the characteristics of the managed marsh when it is created, and (2) long-term management of the managed marsh. The following describes the coordination between IID and the HCP IT, how the data collected for effectiveness monitoring will be used to adjust creation and/or management of the managed marsh, and the limits to which IID will adjust creation and/or management of the marsh. Figure 4.3-1 diagrams the interrelations among the survey data, HCP IT and IID, and creation and management of the managed marsh.

4.3.4.1 Creation of Managed Marsh

Under the Drain Habitat Conservation Strategy IID will create one-third of the required managed marsh acreage within 5 years of issuance of the incidental take permit with the second and final thirds created within 10 and 15 years, respectively. IID will work with the HCP IT to develop site-specific habitat creation and management plans. Because at least one-third of the habitat must be created within 5 years of issuance of the permit, development of the habitat creation plan will need to be initiated soon after the completion of the vegetation survey of the drains. It is likely that only one year of the covered species surveys of the drains will have been completed prior to development of the habitat creation plan. Thus, the habitat creation and management plan for the first third of managed marsh will be largely based on how emergent freshwater marsh areas are created and managed on the state and federal refuges. To the extent possible, the HCP IT will consider the results of covered species surveys of the drains in developing the habitat creation and management plan.

The second and final third of the managed marsh habitat will be created following completion of baseline surveys for covered species. Additionally, several years of surveys for covered species will be available from the first installment of managed marsh habitat. The HCP IT will use the survey results of the drains and the managed marsh to develop the habitat creation plans for the subsequent managed marshes. For example, if the baseline surveys reveal a high level of use of the drains by a covered species other than clapper rails, the HCP IT may adjust the design and management of the created habitat to better meet the needs of this species.

4.3.4.2 Management of Created Managed Marsh Habitat

The HCP IT will develop management plans for the managed marsh in conjunction with the habitat creation plans. As described under Section 4.3.3: Effectiveness Monitoring, the HCP IT will annually review results of vegetation monitoring and covered species surveys of the managed marsh and other relevant information. Based on its review and assessment of the available information, the HCP IT may recommend management actions or changes in management practices to achieve the goal of the Drain Habitat Conservation Strategy (i.e., to maintain the species composition and life history functions of covered species that use drain habitat). Over the term of the permit, the HCP IT may recommend management actions that are outside the scope of the management actions identified and defined in the site-specific habitat management plans. For these management actions, IID will obtain written approval from the USFWS and CDFG prior to implementing the action.

Examples of actions that IID could take in adjusting management include, but are not limited to:

- Changes in flooding regime
- Vegetation management activities (e.g., replacement of failed plantings, burning, discing, flooding)
- Minor earth-moving activities within the managed marsh units
- Changes in water levels
- Predator control
- Invasive species control

The following actions are outside the scope of actions that IID would take in adjusting management of the managed marsh over the term of the permit and will not be considered as part of adaptive management:

- Creation of additional acreage of managed marsh habitat beyond that required under Drain Habitat–1
- Change in the location of previously created managed marsh habitat
- Provision of additional water to the managed marsh

- Creation of additional water delivery infrastructure after the initial creation of the managed marsh

4.3.5 Reporting

4.3.5.1 Baseline Covered Species Surveys

IID will conduct a drain vegetation survey within 1 year of issuance of the incidental take permit (see Drain Habitat–1). IID will submit a report of the results of the drain vegetation survey to the USFWS and CDFG within six months of completing the surveys. The report will include the following:

- A description of the survey methods
- Total acreage of vegetation supported in the drainage system
- Plant species percent composition of the vegetation

The raw data sheets will be made available to the USFWS and CDFG for review.

For the covered species surveys, IID will submit a report to the USFWS and CDFG of the results within six months of completing the survey each year. The report will:

- Describe the survey methods used (as described in Appendix F and as modified by the HCP IT)
- List the species and number of individuals of each species observed
- Identify the location of covered species
- Present and discuss the relative abundance of covered species among the survey stations
- Note indications of breeding activity by covered species
- Describe recommendations from the HCP IT for creation and management of the managed marsh units and the bases for the recommendations

As additional surveys are conducted, the reports will present the cumulative information collected. The raw data sheets will be made available to USFWS and CDFG for review.

4.3.5.2 Habitat Creation

The Drain Habitat Conservation Strategy specifies creation of managed marsh habitat within certain time periods. Before creating managed marsh habitat, IID will submit to USFWS and CDFG for approval, site-specific plans of the habitat to be created. The site-specific plan will:

- Show the location of the created habitat
- Describe and diagram earthwork and water control structures
- Describe the desired plant species composition and how to achieve it
- Describe how the habitat will be managed
- Success criteria for planting and vegetation monitoring requirements

IID will notify the USFWS and CDFG when the work has been completed.

4.3.5.3 Vegetation and Covered Species Surveys of the Managed Marsh

IID will submit a report of the results of the vegetation monitoring of the managed marsh to the USFWS and CDFG annually until achievement of the success criteria has been demonstrated. These annual reports will:

- Present the results of the vegetation monitoring specified by the HCP IT
- Describe the overall condition and development of the managed marsh
- Indicate whether the success criteria have been met
- Describe recommendations from the HCP IT for creation and management of the managed marsh units and the bases for the recommendations

Following achievement of the success criteria, IID will continue to assess the condition of the managed marsh and IID will submit annual reports that:

- Present the results of long-term vegetation monitoring as required by the HCP IT as part of the marsh management plan
- Indicate whether the success criteria are being met
- Describe recommendations from the HCP IT for management of the managed marsh units and the bases for the recommendations

IID will submit a report of the results of the rail and point count surveys to the USFWS and CDFG each year that the surveys are conducted. For clapper rails and black rails, the report will show the number of each species that responded during the current year's survey and in each previous survey for the habitat area surveyed. Similarly for the point count data, the report will list the species and number of individuals recorded for the current year's survey and in each previous survey for the habitat area surveyed. The report will include the HCP IT's assessment of the effectiveness of the managed marsh in meeting the biological goal as described under Section 4.3.4: Adaptive Management Program. The report also will include the HCP IT's recommendations for creation and management of the managed marsh units and the bases for the recommendations.

4.4 Desert Habitat

4.4.1 Baseline Surveys

4.4.1.1 Desert Habitat Survey

Desert habitat occurs in the HCP area in IID's right-of-way along the All American Canal (AAC) and adjacent to the East Highline, Westside Main, Thistle, and Trifolium Extension canals. Desert Habitat–4 requires IID to conduct baseline surveys for covered species along these canals. Prior to conducting the surveys, IID will conduct a habitat survey to identify and map habitat and habitat features. The area covered by the survey will encompass IID's right-of-way along the AAC from its intersection with the East Highline Canal to the desilting basins at Imperial Dam, and IID's rights-of-way along the Westside Main, East

Highline, Thistle, and Trifolium Extension canals where the right-of-way contains or is immediately adjacent to desert habitat.

Habitats will be mapped by delineating habitat patch boundaries on aerial photographs or DOQQs within IID's right-of-way. Habitats or unique habitat features adjacent to but outside of IID's right-of-ways also could influence the occurrence and distribution of covered species within the HCP area. Areas outside of the HCP area will not be comprehensively surveyed. Rather, the aerial photographs / DOQQs will be examined to identify habitats or habitat features within 0.5 miles that could support use by the covered species. Habitats or features identified on the aerial photographs / DOQQs will be visited to determine the specific habitat and feature type as long as access to the property is granted. The location and characteristics of the habitat or habitat feature will be mapped.

Habitats will be classified according to the California Wildlife Habitat Relationships (CWHR) habitat classification system (Mayer and Laudenslayer 1988). The CWHR system is commonly used in California to classify habitat. The CWHR classifies habitat in a standardized manner based on plant species composition and major structural attributes (e.g., canopy coverage, shrub, or tree size).

The CWHR habitat types potentially occurring in the HCP area are as follows:

- Desert scrub
- Desert succulent scrub
- Desert wash
- Desert riparian
- Alkali sink scrub
- Desert dunes

For each habitat patch, the CWHR will be identified and a canopy closure class assigned. To better distinguish varying structural characteristics of desert habitats, the California Native Plant Society' cover classes (Table 4.1-1) will be used to describe canopy closure rather than the CWHR system's classes. For areas classified as Desert Riparian the dominant species will be identified and subareas delineated based on species composition where distinct differences in plant species composition occur. For example, between Drops 3 and 4 along the AAC, water seepage from the canal supports a 1,422-acre complex of tamarisk, mesquite, cottonwoods, willows and cattails. Under this habitat classification system, the 1,422-acre area would be classified as Desert Riparian. Within this area, the patches of tamarisk, mesquite, cottonwood / willows and cattails would be delineated and the dominant vegetation identified. Following completion of the habitat surveys, a GIS of the habitat data will be developed.

The distribution of some of the covered species depends on the occurrence of unique habitat features in addition to general habitat types. Important features are burrows, rock outcrops / piles, and temporary pools. During the habitat surveys, the surveyors will note the presence of burrows for each habitat patch; however, the exact location of burrows will not be mapped. Areas where temporary pools are likely to form will be identified. The location and extent of temporary pools will be confirmed during surveys for Couch's spadefoot toad that will be conducted during and following periods of rain (Appendix F). Mapped features will be added to the GIS.

4.4.1.2 Covered Species Surveys

Annual baseline surveys for the covered species will be initiated within 1 year of issuance of the incidental take permit and conducted over a consecutive 3-year period to determine the seasonal occurrence and distribution of covered species along the AAC, East Highline, Westside Main, Thistle, and Trifolium Extension canals in the HCP area. The covered species surveys will start within 6 months of completion of the desert habitat survey described above. A general survey protocol for the covered species surveys is provided in Appendix F. However, the number of sample points and location of sample points for the covered species surveys will be influenced by the results of the desert habitat survey. Thus, the HCP IT will develop the final protocol for the covered species surveys following completion of the desert habitat survey.

4.4.2 Compliance Monitoring

4.4.2.1 Avoidance and Minimization Measures

As part of the Desert Habitat Conservation Strategy, IID will implement a worker education program and implement measures to avoid and minimize impacts to covered species associated with desert habitat and their habitat resulting from covered activities. IID will provide copies of the worker education manual and updates of the manual to the USFWS and CDFG.

The HCP Implementation Biologist will periodically conduct random checks (during their routine duties) of workers conducting operation and maintenance (O&M) activities to assess whether workers are following the standard operating procedures. If during the periodic random checks of workers conducting O&M, the HCP Implementation Biologist finds that a worker is not following the standard operating procedures, the HCP Implementation Biologist will report the infraction to the workers' supervisor. Workers will be subject to retraining or disciplinary action through IID's Policies and Procedures.

4.4.2.2 Habitat Restoration

Under Desert Habitat–3, IID will restore native desert vegetation temporarily impacted by construction activities. The HCP IT will work with IID to develop vegetation restoration plans. IID will submit the restoration plans to the USFWS and CDFG for approval prior to initiating construction activities. Through the reporting and approval requirements and involvement of the HCP IT, the USFWS and CDFG will be able to monitor IID's compliance with Desert Habitat–3 (Figure 4.4-1).

As part of the restoration plans, the HCP IT will specify success criteria and the frequency and techniques for monitoring vegetation. Typically, success criteria for habitat creation projects consist of survival of plantings, vegetation density and structural characteristics at specified time periods. The HCP IT annually will review the vegetation monitoring data. If the vegetation has not met the success criteria, the HCP IT will identify appropriate management actions to achieve the desired characteristics. The range of management actions that IID would implement are described below under Section 4.4.4: Adaptive Management Program.

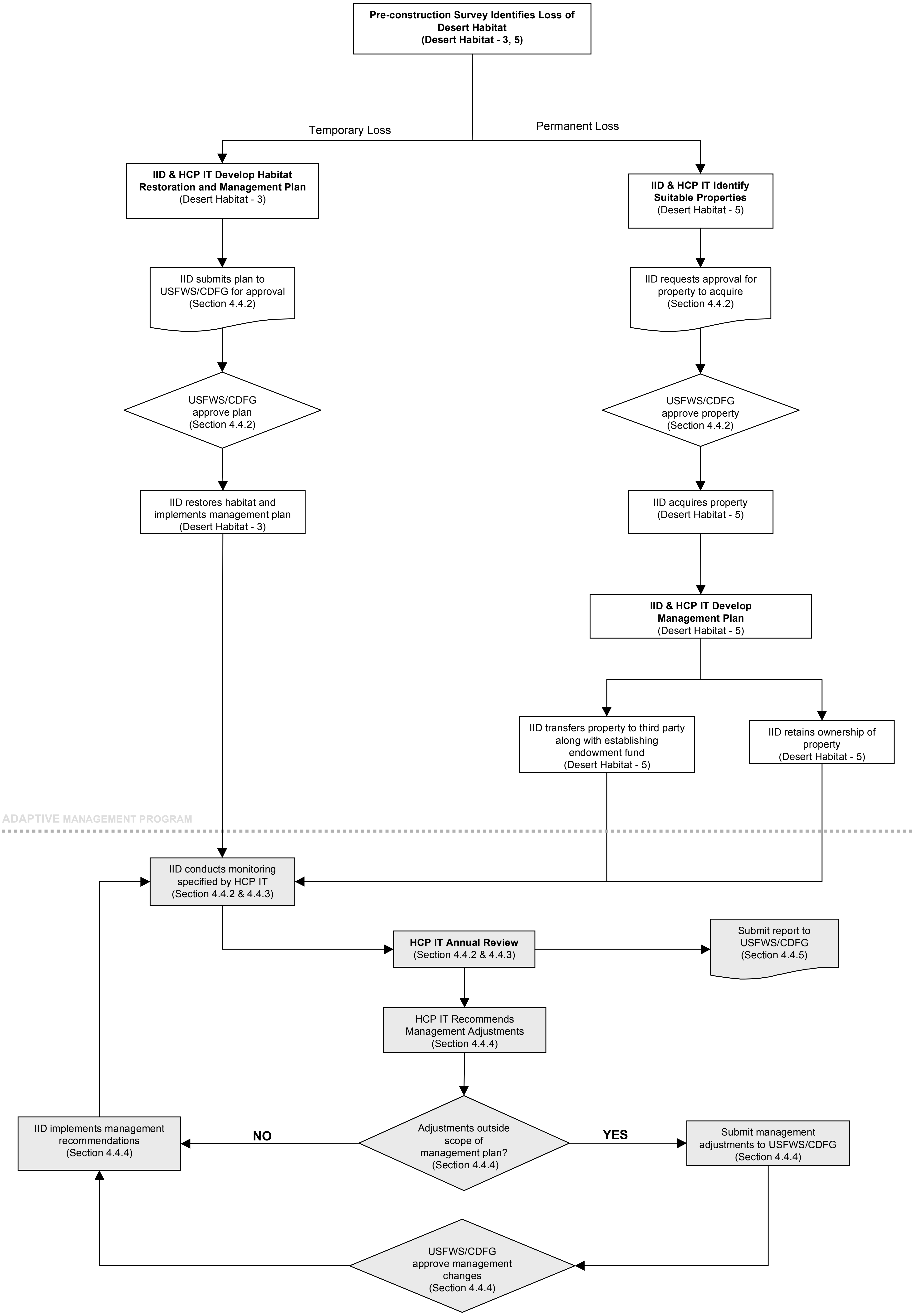


Figure 4.4-1
Implementation Process for Desert Habitat Conservation Strategy Habitat Acquisition/Restoration

4.4.2.3 Habitat Acquisition

Under Desert Habitat–5, IID will acquire land or protect land with a conservation easement to mitigate permanent loss of desert habitat. The HCP IT will assist IID in identifying properties for acquisition/protection. IID will obtain written approval from the USFWS and CDFG prior to acquiring property or, for land it owns, recording a conservation easement. Through the reporting and approval requirements and involvement of the HCP IT, the USFWS and CDFG will be able to monitor IID's compliance with Desert Habitat–5 (Figure 4.4-1).

4.4.3 Effectiveness Monitoring

4.4.3.1 Take Minimization and Avoidance

The primary goal of the Desert Habitat Conservation Strategy is to avoid killing or injuring covered species as a result of covered activities. Because of the low likelihood of observing an injured individual and subsequently being able to attribute the injury to a specific action, it is not possible to specifically address the effectiveness of the measures in avoiding take. The best information on the effectiveness of the measures will come from the workers and HCP Implementation Biologist. First, workers will be instructed to report any incidences of mortality or injury of a covered species. Few or no reported incidences could suggest that the measures are effective while a large number of reports could suggest areas needing improvement. The HCP Implementation Biologist also will be a valuable source of information. The biologist will be regularly coordinating with workers, monitoring construction activities, and checking on the implementation of the measures. The biologist will include comments/recommendations and observations regarding the effectiveness of the measures to avoid take of covered species in required reports (see Section 4.4.5.2). While this information will not be conclusive with respect to the effectiveness of the measures, the HCP IT will consider this information in deciding whether to adjust the avoidance measures (see Section 4.4.4: Adaptive Management Program). In addition, under Desert Habitat–4, IID will conduct covered species surveys every 5 years. The results of these surveys may provide additional information for evaluating the effectiveness of the avoidance and minimization measures and will be used as appropriate.

4.4.3.2 Habitat Restoration

IID will restore native desert vegetation temporarily impacted by construction activities under Desert Habitat–3. As part of the restoration plans for temporarily impacted desert habitat, the HCP IT will specify monitoring of covered species (or appropriate surrogates) as necessary and appropriate to determine the effectiveness of restoration actions. Desert Habitat–3 requires preconstruction surveys to determine the occurrence of covered species. If covered species are identified using habitat that would be temporarily impacted based on the preconstruction surveys or other site-specific surveys (e.g., baseline covered species surveys conducted), monitoring for covered species use of restored habitat will focus on those species found using the habitat prior to its disturbance. Monitoring for covered species use of restored habitat will not be conducted if no covered species are found using the temporarily disturbed habitat. Because the type and characteristics of desert habitat that would be restored will be based on the characteristics of the impacted habitat and its use by covered species, it is not appropriate to specify monitoring requirements for restored habitat at this time. Consistent with the effectiveness monitoring for habitat restored under the Tamarisk Scrub Habitat Conservation Strategy, the HCP IT will design the monitoring program for restored desert habitat to determine the seasonal occurrence of the target covered species (i.e., the species found to use the temporarily impacted habitat) in the restored habitat.

The HCP IT annually will review the monitoring results of the restored desert habitat and assess the effectiveness of the restored habitat in compensating for the impacted habitat. Based on its review of the monitoring data and consideration of any other relevant and available information, the HCP IT may recommend management actions to improve the habitat value of the restored habitat as described under Section 4.4.4: Adaptive Management Program. The HCP IT will determine when monitoring for covered species using the restored habitat can be discontinued in consideration of demonstration of use of the restored habitat by the target covered species, achievement of vegetation success criteria, results of on-going surveys for covered species as appropriate.

4.4.3.3 Habitat Acquisition

Under Desert Habitat–5, IID will acquire native desert habitat to mitigate permanent loss of native desert habitat caused by construction activities. IID will work with the HCP IT to develop a management plan for acquired habitat. As part of the management plan, the HCP IT will specify monitoring of covered species (or appropriate surrogates) as necessary and appropriate to determine the effectiveness of the acquired habitat to support covered species known or expected to have used habitat removed by construction. Because the type and characteristics of desert habitat that would be acquired will be based on the characteristics of the impacted habitat and its use by covered species, it is not appropriate to specify monitoring requirements for acquired habitat at this time. Consistent with the effectiveness monitoring for habitat acquired under the Tamarisk Scrub Habitat Conservation Strategy, the HCP IT will design the monitoring program for acquired desert habitat to determine the seasonal occurrence of the target covered species (i.e., the species known or expected to have been impacted by removal of habitat) in the acquired habitat.

The HCP IT annually will review the monitoring results of the acquired native desert habitat and assess the effectiveness of the acquired habitat in compensating for the impacted habitat.

Based on its review of the monitoring data and consideration of any other relevant and available information, the HCP IT may recommend management actions to improve the habitat value of the acquired habitat as described under Section 4.4.4: Adaptive Management Program.

4.4.4 Adaptive Management Program

A key element of the Adaptive Management Program is the involvement and oversight of the HCP IT. Although the responsibility for implementing the HCP ultimately rests with IID, the HCP IT will play an important role in guiding implementation of the HCP. Under the Desert Habitat Conservation Strategy, IID has committed to implement take avoidance and minimization measures for O&M activities and scheduled construction activities. The HCP IT will play an important role in improving the take avoidance and minimization measures over the term of the permit. IID also has committed to acquire desert habitat when scheduled construction activities would remove native desert habitat. The following describes the coordination between IID and the HCP IT in implementing the Desert Habitat Conservation Strategy.

4.4.4.1 Avoidance and Minimization Measures

The HCP IT will review the measures of Desert Habitat–2 and Desert Habitat–3 annually for 3 consecutive years and every 5 years thereafter coincident with the covered species surveys. The HCP IT may recommend adjustments to the avoidance and minimization measures. In determining adjustments to the avoidance and minimization measures, the HCP IT will consider the results of the covered species and habitat surveys, prevailing practices for avoiding take, and observations/recommendations of the HCP Implementation Biologist, among others. Adjustments recommended by the HCP IT will be submitted to the USFWS and CDFG for approval prior to IID implementing the adjustments. IID will implement the adjustments upon approval by the USFWS and CDFG. Figure 4.4-2 graphically displays the implementation of the avoidance/minimization component of the Desert Habitat Conservation Strategy, including the adaptive management program.

4.4.4.2 Habitat Restoration/Acquisition

The HCP IT will develop management plans for restored and acquired native desert habitat. As described under Section 4.4.3: Effectiveness Monitoring, the HCP IT will annually review monitoring results for restored and acquired habitat and other relevant information. Based on its review and assessment of the available information, the HCP IT may recommend management actions or changes in management practices. Figure 4.4-1 graphically displays the implementation of the habitat restoration/acquisition component of the Desert Habitat Conservation Strategy, including the adaptive management program. Over the term of the permit, the HCP IT may recommend management actions that are outside the scope of the management actions identified and defined in the site-specific habitat management plans. For these management actions, IID will obtain written approval from the USFWS and CDFG prior to implementing the action.

Examples of actions that IID would take in adjusting management of the restored or acquired habitat include, but are not limited to:

- Vegetation management activities (e.g., replacement of failed plantings, burning)
- Predator control
- Invasive species control

The following actions are outside the scope of actions that IID would take in adjusting management of restored or acquired desert habitat over the term of the permit and will not be considered as part of adaptive management:

- Restoration or acquisition of additional acreage of native desert habitat beyond that required under Desert Habitat–3 and –5
- Change in the location of previously restored or acquired desert habitat

4.4.5 Reporting

4.4.5.1 Habitat and Baseline and Periodic Covered Species Surveys

IID will submit a report of the results of the desert habitat survey to the USFWS and CDFG within six months of completing the survey. The report will include the following:

- A description of the survey methods
- Acreages and maps of the various habitat types

The raw data sheets will be made available to the USFWS and CDFG for review.

IID will submit reports to the USFWS and CDFG within six months of completing covered species surveys. The report will include the following information.

The report will:

- Describe the survey methods used (as described in Appendix F and as modified by the HCP IT)
- List the species and number of individuals of each species observed
- Identify the location of covered species
- Present and discuss the relative abundance of covered species among the survey stations
- Note indications of breeding activity by covered species
- Comments/observations and recommendations

As additional surveys are conducted, the reports will present the cumulative information collected. The raw data sheets will be made available to the USFWS and CDFG for review.

4.4.5.2 Take Avoidance and Minimization Measures

IID will submit an annual report to the USFWS and CDFG regarding the take avoidance and minimization aspects of the Desert Habitat Conservation Strategy. The report will include:

- A narrative description of the effectiveness of the take avoidance and minimization measures

- Recommendations for modifications to the take avoidance and minimization measures to improve their effectiveness

4.4.5.3 Habitat Restoration/Acquisition Plans

For scheduled construction activities that would remove native desert habitat, IID will conduct preconstruction vegetation and covered species surveys. IID will transmit the results of preconstruction surveys to the HCP IT within one week of its completion. On an annual basis, IID will submit all of the preconstruction survey checklists completed during the preceding year to the USFWS and CDFG.

Where construction activities would permanently remove habitat, IID will work with the HCP IT to identify properties supporting desert habitat to acquire. IID will obtain written approval from the USFWS and CDFG prior to purchasing a property to meet the commitments of Desert Habitat–5. For acquired habitat, IID will work with the HCP IT to develop habitat management plans. IID will submit management plans to the USFWS and CDFG for approval. While the specific management needs will vary depending on the property acquired, considerations for the management plan include:

- Measures to control human access (e.g., fencing, signage)
- Frequency at which land will be visited to assess maintenance/management needs
- Types of maintenance action (e.g., removing garbage, repairing fences)
- Vegetation management practices (e.g., prescribed burning, removal of exotic plants)

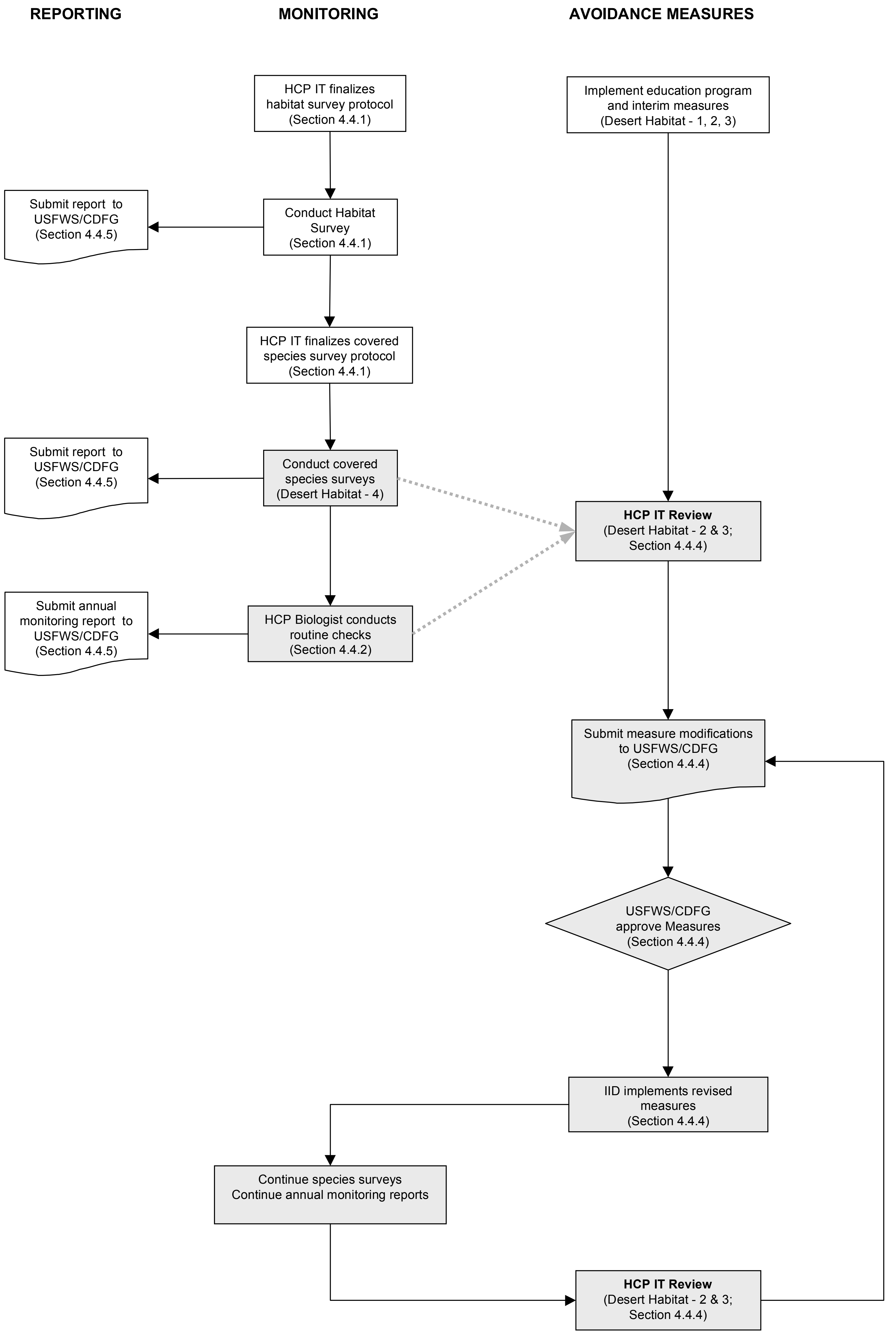


Figure 4.4-2
Implementation Process for Desert Habitat Conservation Strategy Avoidance and Minimization Program

For construction activities that would temporarily disturb native desert habitat, IID will prepare a restoration plan. The habitat restoration plan will include the following information:

- Location
- Planting plan (including species composition and layout)
- Grading and other construction activities necessary for restoration
- Long-term management practices
- Vegetation and covered species monitoring
- Success criteria for the plantings and the actions that IID will take if the success criteria are not met

IID will submit habitat restoration plans to the USFWS and CDFG for approval prior to initiating restoration actions.

4.4.5.4 Vegetation and Covered Species Monitoring of the Acquired/Restored Desert Habitat

IID will submit a report of the results of the vegetation monitoring of restored desert habitat to the USFWS and CDFG annually until achievement of the success criteria has been demonstrated. These annual reports will:

- Present the results of the vegetation monitoring specified by the HCP IT
- Describe the overall condition and development of the native desert habitat
- Indicate whether the success criteria have been met
- Describe recommendations from the HCP IT for creation and management of the native desert habitat and the bases for the recommendations
- Describe the outcome of previous management actions

Following achievement of the success criteria and for acquired habitat, IID will continue to assess the condition of the native desert habitat. IID will submit annual reports that:

- Present the results of any long-term vegetation monitoring required by the HCP IT as part of the habitat management plans
- Indicate whether the success criteria are being met for restored habitat as appropriate
- Describe recommendations from the HCP IT for management of the native desert habitat units and the bases for the recommendations

IID will submit a report of the results of surveys for covered species to the USFWS and CDFG each year that the surveys are conducted as specified by the HCP IT. The report will list the species and number of individuals recorded for the current year's survey and in each previous survey for the habitat area surveyed. The report will include the HCP IT's assessment of the effectiveness of the acquired and restored desert habitat in providing habitat for the target covered species. The report also will include the HCP IT's recommendations for continued management of the native desert habitat and the bases for the recommendations.

4.5 Burrowing Owls

4.5.1 Compliance Monitoring

As part of the Burrowing Owl Conservation Strategy, IID will implement a worker education program and implement measures to avoid and minimize impacts to burrowing owls and their habitat resulting from covered activities (Owl–1). IID will provide copies of the worker education manual and updates of the manual to the USFWS and CDFG. Submission of the manual and updates will serve as compliance monitoring for Owl–1.

The HCP Implementation Biologist will periodically conduct random checks (during their routine duties) of workers conducting O&M activities to asses whether workers are following the standard operating procedures for burrowing owls. If during the periodic random checks of workers conducting O&M, the HCP Implementation Biologist finds that a worker is not following the standard operating procedures, the HCP Implementation Biologist will report the infraction to the workers' supervisor. Workers will be subject to retraining or disciplinary action through IID's Policies and Procedures. These random checks will serve as compliance monitoring for Owl–2, –3, and –4.

Under Owl–5, workers are to coordinate with the HCP Implementation Biologist prior to conducting various construction activities. Owl–8 also addresses construction-related effects on burrowing owls. To demonstrate compliance with these measures over the term of the permit, within six months of the issuance of the ITP, IID will develop a standard preconstruction checklist. Information to be included on the preconstruction checklist includes:

- Location of activity
- Type of activity
- Whether owls are known to occur in the construction area
- Number of suitable burrows that would be permanently lost
- The actions taken to avoid and minimize impacts to burrowing owls, including timing of construction, removal of owls from the burrows, number of artificial burrows installed and location of artificial burrows

IID will submit completed checklists to the USFWS and CDFG on an annual basis.

Under Owl–7, IID has committed to conducting a demographic study on burrowing owls. Compliance with this measure will be ensured through the submittal of the demographic study plan to the USFWS and CDFG for approval and annual reporting requirements of the results (see Section 4.5.4).

4.5.2 Effectiveness Monitoring

4.5.2.1 Avoidance and Minimization Measures

To assess the effectiveness of the avoidance and minimization measures, the HCP Implementation Biologist will periodically conduct random checks (during their routine duties) of workers conducting O&M activities. During these checks the biologist will judge the effectiveness of the measures in avoiding the collapse or fill of burrows. A narrative description of the effectiveness in avoiding impacts to burrows will be included in the annual report.

4.5.2.2 Relative Abundance and Distribution

IID will determine the relative abundance and distribution of burrowing owls in the HCP area. IID will survey 20 percent of the drainage and conveyance system in such a manner as to provide a valleywide perspective of the burrowing owl population each year for the term of the permit. The HCP IT will approve the final study design but the general survey protocol will be as follows. The survey will be conducted by driving along the drains and canals and counting the number of territorial male owls observed. If more than one owl is observed at a burrow, only one owl will be counted to reflect one territory. Because owls in burrows in drain banks are more reliably observed from the drain bank opposite the burrow, both sides of drains will be driven. Along canals, owls can be reliably observed from one side of the canal, thus driving both sides of the canals will not be necessary. The surveys will be conducted after territories have been established but prior to the chicks fledging, approximately late April to early May. The location of each territory will be recorded to within 30 meters. The surveyors also will note any observations of banded birds.

The locations of the observed burrowing owls will be incorporated into a GIS. The burrowing owl GIS will be linked to or combined with spatial information on IID’s maintenance activities and crop types in the HCP area. The GIS will be updated annually.

4.5.2.3 Demographic Study

Under the Burrowing Owl Conservation Strategy, IID will conduct a study of the burrowing owl population to understand the status of the population and estimate key population parameters. The demographic study will be initiated once relative abundance and distribution data have been obtained for the entire HCP area (i.e., after 5 years). The relative abundance and distribution data will be used to select areas for the demographic study. In the selected areas, all owls will be captured and banded. The weight, wing cord, and sex (when it can be reliably determined) of each owl will be recorded. Clutch sizes (number of chicks at time of banding) will be recorded for each female. The location of active nest burrows will be identified and entered into a GIS. The demographic study will be conducted for 12 to 15 years, with banding conducted annually. The specific study term and number of nests will be determined by the HCP IT following consultation with a statistician. The fate of banded birds will be tracked through the annual capture of birds for banding as well as through observations during the relative abundance and distribution survey. The data collected through the demographic study will be used to construct a life table and calculate annual growth rates (λ). IID will develop the final study plan for the demographic study with input from the HCP IT. The study plan will be submitted to the USFWS and CDFG for approval.

4.5.3 Adaptive Management Program

IID has been delivering water to farmers in the Imperial Valley and maintaining its drainage and conveyance system for over 75 years. The Imperial Valley supports one of the highest densities of burrowing owls and supports much higher densities than in nearby native desert habitat (Rosenberg and Haley 2001). These observations suggest the persistence of burrowing owls in the HCP area is compatible with IID's drainage and conveyance system O&M activities. The burrowing owl population has persisted in the Imperial Valley for many years. Agriculture and IID's activities have made positive contributions to this persistence.

The results of the demographic study will be used to determine the population trend of the burrowing owl population. An annual growth rate (λ) equal to 1 indicates a stable population. A $\lambda > 1$ indicates that a population is increasing, whereas a $\lambda < 1$ suggests a population that is decreasing. Once the demographic study is completed, a one-tailed statistical test will be used to determine if λ is significantly less than 1. The appropriate significance level for this test will be determined by a statistician. If λ is not significantly less than 1, the burrowing owl population will be considered to be stable or increasing and the conservation strategy will be considered effective. No adjustments to the operating Burrowing Owl Conservation Strategy will be made.

If λ is significantly less than 1, the HCP IT will have the option to access the Owl Contingency Fund. The HCP IT will have the discretion in determining whether the fund should be accessed and how the funds will be directed; however, the Owl Contingency Fund must be used only for actions addressing burrowing owls. Actions that could be funded with the Owl Contingency Fund include, but are not limited to:

- Conducting focused studies to understand the factors influencing the burrowing owl population
- Implementing management actions to benefit the population (e.g., creating burrows)
- Continuing the demographic study

The demographic study will be discontinued after 12 to 15 years unless supported through the Owl Contingency Fund as authorized by the HCP IT. However, the relative abundance and distribution will continue over the term of the permit and will be used to provide insight on the status and trend of the burrowing owl population. The HCP IT will evaluate the relationship between the relative abundance survey and the population trend of burrowing owls in the Imperial Valley. If the relative abundance survey is determined to be an adequate indicator of the burrowing owl population in the Imperial Valley then , the HCP IT will establish criteria for using the relative abundance data to signal a "substantial adverse change" in the burrowing owl population. During the remainder of the permit (i.e., the period following completion of the demographic study until the end of the permit), if the relative abundance indicates a substantial adverse change based on the established criteria, the HCP Implementation Team will have the discretion to use the Owl Contingency Fund as described above. The adaptive management program for burrowing owls is depicted in Figure 4.5-1.

4.5.4 Reporting

IID will submit an annual report to the USFWS and CDFG. The annual report will include the following information:

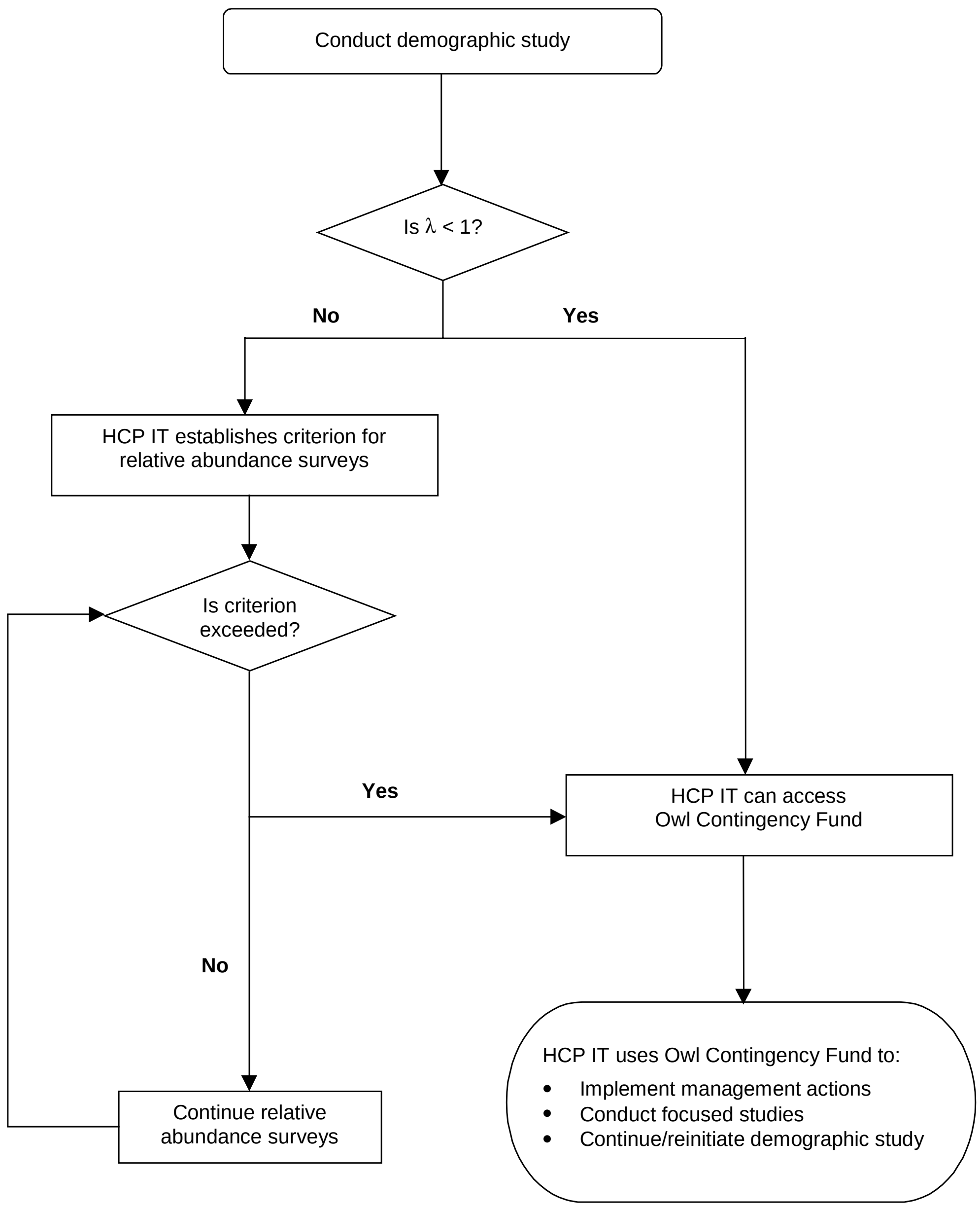


FIGURE 4.5-1
Burrowing Owl Adaptive Management Framework

- A narrative description of the effectiveness of the avoidance and minimization measures
- Results of the relative abundance and distribution surveys, including deviations from the standard methodology, map of owl locations, data tables of the survey results and summary statistics, comments/observations and recommendations
- For those years when the demographic study is conducted, results of the demographic study, including deviations from the standard methodology, data tables of study results, calculations of λ, comments/observations and recommendations

4.6 Desert Pupfish

4.6.1 Compliance Monitoring

To achieve the biological goals of the desert pupfish strategy, IID has committed to implement several measures that will benefit pupfish and help ensure the persistence of pupfish in the drainage system. Each of these measures will be carried out in coordination with the HCP IT and will include various reporting requirements (see Section 4.6.4 below). These reports and routine interaction with the HCP IT will ensure compliance with the measures.

4.6.2 Effectiveness Monitoring

Several measures outlined in the pupfish strategy assume that maintaining potential habitat will ensure continued use by pupfish. Although factors beyond IID's control could influence the persistence of pupfish in the drains (e.g., competition with exotic species), routine monitoring of pupfish presence will be necessary to confirm continued use and to develop information useful in adaptively adjusting the creation and management of habitat in the future. Under Pupfish–4, IID and the HCP IT will develop a survey protocol that is appropriate for determining pupfish presence in the drains. This protocol will be used to develop baseline information on presence and patterns of use by pupfish in the drains and to determine the effectiveness of any adjustments in drain maintenance techniques and habitat enhancement measures.

4.6.2.1 Baseline Surveys

Following identification of the survey protocol (Pupfish–4), IID will monitor pupfish presence in each of the pupfish drains for five consecutive years to establish patterns of use and to augment baseline information. The HCP IT will develop the details of the monitoring program, including sampling frequency and locations, and submit the plan to USFWS and CDFG for approval. Subsequent to the 5 years of baseline surveys, pupfish monitoring will be conducted at a frequency of once every five years for the remainder of the permit term. The HCP IT may reduce the frequency of monitoring pupfish in the drains or reduce the number of drains monitored with approval from USFWS and CDFG.

In addition to the pupfish surveys, IID will monitor the selenium in pupfish drain water to establish baseline concentrations. IID will initiate annual selenium monitoring within one year of issuance of the ITPs, and continue to collect selenium data until the HCP IT makes a determination (based on USFWS or other studies) regarding the effects of selenium on pupfish. IID and the HCP IT will develop the selenium monitoring plan, which will include sampling frequency and locations, detection limits, and quality assurance / quality control (QA / QC) protocols. The detailed plan for selenium monitoring will be submitted to USFWS and CDFG for approval prior to implementation.

4.6.2.2 Selenium Monitoring

Under Pupfish–2, IID will modify certain drains or implement measures to reduce selenium concentrations in the pupfish drains based on recommendations from the HCP IT. In the event that actions to reduce selenium concentrations in the drains are warranted, the HCP IT will develop detailed plans for monitoring the effectiveness of any actions implemented.

These monitoring plans will identify the frequency of sampling and the duration of the monitoring program. IID will be responsible for implementing the effectiveness monitoring.

4.6.2.3 Pupfish Monitoring

Under Pupfish–5, IID will modify its maintenance activities in pupfish drains if the HCP IT determines, based on the results of the study, that the potential for take of pupfish can be reduced. In the event that an adjustment in the maintenance practices is warranted, the HCP IT will recommend modification to the practices and develop a plan for monitoring the effectiveness of the adjustments. The plan will include the frequency, duration, and location of sampling. IID will be responsible for implementing the effectiveness monitoring.

4.6.3 Adaptive Management

The pupfish conservation strategy contains two measures (Pupfish–2 and Pupfish–5) that have adaptive management elements. IID will adjust its management on each of the pupfish drains, if warranted, under the operating budget of the HCP. However, any additional adjustments or modifications within individual drains will be funded, at the discretion of the HCP IT, from a fixed pupfish adaptive management fund established by IID.

Under Pupfish–2, the HCP IT will evaluate the potential for adverse selenium effects on pupfish in the drains by comparing the results of the selenium baseline monitoring to the results of the USFWS or other relevant studies of the effects of selenium on pupfish. Based in this evaluation, the HCP IT will determine whether an action to reduce selenium concentration in individual drains is warranted. If warranted, the HCP IT will develop a drain-specific plan to reduce selenium, including the effectiveness monitoring requirements described above, and submit the plan to USFWS and CDFG for approval. IID will implement the adjustment and monitor the effectiveness. If the adjustment is effective at reducing selenium in the drains, IID will make similar adjustments on other drains where appropriate and monitor the effectiveness. In the event that an adjustment is not effective, the HCP IT has the discretion to maintain the current drain configuration and operation or to recommend additional adjustments. However, any additional adjustments to an individual drain must be implemented using the pupfish adaptive management fund. A flowchart of the adaptive management program for selenium is presented in Figure 4.6-1.

Under Pupfish–5, IID will implement adjustments to its drain maintenance practices in pupfish drains if the HCP IT determines, based on study results, that adjustments could reduce the potential for take of pupfish. The HCP IT will evaluate the effectiveness of the adjustments based on the results of the effectiveness monitoring described above. If the adjustment is effective, IID will continue to use the modified drain maintenance practices. If the adjustment is not effective, the HCP IT has the discretion to recommend a return to the current drain maintenance practices or to access the pupfish adaptive management fund to experiment with and monitor alternative practices. A flowchart of the adaptive management program for drain maintenance is presented in Figure 4.6-2.

4.6.4 Reporting

IID will submit an annual report to the USFWS and CDFG that includes information developed or updated during the preceding year. The annual report will include the following types of information:

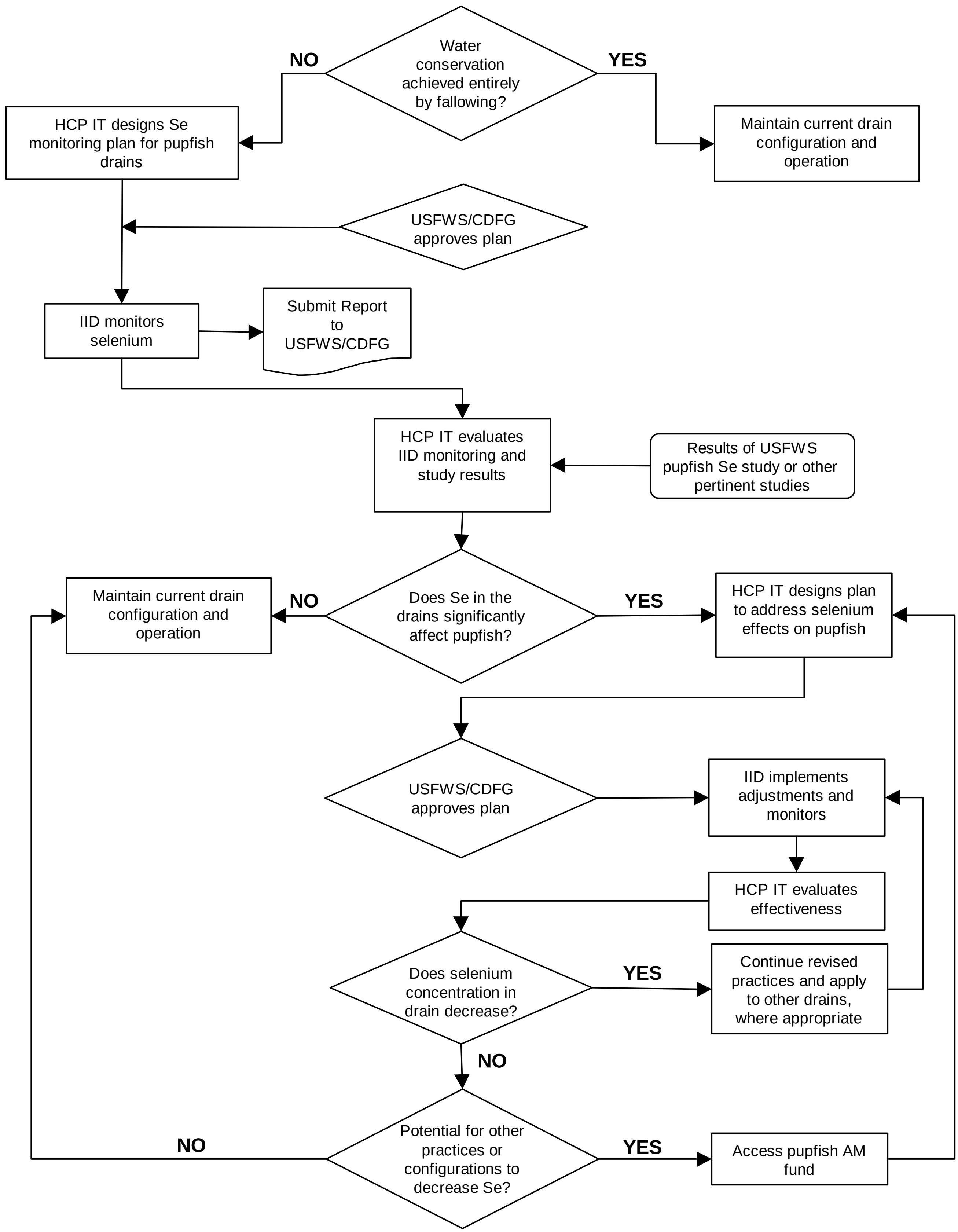


Figure 4.6-1
Desert Pupfish Selenium Evaluation

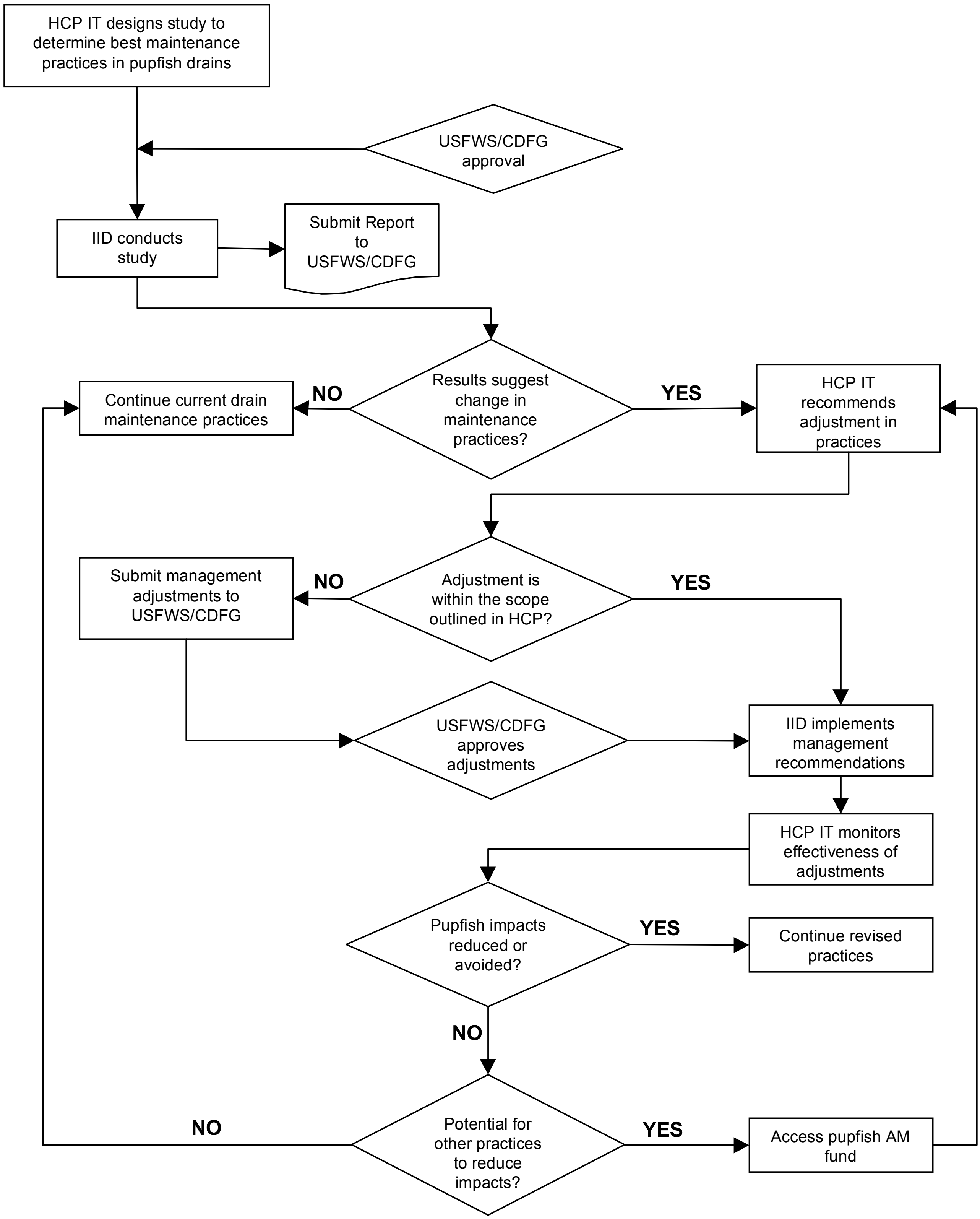


Figure 4.6-2
Desert Pupfish Drain Maintenance Evaluation

- All information specified in the reporting requirements identified in the detailed pupfish monitoring plan developed by the HCP IT.
- Amount of pupfish drain habitat defined as the length (miles) of drain extending from the outlet to the Salton Sea upstream to the first check (to be reported every five years or less as determined by the HCP IT).
- Results of selenium baseline monitoring in the drains.
- Results of selenium monitoring in drains modified by IID under Pupfish–2.
- Results of pupfish monitoring in drains where IID modifies maintenance practices based on HCP IT recommendations (Pupfish–5).
- Results of pupfish baseline monitoring (to be reported annually during years when surveys are conducted).
- Summary of the results of pupfish salvage efforts at construction sites, including date, location, number and approximate age (e.g., adult or juvenile) of fish salvaged, number surviving transport and initial release, and release location. In addition to inclusion in the annual report, pupfish salvage information will be submitted to USFWS and CDFG within one week of salvaging the fish.

4.7 Razorback Suckers

4.7.1 Compliance Monitoring and Reporting

Under the Razorback Sucker Conservation Strategy, razorback suckers found when a main canal (AAC, East Highline, Westside Main, or Central Main) or associated reservoir is dewatered will be salvaged and released in the LCR. Whenever suckers are salvaged, IID will submit the following information to the USFWS and CDFG within one week of salvaging the fish:

- Canal where razorback suckers were salvaged
- Number and approximate age (i.e., adult or juvenile) of fish salvaged
- Number surviving transport and initial release

4.7.2 Effectiveness Monitoring

The objective of the razorback sucker conservation strategy is to avoid killing any suckers that inhabit the canal system. The reports submitted to USFWS and CDFG of the number of fish salvaged and the number surviving until release will allow an assessment of the effectiveness of the measure in avoiding mortality of razorback suckers.

4.7.3 Adaptive Management

The HCP IT will develop the procedure for salvaging, transporting and releasing razorback suckers. Over the term of the permit, the HCP IT may adjust the procedures to improve survival of fish during capture, transport and release. The HCP IT may adjust the procedure if the compliance monitoring shows a high level of mortality or for consistency with standard practices developed by the USFWS or CDFG. With written approval from the USFWS and CDFG, IID can discontinue salvaging fish if: (1) studies elsewhere indicate that long-term survival of salvaged razorback suckers is poor, and / or (2) the USFWS and CDFG discontinue requiring salvage of razorback suckers for other projects.

4.8 Agricultural Field Habitat Conservation Strategy

4.8.1 Agricultural Statistics

The primary component of the Agricultural Field Habitat Conservation Strategy is implementing the water conservation and transfer project as a means to increase the certainty that agriculture will continue to be the predominant land use in the Imperial Valley. As a means for confirming that agriculture remains the predominant land use in the Imperial Valley with implementation of the water conservation and transfer project, IID will make valleywide statistics regarding agricultural production and implementation water conservation measures available to the USFWS and CDFG on an annual basis. These statistics will include:

- Total acreage in agricultural production in the IID Water Service Area
- Acres of each crop grown in the IID Water Service Area
- Acres of land fallowed in the IID Water Service Area
- Acreage of farms participating in the water conservation program
- Total amount of water conserved and transferred

4.8.2 Power Line Markers

4.8.2.1 Compliance Monitoring and Reporting

Agriculture–1 requires IID to install markers on power lines if it builds additional lines to provide power to pumps to run tailwater return systems. When IID implements this measure, IID will submit a report to the USFWS and CDFG within one month of erecting the new power line. The report will include:

- Location
- Length of power line constructed
- Type, number and spacing of markers used

4.8.2.2 Effectiveness Monitoring

Most farmers are anticipated to use diesel pumps for tailwater recovery systems rather than electrical pumps such that few transmission lines would be installed for pumps for tailwater recovery systems. Because of the limited amount of transmission lines that would be installed, it would not be possible to obtain sufficient information on the effectiveness of line markers to reduce bird strikes to draw meaningful conclusions.

4.9 Other Covered Species

As specified under Other Species–2, IID will work with the HCP IT to develop specific compliance and effectiveness monitoring requirements, adaptive management programs and reporting requirements for each of the other covered species. These requirements and programs will be submitted to the USFWS and CDFG for approval.

4.10 Incidental Takings

IID will notify the USFWS Carlsbad Field Office within three working days if a covered species is found dead or injured and the death or injury is reasonably attributable to a covered activity. A written notification will be made within five calendar days and will include the date, time, and location of the discovered animal/carcass, the expected cause of injury or death and any other pertinent information. Injured animals will be transported to a veterinarian or certified wildlife care facility and the USFWS informed of the final disposition of any surviving animal(s). All dead specimen(s)/carcass(es) shall be submitted to educational/research institutions possessing the appropriate state and federal permits. If deposition to an institution is not possible, the carcass will be marked, photographed, and left in the field.

CHAPTER 5

Plan Implementation and Costs and Funding

5.1 Plan Participants and Covered Persons

Imperial Irrigation District (IID) only shall receive an incidental take permit (ITP), under Section 10(a)(1)(B) of the Federal Endangered Species Act of 1973 (FESA), from the U.S. Fish and Wildlife Service (USFWS) pursuant to this habitat conservation plan (HCP). Similarly, IID only shall receive an ITP under Section 2081(b) of the California Fish and Game Code (Code) from the California Department of Fish and Game (CDFG) pursuant to this HCP. Coverage under the ITPs shall extend to others (e.g., farmers) engaged in activities related specifically to the water conservation program, as described below under Chapter 5.1.2: Third-party Beneficiaries.

5.1.1 Role and Responsibilities of IID

Imperial Irrigation District will have the sole responsibility for implementing the HCP. Specific duties include the following:

- Participate in the HCP implementation team (IT)
- Administer funds received from San Diego County Water Authority (SDCWA) pursuant to the Transfer Agreement
- Enter into water conservation agreements with willing farmers
- Implement the commitments of the HCP as described in Chapters 3, 4, and 5 of the IID HCP, including the following:
  - Create and manage habitat as described in Chapter 3, and as modified by the HCP IT and approved by the USFWS and CDFG as provided for in Chapter 4 and 5
  - Conduct monitoring in the HCP area and of created habitats, as described in Chapter 4
  - Implement adaptive management strategies, as described in Chapter 4
  - Generate the periodic reports as described in Chapter 4
- Manage available funds to implement this HCP

5.1.2 Third-Party Beneficiaries

The covered activities include installation and operation of on-farm water conservation activities and fallowing which is considered an on-farm water conservation technique. Under the water conservation and transfer programs, individual farmers would voluntarily participate in the conservation program. The method of achieving water conservation would be at the discretion of the individual farmer. Any take of covered species attributable to farmers resulting from installation or operation of water conservation measures is covered by the HCP. Furthermore, any take of covered species resulting from cessation of water conservation practices is covered.

5.2 Plan Implementation

IID will be responsible for ensuring that the commitments in the HCP are met. Although the responsibility for implementing the HCP will ultimately rest with IID, the HCP IT will play an important role in guiding the implementation of specific aspects of the HCP over the term of the permit. The CDFG and USFWS (outside of the HCP IT) also will continue to be involved in the HCP over the term of the permit as various aspects of the HCP require approvals from these agencies. The following describes the roles and responsibilities of the HCP IT and the integration of HCP IT oversight of plan implementation with approval requirements from the USFWS and CDFG.

5.2.1 HCP Implementation Team

Under the HCP, IID will convene an HCP IT consisting of representatives of the USFWS, CDFG, and IID to guide execution of the HCP over the term of the HCP. The HCP IT will be responsible for the following:

- Guiding implementation of the HCP measures specified in Chapter 3: Habitat Conservation Plan Components and Effects on Covered Species, including but not limited to:
    - Working with IID to develop habitat creation and management plans
    - Identifying properties appropriate for acquisition
    - Overseeing management of created and acquired habitat
- Refining methods for survey programs and studies,
- Reviewing and interpreting monitoring results, and
- Adjusting the HCP measures under the Adaptive Management Program, including but not limited to:
    - Modifying habitat management practices
    - Refining avoidance and minimization measures

Specific responsibilities of the HCP IT are identified in the HCP measures contained in Chapter 3: Habitat Conservation Plan Components and Effects on Covered Species and in Chapter 4: Monitoring and Adaptive Management and summarized in Table 5.2-1.

It is anticipated that substantial coordination between the HCP IT and IID will be necessary during the initial stages of implementing the HCP with less intensive involvement needed over time. Thus, initially it is anticipated that the HCP IT will meet monthly, but the HCP IT will have the authority to adjust its meeting schedule and frequency as necessary to implement the HCP measures. Over the term of the permit, the HCP IT will meet at least annually to review monitoring results and assess the overall functioning of the HCP.

5.2.2 Decisionmaking Processes and Approvals

IID will be responsible for implementing the HCP requirements, but the HCP IT will have direct oversight on IID's implementation of the HCP. While the HCP IT will have the authority to recommend adjustments in the implementation of the HCP, the HCP IT will not have the power to authorize IID to implement the revised measures and remain in compliance with the HCP. Only the USFWS and CDFG can determine whether future adjustments are in compliance with the HCP requirements. In general, actions that would change the HCP measures or what constitutes fulfillment of a commitment of the HCP measures require approval from the USFWS and CDFG. Actions that require approval from the USFWS and CDFG are identified in Chapters 3, 4, and 5, and are summarized in Table 5.2-1.

TABLE 5.2-1
Actions Requiring Approval from the USFWS and CDFG

Action	Measure or Section
Salton Sea Conservation Strategy	
Plan for maintaining pupfish connectivity	Salton Sea – 2
Design and management of pupfish refugium	Salton Sea – 2
Survey protocol for tamarisk adjacent to the Salton Sea	Salton Sea – 3
Native tree habitat acquisition property	Salton Sea – 3
Native tree habitat creation plan	Salton Sea – 3
Native tree habitat management plan	Salton Sea – 3
Tamarisk Scrub Habitat Conservation Strategy	
Native tree habitat acquisition property	Native Tree Habitat – 1 and 2
Native tree habitat creation plans	Native Tree Habitat – 1 and 2
Native tree habitat management plans	Native Tree Habitat – 1 and 2
Vegetation and wildlife monitoring program	Section 4.2.2
Management adjustments outside approved scope of actions	Section 4.2.3
Drain Habitat Conservation Strategy	
Managed marsh habitat creation plans	Drain Habitat – 1
Managed marsh habitat management plans	Drain Habitat – 1
Acreage of managed marsh to create	Section 4.3.2
Management adjustments outside approved scope of actions	Section 4.3.4
Desert Habitat Conservation Strategy	
Worker education manual	Desert Habitat – 1
Desert habitat restoration plans	Desert Habitat – 3
Desert habitat acquisition property	Desert Habitat – 5
Desert habitat management plans	Desert Habitat – 5

TABLE 5.2-1
Actions Requiring Approval from the USFWS and CDFG

Action	Measure or Section
Adjustments outside approved scope of actions	Section 4.4.4
Burrowing Owl Conservation Strategy	
Worker education program	Owl – 1
Change in drain/canal maintenance practices	Owl – 6
Demographic study plan	Owl – 7
Desert Pupfish Conservation Strategy	
Determination that drains segments do not support suitable habitat	Pupfish – 1
Selenium monitoring plan and drain reconfiguration plan	Pupfish – 2
Pupfish habitat creation plan	Pupfish – 3
Pupfish monitoring protocol	Pupfish – 4
Maintenance practice evaluation study plan and revised maintenance plan, if needed	Pupfish – 5
Personnel used to capture and handle pupfish	Pupfish – 6
Razorback Sucker Conservation Strategy	
Discontinuation of salvage program	Section 4.7
Other Species Conservation Strategies	
Survey program	Other Species – 1
Species-specific take authorization	Other Species - 2

The HCP IT will have the authority to adjust implementation of the HCP within the scope of actions that have been approved by the USFWS and CDFG. For example, IID must obtain approval from the USFWS and CDFG to implement management plans for managed marsh habitat. In managing the habitat, IID will implement actions recommended by the HCP IT that are within the scope of actions covered by the management plan. Because the USFWS and CDFG previously approved the management plan no additional approvals from these agencies would be necessary. However, if the HCP IT recommends management actions that are outside the scope of the approved management plan, IID would be required to obtain approval from the USFWS and CDFG prior to implementing the action.

The HCP IT will make decisions and recommendations on a consensus basis. If consensus among the three parties of the HCP IT cannot be achieved for a particular decision, the issue will be elevated to the next highest level within each agency until consensus can be achieved. Once the three parties are in agreement, IID will implement the agreed-to action. Figure 5.2-1 displays the decisionmaking and approval process.

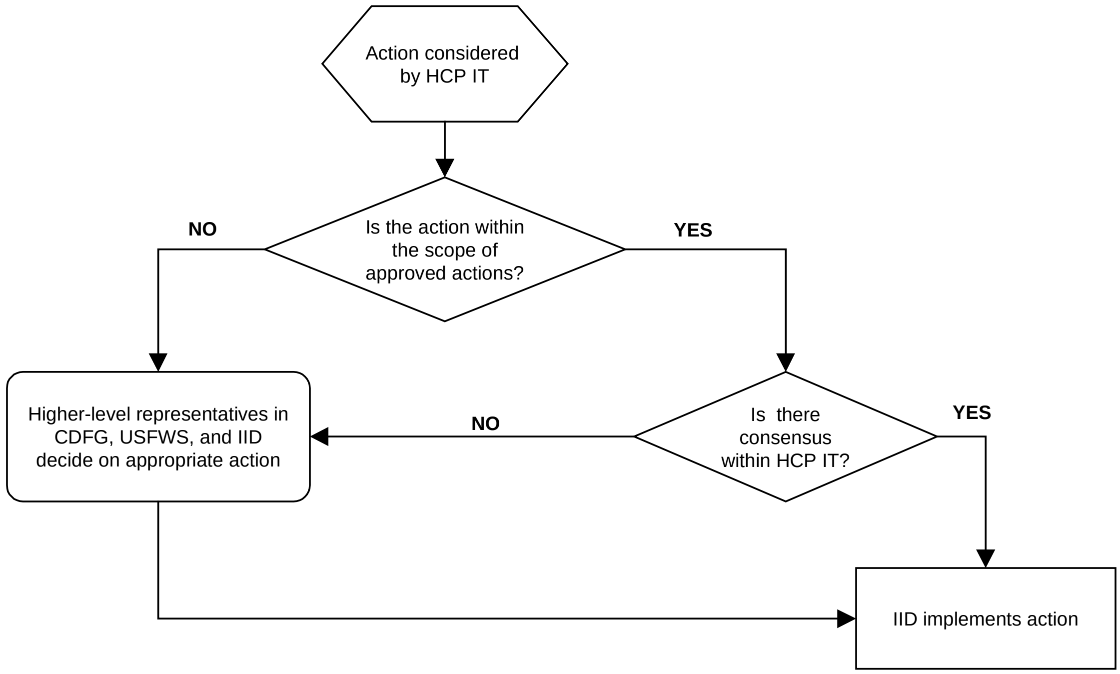


FIGURE 5.2-1
Decisionmaking and Approval Process

5.3 Costs and Funding

The estimated cost of implementing the HCP ranges widely depending on the ultimate amount of habitat creation necessary under the Drain Habitat and Tamarisk Scrub Habitat Conservation Strategies, and for tamarisk adjacent to the Salton Sea under the Salton Sea Habitat Conservation Strategy. Per commitments identified in the IID/SDCWA Water Conservation and Transfer Agreement and the Quantification Settlement Agreement (QSA), approximately $22.5 million has been allocated for the environmental mitigation required to mitigate project impacts and to minimize the impact of the potential take of covered species. Any mitigation costs in excess of the $22.5 million estimated to minimize and mitigate project impacts could be funded through one or a combination of the following: revenue generated through conservation and transfer of water, additional funds contributed by the water agencies, and grants or funding provided by the federal and state governments.

5.4 Response to Emergencies

Occasionally IID must respond to emergency situations. Emergency activities are actions that IID must take immediately and unpredictably to repair or prevent damage to its facilities in order to prevent property damage, protect human health and safety, or maintain mitigation sites. IID’s primary responsibility is to deliver water to its customers and maintain drainage in its service area. Because of the risks associated with failure to meet these obligations (e.g., economic loss from crop failure and threats to public safety), IID places a high priority on responding quickly and effectively to emergency conditions.

During major emergencies, IID follows its emergency plan, which outlines the procedures for mobilizing people and equipment to respond to events that threaten its ability to deliver and drain water. IID also supports an in-house hazardous materials team that responds to spills or discharges of toxic materials.

For this HCP, emergencies are situations under which IID cannot follow the normal procedures detailed under each of the conservation strategies (Chapter 3) to correct or prevent damage to property, risk to human health or safety, to correct or prevent damage to habitat areas maintained as mitigation sites. Emergency activities are most frequently required to respond to storm events or natural disaster (e.g., earthquakes) that result in damage to IID facilities (e.g., canal washout, plugged siphon) and interrupt the distribution or collection of water. In the event of an emergency that simultaneously threatens human health and safety, property and habitat areas, IID will address threats to mitigation areas as quickly as possible. Where the emergency changes the conditions of habitat maintained for covered species, IID will work with the HCP IT, USFWS, and CDFG to restore the habitat as quickly as possible.

Responding to an emergency requires IID to take immediate action. Because of the need to respond immediately in emergency situations, IID would not be able to follow the avoidance measures of the HCP. These measures generally consist of surveying areas for covered species use prior to conducting construction activities and avoiding construction during sensitive time periods if covered species are present. In addition, Tree Habitat–1 requires that construction areas be surveyed prior to construction to determine the acreage and plant species composition of vegetation that would be impacted. Similarly Desert Habitat–5 requires a habitat survey if desert habitat would be impacted. In an emergency situation, IID would not be able to conduct the required species or habitat surveys nor schedule construction to avoid sensitive time periods. The measures IID would not be able to comply with are listed in Table 5.4-1. However, IID would be able to comply with HCP measures that specify restoration or creation of replacement habitat.

TABLE 5.4-1
Measures of the HCP that Contain Elements that IID Would not Be Able to Follow When Responding to Emergencies

Measure	Description
Tree Habitat–1	For construction activities, the site will be surveyed before initiation of construction activities. If tamarisk scrub habitat occurs on the project site and would be affected by the construction activities, the acreage and plant species composition of the affected vegetation will be determined.
Tree Habitat–3	For scheduled construction activities, the site will be surveyed to determine whether any covered species are potentially breeding at the site. If covered species are found, IID will schedule the construction activities that directly affect habitat to occur outside of the breeding season.
Drain Habitat–2	IID will not dredge the river deltas between February 15 and August 31.
Drain Habitat–3	For scheduled construction activities, the site will be surveyed to determine whether any covered species are potentially breeding at the site. If covered species are found, IID will schedule the construction activities that directly affect habitat to occur outside of the breeding season.

TABLE 5.4-1
Measures of the HCP that Contain Elements that IID Would not Be Able to Follow When Responding to Emergencies

Measure	Description
Desert Habitat–3	Prior to initiating construction activities, the HCP Implementation Biologist will conduct a habitat survey of the construction area and adjacent areas. IID will implement the species-specific minimization and avoidance measures contained for the species identified by the biologist as potentially occurring at the construction site. A biological monitor will be onsite during construction activities or exclusion fencing will be erected to keep covered species out of the construction area. The construction area will be clearly flagged prior to the start of construction activities and all construction activities will be confined to the demarcated area.
Owl–5	Prior to replacing facilities or constructing new facilities, workers will coordinate with the HCP Implementation Biologist. The biologist will determine if burrows occupied by burrowing owls would be filled or collapsed by the required work. If occupied burrows would be affected, the work will be scheduled to occur during October through February. Prior to conducting the work, the HCP Implementation Biologist will ensure that owls are not present in the burrows.
Owl–8	For activities that would permanently eliminate burrows suitable for burrowing owls, IID will determine if owls are currently using burrows that would be impacted. If owls are using burrows that would be impacted, IID will conduct the activity during October through February and prior to the start of the activity, the HCP Implementation Biologist will ensure that owls are not present in the burrows.
Pupfish–5	For construction activities (i.e., in-channel modifications) that directly affect pupfish drains, IID will gradually dewater the affected drain segment. IID will ensure that a person qualified to capture and handle pupfish and that meets the approval of the USFWS and CDFG will be present during the dewatering process to salvage and transport any pupfish stranded in the affected portion of the drain. Salvaged fish will be transported to a safe location downstream of the construction site or to a location determined by the HCP Implementation Team.
Sucker–1	IID will salvage any razorback suckers found stranded in the dewatered portions of canals. Salvaged fish will be transported to the Colorado River.

When an emergency occurs, IID will implement the following procedures:

- IID will notify the Implementation Biologist immediately.
- IID will notify the USFWS and CDFG within 24 hours of initiating emergency activities. In notifying the USFWS and CDFG, IID will describe the nature of the emergency and the actions necessary to correct the problem.
- Where multiple actions need to be taken, the HCP Implementation Biologist will work with repair crews to prioritize repairs based on the risk to covered species and habitats for covered species provided under the HCP and threats to human health and safety and property.
- The HCP Implementation Biologist will visit sites where emergency activities are being implemented as soon as possible. The biologist will take pictures of the damaged areas and note the general extent and species composition of any vegetation impacted by the

emergency response activities. IID will use this information to restore or create replacement habitat in accordance with Tree Habitat–1 and Desert Habitat–3 and –5.

- For burrowing owls, the HCP Implementation Biologist will estimate the number of burrows impacted during the emergency activities based on the ongoing surveys and the emergency action site visit. In accordance with Owl–8, IID will install two burrows for every burrow permanently lost as a result of the emergency activities.
- Within one month of completing emergency actions, IID will meet with USFWS and CDFG to review the measures IID will implement to mitigate any impacts resulting from the emergency actions.
- Following agreement with the USFWS and CDFG regarding appropriate mitigation, IID will prepare a Post Incident Report for submittal to these agencies. This report will document:
  - the nature of the emergency
  - the actions taken to address the emergency
  - the impacts to covered species and/or their habitats (e.g., area of drain habitat impacted, approximate number of burrowing owl burrows impacted)
  - the mitigation measures to be implemented to address the impacts
  - monitoring and reporting requirements (if any) for the mitigation measures

To facilitate effective and appropriate responses to emergencies, the HCP IT may refine and further specify these general procedures to address specific types of emergencies that could arise.

5.5 Changed and Unforeseen Circumstances

5.5.1 The No Surprises Rule

The No Surprises Rule, published as a final rule in the *Federal Register* on February 28, 1998 (*63 FR* 8859), generally provides that, as long as the HCP is properly implemented, the federal government will not require additional land, water, or money from the permittee in the event of unforeseen circumstances. Also, any additional measures to mitigate reasonably foreseeable changed circumstances will be limited to those changed circumstances specifically identified in the HCP and only to the extent of the mitigation specified in the HCP.

The No Surprises Rule has the following two major components:

- Changed Circumstances: *Code of Federal Regulations* USFWS regulations (*50 CFR* 17.32) state that:

  "If additional conservation and mitigation measures are deemed necessary to respond to changed circumstances and were provided for in the plan's operating conservation program, the permittee will implement the measures specified in the plan. If additional conservation and mitigation measures are deemed necessary to respond to

> *changed circumstances and such measures were not provided for in the plan's operating conservation program, the Director will not require any conservation and mitigation measures in addition to those provided for in the plan without the consent of the permittee, provided the plan is being properly implemented."*

- Unforeseen Circumstances: USFWS regulations (*50 CFR* 17.32) state, in part, that:

> *"In negotiating unforeseen circumstances, the Director will not require the commitment of additional land, water, or financial compensation or additional restrictions on the use of land, water, or other natural resources beyond the level otherwise agreed upon for the species covered by the conservation plan without the consent of the permittee. If additional conservation and mitigation measures are deemed necessary to respond to unforeseen circumstances, the Director may require additional measures of the permittee where the conservation plan is being properly implemented, but only if such measures are limited to modifications within conserved habitat areas, if any, or to the conservation plan's operating conservation program for the affected species, and maintain the original terms of the conservation plan to the maximum extent possible. Additional conservation and mitigation measures will not involve the commitment of additional land, water or financial compensation or additional restrictions on the use of land, water, or other natural resources otherwise available for development or use under the original terms of the conservation plan without the consent of the permittee. The Director will have the burden of demonstrating that unforeseen circumstances exist, using the best scientific and commercial data available."*

For the purposes of this HCP, changed circumstances are those changes affecting a species or geographic area covered by an HCP that can reasonably be anticipated and planned for by IID and the USFWS at the time of preparation of the HCP. Unforeseen circumstances refer to changes that could not reasonably have been anticipated by IID and the USFWS at the time the HCP was developed and negotiated, and that result in a substantial and adverse change in the status of a species covered by the HCP. The USFWS bears the burden of demonstrating that unforeseen circumstances exist, using the best available scientific and commercial data available, and considering certain specific factors.

Consistent with the No Surprises Rule and long-established agency practice, the HCP Implementation Agreement includes provisions restricting the authority of the USFWS and CDFG to require additional mitigation measures from IID to provide for the conservation of the covered species.

5.5.2 Changed Circumstances

In discussions with USFWS and CDFG, IID identified several circumstances under which changes could occur during the term of the ITP that would result in a substantial and adverse change in the status of a species covered by the HCP. These relate primarily to circumstances that influence IID's ability to carry out its obligations: (1) on managed marsh and native tree habitats created and managed for mitigation, (2) in habitats supported by IID water (e.g., pupfish drains), and (3) in habitats acquired and managed for mitigation. These circumstances include:

- Seismic activity that affects IID's conveyance and drainage infrastructure and/or its ability to deliver or drain water
- Storm events that result in damage to IID infrastructure and substantial flooding
- Toxic spills that influence operations or directly affect species and habitat
- Introduction and invasion by exotic plant or animal species that affect covered species or their habitat
- Drought conditions in the Colorado River basin that influence the availability of water in the Imperial Valley
- Condemnation of IID mitigation land

In the event that any of the circumstances listed above results in destruction or damage to mitigation land, IID will remain obligated to fulfill the requirements of the HCP and IA. Any mitigation land that is damaged as a result of the above circumstances will be restored as quickly as possible.

The potential for each of these circumstances is reasonably foreseeable. IID's strategy for addressing each of these is described below.

5.5.2.1 Earthquake

Because of its proximity to several faults, the Imperial Valley lies within a very seismically active area. The potential for an earthquake to cause a changed circumstance stems primarily from the possibility of a canal rupture or blockage that impairs IID's ability to deliver or drain water locally. This could potentially inhibit IID's ability to deliver water to the managed marsh and tree habitat mitigation sites over the short term or adversely influence conditions in the drains that support pupfish. In the event that an earthquake ruptures canals or drains, IID will implement the emergency measures described in Section 5.4 of this chapter. These measures are intended to address repairs as quickly as possible and to mitigate potential habitat losses associated with those activities. Because IID's primary business is delivering irrigation water for agriculture in the Imperial Valley, it has a strong incentive to repair damage and restore deliveries as quickly as possible. IID will give managed marsh and tree habitat mitigation sites and pupfish drains the same priority as the most sensitive crops when restoring service to affected areas.

In addition to the potential consequences of earthquake on mitigation sites and pupfish, the repair of earthquake damage along canals (including concrete lining) and drains could affect burrowing owls. Actions taken by IID to repair damage to canals and drains will be carried out according to the emergency measures described in Section 5.4. In addition to these measures, which address the direct effects of emergency repair activities, the HCP IT will have access to a contingency fund allocated specifically to remedy adverse changes in the status of the burrowing owl population (for any reason) in the HCP area as evidenced by the population monitoring program for this species.

5.5.2.2 Flood

On average, the Imperial Valley receives just over three inches of precipitation annually and the potential for major flooding is low. Nonetheless, intense storms occasionally result in local flooding and damage to IID canals and drains. These flood events typically are short in duration, and are not expected to result in a change in the status of a covered species. Flood damage to IID facilities (e.g., canals and drains) will be addressed and mitigated by the emergency measures described in Section 5.4.

5.5.2.3 Exotic Species

Invasive exotic plant species, such as tamarisk, are common in the agricultural areas of the Imperial Valley. These exotic species, as well as other unwanted vegetation, are routinely controlled by various means in the irrigated areas by farmers and IID. An invasion of exotic species could impair IID's ability to maintain its mitigation lands and habitats or reduce the suitability of these areas to covered species if left unmanaged. Weed control will be an integral element of the management plans developed with the HCP IT for each of the mitigation sites. Therefore, IID anticipates that the potential for exotic or competing plants to adversely affect habitat and covered species is very low and that reasonable outbreaks will be addressed by the current measures identified in the HCP. In the event that an exotic plant species is introduced that cannot be controlled by conventional means, IID will notify USFWS and CDFG as soon as it is identified as a threat to providing habitat for covered species, and work with the HCP IT to develop an appropriate corrective strategy. IID will take those actions deemed necessary and appropriate by the HCP IT to maintain or restore habitat such that it achieves its biological goals.

In addition to the possibility of invasive plants affecting habitat and covered species, introduced animal species have the potential to influence the status of covered species over the term of the HCP. Introduced animals that prey upon or compete with covered species could influence the persistence and survival of covered species in the mitigation sites. If the introduction of an exotic species creates a circumstance that adversely affects a covered species on the mitigation sites, IID will work with the USFWS, CDFG, and HCP IT to develop a strategy for reducing the effects of that species' introduction. Actions could include modifying the management of mitigation lands to discourage the use by exotic species, implementing control measures, or developing educational materials for IID workers and farmers. Any activities conducted by IID in response to an exotic species must be conducted within the original operating budget for the HCP.

5.5.2.4 Drought

As previously described, agricultural production in the Imperial Valley is supported by irrigation and is not dependent on natural rainfall. Similarly, the managed marsh and native tree habitat mitigation sites, and flows in the pupfish drains are supported by water from the Colorado River. While drought in the conventional sense is not a foreseeable concern in the valley, long-term drought conditions in the Colorado River Basin could produce occasional reductions in water supplies that could affect IID's ability to fully deliver water to some or all of its customers.

In the unlikely event that water supplies from the Colorado River were reduced, IID would continue to give the mitigation sites and pupfish drains priority in water delivery. Given the amount of water necessary to support these mitigation and habitat areas relative to the agricultural needs in the valley, IID could easily continue to deliver water to the mitigation lands and the drains that support pupfish.

Over the history of IID's operation, agricultural users in the Imperial Valley have not lost crops or changed cropping patterns due to the unavailability of irrigation water. This is due in large part to the storage capacity of water projects on the Colorado River, the reliability of IID's delivery infrastructure and the seniority of IID's water rights.

5.5.2.5 Disease

Various avian diseases (e.g., avian botulism) are common in the Imperial Valley, and USFWS and CDFG maintain ongoing programs to monitor and control disease outbreaks in the Salton Sea area. Infestations of avian parasites also could occur over the term of the permit. Managed marsh habitat created and managed by IID as mitigation associated with the HCP likely will attract waterfowl and other birds susceptible to diseases and parasites. If ponds are constructed to support fish for piscivorous birds under the Salton Sea Conservation Strategy, fish disease outbreaks and infestations of fish parasites could be a concern. Outbreaks of fish disease or parasite infestations also could be a concern for desert pupfish in IID drains. As part of its ongoing management of mitigation habitat and pupfish drains, IID will monitor the open water and shoreline areas for dead and sick birds and fish, and coordinate the removal and disposal of dead and dying birds and fish (as necessary) with the refuges and the Salton Sea Authority. Coordination consists of mutual notification among the refuges, Salton Sea Authority, and IID as soon as a disease outbreak or parasite infestation is identified and staffing and scheduling work crews. During periods of severe outbreaks, IID will work with the HCP IT to modify its water management practices in the mitigation sites or implement other measures to reduce the potential for infection. Water management practices that could be implemented include completely draining marsh habitat or pond habitats. The removal and disposal of dead birds and fish and adjustments in water management were incorporated in the budgets allocated for the managed marsh mitigation. Additional activities to reduce disease outbreaks will be conducted to the extent the operating budget allows.

5.5.2.6 Toxic Spills

Toxic materials (e.g., anhydrous ammonia, diesel, and pesticides) are frequently transported or used in the Imperial Valley to support agriculture. IID maintains a hazardous materials team that responds to toxic spills. In the event of a spill in a canal that conveyed water to one of the mitigation sites, IID will take immediate action to minimize the migration of the material from the spill site and prevent movement of the material into the mitigation site (e.g., close delivery gates). IID will notify USFWS and CDFG, and work with the HCP IT to develop a plan for restoring water to the affected site. The timing and mechanism for restoring water will be determined by IID and the HCP IT in consideration of the characteristics of the spill and the type of material released.

The accidental release of a toxic material into a drain that supports pupfish will be treated in a manner similar to spills in canals. IID will take actions to minimize the downstream impact of the material in the drain and notify USFWS and CDFG immediately. These actions may include opening spill gates from laterals to the drain to dilute as much as practicable the concentration of the toxic substance within the drain flow. IID and the HCP IT will develop a course of action based on the specific circumstances of the event. Any activities conducted by IID in response to toxic spills must be conducted within the original operating budget for the HCP.

5.5.2.7 Land Condemnation

Over the course of the permit term, IID will create and maintain habitat for mitigation purposes. These mitigation lands will be located in various locations in the Imperial Valley. In the unlikely event that a public entity with the power of eminent domain requires the use of portions of these lands and condemns the property, IID will acquire land in the amount lost and create or restore the habitat values lost. If fewer than 80 acres of mitigation land are lost through condemnation, IID will restore (i.e., design, develop, and plant) the new mitigation land within one year of the event. Affected areas greater than 80 acres will be restored within two years. Funds derived from a condemnation action could be used to fund creation or restoration of habitat values.

5.5.3 Unforeseen Circumstances

There are various, reasonably foreseen events that have the potential to affect the status of a covered species or influence IID's ability to meet its obligations under the HCP. A strategy for responding to potential changed circumstances associated with these events is outlined above. All circumstances not described above that would result in a substantial and adverse change in the status of a covered species are considered unforeseen.

5.6 End of Term of Incidental Take Authorization

IID will receive authorization for incidental take from the USFWS and CDFG. At the end of the permit term, IID would discontinue the water conservation and transfer program. As a result, flows and water quality conditions in the drains and inflow to the Salton Sea would approach pre-project conditions. Unless IID, USFWS, and CDFG negotiate to extend the period of incidental take authorization, the ITPs would no longer be in effect and IID would need to comply with the prevailing regulations regarding listed species. The term of the permit could be extended if IID continued to conserve and transfer water and needed continued incidental take coverage or if IID desired continued incidental take authorization for operation and maintenance (O&M).

Creation of habitat under the HCP is anticipated to attract covered species and to support them through the term of the permit. At the end of the permit term, IID would cease management and maintenance of habitats that are not required to be provided in perpetuity. To minimize adverse effects to covered species that may have colonized created habitats, 5 years prior to the end of the permit term, IID will meet with the USFWS and CDFG (or their successors) to develop a plan for the created habitats after termination of the permit. These agencies will review the status of the covered species that have inhabited the created habitat and consider these species' biological needs in determining whether and how to continue managing the created habitats. Regardless of the plan for the habitat developed by IID, USFWS and CDFG, at the end of the permit term, IID will have no further obligation to provide land, money, water or management of created habitats that are not required to be maintained in perpetuity under the conservation strategies. In addition, any incidental take of covered species resulting from termination of the permit and cessation of IID's obligation to maintain the created habitat is covered by this HCP.

CHAPTER 6

Alternatives

Section 10 of the Federal Endangered Species Act of 1973 (FESA) requires an applicant for an incidental take permit (ITP) to consider and describe "alternative actions to such takings" within the habitat conservation plan (HCP). Imperial Irrigation District (IID) considered several alternatives in the process of developing the HCP that were determined to be inconsistent with its objectives and/or less likely to be successfully implemented. The alternatives to the HCP that were considered are listed below.

1. No Action Alternative
2. Conservation and Transfer of 130 thousand acre-feet (KAF)
3. Conservation and Transfer of 230 KAF

6.1 No Action Alternative

Under the No Action Alternative, IID would continue to meet the demands of farmers and other water users within its service area in the Imperial Valley using Colorado River water diverted in accordance with IID's existing water rights. IID would not engage in a program to conserve water for the purpose of transferring it outside the service area other than continued implementation of the 1988 IID/Metropolitan Water District of Southern California (MWD) Water Conservation and Transfer Agreement. System improvements and modernization programs would continue as needed, with listed species consultations (when necessary) conducted on an individual, project-specific basis. IID's ongoing operation and maintenance (O&M) activities along the All American Canal (AAC) and in the Imperial Valley would continue.

Under this alternative, diversion of water through the AAC would remain consistent with the range of flows currently diverted at Imperial Dam. In the Imperial Valley, the canal system would be operated and maintained in a manner consistent with current O&M activities, and the habitat values supported by the canal system would remain similar to the levels currently supported. Water quantity and quality in the drainage system also would be expected to be similar to existing conditions and trends.

Under the No Action, the salinity of the Salton Sea would continue to increase and the water surface elevation would decrease. The rate and magnitude of salinity and water surface elevation changes and the effects of these changes on covered species is described in Chapter 3, Section 3.3.2. In addition, the environmental impact report and environmental impact statement (EIR/EIS) provides an evaluation of the trends in biological resources of the HCP area under the No Action.

The No Action Alternative is inconsistent with IID's primary goals and objectives. IID's primary objective is to continue to reliably deliver water and provide drainage to its agricultural and other water customers in the Imperial Valley. The Proposed Project and Quantification Settlement Agreement (QSA) provide IID with a means for protecting its water right and gaining additional future certainty in meeting the water demands of its customers. The No Action Alternative is also inconsistent with the objective of implementing the QSA which provides for a 75-year reallocation of Colorado River water among IID, MWD, and Coachella Valley Water District (CVWD) to address state and national issues concerning the Lower Colorado River (LCR). This provides considerable benefit to the agricultural community and economy in the Imperial Valley and also benefits the covered species by assisting in assuring the continued viability of agriculture in the Imperial Valley. The agricultural activities supported by water delivered by IID provide habitat that has attracted many species to the area. Species using habitats associated with agricultural production in the Imperial Valley also are dependent upon continued delivery of water to maintain existing levels of use. Future impairment of IID's ability to fully deliver water to its customers could also result in negative effects on the fish and wildlife resources that are dependent upon the habitats supported by agricultural irrigation water.

In consideration of these factors, IID determined that taking no action could lead to the impairment of its ability to deliver water in the future and result in negative impacts to its customers, the biological resources, and the agricultural economy that depends on water delivery. Therefore, the No Action Alternative is not considered to be a practicable or feasible alternative.

6.2 Modification of Water Conservation and Transfer Amounts

Two different levels of water conservation were examined as alternative actions to the level of take anticipated under the proposed water conservation programs and the HCP. The underlying premise for considering these alternatives was that the potential for impact and the level of take are related to the amount of water conserved and transferred out of the system. Each of these alternatives was anticipated to have incrementally less impact relative to the Proposed Project.

As described in Section 6.1, No Action Alternative, it is important for IID to meet the terms of the IID/San Diego County Water Authority (SDCWA) Water Conservation and Transfer Agreement and the QSA to protect its water right and its ability to fully serve its customers in the future. Modification of the water conservation and transfer amounts is inconsistent with meeting that objective. In addition, as described below, reduced conservation and transfer amounts would not substantially reduce the level of take or mitigation requirements. For these reasons, none of these alternatives were adopted.

6.2.1 Conservation and Transfer of 130 Thousand Acre-Feet Out of the Basin

Under this level of water conservation, IID would restrict the amount of water conserved and transferred out of the basin (i.e., to SDCWA) to 130 KAFY. Water would be conserved through a variety of on-farm methods. As with the proposed HCP, potential impacts along and within IID's canal and drainage system, and in and around the Salton Sea could occur. Habitat conditions along the AAC would remain relatively unchanged. IID's ongoing O&M activities would be the same as those outlined in the proposed HCP. The primary difference between this alternative and the proposed HCP relate to the amount and quality of water in the drains and entering the Salton Sea.

Results of the analysis conducted for the proposed HCP indicate that conservation of 130 KAFY annually using on-farm methods would result in a maximum of 23 acres of additional drain vegetation being needed to compensate for increased selenium toxicity as indicated by predicted hatchability effects (see Chapter 3, Section 3.5). Using a mitigation ratio of 1:1 for take associated with selenium toxicity, a maximum of 23 acres of managed marsh habitat would be created to mitigate selenium toxicity impacts to covered species under this alternative. Under the proposed HCP, 23 to 42 acres of habitat would be needed to offset selenium toxicity. While the level of mitigation required specifically for selenium effects would be lower under this alternative, creation of managed marsh to address impacts of other covered activities would result in the overall amount of mitigation being similar to the Proposed HCP.

The rate of salinization of the Salton Sea and the expected effects on covered species using the Salton Sea would also not differ substantially from the proposed HCP. Conservation of 300 KAF through on-farm and system-based measures under the HCP would reduce inflow to the sea by about 300 KAF. At this level of reduced inflow, the modeling shows the salinity of Salton Sea exceeding 60 parts per thousand (ppt)[1] in 2012 (Table 3.3-2, Figure 3.3-1). Conservation and transfer of 130 KAF of water using on-farm measures would reduce inflow to the Salton Sea by 130 KAF. At this level of inflow reduction, the modeling shows that 60 ppt would be exceeded in 2013, one year later than under the Proposed HCP. Because the reduced level of conservation under this alternative would not significantly reduce the level of impact relative to the activities covered by the permit, it was not carried forward.

6.2.2 Conservation and Transfer of 230 Thousand Acre-Feet

This level of water conservation anticipates the conservation of a total of 230 KAFY and transfer of 130 KAFY to SDCWA and 100 KAFY to CVWD. Under this scenario, it is assumed that the impacts to the Imperial Valley (e.g., reduction of habitat quality in the drains) would be intermediate to the Proposed Project and the 130 KAF level of conservation. IID's ongoing O&M activities would be the same as those outlined in the proposed HCP.

Conservation of 230 KAF annually using a combination of on-farm methods (130 KAFY) and system improvements (100 KAFY) would result in a maximum of 37 acres of drain vegetation needed to offset selenium toxicity as indicated by predicted hatchability effects. If the total of 230 KAFY were conserved using only on-farm methods, a maximum of 24 acres of would be needed. Using a mitigation ratio of 1:1 for take associated with selenium toxicity, from 24 to 37 acres of managed marsh habitat would be created to mitigate selenium toxicity impacts to covered species under this alternative. This range of impacts is nearly identical to that predicted under the proposed HCP (23 to 42 acres). Thus, this alternative would not substantially change the level of take of covered species or mitigation requirements.

The rate of salinization of the Salton Sea and the expected effects on covered species using the Salton Sea would also not differ substantially from the proposed HCP. Conservation and transfer of 230 KAF would be achieved through conservation of 130 KAF through on-farm conservation measures and 100 KAF conserved through system-based measures, fallowing or additional on-farm measures. Inflow to the sea would be reduced by up to 230 KAF. At this level of inflow reduction, the salinity of the Salton Sea is projected to surpass 60 ppt in 2012, the same year as under the Proposed HCP. Thus, this lower level of conservation would not reduce the level of impact relative to the activities covered by the permit.

[1] Many of the studies regarding salinity tolerance of various species report the results in parts-per-thousand (ppt). Modeling conducted for this HCP utilized concentrations in mg/L (converted to g/L) which differs slightly from ppt as salinity increases due to the difference in the specific gravity of saltwater versus freshwater. Model results are reported in ppt for simplicity and to allow direct comparison with reported tolerances.

CHAPTER 7

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Acronyms and Abbreviations

µg/g dw	micrograms per gram for drinking water
µg/L	micrograms per Liter
AAC	All American Canal
AF	acre-feet
AFY	acre-feet per year
BEPA	Bald Eagle and Golden Eagle Protection Act
BLM	Bureau of Land Management Sensitive Species
CDFG	California Department of Fish and Game
CESA	California Endangered Species Act
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
cfs	cubic feet per second
Code	California Fish and Game Code
CSC	California Species of Special Concern
CVWD	Coachella Valley Water District
CWHR	California Wildlife Habitat Relationship
DDD	dichloro diphenyl dichloroethane
DDE	dichlorophenyldichloro-ethene
DDT	dichloro-diphenyl-trichloroethane
DOI	Department of Interior
DOQQ	Digital Orthophoto Quarter Quadrangle
DW	dry weight
E	endangered
EIR/EIS	environmental impact report and environmental impact statement
F	Fahrenheit
FESA	Federal Endangered Species Act of 1973
FP	fully protected
FR	*Federal Register*
ft/s	foot per second
g/L	grams per liter
GIS	geographic information systems
GM	geometric mean
HCP	habitat conservation plan

IA	Implementation Agreement
IID	Imperial Irrigation District
IT	Implementation Team
ITP	Incidental Take Permit
KAFY	thousand acre-feet per year
Kg/ha/yr	kilograms per hectare per year
lb/acre	pounds per acre
LCR	Lower Colorado River
m	meter
MAFY	million acre-feet per year
mi^2	square mile
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
MOU	Memorandum of Understanding
msl	mean sea level
MWD	Metropolitan Water District of Southern California
NEPA	National Environmental Policy Act
NMFS	National Marin Fisheries Service
NNE	north-northeast
NPPA	Native Plant Protection Act
NWR	National Wildlife Refuge
O&M	operation and maintenance
PL	Public Law
ppb	parts per billion
ppm	parts per million
PPR	present perfected water rights
ppt	parts per trillion
PCB	polychlorinated biphenyl
PT	proposed threatened
QA/QC	quality assurance/quality controls
QSA	Quantification Settlement Agreement
R	rare
Reclamation	U.S. Bureau of Reclamation
ROD	Record of Decision
RV	recreational vehicle
S	federal species of concern
SDCWA	San Diego County Water Authority

T	threatened
TDS	total dissolved solids
TSS	total suspended solids
USACOE	U.S. Army Corps of Engineers
USC	United States Code
USFWS	U.S. Fish and Wildlife Service
WA	wildlife area

APPENDIX A

Species Covered by the HCP

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Species Covered by the HCP

Invertebrates

Cheeseweed Moth Lacewing (*Oliarces clara*)

Range and Distribution

The cheeseweed moth lacewing has been documented from Yuma County in western Arizona; Imperial, Riverside, and San Bernardino Counties in Southern California; and Clark County, Nevada. Collections of the moth lacewing have been made from sea level in Imperial County to 100 meters (328 feet) elevation in Riverside County (Faulkner 1990; Faulkner personal communication). The range of the species may be much more extensive than its documented range, correlating to some extent with the range of its larval host plant, the creosote bush (*Larrea tridentata*) (Faulkner personal communication).

Population Status and Threats

This species is rarely observed in the field. However, in 1964, a massive emergence occurred near Palm Springs, with hundreds of individuals present (Faulkner 1990). The cheeseweed moth lacewing is a federal species of concern (former category 2 candidate for federal listing). Although infrequently observed, the moth lacewing may exist at many undocumented sites throughout the arid southwest region of the United States. The fleeting, localized nature of adult emergence complicates efforts to assess the population status of this species. Current threats to this species' survival are unknown.

Habitat Requirements

The larval stage is associated with the creosote bush, a desert shrub found throughout much of the southwestern United States and northwestern Mexico (Faulkner 1990). All collections of mature larvae and egg cases have produced specimens that were found inhabiting the root mass of this plant (U.S. Bureau of Reclamation [Reclamation] 1996). Adult emergence from soils near creosote bushes often follows winters of high precipitation and is fleeting and localized, lasting no longer than 4 days (Faulkner personal communication). On the first day, adult males emerge early in the morning and form large aggregations at the highest natural or artificial landmark. This landmark may be a cliff, rock outcropping, or telephone pole. Flight is weak, and many individuals are observed walking to the landmark rather than flying. Adult male activity on the first day ceases at noon with individuals taking shelter in the cracks of cliff walls, under rocks, and under vegetation. Females emerge on day two and mating occurs. Activity decreases throughout the third day with the increased occurrence of mortality, and ceases by the fourth day with nearly complete mortality (Faulkner 1990).

Habitat in the Proposed Project Area

The creosote bush scrub community is widespread throughout the unirrigated areas of the Sonoran Desert. This habitat type surrounds the Salton Sea between the higher rock hillsides and the more saline desert saltbrush community. In the Habitat Conservation Plan (HCP) area, creosote scrub also occurs with the right-of-way of the Imperial Irrigation District (IID) along the All American Canal (AAC).

Proposed Project Area Occurrence

The occurrence and distribution of the cheeseweed moth lacewing in the proposed project area are unknown. Suitable habitat likely exists in the HCP area in desert habitats adjacent to the AAC. A single moth lacewing was attracted to a light near Parker, California, in 1949 (Belkin 1954); however, no emergence sites have been documented for this area (Reclamation 1996).

Andrew's Dune Scarab Beetle (*Pseudocatalpa andrewsi*)

Range and Distribution

The Andrew's dune scarab beetle is endemic to the creosote bush scrub habitats of the Algodones Dunes in Imperial County, California, and may occur in portions of the sand dune system in Baja California Norte, Mexico.

Population Status and Threats

Detailed population information is not available for this species. However, its limited distributional range and endemism to the area make this beetle a federal species of concern. No current threats have been identified; however, off-road vehicle traffic on the dunes could potentially impact this species.

Habitat Requirements

Andrew's dune scarab beetle primarily occurs at elevations between 98 and 492 feet (30 and 150 meters) in desert dune and Sonoran desert scrub habitats. This species inhabits both surface and subsurface sand, using the wet sand interface as protection from heat of the day. This beetle specifically inhabits troughs of loose drifting sand between the dunes. They have been observed buried 12 inches deep in the sand.

Habitat in the Proposed Project Area

Suitable habitat for Andrew's dune scarab beetle in the proposed project area occurs where the AAC traverses the Algodones Dunes.

Proposed Project Area Occurrence

Andrew's dune scarab beetle is endemic to the Algodones Dunes in Imperial County. Distribution of this species is apparently widespread across the main dune mass, and it could potentially occur within the right-of-way of IID along the AAC. There is no evidence that the beetle inhabits desert areas other than the main dunes (Hardy and Andrews 1980).

Fish

Razorback Sucker (*Xyrauchen texanus*)

Range and Distribution

Historically, the razorback sucker inhabited the Colorado River and its tributaries from Wyoming to the Gulf of California. Razorback suckers were found in the Gila, Salt, and Verde Rivers, which are all tributaries of the Lower Colorado River (LCR). Upper basin tributaries containing historic populations of razorback suckers included the Gunnison River upstream to Delta, Colorado; the Green River from its confluence with the Colorado River upstream to Green River, Wyoming (Vanicek et al. 1970); the Duchesne River (Tyus 1987); the lower White River near Ouray, Utah (Sigler and Miller 1963); the Little Snake River and lower Yampa River, Colorado (McAda and Wydoski 1980); and the San Juan River, New Mexico. Most razorback suckers in the LCR basin are currently restricted to Lake Mohave, with smaller populations occurring in the Colorado River below Davis Dam, Lake Mead, and Senator Wash Reservoir (Bradford and Vlach 1995). Razorback suckers have also been captured sporadically from the mainstream Colorado River, impoundments, and canals (Marsh and Minckley 1989). Valdez and Carothers (1998) indicate that a small population also exists in the Grand Canyon section of the Colorado River. The current distribution of razorback suckers in the Upper Colorado River basin is confined to small groups of fish in several widely distributed locations. Most fish occur in an area including the lower 6.4 kilometers (4 miles) of the Yampa River and the Green River from the mouth of the Yampa River downstream to the confluence with the Duchesne River (USFWS 1997a). Small populations may also occur in the Colorado River at Grand Valley and in the San Juan River upstream from Lake Powell.

Population Status and Threats

The largest extant population of razorback suckers in the LCR basin occurs in Lake Mohave; however, this population is declining rapidly. The Lake Mohave population was estimated to contain 60,000 individuals in 1988 (Minckley et al. 1991) but by 1995, only 25,000 razorback suckers were thought to exist there (Marsh 1995). Although razorback sucker spawning has been successful and larval fish have been observed (more than 20,000 wild razorback sucker larvae were collected in 1995 from Lake Mohave [Reclamation unpublished data]), virtually no recruitment has been detected. Combined data from 1990 to 1997 suggest that the total population of razorback suckers in Lake Mead during 1997 was between 400 and 450 individuals (Holden et al. 1997). Recent population estimates from 1998 indicate that this population may have decreased to less than 300 fish (Holden et al. 1999). Successful spawning has been identified at two locations in Lake Mead. Thousands of larvae were collected during the spring of 1997, but no juveniles were found during May and June of the same year (Holden et al. 1997). The occurrence of some relatively young razorback suckers in recent surveys indicates there may be some recruitment in Lake Mead.

In the upper basin, razorback sucker populations are smaller and more widely distributed. The largest concentration occurs in the middle Green River, but Modde et al. (1996) report that the mean razorback sucker population from 1980 to 1992 in the middle Green River was only 524 individuals.

During the past few decades, the population dynamics of razorback suckers at different locations in the LCR basin have exhibited similar trends. Adult fish were observed in each population; however, juveniles were rare. Although wild populations of razorback suckers had been observed spawning in various locations in the lower basin, recruitment was never successful enough to replenish the adult populations. Eventually, the adult fish die of old age, and populations become reduced or extirpated. The lack of recruitment in these populations is thought to be primarily a result of predation by non-native fish on early life stages of razorback suckers.

Water resource development and interactions with non-native fish species currently threaten razorback suckers (Pacey and Marsh 1998). The limiting factors resulting from these two major threats include altered temperature and flow regimes, habitat loss, habitat fragmentation, predation, competition, and an increased risk of disease and parasitism. The primary limiting factor for razorback suckers in the lower basin is probably the direct effect of predation by non-native fish on early life stages of razorback suckers (Johnson 1997; Pacey and Marsh 1998).

The presence of impoundments in the LCR represents another major threat to razorback suckers. The unnatural temperature and flow regimes created by impoundments may inhibit spawning and reduce growth of razorback suckers. Daily fluctuations in the river may result in mortality from fish stranded in flooded areas. Another limiting factor that is directly related to the flow regime is loss of habitat. The comparatively stable flows that occur downstream of impoundments during the spring and early summer do not allow the river to flood and maintain low-lying areas. Historically, high spring and summer flows created large backwater areas and off-channel habitat that may have been important habitat for early life-stages of razorback suckers. The dams and impoundments also act as barriers to larval drift, species expansion, and migration.

Habitat Requirements

Adult razorback sucker habitat use can vary depending on season and location. Adult razorback suckers are adapted for swimming in swift currents, but they may also be found in eddies and backwaters away from the main current (Allan and Roden 1978). Ryden and Pfeifer (1995) observe that subadult razorback suckers use eddies, pools, backwaters, and other slow water habitats during spring runoff, and move into swifter habitats associated with the main channel during summer. Tyus and Karp (1990) report that during spring runoff, adults also use flooded lowlands and areas of low velocity. Tyus (1987) indicates that mid-channel sandbars represent a common summer habitat. Bradford et al. (1998) conclude that adult razorback suckers in the lower Imperial Division area of the Colorado River actively selected backwater habitats for use; however, many of these habitats had become unavailable to fish due to the effects of regulated flows. In clear reservoirs, adults of this species are considered pelagic, and can be found at various depths, except during the spawning period when they use more shallow shoreline areas. Little is known about juvenile habitat requirements because very few juveniles have been captured in the wild. Larval razorback suckers have been observed using nearshore areas in Lake Mohave (Marsh and Langhorst 1988). In riverine environments, young razorback suckers use shorelines, embayments, and tributary mouths (Minckley et al. 1991).

During the spawning season, adult razorback sucker migrations have been documented in Lake Mohave (Marsh and Minckley 1989), the Green River, and the lower Yampa River (Tyus 1987). Razorback sucker adults have demonstrated fidelity to spawning locations (Tyus and Karp 1990). Spawning in lakes and streams takes place over loosely packed gravel or cobble substrate, and always at velocities less than 1.5 meters/second (4.9 feet/second) (Bradford and Vlach 1995). In the lower basin reservoirs, spawning occurs from January through April/May (Langhorst and Marsh 1986). In Lake Mead, spawning has been observed from mid-February until early May (Holden et al. 1997). In the upper basin, spawning occurs later in the year; but the temperature range is similar to lower basin spawning times (USFWS 1997a). The final thermal preferendum for the adult razorback sucker is estimated to lie between 22.9º and 24.8º Celcius (C) (73.2º and 76.6º Fahrenheit [F]) (Bulkley and Pimental 1983).

The razorback sucker is an omnivorous bottom feeder. Its diet is dependent on location and life stage (Bradford and Vlach 1995; Valdez and Carothers 1998). Larval razorback suckers were reported to feed on diatoms, rotifers, algae, and detritus (Wydoski and Wick 1998). Stomach contents of adult individuals collected in riverine habitat consist of algae and dipteran larvae, while adults examined from Lake Mohave were found to feed primarily on planktonic crustaceans (Minckley 1973).

Habitat in the Proposed Project Area

Razorback suckers are associated with large river systems and, within those systems, prefer low-velocity backwater areas. The high-water velocities and sparse vegetation associated with the irrigation canals in Imperial Valley do not provide these conditions, and habitat quality is low for razorback suckers. While it is possible that adult razorback suckers entrained in the canal system persist for some time, they are not likely to establish a self-sustaining population.

Proposed Project Area Occurrence

Razorback suckers are known to occur in the All American and East Highline canal systems. The species has also been found in an IID reservoir near Niland. The population in Imperial County is believed to be composed of old members of a dwindling, nonreproductive, remnant stock (Tyus 1991; Minckley et al. 1991). No recruitment of wild-spawned fish occurs, probably because of predation by introduced fishes and poor habitat conditions (Tyus 1991).

Desert Pupfish *(Cyprinodon macularius)*

Range and Distribution

Desert pupfish historically occupied the Gila River basin below approximately 1,500 meters elevation in Arizona and Sonora, including the Gila, Santa Cruz, San Pedro, and Salt Rivers; the LCR in Arizona and California downstream from the vicinity of Needles to the Gulf of California and onto its delta in Sonora and Baja California; the Rio Sonoyta of Arizona and Sonora; Puerto Penasco, Sonora; and the Laguna Salada basin of Baja California. (Marsh and Sada 1993). Suitable habitat was available, and the species probably occurred in the Agua Fria, Hassayampa, and Verde Rivers of Arizona as well. Distribution of desert pupfish was widespread but probably not continuous within its historic range.

There are currently two recognized subspecies of the desert pupfish, *Cyprinodon macularius macularius* and *C. m. eremus*. Both subspecies are included in the federal listing of the desert pupfish as endangered. Only the *macularius* subspecies occurs in the proposed project area. Historically, *C. m. macularius* occurred in the Gila River basin, mainstream Colorado River from Needles to the Gulf of California, Rio Sonoyta, Puerto Peñasco, and Laguna Salada (Minckley 1973 and 1980; Miller and Fuiman 1987). Currently, in California, the *macularius* subspecies is restricted to San Felipe Creek and the adjacent wetland, San Sebastian Marsh, upper Salt Creek, and a small portion of the Salton Sea (Miller and Fuiman 1987). In California, the San Felipe Creek system, including San Sebastian Marsh and Salt Creek, provides natural habitat for the desert pupfish populations. *C. m. eremus* was historically found only in Quitobaquito Spring, Arizona. This species still contains a natural population. Reintroductions of *C. m. macularius* (15 populations) and *C. m. eremus* (6 populations) have occurred at many different locales in Arizona. Pupfish are also thought to inhabit the Rio Sonoyta and Santa Clara Slough in Sonora, Mexico (*Federal Register 19*86).

Population Status and Threats

Although remarkably tolerant of extreme environmental conditions, the desert pupfish is threatened throughout its native range primarily because of habitat loss or modification, pollution, and introductions of exotic fishes (USFWS 1986). The introduction of non-native species is the greatest future threat and current limiting factor affecting the desert pupfish. Introduced species, such as the mosquitofish (*Gambusia affinis*) and largemouth bass, supplant pupfish as a result of predation and aggression, while cichlids (*Tilapia* spp.) and mollies interfere with reproductive behavior (USFWS 1993a). The non-native bullfrog (*Rana catesbiana*) is also a predator of the desert pupfish (USFWS 1993a).

Although desert pupfish have very high tolerances for adverse environmental conditions, severe conditions can reduce this species' ability to survive. Improper grazing can increase turbidity by increasing erosion and reducing riparian vegetation. Water pollution from the application of pesticides in proximity to desert pupfish habitat is also an important factor, contributing to the decline of the Quitobaquito subspecies (Miller and Fuiman 1987).

Desert pupfish habitat quality can be a limiting factor. Droughts can cause the springs and headwaters that this species inhabits to dry up. Water development proposed projects can degrade desert pupfish habitat by removing water through groundwater pumping, diversion, and irrigation. The reduction of the amount of water in these habitats can create situations where the desert pupfish are at a competitive disadvantage with exotic fish species.

Habitat Requirements

Desert pupfish use a variety of different habitats, including cienagas, springs, headwater streams, and margins of large rivers. They prefer shallow, clear water, with either rooted or unattached aquatic plants, restricted surface flow, and sand-silt substrates (Black 1980; Marsh and Sada 1993; and Schoenherr 1990). They have the ability to withstand extreme water temperatures up to 45°C (113°F), dissolved oxygen concentrations down to 0.1 to 0.4 parts per million (ppm) (USFWS 1986), and salinity twice that of seawater (68 parts per thousand [ppt], Lowe et al. 1967). Barlow (1958) reported that adult desert pupfish survived salinity as high as 98,100 milligrams per liter (mg/L) in the laboratory. They can also survive 10 to 15 ppt changes in salinity as well as daily temperature fluctuations of 22? to 26?C (Kinne 1960; Lowe and Heath 1969). In less harsh environments where a greater diversity of fishes are found, pupfish tend to occupy water shallower than that inhabited by adults of most other species (Marsh and Sada 1993).

Spawning at the Salton Sea takes place between late March and late September, when water temperatures exceed 20°C (Moyle 1976; UCLA 1983). Pupfish can spawn several times during this period. Adult male desert pupfish are very territorial during the spawning season such that schools consist either entirely of adult females or entirely of juveniles. Desert pupfish usually set up territories in water less than 1 meter (3 feet) deep and associated with structure (Barlow 1961). Territoriality is highest in locations with large amounts of habitat, high productivity, high population densities, and limited spawning substrate (USFWS 1993a). Desert pupfish prefer water 18 to 22 centimeters deep for egg deposition (Courtois and Hino 1979). Depending on size, a female pupfish may lay 50 to 800 eggs or more during a season (Crear and Haydock 1971). The eggs hatch in 10 days at 20?C, and the larvae start feeding on small invertebrates within a day after hatching (Crear and Haydock 1971). Larvae are frequently found in shallow water where environmental conditions are severe.

Desert pupfish are omnivorous and consume a variety of algae, plants, insects, and crustaceans (USFWS 1993a; Cox,1972; and Naiman 1979). Walters and Legner (1980) found that pupfish foraged mostly on the bottom, consuming midge larvae, detritus, aquatic vegetation, and snails. Desert pupfish are opportunistic feeders whose diet varies seasonally with food availability (Naiman 1979). In general, when invertebrates are available, they are the preferred food of foraging pupfish. In the Salton Sea, ostracods, copepods, and occasionally insects and pile worms are taken (Moyle 1976). As invertebrates become less available, pupfish adjust their feeding behavior, and their gut usually contains large amounts of algae and detritus, as well as invertebrates (Cox 1972). The desert pupfish is not considered an important food for wading birds and other fish because of its low numbers (Walker et al. 1961; Barlow 1961).

Habitat in the Proposed Project Area

Desert pupfish prefer backwater areas, springs, streams, and pools along the shoreline of the Salton Sea. Desert pupfish habitat occurs in pools formed by barnacle bars located in near-shore and shoreline areas of the Salton Sea and in Salt Creek. Barnacle bars are deposits of barnacle shells on beaches, near-shore, and at the mouths of drains that discharge into the Salton Sea. The bars form pools that provide habitat for desert pupfish (IID 1994). Habitat for desert pupfish also occurs in the mouths of drains discharging directly into the Salton Sea and in the desert washes at San Felipe Creek and Salt Creek.

Proposed Project Area Occurrence

Desert pupfish were abundant along the shore of the Salton Sea through the 1950s (Barlow 1961). During the 1960s, the numbers declined; by 1978, they were noted as scarce and sporadic (Black 1980). Declines are thought to have resulted from the introduction and establishment of several exotic tropical species into the Salton Sea (Bolster 1990; Black 1980). These introduced species prey on or compete with desert pupfish for food and space. The sailfin molly (*Poecilia latipinna*) was discovered in irrigation drains in the late 1950s (Black

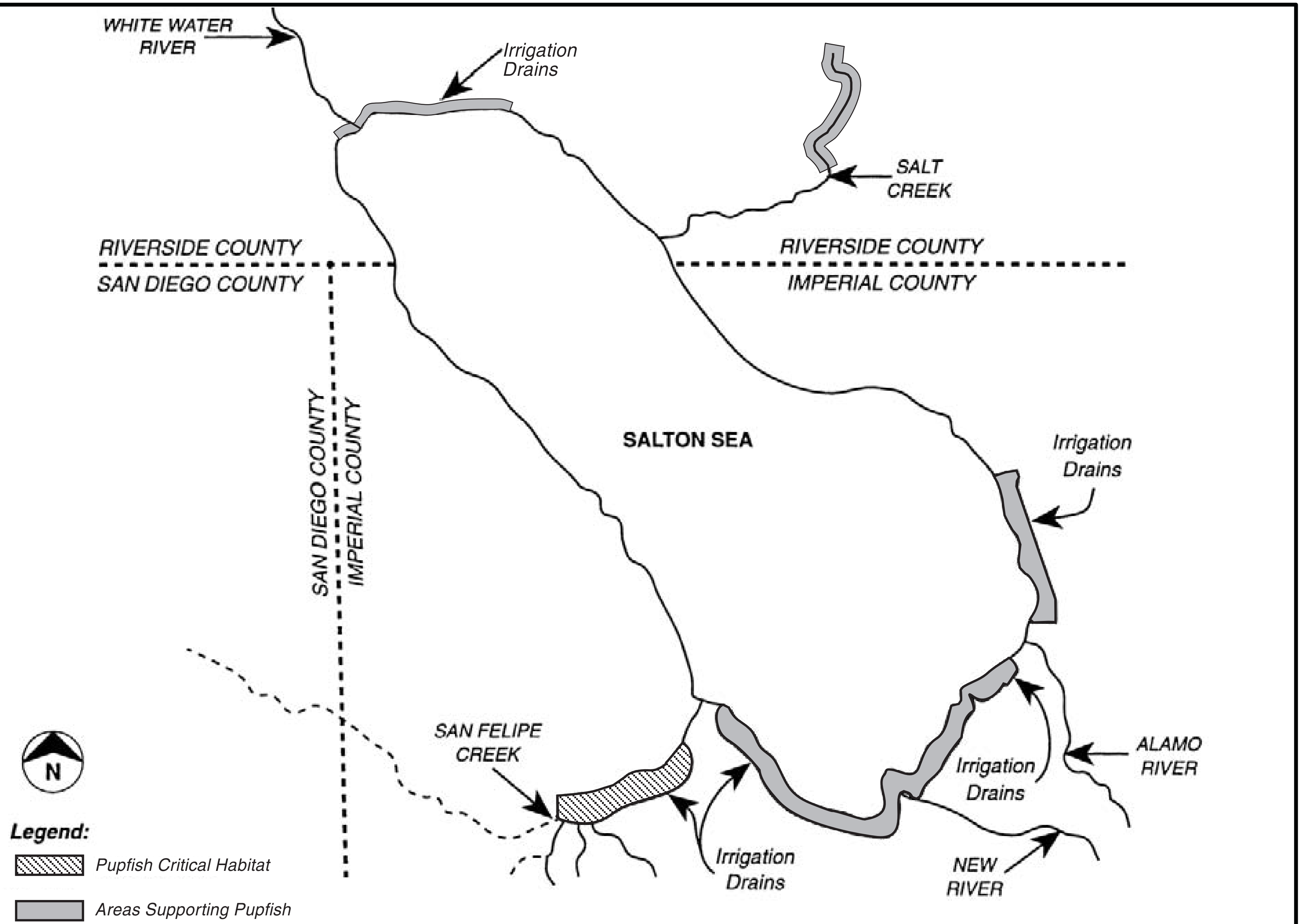
1980) and has become established in the Salton Sea (Moyle 1976). The Mozambique mouthbrooder (*Tilapia mossambicus*) and Zill's cichlid (*T. zillii*) were introduced into the Salton Sea in the late 1960s and early 1970s to control aquatic weed growth in the irrigation canals and drains (Black 1980). Interactions with the introduced mosquitofish (*Gambusia affinis*) have contributed to the decline of pupfish (Evermann 1930; Jennings 1985). Other factors responsible for declines in desert pupfish populations around the Salton Sea include habitat modification due to water diversions and groundwater pumping for agriculture (Pister 1974; Black 1980). There is also concern that introduced saltceder (tamarisk) near pupfish habitat may cause a lack of water at critical times due to evapotranspiration (Marsh and Sada 1993). Aerial pesticide application is a common practice around the Salton Sea that may also affect pupfish populations (Marsh and Sada 1993).

Historical accounts indicate that desert pupfish were once widespread and abundant around the Salton Sea. Surveys conducted by the USFWS to determine their distribution around the Salton Sea indicated that desert pupfish were present in more than 50 localities in canals and shoreline pools on the southern and eastern margins of the Salton Sea (Lau and Boehm 1991) and in small pools in San Felipe Creek, Carrizo Wash, and Fish Creek Wash near the Salton Sea. Localities also include agricultural drains in the Imperial and Coachella Valleys, shoreline pools around the Salton Sea, the mouth of Salt Creek in Riverside County, lower San Felipe Creek and its associated wetlands in Imperial County, and eight artificial refuge ponds (Bolster 1990; USFWS 1999). Designated critical habitat for desert pupfish includes San Felipe Creek, Carrizo Wash, and Fish Creek in Imperial County, California (USFWS 1986). The distribution of pupfish around the Salton Sea and designated critical habitat are shown on Figure A-1.

In surveys conducted by the California Department of Fish and Game (CDFG) in 1978-1979, desert pupfish accounted for 3 percent of the total catch in irrigation drains, 5 percent of the catch in shoreline pools, and less than 1 percent of the catch from three natural permanent tributaries and the Salton Sea proper (Black 1980). However, desert pupfish accounted for 70 percent of the total catch from San Felipe Creek.

Dunham and Minckley (1998) reported a rebound of pupfish populations in the Salton Sea paralleling recent declines in non-native fishes, presumably in response to increasing salinity. However, surveys in the various habitats around the Salton Sea indicate a general decline in desert pupfish abundance and distribution since 1991 (Table A-1). In 1991, 41 irrigation drains contained pupfish; this number was reduced to 33 in 1993 (Remington and Hess 1993). Only 11 irrigation drains contained pupfish in 1998, and the numbers of desert pupfish also declined from the earlier surveys (Sutton 1999).

Extreme annual variability in catch has occurred at individual sample sites (e.g., Trifolium 12 and County Line drains) (Table A-1). Variability in catch also occurs within a season, and some drains that did not yield pupfish during one trap set often produced pupfish in subsequent trappings (Nicol et al. 1991). This suggests that desert pupfish may move among habitats for various reasons. A variety of other factors may also influence trapping results, including numbers of traps, trap location, bait types, timing, water level fluctuations, and vegetation removal (Nicol et al. 1991).



3297_13 (3/7/01)

Figure A-1
Areas Sampled During 1993
CDFG/IID Desert Pupfish Survey
IID Water Conservation and Transfer Project Draft HCP

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TABLE A-1
Numbers of Desert Pupfish Collected During Various Surveys at the Salton Sea

	Year						
Drains	**1991[1]**	**1993[2]**	**1994[3,4]**	**1995[1]**	**1996[4]**	**1997[4,5]**	**1998[4]**
North End							
County Line	*				490	6	4
Oasis Grant	7						
Ave 84	38	27			*		1
Ave 83	5	1			27		1
Ave 82	*	4			*		1
Ave 81	3	5			6	6	8
Ave 80	80						
Ave 79	22	35	7				
Ave 78	155	84	1				
Ave 76	1	8	16		1		
Ave 74			1		3		
Ave 73			6				
Ave 68			2				
King Street	67		12		8	14	3
McKinley 0.5	*						
McKinley	17	51					
Cleveland 0.5	10	12					
Cleveland	18	29					
Arthur 0.5	18	6					
Arthur 4	4	8					
Garfield 0.5	2						
Garfield	*	1			1		
Hayes 0.5	9						
Hayes	2	79					
Grant 0.5	7						
Grant	92	5					
Johnson 0.5	37	17			1		
Lincoln		1					
Buchanan			*				

TABLE A-1
Numbers of Desert Pupfish Collected During Various Surveys at the Salton Sea

	Year						
Drains	**1991[1]**	**1993[2]**	**1994[3,4]**	**1995[1]**	**1996[4]**	**1997[4,5]**	**1998[4]**
South End							
Niland 4	19						
Niland 3		1					
Niland 2	2						
Niland 1		1	2				
Z		1	3				
W		11	356				1
T			2				
S		4	1				1
R		2	1			1	
Q			10				
P			10				
O			1				
Vail 4A	1						
Vail 56	44		53				
Vail 5A	26						
Vail 6	1						
Vail cutoff		1	2				
Vail 7		4	3				
Trifolium 12		261	3		1		
Trifolium 13		38	1				1
Trifolium 14A			1				1
Trifolium 1	9		1		1		
Tri Storm	1	2	3		16		2
Trifolium 18	2		2				
Poe	13	1	3		1		
Lone Tree Wash	8						
3W of Lone Tree	6						
Trifolium 19	8		3		1		
Trifolium 20		50	7				1
Trifolium 20A					13		

TABLE A-1
Numbers of Desert Pupfish Collected During Various Surveys at the Salton Sea

	Year						
Drains	**1991[1]**	**1993[2]**	**1994[3,4]**	**1995[1]**	**1996[4]**	**1997[4,5]**	**1998[4]**
Trifolium 22		34	47				
Trifolium 23	13	64	22		1		
Trifolium 23N	2						
WP-10 SS-11	1						
S. Felipe Wash	5	3	1		31		
Pools							
S. of Bombay	23						
N. of Niland 4	30						
N. of Niland 3	9						
N. of Niland 1	4						
“U” drain pool							1
W. of New River	7						
S. of New River	1						
E. of Tri 22	6						
By Tri 23	4						
By Tri 23N	*						
N. of Tri 20A							70
N. of Grant 0.5							2
N. of Hayes 0.5					2		
S. of Salt Creek				3			
Tributaries							
S. Felipe Creek	*	224	195	115	*	388	*
Upper Salt Creek		9	15	45	18	102	
Lower Salt Creek	1			12			
* - observed							

Source: Sutton (1999)
[1] Nicol et al. (1991)
[2] Remington and Hess (1993)
[3] Schoenherr (1994) – Only surveyed north end drains
[4] CDFG, unpublished data
[5] No drain surveys in 1995; only north end drains surveyed in 1997

In a study of pupfish distribution and movement, Sutton (1999) found that physical habitat conditions appeared to influence the distribution and abundance of desert pupfish. While most irrigation drains were characterized by high densities of non-native fishes and low numbers of pupfish, one drain (Drain C) was unique because of a large, healthy population of desert pupfish coexisting with a high density of young tilapia. The habitat in Drain C was different from the other drains in having a high density of emergent vegetation (e.g., cattails) along both banks combined with a large portion of open, slow-moving water. The rooted aquatics acted to reduce the flow of water and provided cover and shelter for the pupfish (Sutton 1999).

Sutton (1999) observed desert pupfish movement between the Salton Sea and nearby drains. Pupfish were observed moving from both irrigation drains and Salt Creek downstream into shoreline pools. The reverse movement from shoreline pools upstream into both drains and Salt Creek was also observed. The best evidence of movements was observed in the southwestern area between Drain C and a connected shoreline pool. Decreases in the size of shoreline pools during seasonal fluctuations in water levels may affect fish health and/or force pupfish to seek other habitat. Thus, the connectivity between habitat types may be necessary to prevent pupfish from becoming stranded in habitats that cannot sustain them for prolonged periods (Sutton 1999). These observations indicate the importance of agricultural drains as pupfish habitat and the potential for pupfish to use shoreline aquatic habitats as corridors. This potential movement may be important in providing genetic mixing between various populations.

Based on the trapping studies conducted to date, desert pupfish populations are known from or expected in drains directly discharging to the Salton Sea, in shoreline pools of the Salton Sea, and in desert washes at San Felipe Wash and Salt Creek. Desert pupfish are not known to occur nor are they expected to occur in the New or Alamo Rivers because of the high sediment loads, excessive velocities, and presence of predators. Drains in the HCP area where pupfish have been found are shown on Figure A-2.

Amphibians

Couch's Spadefoot Toad (*Scaphiopus couchii*)

Range and Distribution

The Couch's spadefoot toad occurs from southeastern California eastward through Arizona, New Mexico, Texas, and Oklahoma, and southward into San Luis Potosí, Nayarit, and the southern tip of Baja California, Mexico. An isolated population of the species also occurs near the Petrified Forest National Monument in Colorado (Jennings et al. 1994).

Population Status and Threats

Despite an apparent tolerance for agricultural habitat modification and other disturbances, the Couch's spadefoot toad seems to be declining throughout its range (Jennings et al. 1994). Factors responsible for the decline of this species are not well known, but threats to this species may include noise disturbances from off-road vehicles and disturbances that alter the percolation characteristics of temporary rain pools used as breeding sites (Jennings et al. 1994).

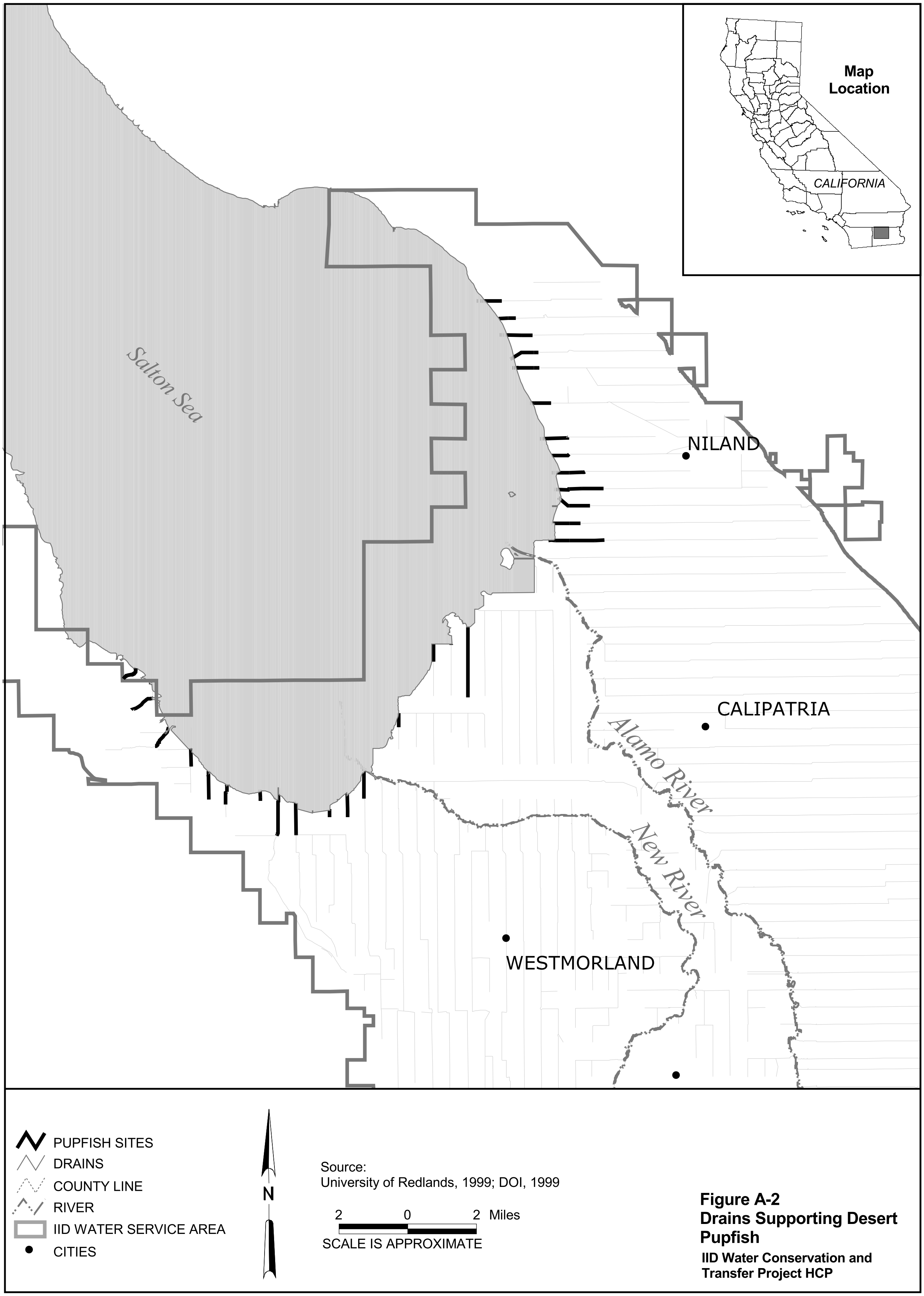

Figure A-2
Drains Supporting Desert Pupfish
IID Water Conservation and Transfer Project HCP

HABITAT REQUIREMENTS

Couch's spadefoot toad frequents arid and semiarid habitats of the southwest, occurring along desert washes, in desert riparian, palm oasis, desert succulent shrub, and desert scrub habitats. It is also found in cultivated cropland areas. This toad requires friable soil for burrowing. Burrowing sites are often selected beneath desert plants to reduce exposure to lethal maximum temperatures during the hottest part of the summer (Dimmitt and Ruibal 1980). Logs and other debris are also used as shelter from the heat.

Temporary pools and potholes with water lasting longer than 10 to 12 days are required as breeding sites. Runoff basins at the base of sand dunes are also sites of reproduction (Mayhew 1965). The water temperature of these potential breeding sites must be above 17°C (63°F) for normal embryonic development to occur (Hubbs and Armstrong 1961). Soil temperatures above 20°C (68°F) are also required to initiate breeding. Standing, still water is required for reproduction.

Habitat in the Proposed Project Area

In the proposed project area, native desert habitats are restricted to along the AAC. Spadefoot toads could use these desert areas, particularly in areas near the seepage communities where they may be able to breed. As spadefoot toads are also known to use agricultural areas, they may occur throughout the proposed project area in association with agricultural drains.

Proposed Project Area Occurrence

The proposed project area occurs within the range of this species; however, no populations have been reported from the Imperial Valley. The nearest known populations have been reported from the neighboring Conchise County in Arizona (AGFD 1995), and Sonora, Mexico (Flores-Villela 1993).

Colorado River Toad (*Bufo alvariu*)

Range and Distribution

The Colorado River toad ranges from southeast California across lowland Arizona to southwestern New Mexico, and southward through most of Sonora to northern Sinaloa, Mexico (Fouquette 1970). Historically, the species likely extended northward along the bottomlands of the Colorado River to extreme southern Nevada near Fort Mohave (Jennings et al. 1994). In the main part of its range, it can be found from sea level to 1,600 meters (5,300 feet).

Population Status and Threats

The overall status of the Colorado River toad is uncertain. The New Mexico Department of Game and Fish (NMDGF 1997) describes the status of this species as probably fairly secure, while other investigators have suggested the species is imperiled throughout much of its range (Jennings et al. 1994). In California, the species is probably extirpated over most of its range due to habitat destruction and use of pesticides (Jennings et al. 1994). Although habitat alteration along the LCR has adversely affected this species, the specific factors responsible for declines in this region are uncertain. Isolation of small, vulnerable populations caused by channelization and damming of the Colorado River, and the introduction of the spiny softshell turtle and bullfrog in the early 1900s may also be partly responsible for the species' decline along the LCR (King and Robbins 1991). Habitat destruction/alteration, pesticide use, and predation by exotics may continue to threaten the survival of this species.

Habitat Requirements

Colorado River toads are found in a variety of desert and semiarid habitats including brushy desert with creosote bush and mesquite washes, semiarid grasslands, and woodlands. The toad is semiaquatic and usually associated with large, permanent, or semipermanent streams. It is occasionally found near small springs, temporary rain pools, constructed canals, and irrigation ditches. When not on the surface, this species uses the burrows of other animals as refugia. Colorado River toads have also been found underneath watering troughs (Wright and Wright 1949; Stebbins 1985). Primary breeding habitat for the Colorado River toad is moderately large streams, but it is also known to breed in temporary rain pools and constructed watering holes and irrigation ditches (Blair and Pettus 1954; Stebbins 1954 and 1985; Savage and Schuierer 1961). This species needs permanent or semipermanent water sources for breeding.

Habitat in the Proposed Project Area

In the proposed project area, native desert habitats are restricted to along the AAC. The toad could use these desert areas, particularly in areas near the seepage communities where they may be able to breed. Agricultural drains have the potential to be used by the toad, and the toad could use areas adjacent to the New and Alamo Rivers, although its use of tamarisk has not been determined.

Proposed Project Area Occurrence

The known extant populations in the U.S. have been reported from southeastern Arizona and southwestern New Mexico (Rosen et al. 1996). While populations have been reported to occur in Sonora, Mexico (Flores-Villela 1998), this species is presumably extinct in California (Jennings et al. 1994). No populations have been reported from the HCP area.

Lowland Leopard Frog (*Rana yavapaiensis*)

Range and Distribution

The historic range of the lowland leopard frog included the lower Colorado River and its tributaries in Nevada, California, Arizona, New Mexico, northern Sonora and extreme northeast Baja California, Mexico. This frog occurred in the Colorado River near Yuma in extreme southwestern Arizona, in west, central, and southeastern Arizona south of the Mogollon Rim, and the Virgin River drainage in extreme northwestern Arizona (AGFD 1997; Platz and Frost 1984; NMDGF 1997). It now occurs mostly in central Arizona, below 1,676 meters (5,500 feet), south and west of the Mogollon Rim (NMDGF 1997).

Population Status and Threats

The lowland leopard frog has been extirpated from southeastern California. It is also believed to have been extirpated from southwestern Arizona and New Mexico (AGFD 1997). The species has not been found in surveys in California since 1965 (Clarkson and

Rorabaugh 1989; USFWS 1999). The species is considered stable in central Arizona, but declining in southeast Arizona (AGFD 1997).

Potential reasons for regional declines include water manipulations; water pollution (including human use of aquatic habitat); introduced species (e.g., fish, bullfrogs, and crayfish); heavy grazing; and habitat fragmentation (Clarkson and Rorabaugh 1989; AGFD 1996 and 1997). These factors continue to threaten the survival of this species. In addition, in Arizona where the species still occurs, it may face future threats from competition with the Rio Grande leopard frog, an introduced species that is expanding into the range of the lowland leopard frog (AGFD 1996).

Habitat Requirements

The lowland leopard frog is generally restricted to permanent waters associated with small streams and rivers, springs, marshes, and shallow ponds. It is normally found at elevations below 1,500 meters (4,921 feet) and is often concentrated near deep pools in association with the root masses of large riparian trees (NMDGF 1997). In New Mexico, lowland leopard frogs were associated with vegetation that includes Arizona sycamore (*Platanus wrightii*), seepwillow (*Baccharis glutinosa*), other trees and shrubs, and various forbs and graminoid plants. In Arizona, populations typically occur in aquatic systems with surrounding Sonoran desert scrub, semidesert grassland, or Madrean evergreen woodland upland vegetation communities at elevations from 244 to 1,678 meters (800 to 5,500 feet) (AGFD 1997). In Arizona, lowland leopard frogs show a strong preference for lotic habitats, with 82 percent of known localities being natural lotic systems and 18 percent lentic habitats, primarily stock tanks (Sredl 1997).

Historic accounts from the Imperial Valley reported the species occurring in slack water habitats, such as canals and roadside ditches with abundant aquatic vegetation (Storer 1925; Klauber 1934). Emergent or submergent vegetation, such as bulrushes or cattails, is probably necessary for cover and as substrate for oviposition (Jennings et al. 1994). Both aquatic habitat and adjacent moist upland or wetland soils with a dense cover of grasses or forbs and a canopy of cottonwoods or willows are important components of leopard frog habitat. Large pools may be essential for adult survival and reproductive efforts, while smaller pools and marshy habitats probably enhance juvenile survival (NMDGF 1997). Studies of microhabitat use by differing age classes of lowland leopard frogs suggest that management practices that create or maintain a variety of aquatic habitats may be important to this species. The primary food source for adults is small invertebrates, while larvae eat algae, plant tissue, organic debris, and probably small invertebrates (AGFD 1997).

Leopard frogs may be especially vulnerable to catastrophic events, such as floods and drought. Tadpoles are susceptible to predation by introduced predators, such as catfish and bullfrogs. Removal of vegetation may result in increased predation by both aquatic and terrestrial predators (NMDGF 1997). Because local populations of leopard frogs are prone to extinction, it is also important to facilitate recolonization through the maintenance of adequate dispersal corridors (Sredl 1997).

Habitat in the Proposed Project Area

Lowland leopard frogs are generally associated with small streams and marshes that support emergent vegetation. In the HCP area, suitable habitat could occur in the wetlands on the state and federal refuges and wetlands adjacent to the Salton Sea. The New and Alamo Rivers probably do not provide suitable habitat conditions due to their large size. However, portions of the agricultural drainage system that support cattails could provide suitable conditions.

Proposed Project Area Occurrence

Lowland leopard frogs are not known to inhabit the proposed project area currently. Lowland leopard frogs have the potential to occur in the proposed project area in the future as a result of additional introductions or migration from reintroduced populations.

Reptiles

Desert Tortoise (*Gopherus agassizi*)

Range and Distribution

The desert tortoise is found in many Mojave and Sonoran Desert habitats in a range that covers southeastern California, southern Nevada, and northern Mexico. Suitable tortoise habitat includes sandy washes, canyons, and gravel beds dominated by creosote bush scrub with ocotillo, cactus, and yucca, usually between elevations from 500 to 2,700 feet (Reclamation 1993). In the Salton Trough, desert tortoise occur near San Gorgonio Pass and on the alluvial fans of Coachella Valley.

The Colorado River has been an effective geographic barrier, separating the Mojave and the Sonoran populations of desert tortoise for millions of years. The Mojave population is found to the west and north of the Colorado River, and the Sonoran population is found to the east and south. The Mojave population may be further divided into two subpopulations, western and eastern. A low sink that generally runs from Death Valley to the south may be used to separate the western and eastern subpopulations.

Population Status and Threats

Analysis of study plot data from sites in the western Mojave Desert indicates that subpopulations (both adults and especially juveniles) have declined over the last decade. Populations are threatened by a combination of human activities (i.e., urbanization, agricultural development, off-highway vehicle use, grazing, and mining) and from direct vandalism, collections, and raven predation of young. Luckenbach (1982) concluded that human activity is the most significant cause of desert tortoise mortality. In addition, a virus is spreading through the natural population.

Data recently collected on the Mojave population of the desert tortoise indicate that many local desert tortoise subpopulations have declined precipitously. The apparent distribution of Upper Respiratory Disease Syndrome, not identified before 1987 in wild desert tortoises, has suggested the possibility of an epizootic condition and thus may be a significant contributing factor to the current high level of desert tortoise losses documented for certain localities.

Habitat Requirements

The species inhabits desert scrub, desert wash habitats, and Joshua tree woodland (Zeiner et al. 1988). Optimal habitat has been characterized as creosote bush scrub in which precipitation ranges from 5 to 20 centimeters (2 to 8 inches), the diversity of perennial plants is relatively high, and production of ephemerals is prominent (Luckenback 1982; Turner 1982, Turner and Brown 1982; Schamberger and Turner 1986). Tortoises feed primarily on spring annual grasses and forbs, as well as perennial grasses. They are most active in the spring and fall months, and escape extreme temperatures of summer and winter by remaining in underground burrows, hibernating in the winter months. Soil conditions must be firm, but soft sandy loams are suitable for burrow construction. Desert tortoise burrows have been found in a variety of locations, such as along the banks of washes, at the base of shrubs, in the open on flat ground, under rocks, on steep hill sides, in caleche caves, and in berms along rail lines.

Habitat in the Proposed Project Area

In the HCP area, creosote bush scrub only occurs in the right-of-way of IID along the AAC. Outside the HCP area, creosote bush scrub surrounds the Salton Sea between the higher rock hillsides and the more saline desert saltbrush community. It also occurs adjacent to the irrigated portions of the valley.

Proposed Project Area Occurrence

Desert tortoise populations are known from areas northeast of the Imperial Valley, particularly in the Chocolate Mountains and the Chuckwalla Valley where high densities have been recorded. Areas adjacent to the Coachella Canal were surveyed in 1981, but no animals were found; the area was considered poor habitat because of rocky soils and sparse vegetation (Reclamation 1993). Populations have also been reported from the Pinto Drainage in the far southwestern part of Imperial County. It is unlikely that desert tortoise would be found in most of the HCP area because most of the HCP area is at or below sea level (IID 1994).

Flat-Tailed Horned Lizard (*Phrynosoma mcalli*)

Range and Distribution

The flat-tailed horned lizard occurs only in sparsely vegetated, sandy areas of the deserts of extreme southwestern Arizona; southeastern California; northeastern Baja California; and extreme northwestern Sonora, Mexico. In Arizona, the species occurs in the Yuma Desert west of the Tinaja Altas and Gila Mountains, and south of the Gila River. In California, it is found in the Coachella Valley, then south toward the head of the Gulf of California (AGFD 1997c). The original range of the species has diminished in recent years due to human activities (Turner et al. 1980).

Population Status and Threats

The flat-tailed horned lizard was proposed as threatened in November 1993 (Federal Register [FR] 58 [227]: 62624-62629). The species was withdrawn from proposed status on July 15 1997. Habitat loss and other impacts have fragmented this species' distribution. Agricultural and urban development in the Imperial Valley have isolated populations in

East Mesa from those west of the Salton Sea, in the Yuma desert, and in the Superstition Mountain area. Flat-tailed horned lizards in the Coachella Valley may be geographically isolated from flat-tailed horned lizards in the Imperial Valley by the Salton Sea and conversion of habitat to croplands. The All American and Coachella Canals are likely barriers to movement, and major highways, such as Interstate 8 in Imperial County and Interstate 10 in Riverside County, further fragment populations. Habitat loss to development and recreation, such as off-highway vehicle use, are the principal threats to species persistence (Zeiner et al. 1988).

Human impacts have resulted in the loss of roughly 34 percent of the historic flat-tailed horned lizard's habitat. In the Imperial and Coachella valleys, a large portion of the flat-tailed horned lizard's habitat has been converted to urban or agricultural use or was flooded by the filling of the Salton Sea from 1905 to 1907. The precise extent of this species' historic habitat cannot be quantified because filling of the Salton Sea and much of the agricultural development predates most collections of flat-tailed horned lizards.

Habitat Requirements

Flat-tailed horned lizard habitat is characterized by areas of low relief with surface soils of fine, packed sand, or pavement overlain with loose, fine, windblown sand (Turner et al. 1980). This species requires fine sand substrates that allow subsurface burrowing to avoid extreme temperatures. Shrubs and clumps of grass are also used for thermal cover when soil surface temperature is very high. Within its range, the flat-tailed horned lizard typically occupies sandy, desert flatlands with sparse vegetation and low plant species diversity, but is occasionally found in low hills or areas covered with small pebbles or desert pavement. Optimal habitat is found in the desert scrub community; however, the species is also known to occur at the edges of vegetated sand dunes, on barren clay soil, and in sparse saltbush communities. Flat-tailed horned lizards are occasionally found on blacktop roads. The flat-tailed horned lizard shares habitat with the fringe-toed lizard.

Habitat in the Proposed Project Area

Suitable habitat for flat-tailed horned lizards in the proposed project area occurs along the AAC and along the western side of the Westside Main Canal in the West Mesa. Extensive habitat for this lizard also occurs to the east of the East Highline Canal (BLM 1990).

Proposed Project Area Occurrence

Flat-tailed horned lizards are known to occur in the HCP area. Lizards have been observed near Gorden Wells where the Coachella Canal branches off the AAC. Field surveys have detected lizards in the East Mesa south of Highway 78 east of the East Highline Canal (BLM 1990). Surveys for the flat-tailed horned lizard were conducted in May 1984 and again in June 1993 (Reclamation and IID 1994). Results of the two surveys were similar. Flat-tailed horned lizards were observed along the AAC between Drops 1 and 3; however, scat was also observed east of the eastern Interstate 8 crossing of the Algodones Dunes. USFWS (1996b) surmised that the species is probably absent from the high dunes between Drop 1 to around the eastern Interstate 8 crossing. Although this species is well distributed along the AAC, this area has not been identified as a key area for the species (Turner and Medica 1982). The area is isolated from other flat-tailed horned lizard habitat by the AAC, Interstate 8 on the north, and agricultural development in the Mexicali Valley to the south.

Western Chuckwalla *(Sauromalus obesus obesus)*

Range and Distribution

The chuckwalla is found throughout the deserts of the southwestern U.S. and northern Mexico (Stebbins 1985). Chuckwallas are found in a variety of desert scrub and woodland habitats from sea level to 3,750 feet in the Mojave and Colorado deserts.

Population Status and Threats

The chuckwalla is a widespread species but is regionally limited by its requirement for rock outcrops. Under ideal conditions, it can be quite common locally. Urban expansion (e.g., construction of roads and utilities, inundation by reservoirs, and agriculture) has reduced the available habitat for this species and is the primary threat to this species. Overcollection by collectors or shooters can also cause local declines in this long-lived species. Collection also leads to habitat destruction when collectors use tools to pry open crevices and break up rockpiles resulting in further declines in chuckwalla populations (NMDGF 1997).

Habitat Requirements

Western chuckwallas are most abundant in the Sonoran Creosote Bush Scrub plant community, but only occur in areas with large rocks, boulders, or rocky outcrops, usually on slopes. Warm rock surfaces are used for basking and as lookout positions for predators. Typical habitat includes rocky hillsides and talus slopes, boulder piles, lava beds, or other clusters of rock, usually in association with desert scrub habitat. Burrows are dug between rocks for dwelling and breeding (NMDGF 1997). Chuckwallas feed entirely on plant material, especially the flowers, leaves, and fruits of the creosote bush. Nests are dug in sandy, well-drained soils. Chuckwallas are generally active only from mid-spring to mid-summer and occasionally in fall, though they can be active year-round in warm areas.

Habitat in the Proposed Project Area

The creosote bush scrub community is widespread throughout the nonirrigated areas of the Sonoran Desert. This habitat type surrounds the Salton Sea between the higher rock hillsides and the more saline desert saltbrush community. In the HCP area, creosote scrub only occurs within the right-of-way of IID along the AAC. However, most of the habitat along the AAC consists of sandy soils, lacking significant amounts of rocky habitat. IID operates two quarries adjacent to the Salton Sea. These quarries could provide suitable habitat conditions for chuckwallas, but chuckwallas are unlikely to inhabit these quarries because they are surrounded by agriculture and wetlands and are isolated from desert habitats.

Proposed Project Area Occurrence

This species is known to occur on lava flows and craters of the LCR Valley, but has not been observed in the HCP area. Lack of suitable habitat makes the occurrence of this species unlikely. The right-of-way of IID along the AAC is the only location where chuckwallas might occur.

Colorado Desert Fringe-Toed Lizard (*Uma notata notata*)

Range and Distribution

This species ranges from the extreme southeastern California west, to the extreme eastern part of San Diego County, and into northeastern Baja California. In California, this species is found south of the Salton Sea in the Colorado Desert Region in northeast San Diego County and the majority of Imperial County. It is restricted to areas containing fine, loose sand.

Population Status and Threats

While the distribution of this species is limited, populations in areas without disturbance appear healthy and stable. The current primary threat to this species is off-road vehicle use.

Habitat Requirements

The Colorado desert fringe-toed lizard is highly adapted to living in areas of windblown sand and is not known to occur elsewhere (Smith 1971). Distribution is restricted to fine, loose, windblown sand of dunes, flats, riverbanks, and washes (Stebbins 1985). It is most abundant on well-developed dunes, but does occur on level or undulating sand with very low vegetation. The species is a habitat specialist and is restricted to the distribution of sand particles no coarser than 0.375 millimeters.

Colorado desert fringe-toed lizards often seek cover under shrubs at the foot of dunes. They burrow in sand during hot or cold weather and go into torpor in winter. The lizards usually hibernate on the lee side of the dunes and can tolerate being buried by up to 12 feet of wind-deposited sand. Fringe-toed lizards often burrow 5 to 6 centimeters below the sand surface, using rodent burrows or the bases of shrubs for cover and thermoregulation.

Habitat in the Proposed Project Area

Suitable habitat for the Colorado desert fringe-toed lizard occurs in the proposed project area, specifically, where the AAC traverses the Algodones Dunes.

Proposed Project Area Occurrence

The Colorado desert fringe-toed lizard is found in areas with fine, loose, windblown sand in habitats such as desert wash or sparse desert scrub south of the Salton Sea in San Diego and Imperial Counties. It could potentially occur throughout the study area wherever aeolian sand is found (Norris 1958). During Reclamation surveys for the flat-tailed horned lizard, approximately 100 Colorado desert fringe-toed lizards were sighted in the Algodones Dunes along a 600-foot-wide transect immediately adjacent to the north side of the AAC.

Banded Gila Monster *(Heloderma sespectum cinctum)*

Range and Distribution

The Gila monster is distributed from southwestern Utah and Southern Nevada south to Southern Sonora, Mexico, and from the Colorado River east to extreme southwestern New Mexico (AGFD 1998b). The banded Gila monster, which is the subspecies potentially occurring in the study area, ranges from the Vermilion Cliffs, Utah, south through the LCR basin, including extreme Southern Nevada, southeastern California, and Arizona west of the Central Plateau to Yuma (Jennings et al. 1994).

Population Status and Threats

The Gila monster has declined in heavily urbanized and agricultural areas throughout its range, but remains locally common elsewhere. Overcollection by collectors is the principal threat to this species. Because the Gila monster is only one of two poisonous lizards in the entire world, the species is highly prized as a pet. Demand as a collectors item may have created a black market for this species and contributed to its decline (Jennings et al. 1994; Zeiner et al. 1988).

Habitat Requirements

The banded Gila monster is uncommon in a variety of desert woodland and scrub habitats, principally in desert mountain ranges. This lizard prefers the lower slopes of rocky canyons and arroyos but is also found on desert flats among scrub and succulents. It seems to prefer slightly moist habitats in canyons, arroyos, and washes. The Gila monster uses the burrows of other animals and may construct its own. Rock crevices and boulder piles are also used for shelter (Shaw 1950; Stebbins 1954; Bogert and Del Campo 1956). Little is known about reproductive requirements. Eggs are laid in the soil in excavated nests, so the soil must be sandy or friable. Gila monsters may also require areas with exposure to the sun and moisture (Stebbins 1954; Bogert and Del Campo 1956). This species seems to occur in areas that are moister than surrounding areas.

Habitat in the Proposed Project Area

Most of the proposed project area is agricultural land or urban area and offers no habitat for the banded Gila monster. Desert scrub occurs along the AAC. However, this area is near major highways and areas heavily used for off-highway recreation and is unlikely to support this species. There are no desert mountain ranges in the proposed project area. The nearest suitable habitat likely occurs in the Chocolate Mountains to the northeast of the proposed project site and in the rocky areas along the LCR.

Proposed Project Area Occurrence

The banded Gila monster is not known to occur in the proposed project area, and lack of suitable habitat makes the presence of this species unlikely.

Birds

American White Pelican (*Pelecanus erythrorhynchos*)

Range and Distribution

American white pelicans once nested throughout inland North America on isolated islands in rivers, lakes, and bays that were free of mammalian predators. Breeding colonies were distributed from British Columbia and the prairie provinces of Canada south across the southern U.S. from California to Florida. This species now breeds in scattered locations in the prairie provinces and in the western U.S. (Washington to Texas). Most white pelicans winter in central California, along the Pacific coastal lowlands south to Guatemala and Nicaragua, along the Gulf Coast, and throughout most of Florida (Terres 1980; Ehrlich et al. 1988).

Population Status and Threats

The American white pelican has declined in numbers since presettlement times due primarily to the loss and degradation of breeding and foraging habitats and to human persecution, especially by fishermen who mistakenly believed that the pelican competed for game fishes. Eggshell thinning caused by the use of insecticides may also have played a significant role in the decline of this species (Terres 1980).

Nesting American white pelicans have declined in California in the last century because of degradation and loss of nesting habitat; the only remaining nesting colonies are at large lakes in the Klamath Basin. The white pelican population is vulnerable to decline because of its low annual reproductive output, colonial nesting, and dependence on isolated nesting sites. Drought, water diversion proposed projects, and disruptive human activities at nesting colonies continue to threaten this species. Lowering water levels in lakes allows predators to destroy nesting colonies as nesting islands become connected to mainland shorelines. American white pelicans also are susceptible to persistent pesticides that pollute the watershed. An estimated 10 percent of the white pelican western population died from avian botulism in 1996 (Rocke 1999).

Habitat Requirements

White pelicans are usually associated with large freshwater marshes and shallow lakes at lower elevations 853 to 1,676 meters [2,800 to 5,500 feet]) that support a rich supply of fish. They are also frequently found in coastal estuaries (Garrett and Dunn 1981; Terres 1980). Large expanses of open water appear to be a major stimulus in attracting these birds to an area, with the nearby vegetation seemingly an unimportant factor (NMDGF 1997). Fish are the primary diet of the white pelican, but salamanders, frogs, crayfish, and a variety of aquatic invertebrates are also consumed. This species can catch prey only in shallow water or within about 1 meter (3 feet) of the surface of the water. The white pelican has the ability to disperse widely and locate new food supplies.

The white pelican is a colonial species that is often found nesting and foraging in association with several species of waterbirds, particularly the double-crested cormorant. White pelicans breed synchronously and due to brood reduction (i.e., starvation of smaller chicks because of harassment by the larger sibling), only one juvenile is usually raised per successful nesting attempt. Sexual maturity is reached at age three (NMDGF 1997).

Habitat in the Proposed Project Area

Suitable habitat for white pelicans in the proposed project area occurs mainly at the Salton Sea. Pelicans congregate at the mouths of the New and Alamo Rivers, where prey items are generally abundant (IID 1994). Lakes in the valley (e.g., Fig, Lagoon, and Finney Lakes) also provide suitable habitat for white pelicans.

Proposed Project Area Occurrence

The Salton Sea is an important migratory stopover for American white pelicans. The pelicans appear to use the Salton Sea for a few weeks to a few months before continuing on their migration to Mexico (Shuford et al. 1999). As many as 33,000 American white pelicans have been counted at the Salton Sea during migration and during the winter (USFWS 1999). From the early 1900s to the late 1950s, this species also nested at the Salton Sea. Currently, it is unlikely that there is sufficient undisturbed habitat at the Salton Sea to support nesting colonies of American white pelicans.

In radio-telemetry studies during 1991, individual pelicans migrating south from northern California (e.g., Clear Lake National Wildlife Refuge) were documented as using the Salton Sea (Anderson 1993). The large populations of white pelicans at the Salton Sea in the early- to mid-1980s were likely associated initially with extensive flooding in the LCR Delta area from the late 1970s through the mid-1980s, when many white pelicans came to reside in the region for a substantial portion of the wintering period, using Salton Sea/Laguna Salada/Rio Hardy wetlands as wintering habitat. Most recent censuses of the Salton Sea white pelicans (Anderson 1993) indicate that use may be declining in recent years, but that the area still supports several thousand white pelicans for significant periods during the winter (Anderson 1993; Setmire et al. 1993). Although accurate data are not available to compare relative numbers of white pelicans at the Salton Sea with those found at other typical habitats in the region, the population at the sea is probably much larger than at the other areas (Anderson 1993). Data collected by the USFWS (USFWS 1993d) also indicate that smaller numbers of white pelicans have used the Salton Sea and adjacent wetlands in recent years as compared to the peak numbers reported in 1985. Overall, the USFWS counts in combination with data summarized above indicate that 2,000 to 17,000 white pelicans use the Salton Sea as overwintering habitat for up to 6 months.

California Brown Pelican *(Pelecanus occidentalis californicus)*

Range and Distribution

Brown pelicans occur in marine habitats along the Pacific, Atlantic, and Gulf Coasts in North America and range southward through the Gulf and Caribbean areas to Central and South America. The California subspecies nests on islands off the coast of Southern California, south along the coast of Baja California and the Gulf of California, to Guerrero, Mexico (CDFG 1992). After the breeding season, California brown pelicans disperse from breeding areas and can be found as far north as British Columbia, Canada, and as far south as South America.

Population Status and Threats

Brown pelican populations declined greatly in the mid-20th century because of human persecution, disturbance of nesting colonies, and reproductive failure caused by eggshell thinning and the adverse behavioral effects of pesticides (Palmer 1962; Terres 1980). Most North American populations of this species were extirpated by 1970. Since the banning of dichlorodiphenyl-trichloroethane (DDT) and other organochlorine use in the early 1970s, brown pelicans have made a strong recovery and are now fairly common and perhaps still increasing on the southeast and west coasts (Kaufmann 1996). The endangered Southern California Bight population of the brown pelican grew to 7,200 breeding pairs by 1987, but has experienced considerable population fluctuations in recent years and has not, as yet, been considered sufficiently stable for delisting (CDFG 1992). In 1992, there were an estimated 6,000 pairs in Southern California and approximately 45,000 pairs on Mexico's west coast (Ehrlich et al. 1992). Transient brown pelicans are threatened by physical injury or direct mortality resulting from human persecution, fish hooks, or accidental entanglement in fishing lines. Pesticides, poisons, and other environmental contaminants as well as human disturbance and disease may also threaten brown pelicans (CDFG 1992).

Habitat Requirements

Brown pelicans are found primarily in warm estuarine, marine subtidal, and marine pelagic waters (Zeiner et al. 1990; NMDGF 1997). They occur mostly over shallow waters along the immediate coast, especially near beaches and on salt bays (Kaufmann 1996). Brown pelicans roost on water, rocks, rocky cliffs, jetties, piers, sandy beaches, and mudflats, and forage in open water. Brown pelicans are plunge divers, often locating fish from the air and diving into the water to catch them. They feed almost exclusively on fish. The brown pelican is a colonial nester. It nests on islands in trees, bushes, and on the ground. This species first breeds at 2 or 3 years of age with only one brood raised per year (Kaufmann 1996; Terres 1980; Zeiner et al. 1990). For roosting, brown pelicans congregate at selected roosting locations that are isolated from human activity.

Habitat in the Proposed Project Area

Because brown pelicans are associated with large open bodies of water, habitat for brown pelicans in the proposed project area principally occurs at the Salton Sea where abundant fish populations provide foraging opportunities for brown pelicans. Nesting habitat is present at the Alamo River Delta, where brown pelicans have nested since 1996 (Shuford et al. 1999). In addition to the Salton Sea, brown pelicans are known to use Finney Lake in the Imperial Wildlife Area (U.S. Army Corps of Engineers [Corps] 1996).

Proposed Project Area Occurrence

Brown pelicans probably had little historical use of the Salton Sea (Anderson 1993). Some visiting postbreeding pelicans were documented at the Salton Sea in the late 1970s, but overwintering was not confirmed until 1987. Use of the Salton Sea by brown pelicans subsequently increased. The Salton Sea currently supports a year-round population of California brown pelicans, sometimes reaching 5,000 birds, although more typically numbering 1,000 to 2,000 birds. In 1996, the brown pelican was first found to nest successfully at the Salton Sea, and several pairs have attempted to nest annually since then (Shuford et al. 1999).

Other than the small number of breeding birds at the Salton Sea, the closest breeding colonies of brown pelicans are located in the Gulf of California on San Luis Island (about 220 miles southeast of the Salton Sea). On San Luis Island, breeding populations vary between 4,000 and 12,000 pairs. The Puerto Refugio area contains about 1,000 to 4,000 breeding pairs, and the Salsipuedes / Animas / San Lorenco area supports 3,000 to 18,000 pairs. Birds from these breeding areas may visit the Salton Sea after the breeding period.

Double-crested Cormorant (*Phalacrocorax auritus*)

Range and Distribution

The double-crested cormorant is a year-round resident along the Pacific Coast of Canada and the U.S. During the summer, it may occur in the north-central U.S. and central provinces of Canada. Wintering birds are found in coastal states along the Gulf of Mexico

(Kaufman 1996). Double-crested cormorants are found year-round along the California coast. Approximately 7,500 individuals nest in Northern California, with lesser numbers in Southern California, Oregon, and Washington (Tyler et al. 1993).

Population Status and Threats

The population of double-crested cormorants declined considerably during the 1960s and early 1970s. This decline was attributed to pesticide residues in the marine food chain, principally DDT (Small 1994). The population began recovering in the late 1970s and 1980s, but has not yet achieved historic levels. Kaufman (1996) reports that the population is currently increasing and expanding its range. In some locations, cormorant populations have increased to such levels that some consider them a competition with recreational fishing. The USFWS is considering implementing control measures in some locations. This species may be threatened by persistent pesticides in water, habitat destruction, and human disturbance. Many nesting colonies in California have been abandoned after human disturbance and habitat destruction (Remsen 1978). Predation on eggs and young by gulls and crows may also be an important factor reducing nesting success (Ellison and Cleary 1978; Siegel-Causey and Hunt 1981).

Habitat Requirements

The double-crested cormorant is a year-round resident along the entire coast of California and on inland lakes and rivers of fresh, salt, or brackish quality (Zeiner et al. 1990). It feeds mainly by diving for fish in water less than 30 feet deep, but will also prey on crustaceans and amphibians. The species requires undisturbed nest sites beside water on islands or on the mainland, including offshore rocks, cliffs, rugged slopes, and live and dead trees. In the midwest, it typically nests in flooded dead timber (snags) and on rocky islands, often in mixed colonies with great blue herons and black-crowned night herons (Meier 1981).

Habitat in the Proposed Project Area

Suitable habitat for double-crested cormorants in the proposed project area occurs at the Salton Sea and at lakes in the valley, such as Finney and Ramer Lakes on the Imperial Wildlife Area. At the Salton Sea, cormorants nest on rocky ledges such as occur on Mullet Island or on accumulations of dead vegetation that occur at the deltas of the New and Alamo Rivers. Snags in the Salton Sea are important for providing protected roost sites for double-crested cormorants. Cormorants regularly move between the Salton Sea and the lakes at the Finney-Ramer Unit of the Imperial Wildlife Area where they forage. In addition to suitable habitat found at the Salton Sea and on the refuges, double-crested cormorants occasionally forage in open water areas of the New and Alamo Rivers. They may also use larger agricultural drains for foraging on occasion.

Proposed Project Area Occurrence

Double-crested cormorants occur as a common year-round resident at the Salton Sea, with counts of up to 10,000 individuals (IID 1994). Small numbers of cormorants have nested at the Salton Sea in the past, and small nesting colonies were documented at the north end of the Salton Sea in 1995 (USFWS 1996a), the first time since 1989 (USFWS 1993d). More than 7,000 double-crested cormorants and 4,500 nests were counted on Mullet Island in 1999.

This represents the largest breeding colony on the West Coast (Point Reyes Bird Observatory 1999).

Least Bittern *(Ixobrychus exilis hesperis)*

Range and Distribution

Least bitterns nest throughout much of the U.S. and southeast Canada south to most of tropical and subtropical South America east of the Andes. The northern populations of this species winter in California, south Texas, and central Florida (Terres 1980). Most of the California population winters in Mexico and migrates in the spring and the summer to scattered locations in the western U.S., including the Colorado River, Salton Sea, Central Valley, and coastal lowlands of Southern California.

Population Status and Threats

This species is believed to have declined in many locales, but it is still abundant in parts of North America (Kaufman 1996). Although no trend data are available for western populations of the least bittern, population trends probably reflect the availability of suitable freshwater marsh habitats (Sauer et al. 1997). Marsh habitats have been declining throughout the 20th century due to channelization, dredging, flood control, grazing, stream diversion, recreational activities, and wildfires (NMDGF 1997). Habitat loss remains the primary threat to this species. Pesticides are also considered a threat to least bitterns (Zeiner et al. 1990a).

Habitat Requirements

The least bittern inhabits fresh and brackish water marshes, and desert riparian habitats (Zeiner et al. 1990a). It is a secretive bird usually found in densely vegetated marshes. This long-distance migrant can also inhabit saltwater and brackish marshes near the coast in the southern portion of its range (Kaufmann 1996; Terres 1980). In the LCR Valley, the largest breeding populations of least bitterns are found in extensive cattail and bulrush marshes like those found near Topock and Imperial Dam. Smaller populations of least bitterns are found throughout the LCR Valley at a variety of marshy areas, including ponds and agricultural canals (Rosenberg et al. 1991). Rosenberg et al. (1991) estimated the breeding density of this species to be 40 birds per 40 hectares (100 acres) in some marshy areas along the LCR. The least bittern builds its nest in tall marsh vegetation, usually cattails. It occasionally nests in loose colonies, but nests are generally scattered throughout the appropriate marsh vegetation.

The least bittern is a carnivorous species that primarily eats small fish, such as catfish, minnows, eels, sunfish, killifish, and perch. Other food items consumed by this species include frogs, tadpoles, salamanders, leeches, slugs, crayfish, small snakes, aquatic insects, and, occasionally, shrews and mice (Terres 1980; Kaufmann 1996).

Habitat in the Proposed Project Area

Least bitterns nest in wetlands adjacent to the Salton Sea that provide dense emergent vegetation, such as cattails or tules. They forage for fish, aquatic and terrestrial invertebrates, and small vertebrates in shallow waters and mudflats along the Salton Sea shoreline or in adjacent freshwater marshes. Dense salt cedar stands adjacent to marshes are often used as roost sites (Garrett and Dunn 1981). Agricultural drains with emergent vegetation and areas of the New and Alamo Rivers are also likely to provide foraging habitat for least bitterns. Portions of the drains support cattail stands that could be used by least bitterns for nesting. Whether least bitterns nest in the drain vegetation is unknown. In addition, marsh communities supported by seepage from the AAC and the main canals in Imperial Valley are also expected to provide suitable habitat.

Proposed Project Area Occurrence

Least bitterns occur in the proposed project area throughout the year, although they are more common in the summer. At the Salton Sea, the least bittern population has been estimated at about 550 individuals (IID 1994).

Reddish Egret *(Egretta rufescens)*

Range and Distribution

In the U.S., reddish egrets breed along the Gulf Coast and Florida coast. Outside the U.S., breeding occurs in Baja California and along the Pacific and Atlantic coasts of Mexico and south to Guatemala. The species also breeds in the Caribbean. It overwinters from southern Florida to Colombia and Venezuela (DeGraaf and Rappole 1995).

Population Status and Threats

The population of reddish egrets was substantially reduced in the late 1800s by feather collectors. Since then, the population has increased. Currently, the U.S. population is estimated at approximately 2,000 pairs (Kaufman 1996). Nesting colonies are susceptible to disturbance; habitat loss and human disturbance may threaten this species.

Habitat Requirements

Reddish egrets are associated with coastal tidal flats, salt marshes, ocean shores, and lagoons. For foraging, they prefer calm shallow waters close to shore such as in marshes or protected bays and lagoons. Small fish comprise most of the reddish egret's diet; but frogs, tadpoles, and crustaceans are also taken. Occasionally, reddish egrets will feed on aquatic invertebrates (Kaufman 1996).

Habitat in the Proposed Project Area

In the proposed project area, reddish egrets are mainly expected to occur at the Salton Sea where suitable foraging habitat exists along the margins of the Salton Sea. Mudflats and marsh habitats adjacent to the Salton Sea may provide suitable foraging conditions for this species. Reddish egrets could also find suitable foraging conditions at the wetlands and lakes of the state and federal refuges and duck clubs. Reddish egrets could forage in agricultural drains like other wading birds (e.g., great blue herons) in the proposed project area.

Proposed Project Area Occurrence

The reddish egret is a rare visitor to the proposed project area in the summer and fall. Only seven records of this species exist at the Salton Sea National Wildlife Reserve (NWR) (USFWS 1997b). It is not known to breed in the area.

White-faced Ibis (*Plegadis chihi*)

Range and Distribution

The white-faced ibis formerly nested from Minnesota west to Oregon and south into California, Utah, and Colorado, and locally down to the Gulf Coast and Mexico (Terres 1980). Breeding colonies are now isolated, with the greatest abundance of breeding birds occurring in Utah, Texas, and Louisiana. The winter range extends from California and along the Gulf Coast south into Mexico, Central America, and Costa Rica.

Population Status and Threats

Breeding white-faced ibis populations declined in distribution and abundance during the 1960s and 1970s, especially in the western U.S. (Ryder and Manry 1994; Shuford et al. 1996). Since the 1980s, however, there has been an increase in western white-faced ibis populations due to improved nesting habitat management, increased planting of alfalfa, and a ban on DDT and other pesticide use in the early 1970s. Unlike some other western states, however, the breeding population in California has decreased substantially, and the species is no longer a regular breeder in the state (Remsen 1978; Zeiner et al. 1990).

The winter population in California appears to have increased especially since the 1970s (Shuford et al. 1996). This may be due to changes in agricultural practices that provide more ibis winter habitat or because the species was overlooked and not surveyed adequately in the early part of the century. During the winter of 1994 to 1995, the California population of the white-faced ibis was estimated at 27,800 to 28,800 individuals.

The primary reason for the decline of the white-faced ibis as a nesting species in California is the loss of extensive marsh habitats (Remsen 1978; Shuford et al. 1996). Habitat loss remains the primary threat to this species. Allowing wetlands to dry up in the spring and summer for mosquito and cattail control adversely impacts this species (Remsen 1978). White-faced ibis populations also declined dramatically during the 1960s and 1970s because of the impacts of pesticides on reproductive success, and loss of habitat from drought and proposed flood-control projects (Ryder and Manry 1994). Pesticides (e.g., dieldrin) were documented in the 1970s as causing large-scale nesting failures at breeding colonies in Utah, Texas, and Nevada and may be an additional cause of the decline of this species in California (Remsen 1978; Terres 1980). Decreasing reproductive success of ibis nesting at Carson Lake, Nevada, in the mid-1980s (Henny and Herron 1989) and at Colusa, California, from 1989 to 1991 (Dileanis et al. 1992) was attributed to DDT. These birds appear to have been exposed to pesticides on their wintering grounds (Henny and Herron 1989). However, limited testing for persistent organochlorine pesticides in ibises from several locations in Mexico indicated that concentrations of 1,1-dichloro-2,2-bis(chlorophenyl)ethylene (DDE), a metabolite of DDT, are the same for Mexican birds as for those in the southwestern U.S. (Mora 1997). Although there are some areas in Mexico from which birds that have the potential for higher DDT accumulation were not tested, there is also the possibility that ibises are acquiring DDE during migration stopovers and winter residency in the southwestern U.S.

Habitat Requirements

The white-faced ibis is gregarious throughout the year, foraging in flocks in perennial marshes, wet fields and croplands, and shallow open water (Grinnell and Miller 1944; Palmer 1962; Cogswell 1977; Burger and Miller 1977). Most wintering ibises in the Salton Sea/Imperial Valley area foraged in irrigated agricultural lands, especially alfalfa and wheat (Shuford et al. 1996). Along the Colorado River, the ibis also forages primarily in alfalfa fields, but uses other flooded agricultural fields, marshes, and lake shores (Rosenberg et al. 1991; Shuford et al. 1996). White-faced ibis probe for invertebrates and small vertebrates in freshwater marshes, in shallow waters along lakeshores, in wet agricultural fields and meadows, and occasionally in salt marshes.

The white-faced ibis nests near the ground or over water in colonies located in extensive, undisturbed marshes with large stands of tall marsh plants such as bulrushes (Palmer 1962; Burger and Miller 1977; Terres 1980). Egg laying is from April to July, with incubation lasting 3 weeks and young remaining at the nest for about 5 weeks after hatching (Cogswell 1977; Terres 1980). The species can establish new colonies in areas with extensive marshes and other conditions that are suitable for breeding. Several factors may affect establishment of new breeding colonies, including population age structure and breeding site fidelity. In addition, the white-faced ibis is able to shift nesting areas in response to changing availability of marsh habitat (Ryder 1967). However, this species may need other ibises and other waders, such as herons, gulls, and ducks, present to initiate a new colony (Palmer 1962; Burger and Miller 1977).

Habitat in the Proposed Project Area

For nesting, white-faced ibis typically use areas of extensive marsh. However, in the proposed project area, they nest predominantly in tamarisk and mesquite snags that are over water. In the proposed project area, the state and federal wildlife refuges and naturally occurring marshes along the Salton Sea are the only areas known to support nesting white-faced ibis. Agricultural drains support limited amounts of cattails and bulrushes in small patches within the confines of the drain. These patches are not likely to provide suitable nesting habitat for white-faced ibis.

Nighttime roosts in the Imperial Valley are found in managed wetlands, such as Ramer Lake and local duck club wetlands, where birds roost in open ponds or in marsh vegetation. The Salton Sea also supports roosting birds (Salton Sea Authority and Reclamation 2000).

Agricultural fields are used extensively by white-faced ibis for foraging. Alfala is one of the primary crops of the Imperial Valley, and white-faced ibis typically congregate in these fields foraging on insects displaced as the field is flood irrigated. Wheat fields are also commonly used for foraging.

Proposed Project Area Occurrence

White-faced ibis occur year-round in the proposed project area, although the greatest numbers occur during winter. The Salton Sea provides habitat for the second largest wintering population of this species in California (USFWS 1999), and more than 24,000 were recorded at the Salton Sea in 1999 (Point Reyes Bird Observatory 1999). These numbers represent more than 50 percent of the white-faced ibis in California (Shuford et al. 1999).

Small numbers of white-faced ibis nest at the Salton Sea (USFWS 1996a). At Finney Lake on the Imperial Wildlife Area, recent breeding estimates indicate 370 breeding pairs using this lake (Shuford et al. 1999).

Wood Stork *(Mycteria americana)*

Range and Distribution

Wood storks have a limited distribution in the U.S. They occur as year-round residents in Florida, Mexico, and parts of South America where they breed (Kaufman 1996; DeGraaf and Rappole 1995). They also breed at scattered locations elsewhere in the southeastern U.S. (DeGraaf and Rappole 1995). After the breeding season, wood storks occur throughout their breeding range as postbreeding visitors but also wander outside their breeding range. Post-breeding birds from western Mexico use the Salton Sea and other locations in the southwestern United States (Kaufman 1996).

Population Status and Threats

The population of wood storks in the southeastern U.S. was reportedly greater than 150,000 at one time. By the early 1990s, the population declined to about 10,000 (Kaufman 1996). Numbers in California appear to have declined since the 1950s (CDFG 1999a). The decline of the breeding population of this species in the United Staes is attributed to loss of breeding and foraging habitat in Florida. Habitat loss remains the primary threat to this species. Outside of this United States, it remains common throughout its range (DeGraaf and Rappole 1995).

Habitat Requirements

Wood storks are associated with marshes, lagoons, and ponds. The species primarily feeds on fish, small vertebrates, and aquatic invertebrates. The storks forage while wading by moving their open bill in the water until contacting a prey item, and then quickly snapping the bill closed (CDFG 1999a). Thus, foraging is restricted to shallow water areas. Wood storks appear in California as early as May after the breeding season and remain as late as October (Small 1994).

Habitat in the Proposed Project Area

Suitable habitat for wood storks in the proposed project area principally occurs at the Salton Sea and adjacent wetland areas. Shallow shoreline areas and pools formed by barnacle bars provide appropriate foraging conditions for wood storks. Most wood storks at the Salton Sea occur at the southern end (CDFG 1999a).

Proposed Project Area Occurrence

The wood stork is a common postbreeding visitor to the Salton Sea, generally occurring at the Salton Sea between July and September (IID 1994). It is also known to occur at the Salton Sea during the spring, fall, and winter although less frequently and in fewer numbers (USFWS 1997b). In the 1950s, as many as 1,500 wood storks occurred at the Salton Sea (Shuford et al. 1999). In recent years, up to 275 individuals have been counted at the Salton Sea (IID 1994).

Aleutian Canada Goose *(Branta canadensis leucopareia)*

Range and Distribution

Aleutian Canada geese once nested in the outer two-thirds of the Aleutian Islands in Alaska and in the Commander and Kuril Islands of the former Soviet Union. Currently, they nest on six islands of the Aleutian archipelago and on one island of the Semidi Island group, southward of the Alaska peninsula. Most Aleutian Canada geese migrate from breeding grounds in Alaska during September, arriving at wintering grounds in California in mid-October. Most Aleutian Canada geese winter in the Central Valley from Los Banos to just north of Sacramento.

Population Status and Threats

Predation by arctic foxes introduced during 1920 to 1936 to many of the Aleutian Islands was primarily responsible for reducing the population to about 800 birds. Aleutian Canada geese were also hunted recreationally and for food until 1975. Chronic outbreaks of avian cholera and avian botulism are present threats to wintering Aleutian Canada geese. The Aleutian Canada goose population has increased in recent years to more than 5,000 (Small 1994), and the USFWS delisted this species.

Habitat Requirements

In winter, Aleutian Canada geese are associated with lakes, fresh emergent wetlands, moist grasslands, croplands, pastures, and meadows (CDFG 1990). Geese feed on a wide variety of marsh vegetation, including algae, seeds of grasses and sedges, grain (especially in winter), and berries.

Habitat in the Proposed Project Area

Aleutian Canada geese do not breed in the proposed project area, and their use of the proposed project area is restricted to overwintering. Habitat for Aleutian Canada geese consists of wetlands adjacent to the Salton Sea, managed wetlands on the state and federal refuges, and wetlands on private duck clubs. In addition, Aleutian Canada geese often forage in agricultural fields during the winter.

Proposed Project Area Occurrence

Aleutian Canada geese occur only as rare fall migrants and winter residents in the proposed project area, where they forage in the wetland areas around the Salton Sea in the agricultural fields throughout the Imperial Valley (Small 1994; USFWS 1997b). The 1998 Christmas Bird Count reported two Canada Geese (small races) in the south Salton Sea area.

Fulvous Whistling-Duck (*Dendrocygna bicolor*)

Range and Distribution

The fulvous whistling-duck is a tropical/subtropical species that breeds in widely separated populations in all hemispheres. This goose-like duck is found in the southern U.S. and Mexico, northeast and southeast South America, east Africa, and India. In the Western Hemisphere, it ranges from Mexico north into the Gulf States and California and along the

Atlantic and Pacific Coasts to New Brunswick and British Colombia, respectively (Terres 1980). Breeding birds in the southern U.S. winter in southern Mexico (Ehrlich et al. 1988).

Population Status and Threats

In recent decades, the fulvous whistling-duck has declined in the southwestern U.S. while increasing in numbers in the Southeast. At the Lake Okeechobee area in southern Florida the population was estimated at 6,000 ducks in the late 1980s (Turnbull et al. 1989). The decline of this species in the Southwest has been primarily attributed to the draining of permanent marshes for agricultural use and the diversion of lakes and rivers for irrigation. Habitat loss remains the primary threat to this species. The destruction of nests by farmers in other parts of North America, susceptibility to hunting due to its unwary behavior, and poisoning by crop pesticides have also contributed to this species' decline (Kaufmann 1996; Ehrlich et al. 1988; Zeiner et al. 1990).

Fulvous whistling-ducks historically occurred as a regular summer visitor in small numbers along the Southern California coast north to Los Angeles and in greater numbers in the Central Valley (Garrett and Dunn 1981). In California, the range and population size of fulvous whistling-ducks have declined, particularly on the coastal slope and in the San Joaquin Valley. By the 1970s, the fulvous whistling-duck was thought to breed only in the Imperial Valley (Shuford et al. 1999). It also has declined along the Colorado River and at the Salton Sea and is now considered a rare summer visitor that may sporadically breed at the Salton Sea (USFWS 1997b). Reasons for decline of the fulvous whistling-duck are draining and development of marsh habitats and hunting. Pesticides have been shown to cause declines in fulvous whistling-duck populations in other states and may also have adversely affected the California population (Zwank et al. 1988).

Habitat Requirements

The fulvous whistling-duck inhabits shallow wetlands, preferring freshwater and brackish marshes on the coastal plain. Although marshy shallows are preferred, roving flocks of whistling-ducks wander widely and occasionally occur at most wetland habitats. Ponds, lakes, and irrigated agricultural fields, particularly flooded rice fields, are commonly used by this species (Terres 1980; Kaufmann 1996; and Ehrlich et al. 1988). The fulvous whistling-duck usually builds its nest in freshwater marshes among dense stands of cattails or bulrushes. The nest is frequently built on a marsh hummock or on the ground at the water edge. Occasionally, nests are placed among tall grasses in wet meadows and rarely in tree cavities (Terres 1980; Kaufmann 1996; and Ehrlich et al. 1988). The species forms long-term pair bonds and raises one brood per year (Ehrlich et al. 1988).

The diet of the fulvous whistling-duck consists mostly of plant material, including a wide variety of greens and seeds. It often forages in agricultural fields for alfalfa, rice, and corn. A few aquatic insects are also eaten (Terres 1980; Kaufmann 1996; and Ehrlich et al. 1988).

Habitat in the Proposed Project Area

Habitat for fulvous whistling-ducks primarily occurs on the state and federal wildlife refuges at Finney and Ramer Lakes, which support dense stands of cattails and bulrushes, and the freshwater impoundments above the mouth of the Alamo River (Garrett and Dunn 1981). Freshwater marshes at the Salton Sea National Wildlife Refuge also potentially provide habitat for this species. Fulvous whistling-ducks nest in dense freshwater wetlands consisting of cattails near the south end of the Salton Sea and forage on wetland plants and submerged aquatic vegetation in freshwater habitats (Salton Sea Authority and Reclamation 2000). Agricultural drains and seepage communities along the water delivery canals may provide foraging habitat for fulvous whistling-ducks but are unlikely to be used for nesting due to their small size. Agricultural fields of alfalfa and wheat are used for foraging in addition to marsh habitats.

Proposed Project Area Occurrence

The Salton Sea has supported a population of up to approximately 200 individuals during the spring and summer (IID 1994). Most of these birds are postbreeders arriving in June and July (Small 1994). The species rarely occurs in the HCP area during the winter (USFWS 1997b). Christmas bird surveys in 1999 reported only 5 birds in the south Salton Sea area and 17 birds from the Martinez Lake area near Yuma Arizona. The 1999 breeding bird surveys for the Southern California population reported an average of less than 1, whereas in other parts of its range average counts ranged between 3 and 30.

Cooper's Hawk *(Accipter cooperii)*

Range and Distribution

The Cooper's hawk breeds from Southern Canada south throughout much of the U.S. and into northern Baja California, Mexico, and northern mainland Mexico (Johnsgard 1990). It breeds throughout most of California (Zeiner et al. 1990). Outside of the breeding season, it disperses widely from southern Canada south into Central America. Cooper's hawks are usually year-round residents in the Southwest, with some migrants from more northern areas arriving in winter (Zeiner et al. 1990).

Population Status and Threats

Cooper's hawk populations have declined historically with an estimated decrease of 13.5 percent between 1941 and 1945 and with rates as high as 25 percent a year after 1948 with the widespread use of DDT (Henny and Wright 1972). Since the late 1960s, however, there has been an increase in some populations, especially in the northeast (Evans 1982). A conservative estimate based on Christmas Bird Count data is that there were 19,400 individuals in the U.S. and Canada (Johnsgard 1990). The largest populations were in Arizona and California. An additional but unknown number of individuals that breed in the U.S. but winter south to Central America were not included in this estimate.

Historically, Cooper's hawks nested in lowland riparian woodlands in the Central Valley and coastal valleys. Cooper's hawks declined as a breeding species in California in the 1950s and 1960s (Remsen 1978). Major factors in the decline of Cooper's hawk populations include pesticide-induced reproductive failures, especially in the eastern U.S., and loss of riparian nesting habitat, especially in the Southwest (Remsen 1978). Other threats include human disturbance at the nest and illegal taking of nestlings.

Habitat Requirements

Cooper's hawks are associated with open and patchy deciduous and mixed forests, riparian woodlands, and semiarid woodlands in the Southwest (Johnsgard 1990; Zeiner et al. 1990).

The Cooper's hawk most often nests in deciduous riparian forest, oak woodland, or young- to mid-seral stage, even-aged conifer forest (30 to 70 years old), usually near streams or other open water (Reynolds 1983). Eucalyptus woodlands may also be used. These forests range from extensive wilderness to smaller forest fragments, woodlots, deciduous riparian groves, small conifer plantations, and suburban habitats (Reynolds 1983; Bosakowski et al. 1992; and Rosenfield and Bielefeldt 1993). In central California oak woodlands, Asay (1987) found the majority of nests to be in closed canopy forests, but noted two nests that occurred in lone trees. Cooper's hawks appear to be tolerant of fragmented forest conditions, and forest edge is generally included within their home range (Rosenfield and Bielefeldt 1993). Even in heavily wooded areas, Cooper's hawk nests were found significantly closer to forest openings than random sites (Bosakowski et al. 1992).

In the western U.S., Cooper's hawks' diet includes approximately 50 percent birds, with the remainder consisting of mammals, amphibians, and reptiles. They hunt from perches with short flight attacks or extended searching flights, often relying on stealth to capture their prey. These hawks prefer hunting in broken woodland and along habitat edges, catching prey on the ground, in the air, or on vegetation (Zeiner et al. 1990).

Habitat in the Proposed Project Area

Cooper's hawks primarily forage on small birds and often hunt along woodland edges. In the proposed project area, Cooper's hawks can find suitable foraging conditions in and adjacent to tamarisk stands that occur along the New and Alamo Rivers and agricultural drains. Wetlands and tamarisk scrub along the Salton Sea are known to be used by Cooper's hawks (Salton Sea Authority and Reclamation 2000). Similarly, wetland and riparian habitats on the state and federal refuges provide suitable foraging habitat, as do habitats supported by seepage from the AAC.

Proposed Project Area Occurrence

Cooper's hawks are winter visitors to the proposed project area (USFWS 1997b). About 300 migrants occur in Imperial Valley during winter (IID 1994). Several Cooper's hawks were observed along the Holtville Main Drain during surveys of selected drains in Imperial Valley (Hurlbert et al. 1997). This drain had the greatest amount of vegetation, predominantly tamarisk, of all of the drains surveyed.

Sharp-shinned Hawk (*Accipiter striatus*)

Range and Distribution

Sharp-shinned hawks nest in north-central North America and in Central and South America. Their breeding range extends from west and central Alaska south through much of Canada and into the upper Great Plains. Breeding populations also extend south along the Pacific Coast to central California and along the northern Atlantic Coast southwest to South Carolina. There is a large disjunct breeding area that includes Arizona, Utah, New Mexico, and Colorado. The winter range is south of the breeding range and includes most of the U.S. except Alaska, where they are found only along the southwest coast.

Population Status and Threats

The Canadian and U.S. wintering populations of sharp-shinned hawks were conservatively estimated to be more than 30,100 individuals (Johnsgard 1990). Highest densities were from Massachusetts to Virginia on the Atlantic Coast and in California and Arizona in the west. The size of the population that breeds in the U.S. and winters to the south is unknown, but is expected to be substantial.

Earlier declines in sharp-shinned hawk populations were likely the result of decreased reproductive success due to pesticides introduced after World War II (Johnsgard 1990). Populations increased after DDT was banned in the U.S. in the early 1970s; however, there has been a decline recently in the number of sharp-shinned hawks passing through traditional migratory paths in the eastern U.S. (Viverette et al. 1996). The continued use of pesticides in Central and South America, the wintering grounds for many sharp-shinned hawks that breed in North America and for many of their avian prey species, is also a concern (Johnsgard 1990). Forest management practices in the western U.S. that produce monoculture forest habitats may threaten this hawk species as well. This species was historically shot in large numbers during migration, which also contributed to its historic decline in abundance.

Habitat Requirements

Sharp-shinned hawks' breeding habitat is typically boreal forest, where up to 80 percent of the North American breeding population is found (Johnsgard 1990). In winter, sharp-shinned hawks use a wider variety of habitats. While it is typically associated with woodland habitats, the sharp-shinned hawk will use open or young forests with a variety of plant life supporting abundant avian prey. Along the Colorado River, sharp-shinned hawks forage in mesquite and willow groves and along the brushy borders of agricultural fields and canals. They forage by darting out from a perch or by hunting in low gliding flights to capture unwary avian prey (Zeiner et al. 1990).

Habitat in the Proposed Project Area

Sharp-shinned hawks typically use woodland habitats. In the proposed project area, woodland habitats are relatively rare and consist mainly of tamarisk scrub along the Salton Sea, the New and Alamo Rivers, and agricultural drains. Tamarisk, as well as some cottonwoods, willows, and mesquite, are supported by seepage from the AAC between Drops 3 and 4 and may provide habitat for sharp-shinned hawks. Tamarisk and eucalyptus trees bordering agricultural fields may also be used as perch sites for foraging.

Proposed Project Area Occurrence

Sharp-shinned hawks occur in the proposed project area as migrants and winter visitors (USFWS 1997b). About 250 sharp-shinned hawks occur in Imperial Valley during migration or winter (IID 1994). Ten drains were surveyed in the Imperial Valley during 1994 to 1995. Two sharp-shinned hawks were observed along the Trifolium 2 Drain, and one was observed along the Holtville Main Drain (Hurlbert et al. 1997). These two drains had the greatest vegetation coverage of the 10 drains surveyed.

Golden Eagle *(Aquila chrysaetos)*

Range and Distribution

The golden eagle is found throughout the U.S. and Canada, ranging from Southern Alaska to central Mexico. It is a widely distributed resident throughout western North America, except for the recent extirpation in the Central Valley of California (Harlow and Bloom 1989).

Population Status and Threats

Approximately 500 breeding pairs of golden eagles nest in California (CDFG 1985). Golden eagle populations declined in Southern California primarily because of the loss of large, unfragmented habitat areas as well as lead toxicosis (Harlow and Bloom 1989). Human disturbance of nest areas may have also contributed to earlier statewide declines (Thelander 1974). Habitat loss and human disturbance remain the primary threats to this species.

Habitat Requirements

Golden eagles occupy primarily mountain, desert, and canyon habitats, usually avoiding dense forested areas where hunting is difficult due to their large wingspan (Johnsgard 1990). Golden eagles construct their nests on cliff ledges and high rocky outcrops, in large trees, on top of telephone poles, and on the ground (Bruce et al. 1982; and Knight et al. 1982). Golden eagles hunt over open country for hares, marmots, rodents, snakes, birds, and sometimes newborn ungulates and carrion. In California, golden eagles forage on wintering waterfowl. Grassland, oak savannah, alpine tundra, meadows, open woodland, chaparral, and wetland habitats provide foraging habitat.

Habitat in the Proposed Project Area

Much of the proposed project area could potentially be used by golden eagles for foraging; however, golden eagles are most likely to concentrate foraging activities in areas of high prey concentrations. In the proposed project area, the Salton Sea and managed wetlands at the state and federal wildlife refuges, as well as private duck clubs, attract abundant waterfowl populations during winter. Agricultural fields also attract waterfowl. Golden eagles may exploit the seasonally abundant prey of these areas.

Proposed Project Area Occurrence

Golden eagles occur at the Salton Sea only as accidentals during the winter and spring (USFWS 1997b).

Ferruginous Hawk (*Buteo regalis*)

Range and Distribution

Ferruginous hawks breed from southeastern Washington; southern Alberta and Saskatchewan, Canada; and western North Dakota south to Texas, northern New Mexico, and Arizona (Johnsgard 1990). They winter primarily from the central part of their breeding range in Nevada, Colorado, and Kansas south to northern Mexico (Johnsgard 1990). There are no breeding records from California, but they are a fairly common winter resident in the southwestern part of the state (Zeiner et al. 1990). Important wintering locales for ferruginous hawks in California include Fish Lake Valley, Owens Valley, Carrizo Plain, Cuyama Valley, Antelope Valley, Lucerne Valley, Lakeview-Perris area (Riverside), and Lake Henshaw (Garrett and Dunn 1981).

Population Status and Threats

The ferruginous hawk has declined as a breeding resident in parts of its range, including Oregon, Arizona, and Kansas. It is now considered a sparse breeder in northern Arizona and no longer nests in southeastern Arizona (AGFD 1996). The estimated breeding population of ferruginous hawks in the U.S. and Canada in the early 1980s was 3,000 to 4,000 breeding pairs (Schmutz 1984). In 1986, the estimated wintering population of ferruginous hawks north of Mexico was approximately 5,500 individuals based on Christmas Bird Count data (Johnsgard 1990). Most wintering birds were concentrated in Arizona and Colorado. From 1973 to 1984, there was a substantial increase in the abundance of wintering ferruginous hawks in the U.S. based on Christmas Bird Count data (Warkentin and James 1988). The largest regional increases in wintering populations were in California and the eastern portion of the range.

The decline of the ferruginous hawk is attributed to the loss of large, open tracts of grasslands and desert scrub habitats used for nesting to agriculture and urban development (Schmutz 1984 and 1987; AGFD 1996). This species is also vulnerable to prairie dog control programs, illegal hunting, and human disturbance at nesting sites (Schmutz 1984; AGFD 1996). Habitat loss and illegal hunting may threaten populations of this species in the study area (Schmutz 1984; AGFD 1996).

Habitat Requirements

Ferruginous hawks are adapted to breeding and wintering in large expanses of semiarid grasslands of the Great Plains with scattered trees, rock outcrops, and tall trees along streams and rivers (Johnsgard 1990). They also use agricultural lands in winter for foraging in both California (Zeiner et al. 1990) and the LCR Valley (Rosenberg et al. 1991). Ferruginous hawks forage on rabbits, jackrabbits, and grassland rodents, such as ground squirrels and prairie dogs (Johnsgard 1990; Plumpton and Andersen 1997). They forage mostly from perches and the ground but also capture prey via long, low, overhead flights. They may steal prey from other raptors and scavenge for food.

Habitat in the Proposed Project Area

Ferruginous hawks are associated with arid open habitats. In the HCP area, they could use agricultural fields or desert habitats adjacent to the AAC.

Proposed Project Area Occurrence

Ferruginous hawks regularly occur in the Imperial Valley in small numbers during the winter. In the Colorado River Valley, most winter migrants and residents are observed from mid-October to mid-March, although they can occur in the valley from late September to early April (Rosenberg et al. 1991). Similar periods of occurrence are assumed for the Imperial Valley. Ferruginous hawks are not known to breed in the HCP area.

Swainson's Hawk (*Buteo swainsoni*)

Range and Distribution

Swainson's hawks nest in disjunct areas of central Alaska and from western Canada east as far as Minnesota and south through Texas to Baja California, Mexico, and north-central Mexico (Johnsgard 1990). This species migrates in large flocks between breeding areas in North America and wintering areas in South America (Terres 1980). In California, this formerly widespread hawk is now restricted to portions of the Central Valley and the Great Basin region of the state (CDFG 1991).

Population Status and Threats

The geographic range and abundance of the Swainson's hawk have decreased in the western U.S. (Zeiner et al. 1990). Swainson's hawks have declined in parts of their range (e.g., southeastern Oregon and California) since the 1940s, whereas in the Great Plains, there was no evidence of decline by the mid-1980s except in peripheral populations (Johnsgard 1990). As of the mid-1980s, an estimated 500,000 birds were in North America; however, more recently, there is thought to have been a nationwide decline (AGFD 1996). Detailed information is lacking on the historical and current abundance of breeding Swainson's hawks in Arizona (AGFD 1996). In California, it is estimated that the breeding population around 1900 may have exceeded 17,000 pairs (CDFG 1991). As of the early 1990s, the statewide population was estimated to be only approximately 550 pairs. The population is still declining, and the species has disappeared from Southern California, except as a spring and fall transient during migration.

The major reason for the substantial decline of this species in the western U.S. is the loss of nesting and foraging habitat due to urban expansion into rural areas (Zeiner et al. 1990; CDFG 1991). There has also been considerable foraging habitat loss due to the trend in planting agricultural crops unsuitable for foraging (e.g., vineyards, orchards, and rice); grassland losses due to grazing practices; fire control; and shrub invasion (CDFG 1991; AGFD 1996). Another major threat to Swainson's hawks has been pesticide use in South America, with an estimated 20,000 to 30,000 individuals killed in 1996 (AGFD 1996). Additional threats to Swainson's hawks include nesting habitat loss due to flood control proposed projects, shooting, pesticide poisoning of prey animals, competition with other raptors, and human disturbance at nest sites (CDFG 1991).

Habitat Requirements

Swainson's hawks nest in mature riparian forests; oak groves; or in lone trees adjacent to foraging areas, such as agricultural fields (Johnsgard 1990; Zeiner et al. 1990; and CDFG 1991). Nests are built from 1.2 to 30.5 meters(4 to 100 feet) high with an average nest tree height of nearly 18 meters(58 feet) in the Central Valley of California (Zeiner et al. 1990; CDFG 1991). Swainson's hawks nest from late March to late August. Spring migration occurs from March through May, and fall migration occurs from September through October.

Swainson's hawks are unusual among most large birds of prey in that they feed largely on insects during the nonbreeding season (e.g., dragonflies, grasshoppers, and crickets) and often congregate in large flocks to forage (Jaramillo 1993; Rudolph and Fisher 1993). Because they depend on insect prey in the winter, they are highly migratory (Johnsgard 1990). During the breeding season, they feed on small mammals and, to a lesser degree, on birds, lizards, and amphibians (Terres 1980; Johnsgard 1990). These hawks often soar in search of prey, catching insects and bats in flight, and will also walk on the ground to capture prey (Zeiner et al. 1990). Swainson's hawks forage during migration in grasslands, agricultural fields (including alfalfa and other hay crops), and lightly grazed pastures (CDFG 1991). Unsuitable foraging areas are crops in which prey is scarce or inaccessible, such as vineyards, orchards, rice, corn, and cotton.

Habitat in the Proposed Project Area

Agricultural fields provide the primary foraging habitat for Swainson's hawks in the proposed project area. Swainson's hawks often visit alfalfa fields for foraging in other parts of its range and would be expected to forage in alfalfa, wheat, and sudangrass fields in the Imperial Valley. Trees, such as tamarisk or eucalyptus that occur adjacent to agricultural fields, provide perch and roost sites.

Proposed Project Area Occurrence

Swainson's hawks are occasional visitors to the Salton Sea area during the spring and fall (USFWS 1997b). No breeding occurs in the proposed project area.

Northern Harrier (*Circus cyaneus*)

Range and Distribution

The northern harrier is a widespread species that can be found distributed from Alaska in the spring and summer as far south as South America. It is distributed across the U.S. with populations that exist year-round throughout the central states to the west coast (Kaufman 1996). In California, the harrier is a year-round resident that is commonly found throughout the state in low-lying areas of agricultural lands, estuaries, and marshes (Zeiner et al. 1990).

Population Status and Threats

Northern harriers are generally declining throughout their range, and southern breeding limits are retracting northward (Johnsgard 1990). Breeding populations have been reduced in most parts of the harrier's range due to the loss and degradation of wetland, meadow, and grassland habitats and burning and plowing of nesting areas during early stages of the breeding cycle (Remsen 1978; Johnsgard 1990). Habitat destruction and exposure to pesticides are the primary threats to northern harriers (Ehrlich et al. 1992). In addition, northern harriers nest on the ground and are vulnerable to nest destruction from agricultural and other human activities; nest predation; and heavy grazing, which reduces nesting cover and also can result in trampling of nests (Zeiner et al. 1990a).

Based on California Biodiversity Council (CBC) data, there was an estimated population of 111,500 northern harriers in North America (MacWhirter and Bildstein 1996). Highest densities in the U.S. were reported from the Chesapeake Bay Area, Texas, California, and Arizona.

Habitat Requirements

The northern harrier is an open country species, nesting at low elevations up to about 900 feet (Johnsgard 1990). It feeds mostly on voles and other small mammals; birds; frogs; reptiles; and insects that inhabit low-lying wetland marshes, swamps, bogs, fields, pastures, cropland, and meadows (Johnsgard 1990). In the LCR Valley, harriers forage primarily in alfalfa or grass fields and over sparse riparian vegetation or marshes and occasionally over open desert. The harrier usually hunts with low, coursing flights over the ground (3 to 30 feet), making quick plunges onto prey. Harriers use tall grasses and wetland forbs as cover. The harrier nests on the ground in tall grasses, sedges, reeds, rushes, cattails, willows, or shrubby vegetation, usually on marsh edges (Brown and Amadon 1968; Johnsgard 1990). Grasslands, cultivated fields, and pastures are used for nesting in addition to native habitats. Harriers breed from April to September, with most egg laying between mid-April and July (Johnsgard 1990; Zeiner et al. 1990).

Habitat in the Proposed Project Area

Throughout California, northern harriers commonly use agricultural fields. In the proposed project area, habitat for northern harriers is abundant. Alfalfa, wheat, and sudangrass are currently the principal crops in the valley, all of which provide suitable forage for harriers. Additional foraging and roosting habitat are available in the managed wetlands of the state and federal wildlife refuges and private duck clubs and wetlands in the vicinity of the Salton Sea.

Proposed Project Area Occurrence

Northern harriers are common fall and winter residents in the proposed project area, but only occasionally occur in the area during the spring and summer (USFWS 1997b). Small (1994) states that nesting of harriers has been significantly reduced in the southern part of California. No recent breeding pairs have been confirmed in Imperial Valley, but, given the occasional occurrence of northern harriers in the project area during summer, breeding is possible. Ten drains were surveyed in the Imperial Valley during 1994 to 1995 (Hurlbert et al. 1997). One to nine individuals were observed along eight of the drains. Surveys conducted in 1999 reported 33 northern harriers at the Salton Sea (Salton Sea Authority 2000).

White-Tailed Kite (*Elanus leucurus*)

Range and Distribution

The white-tailed kite's range extends from coastal zones in western Oregon south to Baja California, Mexico. The white-tailed kite is a common to uncommon, year-long resident in coastal and valley lowlands and rarely found away from agricultural areas. It inhabits herbaceous and open stages of most habitats, primarily in cismontane California.

Population Status and Threats

Population declines were noted nationwide during the 1980s and 1990s (Dunk 1995). However, Small (1994) reports a general population increase in California in recent years following declines in several portions of the state (e.g., southern and west-central areas) during the 1980s. Nests may be robbed by jays, crows, magpies, raccoons, and opossums. No other threats to this species have been identified.

Habitat Requirements

The white-tailed kite uses herbaceous lowlands with variable tree growth and dense populations of voles (Waian and Stendell 1970). The preferred foraging habitat of the white-tailed kite consists of farmlands, open grasslands, meadows, emergent wetlands, clearcuts, and lightly wooded areas (Johnsgard 1990). Lightly grazed or ungrazed fields provide the best foraging habitat (Dunk 1995). Specific associations with plant species for foraging or nesting seem unimportant; rather vegetation structure and prey base are thought to be the primary determinants of foraging and nesting habitat quality. Substantial groves of dense, broad-leafed deciduous trees are used for nesting and roosting. This species uses trees with dense canopies for cover. In Southern California, it also roosts in saltgrass and Bermudagrass.

The white-tailed kite makes a nest of loosely piled sticks and twigs and lined with grass, straw, or rootlets. Nests are placed near the top of dense oak, willow, or other tree stand; usually 6 to 20 meters(20 to 100 feet) above ground (Dixon et al. 1957). Nest trees range from 10 to 170 feet tall and can occur as single, isolated trees or in large stands greater than 250 acres. Most nests are placed near forest/grass edges in the upper one-third of the tree (Dunk 1995).

Habitat in the Proposed Project Area

Agricultural fields and managed wetlands associated with the state and federal wildlife refuges provide foraging areas for the white-tailed kite. Tamarisk and eucalyptus bordering agricultural fields provide potential roosting and nesting sites.

Proposed Project Area Occurrence

White-tailed kites may occur in the proposed project area throughout the year. Although not common, they are regularly observed (USFWS 1997b). Breeding status is uncertain. They have bred in the HCP area previously, but have not been verified to breed there recently (USFWS 1997b). White-tailed kites were observed during general avian surveys of several drains in the Imperial Valley (Hurlbert et al. 1997).

Bald Eagle *(Haliaeetus leucocephalus)*

Range and Distribution

Bald eagles occur in North America from central Alaska and Canada south to northern Mexico (USFWS 1995b). They are found primarily along coasts, inland lakes, and large rivers, but may also be found along mountain ranges during migration. Although the bald eagle is greatly reduced in abundance from historical levels, the current distribution is essentially the same (USFWS 1976). Many bald eagles withdraw in winter from northern areas, migrating north again in spring and summer to breed (Terres 1980).

Population Status and Threats

Historically, bald eagles are believed to have nested throughout North America on both coasts and along major rivers and large lakes (Gerrard and Bortolotti 1988). By the mid-1800s, bald eagle populations had declined radically throughout most of the U.S. because of widespread shooting, reductions in the species' prey base, and secondary poisoning as a result of predator control programs. The introduction of DDT for agricultural purposes in the 1940s furthered the decline of this species, resulting in widespread reproductive failure due to eggshell thinning. Efforts to save the bald eagle, including passing of the Bald Eagle Protection Act in 1940, listing the bald eagle as a federally endangered species in 1967, and banning DDT in the U.S. and Canada in the early 1970s, have resulted in a slow recovery of the species. Between 1982 and 1990, the number of occupied bald eagle territories in the lower 48 states. doubled from 1,482 to 3,014. Reintroduction programs have also contributed to the species' recovery (Hunt et al. 1992). Due to population increases, the USFWS has proposed to delist the bald eagle (FR 64 36454-36464). The main threats to bald eagles in the study area are habitat loss and degradation, including declines in prey and roost-site availability. Human disturbance, environmental contamination, electrocution, poisoning, trapping, and illegal taking also threaten this species (NMDGF 1997).

Habitat Requirements

Bald eagles are associated with aquatic ecosystems, including large rivers, major lakes, reservoirs, estuaries, and seacoasts. They require open water habitats that support an adequate food base. Bald eagles forage on fish and waterfowl from perch sites adjacent to foraging areas. Thus, perch sites near open water or marshes are an essential habitat feature. Bald eagles acquire food in a diversity of ways. They catch live prey, steal prey from other predators, and find carrion. Fish, small mammals, and waterfowl make up the majority of the eagles' diet (Terres 1980).

Habitat in the Proposed Project Area

Suitable foraging habitat occurs at the Salton Sea and adjacent wetlands where eagles may prey on fish and waterfowl. The state and federal wildlife refuges as well as private duck clubs that support abundant waterfowl populations during the winter may also attract bald eagles. In addition, some waterfowl species forage in agricultural fields of the valley, and bald eagles probably exploit this food source where trees are present to provide roost sites.

Proposed Project Area Occurrence

Bald eagles are a rare and occasional winter visitor to the proposed project area. A few winter migrants (one to three birds) have been regularly observed at the Salton Sea, but are rarely observed during the fall (IID 1994). They are not known to breed in the proposed project area.

Osprey *(Pandion haliaetus)*

Range and Distribution

The osprey is a cosmopolitan species, found on every continent except Antarctica (Terres 1980). In North America, ospreys breed from northwest Alaska and Canada south to Baja California, Mexico, and Florida (Johnsgard 1990). In the U.S., they occur close to coastal waters on the east and west coasts and inhabit inland areas around the Great Lakes, Utah, Arizona, and Nevada. Ospreys winter on the Gulf Coast and Southern California south into

Central and South America (Terres 1980). This species breeds throughout Northern California from the Cascade Range south to Marin County and throughout the Sierra Nevada (Zeiner et al. 1990).

Population Status and Threats

Ospreys have declined in abundance, especially since the 1960s (Terres 1980). There were an estimated 8,000 pairs in the contiguous U.S. in the early 1980s with Florida having the largest numbers, followed by Chesapeake Bay and Maine (Johnsgard 1990). Based on Christmas Bird Count data, the U.S. winter population was estimated at 7,080 individuals in 1986, with more than half in Florida. Since DDT was banned in the U.S., osprey populations have increased considerably in many parts of the country (Kaufman 1996). The North American breeding population has been estimated at 17,000 to 20,000 individuals (Poole 1989).

The decline in osprey numbers is largely attributed to the adverse effects of DDT and other pesticides on reproduction (Johnsgard 1990). Some areas still have greatly reduced osprey populations that may be due to residual effects of these now banned pesticides. The adverse effects of pesticides continue to threaten this species. More than half of the North American population may winter in Latin America and the West Indies where pesticide use is not as controlled as in the U.S. and Canada. Human encroachments on breeding areas and shooting have also adversely affected osprey populations.

Habitat Requirements

Ospreys are found only in association with lakes, reservoirs, coastal bays, or large rivers. They feed predominantly on fish, although some mammals, birds, reptiles, and amphibians are also eaten. Ospreys require open, clear water for foraging and swoop down while in flight or from a perch to catch fish at the water's surface. Large trees and snags near the water are used for roosting and nesting. During the breeding season, ospreys generally restrict their movements to activities in and around the nest site, and between the nest and foraging sites.

Habitat in the Proposed Project Area

Habitat for ospreys in the proposed project area principally occurs at the Salton Sea, where abundant fish populations provide foraging opportunities. Snags and trees along the margins of the Salton Sea provide important perch sites that ospreys use for foraging and eating captured prey. Ospreys may also forage along the New and Alamo Rivers and lakes in the Imperial Valley, such as Finney Lake and Fig Lagoon.

Proposed Project Area Occurrence

At the Salton Sea, ospreys occur in small numbers as a nonbreeding visitor throughout the year (IID 1994).

Harris' Hawk *(Parabuteo unicinctus)*

Range and Distribution

Historically, Harris' hawks were residents of semiopen habitats from northern Baja California, Mexico, east through central and southern Arizona, southern New Mexico, and southern Texas; and south through Central America and South America. This species has also occurred infrequently in Kansas, Louisiana, Colorado, Utah, and Nevada (Johnsgard 1990). Historically, Harris hawk occurred year-round in the LCR Valley from near Needles to the Imperial National Wildlife Refuge, with a small disjunct breeding population at the south end of the Salton Sea (Small 1994; Bednarz 1995).

Population Status and Threats

Although Harris' hawks are still located throughout most of their historic range, they were believed to be extirpated from southeastern California and southwestern Arizona by the early 1970s. Small numbers of Harris' hawks are once again present in California due to accidental releases and recent attempts at reestablishing a breeding population along the LCR. Attempts to reintroduce the Harris' hawk occurred in the 1980s, when nearly 200 birds were released along the LCR (Walton et al. 1988). A few nests have been found incidentally since (Bednarz 1995). Continuing habitat alteration and increasing recreational impacts are the greatest threats to this species (Johnsgard 1990). Lack of suitable habitat threatens the success of reintroduction programs. Shooting, poisoning (i.e., rodenticides), and the taking of nestlings for falconry may also threaten this species' survival (AGFD 1997c).

Habitat Requirements

Harris' hawks occur in desert scrub dominated by saguaro, paloverde (*Cercidium spp.*), and ironwood (*Olneya tesota*); cottonwood-mesquite forests; and semidesert prairies. Saguaro cacti, paloverde, mesquite, and riparian trees, especially cottonwoods, are used as nest sites. This species also occurs in some urban environments where it takes advantage of washes, vacant lots, and areas of undeveloped desert (Rosenberg et al. 1991; Johnsgard 1990). In urban situations, nests have been placed in pine trees, palm trees, and transmission towers. The diet of the Harris' hawk consists mainly of small- to medium-sized rodents, but it is also known to take birds, lizards, and mammals up to the size of rabbit.

Habitat in the Proposed Project Area

Little potential habitat for Harris' hawk exists in the HCP area. Cottonwood and mesquite trees that Harris' hawks could use for nesting occur only in a few isolated seepage areas along the AAC, principally between Drops 3 and 4. In the remainder of the HCP area, Harris' hawks could use landscape trees and trees on the state and federal refuges. Agricultural fields throughout the HCP area could be used for foraging.

Proposed Project Area Occurrence

Harris' hawks have been observed at the Imperial National Wildlife Refuge and are known to forage in mesquite and willow groves along the LCR (Bednarz and Ligon 1988). Although, historically, they apparently bred at the Salton Sea, they have not been observed recently.

Merlin *(Falco columbarius)*

Range and Distribution

Merlins breed in summer in the northern forests of Europe, Asia, and North America. In North America, their breeding range extends from northwestern Alaska and northern Canada to the southern limits of the boreal coniferous zone. In winter, most merlins migrate south of their breeding range to the western U.S., the Gulf Coast, and south to northern South America (Johnsgard 1990; Terres 1980).

Population Status and Threats

The status of this species is somewhat uncertain. Some merlin populations apparently declined significantly during the 1960s as a result of pesticide contamination and the loss of native grassland habitats. More recent analyses suggest population increases on the northern prairies of the U.S. and southern Canada, possibly resulting from banning DDT. In other areas, merlin numbers are now probably stable. Because merlins feed mostly on birds, pesticide contamination is probably the greatest threat to this species (Zeiner et al. 1990a).

Habitat Requirements

Wintering habitats of the merlin are extremely diverse, ranging from deserts to tropical forests and including prairies, open farmland, and even urban areas. Along the California coast, they often concentrate their foraging in areas supporting abundant shorebird populations. The merlin is a predator that catches and eats a wide variety of avian prey, often consuming locally abundant species like doves and house sparrows. Although birds often comprise more than 90 percent of the merlin's diet, it occasionally feeds on large insects, rodents, bats, and reptiles (Ehrlich et al. 1988; Kaufmann 1996; and Johnsgard 1990).

Habitat in the Proposed Project Area

Much of the proposed project area could be used by merlins. Along the Salton Sea, merlins may forage on shorebirds that congregate along the mudflats and shallows. Wetlands and riparian habitats on the state and federal wildlife refuges also support abundant bird populations that would be attractive to foraging merlins. In the LCR Valley, the merlin prefers open habitats, such as agricultural lands and wetlands with scattered trees or shrubs such as along canals and drains (Rosenberg et al. 1991). Similar habitats are probably used in the Imperial Valley as well.

Proposed Project Area Occurrence

Merlins are rare visitors to the Salton Sea area in the fall and winter (USFWS 1997b). They are not known to breed in the area.

Prairie Falcon (*Falco mexicanus*)

Range and Distribution

Prairie falcons breed from southeastern British Columbia, southern Alberta, and southern Saskatchewan south through the western U.S. to southern Arizona, southern New Mexico, and Baja California, Mexico. It winters from its breeding range in southern Canada south to central Mexico, expanding its range eastward after the nesting season onto the Great Plains and westward to the California coast (Johnsgard 1990; Terres 1980; and Kaufmann 1996). In California, the prairie falcon can be found year-round in the southern half of the state and in the Klamath Basin in Northern California (Zeiner et al. 1990).

Population Status and Threats

The North American population of prairie falcons has been estimated at 7,800 birds (Johnsgard 1990). The species is believed to be declining in Utah, western Canada, and agricultural areas of California. In California, local problems, such as the effects of agricultural chemicals on reproduction and the conversion of grassland to cropland, are thought to be responsible for the species' decline; these factors may continue to threaten local populations.

Habitat Requirements

Prairie falcons typically inhabit open and treeless terrain, such as arid plains, hills, mountains, and deserts. Throughout their range, they prefer habitats with nearby cliffs and escarpments that provide suitable nesting sites. Wintering prairie falcons in the desert Southwest are commonly found in low and moderate elevation habitats, including agricultural fields, lakes, and reservoirs. In summer, higher elevation communities, such as desert grassland and chaparral, are frequently occupied. Breeding prairie falcons nest on sheer cliffs overlooking vast foraging areas. Most nests are built in "potholes" on cliff ledges, but old stick nests that other raptors built are also commonly used. Less frequently, nests are placed in caves, holes, and other rocky crevices (Johnsgard 1990; Ehrlich et al. 1988).

The prairie falcon's diet consists mostly of small birds and mammals. Seasonal shifts in diet tend to reflect changes in the abundance of easily caught prey species. Mourning doves, western meadowlarks, ground squirrels, horned larks, black-tailed quail, and Gambel's quail may all be seasonally important prey animals for the prairie falcon in the study area. Other species, including various lizards and insects, are also eaten regularly (Johnsgard 1990; Kaufmann 1996).

Habitat in the Proposed Project Area

Habitat for prairie falcons in the proposed project area consists mainly of agricultural fields and the shoreline of the Salton Sea. Prairie falcons may also forage in desert areas adjacent to the irrigated portions of the valley. In addition, small areas that have not been cultivated in many years occur within the valley and support more natural vegetation. Prairie falcons may also exploit these areas for foraging.

Proposed Project Area Occurrence

Prairie falcons are rare migrants at the Salton Sea and in the Imperial Valley. About 30 migrants occur in the valley each year (IID 1994). Prairie falcons may also occur along the AAC.

Peregrine Falcon (*Falco peregrinus*)

Range and Distribution

Peregrine falcons breed throughout much of North America, as well as South America, Eurasia, Australia, Africa, and Oceania. The American peregrine falcon, which is the most southerly subspecies of peregrine falcon in North America, breeds south of the arctic tundra of Canada and Alaska to Mexico. In winter and during migration, the American peregrine falcon extends its range southward to the Caribbean and parts of South America.

Population Status and Threats

The American peregrine falcon began its decline in North America in the late 1940s, when DDT and other chlorinated hydrocarbon pesticides were being used in large quantities (Johnsgard 1990; NMDGF 1997). Approximately 600 to 800 pairs nested in the western U.S. before 1940 (NMDGF 1997). By 1965, the species was extirpated from east of the Mississippi, and fewer than 20 breeding pairs still occurred west of the Great Plains (Johnsgard 1990; NMDGF 1997). In the early 1970s, the U.S. and Canada banned DDT; subsequently, the nesting success of wild peregrine falcons began to rise. At the same time, captive breeding and reintroduction programs were being implemented, with the known number of pairs in the West estimated at nearly 200 by 1987 (NMDGF 1997). The peregrine falcon was previously listed as a federal endangered species. However, with the known number of territorial pairs at approximately 1,400 and a total population of more than 3,000 pairs, the USFWS has recently delisted the species. Factors that may continue to threaten peregrine populations include pesticide poisoning on the wintering grounds, low breeding densities, lack of gene flow between populations, and the reduced availability of foraging habitat and avian prey (NMDGF 1997).

Habitat Requirements

Peregrine falcons occur in a wide range of open country habitats from desert mountains to seacoasts (Kaufman 1996). The presence of tall cliffs is the most characteristic feature of the peregrine's habitat and is considered a limiting factor for this species. Cliffs provide the peregrine with both nesting and perching sites and an unobstructed view of the surrounding area. Where cliffs are lacking, manmade structures, such as tall buildings and bridges, can be used as substitutes.

Nearby waterbodies or wetlands that support abundant prey of small- to medium-sized birds, particularly waterfowl, are another common feature of peregrine habitat that influences their distribution and abundance (Johnsgard 1990). Highly mobile, flocking, and colonial-nesting birds, such as pigeons, shorebirds, and waterfowl, are the peregrine falcon's primary prey. River canyons that offer a large number of potential nest sites, abundant prey, and ideal hunting conditions are frequently inhabited by this species (Skaggs et al. 1988).

Habitat in the Proposed Project Area

No cliffs or tall buildings that could provide nesting sites for peregrine falcons occur in the proposed project area; thus, use of the proposed project area by peregrine falcons is limited to foraging. Much of the proposed project area could provide foraging opportunities for peregrine falcons, given this species' association with open habitats. Peregrine falcons are most likely to concentrate foraging activities in areas with high concentrations of shorebirds and waterfowl. In the proposed project area, managed wetlands on the state and federal wildlife refuges as well as private duck clubs attract large numbers of wintering waterfowl and may also attract peregrine falcons. The Salton Sea also provides suitable foraging habitat as large numbers of waterfowl and shorebirds inhabit this area. In addition, some waterfowl and shorebirds forage in agricultural fields and peregrine falcons may also exploit this foraging opportunity.

Proposed Project Area Occurrence

Peregrine falcons are rare visitors to the Salton Sea area, although they may occur at any time during the year (USFWS 1997b). Small numbers of migrant peregrine falcons (one to three birds) are regularly observed over Salton Sea marsh areas, particularly at the Salton Sea National Wildlife Refuge (IID 1994). One peregrine falcon was observed during surveys of selected drains in Imperial Valley (Hurlbert et al. 1997).

California Black Rail *(Laterallus jamaicensis coturniculus)*

Range and Distribution

The California subspecies of the black rail occurs in western North America from San Francisco Bay and the Sacramento/San Joaquin Delta south along the California coast into northern Baja California, Mexico. In California, it also occurs in the San Bernardino/ Riverside area and at the Salton Sea (CDFG 1991). Along the LCR, the California black rail is a permanent resident in the vicinity of Imperial Dam and Bill Williams Delta (Snider 1969; Repking and Ohmart 1977). Black rails are also thought to breed in the Cienega de Santa Clara, one of only three breeding localities for this species in Mexico and one of the few for the subspecies anywhere (Piest and Campoy 1998).

Population Status and Threats

California black rail populations declined substantially between the 1920s and 1970s due to the loss and degradation of coastal salt marsh and inland freshwater marsh habitats (Eddleman et al. 1994; CDFG 1991). Along the LCR, black rail populations declined an estimated 30 percent between 1973 and 1989, with the majority of birds shifting from north of Imperial Dam to Mittry Lake during the same period (Eddleman et al. 1994). Currently, black rails appear to be stable along the LCR, with approximately 100 to 200 individuals estimated to occur from Imperial National Wildlife Refuge south to Mittry Lake (Rosenberg et al. 1991). This population and the small population at the Salton Sea represent the only stable inland population of this subspecies (Eddleman et al. 1994; Rosenberg et al. 1991).

The California black rail's decline throughout its range is attributed to the loss of saltwater and freshwater wetlands to urban and agricultural development (Wilbur 1974). The effect of selenium on black rails remains unknown, but toxic levels of this heavy metal may also threaten black rail populations in the study area (AGFD 1996; Eddleman et al. 1994; and Flores and Eddleman 1991). These factors continue to threaten the California black rail.

Habitat Requirements

Preferred habitat of the California black rail is characterized by minimal water fluctuations that provide moist surfaces or very shallow water, gently sloping shorelines, and dense stands of marsh vegetation (Repking and Ohmart 1977). Studies conducted along the LCR suggest that habitat structure and water depths are more important factors than plant composition in determining black rail use of wetland habitats. Unsuitable water and structural conditions appear to restrict the California black rail to only a fraction of the emergent vegetation available within an entire wetland (Flores and Eddleman 1995). In general, Flores and Eddleman (1995) found that black rails used marsh habitats with high stem densities and overhead coverage that were drier and closer to upland vegetation than randomly selected sites. Marsh edges with water less than 1 inch deep dominated by

California bulrush and three-square bulrush are used most frequently. Areas dominated by cattail are also used regularly, but only in a small proportion to their availability and generally within 165 feet of upland vegetation where water depth is 1.2 inches. Telemetry studies at Mittry Lake found black rails to be sedentary, with home ranges averaging 1.2 acres or less (Flores and Eddleman 1991). The erratic movements recorded for some juvenile and unmated birds during this research were consistent with the "wandering" behavior attributed to this subspecies and supports the idea that black rails may be capable of quickly occupying newly created habitats (Flores and Eddleman 1991).

Flores and Eddleman (1991) also studied black rail diets and food availability at Mittry Lake and found that black rails consume a wide variety of invertebrates throughout the year, including beetles, earwigs, ants, grasshoppers, and snails. When invertebrate availability drops during the winter months, a larger portion of cattail and bulrush seeds is consumed. Lower resource availability in winter causes black rails to experience a significant weight loss, indicating they are more vulnerable to stress during this time.

Nesting biology of the California black rail is poorly understood. Double clutching and renesting may be fairly common in this subspecies. These behaviors, combined with a relatively large clutch size, long breeding season, apparently low predation rates, and aggressive nest defense, suggest that the black rail has a high reproductive potential that is likely limited by the availability of shallow water environments (Eddleman et al. 1994; Flores and Eddleman 1991).

Habitat in the Proposed Project Area

California black rails are associated with dense wetland vegetation consisting of cattails and bulrushes in shallow water. In the proposed project area, these characteristics are found primarily in the managed wetlands on the state and federal wildlife refuges, in wetland areas adjacent to the Salton Sea, and in marsh habitats supported by seepage from the AAC between Drops 3 and 4 and adjacent to the East Highline Canal. Black rails may use agricultural drains in the valley, although they have not been found to make extensive use of agricultural drains in previous surveys. Vegetation along agricultural drains mainly consists of common reed and tamarisk, species that are not generally used by black rails. Areas of cattails and bulrushes do exist along the drains. However, these areas are small and narrow and often interspersed with other vegetation, such as common reed. The habitat value of marsh vegetation supported by agricultural drains is probably limited and may only support foraging by black rails.

Proposed Project Area Occurrence

The species is known to use marsh habitats at Finney Lake on the Imperial Wildlife Area, seepage communities along the All American, Coachella, and East Highline Canals; and wetland areas adjacent to the Salton Sea, including the New River Delta (Evans et al. 1991; Jurek 1975; Garrett and Dunn 1981; and Jackson 1988).

Few surveys for the California black rail have been conducted in the proposed project area. A study by Jurek (1975) and other investigators in 1974 and 1975 identified eight marsh areas with black rails between the Coachella and East Highline Canals south of Niland. The Coachella Canal south of Niland was concrete-lined in 1981, and all black rail habitat supported by canal seepage was dessicated (Evans et al. 1991). Subsequent surveys of seepage communities along unlined portions of the Coachella Canal north of Niland detected rails at another eight sites (Jackson 1988; Evans et al. 1991).

Along the AAC, Kasprzyk et al. (1987) recorded 30 to 50 California black rails in the marsh located between Drops 3 and 4 during surveys in April and May 1984. More recently, California black rails were censused along the AAC during April and May 1988, in conjunction with surveys for Yuma clapper rails. A minimum population of three black rails was recorded for the area between Drops 3 and 4.

In the only systematic survey for the species at the Salton Sea and surrounding areas in 1989, 13 birds were recorded at the mouth of the New River, 8 in seepage comunities along the Coachella Canal, and 1 at Finney Lake. Up to seven rails have been observed at Finney Lake on other occasions (Shuford et al. 1999). The reproductive status of these birds is uncertain, although some locations have had numerous calling birds over periods of several weeks in the spring, suggesting a breeding population (Salton Sea Authority and Reclamation 2000).

Yuma Clapper Rail *(Rallus longirostris yumanensis)*

Range and Distribution

The Yuma clapper rail is one of seven North American subspecies of clapper rails. It occurs primarily in the LCR Valley in California, Arizona, and Mexico and is a fairly common summer resident from Topock south to Yuma in the U.S., and at the Colorado River Delta in Mexico. There are also populations of this subspecies at the Salton Sea in California, and along the Gila and Salt Rivers to Picacho Reservoir and Blue Point in central Arizona (Rosenberg et al. 1991). In recent years, individual clapper rails have been heard at Laughlin Bay and Las Vegas Wash in southern Nevada (NDOW 1998). Population centers for this subspecies include Imperial Wildlife Management Area (Wister Unit), Salton Sea National Wildlife Refuge, Imperial Division, Imperial National Wildlife Refuge, Cibola National Wildlife Refuge, Mittry Lake, West Pond, Bill Williams Delta, Topock Gorge, and Topock Marsh.

Population Status and Threats

In 1985, Anderson and Ohmart (1985) estimated a population size of 750 birds along the Colorado River north of the international boundary. The USFWS (1983) estimated a total of 1,700 to 2,000 individuals throughout the range of the subspecies. Between 1990 and 1999, call counts conducted throughout the species range in the U.S. have recorded 600 to 1,000 individuals. These counts are only estimates of the minimum number of birds present. The population is probably higher than these counts show, since up to 40 percent of the birds may not respond in call surveys (Piest and Campoy 1998). Based on the call count surveys, the population of Yuma clapper rail in the U.S. appears stable (USFWS, unpublished data). The range of the Yuma clapper rail has been expanding over the past 25 years, and the population may increase (Ohmart and Smith 1973; Monson and Phillips 1981; Rosenberg et al. 1991; and McKernan and Brandon 1999).

A substantial population of Yuma clapper rail exists in the Colorado River Delta in Mexico. Eddleman (1989) estimated that 450 to 970 rails inhabited this area in 1987. Piest and Campoy (1998) reported a total of 240 birds responding to taped calls in the Cienega. Accounting for nonresponding birds, they estimated a total population of about 5,000 birds in cattail habitat in the Cienega.

The Yuma clapper rail is threatened by river management activities that are detrimental to marsh formation, such as dredging, channelization, bank stabilization, and other flood control measures. Another threat is environmental contamination due to selenium. High selenium levels have been documented in crayfish, a primary prey of clapper rails, and some adult birds and eggs. Other threats to the Yuma clapper rail include mosquito abatement activities, agricultural activities, development, and the displacement of native habitats by exotic vegetation (CDFG 1991). The large population of Yuma clapper rails at the Cienega de Santa Clara is threatened by the loss of the source of water that maintains the wetland habitat. This threat is significant, given that the recent population estimate of approximately 5,000 individuals suggests the majority of Yuma clapper rails found in North America inhabit this area.

Habitat Requirements

The Yuma clapper rail is associated primarily with freshwater marshes with the highest densities of this subspecies occurring in mature stands of dense to moderately dense cattails and bulrushes. Dense common reed and sparse cattail-bulrush marshes may support the rail at lower densities (Rosenberg et al. 1991). A mosaic of uneven-aged marsh vegetation and open water areas of variable depths appear to provide optimal habitat for Yuma clapper rails (Conway et al. 1993). Similarly, Anderson (1983) found the highest densities of clapper rails in stands of cattails dissected by narrow channels of flowing water.

Anderson and Ohmart (1985) found home ranges of single or paired birds in the LCR Valley encompassed up to 100 acres, with an average home range of 18.5 acres. Home ranges were found to overlap extensively. Estimates of rail densities vary widely, ranging from 0.06-rail/acre to 1.26 rails/acre (Table A-2).

TABLE A-2
Reported Densities of Yuma Clapper Rails

Location	Density rails/acre[a]	Source
Lower Colorado River	0.1	Anderson and Ohmart (1985)
Cienega de Santa Clara	0.36	Piest and Campoy (1998)
Cienega de Santa Clara	0.60[b]	Piest and Campoy (1998)
Topock Marsh	0.06	Smith (1975, reported in Piest and Campoy [1998])
Mittry Lake Wildlife Area	0.39	Todd (1980, reported in Piest and Campoy [1998])
Hall Island	1.26	Todd (1980, reported in Piest and Campoy [1998])

[a] acres of cattail habitat
[b] estimated density, taking into account nonresponding birds

Food primarily consists of crayfish, but Yuma clapper rails will also feed on small fish, isopods, insects, spiders, freshwater shrimp, clams, and seeds when available (Ohmart and Tomlinson 1977; CDFG 1991; and Rosenberg et al. 1991). Crayfish have been found to constitute up to 95 percent of the diet of Yuma clapper rails in some locations (Ohmart and Tomlinson 1977). The availability of crayfish has been suggested as a factor limiting clapper rail populations (Rosenberg et al. 1991).

Yuma clapper rails begin courtship and pairing behavior as early as February, with nesting and incubation beginning as early as mid-March. Most nesting starts between late April and late May (Eddleman 1989; Conway et al. 1993). Young hatch in the first week of June and suffer high mortality from predators in their first month of life (Rosenberg et al. 1991). The majority of rail chicks fledge by August.

Nests are constructed on dry hummock or under dead emergent vegetation and at the bases of cattail/bulrush vegetation. Nests may be located throughout a marsh over shallow or deep water, near the marsh edge, or in the interior of the marsh (Eddleman 1989). Usually, nests have no overhead canopy because the dense marsh vegetation surrounding the nest provides protective cover. Occasionally, nests are located in small shrubs over shallow water areas.

Habitat in the Proposed Project Area

In the proposed project area, habitat for Yuma clapper rails consists mainly of managed wetlands on the state and federal wildlife refuges. Yuma clapper rails will use agricultural drains dominated by common reed for foraging, but these areas do not provide suitable nesting habitat. Clapper rails are strongly associated with cattail stands for nesting, and few areas of cattails exist along the agricultural drains and the New and Alamo Rivers. Areas of cattails that do exist along these waterways are small and narrow and often interspersed with vegetation, such as common reed and offer suboptimal habitat conditions. Seepage from the AAC supports a wetland community between Drops 3 and 4, where clapper rails have been reported.

Proposed Project Area Occurrence

In the proposed project area, the principal concentrations of Yuma clapper rails are at the south end of the Salton Sea near the New and Alamo River mouths, at the Salton Sea Wildlife Refuge, at the Wister Waterfowl Management Area, and at Finney Lake in the Imperial Wildlife Area. Since 1990, an average of 365 (?10 percent) rails have been counted around the Salton Sea, which represents an estimated 40 percent of the entire U.S. population of this species (Point Reyes Bird Observatory 1999; USFWS 1999). Results of surveys conducted at the Salton Sea since 1994 are summarized in Table A-3.

Rails are also known to occur in the seepage community along the AAC between Drops 3 and 4 and in other seepage areas associated with the Coachella and East Highline Canals (Gould 1975; Jurek 1975; Bennett and Ohmart 1978; Kasprzyk et al. 1987). Surveys conducted between Drops 3 and 4 on April 30 and May 1 1981, detected 17 clapper rails (Reclamation and IID 1994). Ten birds were detected during a May 20 1982, survey. Additional surveys along the AAC were conducted in spring 1984. The area surveyed was the same as was surveyed in 1981. These surveys indicated a population of at least three clapper rails. The area was surveyed again in 1988, again indicating a population of three clapper rails in the marsh habitat between Drops 3 and 4 (Reclamation and IID 1994).

Yuma clapper rails have also been found using agricultural drains and the Alamo River. Surveys conducted by the USFWS (Steve Johnson, pers. comm.) found Yuma clapper rails in the Trifolium 1 drain and the Alamo River. Hurlbert et al. (1997) surveyed 10 drains in the Imperial Valley and found 1 clapper rail along the Holtville Main Drain in the southeastern part of the valley. Previous surveys by the USFWS of the Holtville Main Drain reported as many as 12 Yuma clapper rails (5 pairs and 2 individuals) using this drain.

TABLE A-3
Number of Yuma Clapper Rails Found at Traditional Survey Locations at the Salton Sea and Surrounding Areas from 1994 to 2000

Location	1994	1995	1996	1997	1998	1999	2000
Salton Sea NWR Unit 1							
Trifollium 1 Drain	4	3	1	1	1	0	1
A-1 Pond	2	N/S	6	4	3	6	6
B-1 Pond	N/S	N/S	4	9	11	10	10
Reidman 3	7	8	17	N/S	N/S	2	1
Reidman 4	9	8	N/S	N/S	1	3	7
Bruchard Bay	7	6	3	5	3	0	0
New River Delta	7	0	1	0	0	0	N/S
Salton Sea NWR Unit 2 and Hazard							
HQ ‘B’ Pond	5	3	4	2	2	2	3
Union Pond	9	9	12	15	15	9	6
Barnacle Bar Marsh	N/S	0	0	2	0	2	1
McKindry Pond	N/S	N/S	N/S	0	0	2	N/S
Hazard 5	3	N/S	N/S	N/S	N/S	N/S	N/S
Hazard 6	23	22	18	11	11	12	10
Hazard 7	6	3	10	7	5	6	10
Hazard 8 (east) (south)	2	N/S	N/S	N/S	N/S	2	1
Hazard 9 and Ditch	3	4	3	3	3	2	4
Hazard 10	7	7	N/S	N/S	2	6	6
Alamo River (east and delta)	5	4	4	4	4	3	4
Imperial Wildlife Area Wister Unit	309	307	239	211	185	191	N/A
Off-Refuge Areas							
Lack and Grumble	2	3	3	2	2	2	0
‘T’ Drain Marsh	N/S	N/S	10	15	10	6	6
Walt’s Club (McDonald Rd.)	N/S	N/S	N/S	N/S	N/S	2	N/S
Barnacle Beach	N/S	20	20	7	8	3	N/S
Holtville Main Drain	N/S	12	10	5	6	5	1
Boyle and Martin Road	1	N/S	N/S	N/S	N/S	N/S	N/S

TABLE A-3
Number of Yuma Clapper Rails Found at Traditional Survey Locations at the Salton Sea and Surrounding Areas from 1994 to 2000

Location	1994	1995	1996	1997	1998	1999	2000
Total On-Refuge	408	384	322	274	246	258	N/A
Total Off-Refuge	3	35	43	29	26	18	7

Source: USFWS unpublished data
N/S: No surveys
N/A: Not available

Greater Sandhill Crane (*Grus canadensis tabida*)

Range and Distribution

With the exception of those that nest in Siberia or Cuba, sandhill cranes are restricted to North America. Six subspecies are currently known. The lesser (*G. c. canadensis*), Florida (*G. c. pratensis*), and greater (*G. c. tabida*) are migratory. Historically, the migratory subspecies nested in wetland habitats over much of eastern Siberia, Alaska, Canada, and the northern U.S. as far south as northern Arizona, Utah, western Colorado, central Nebraska, northern and eastern Iowa, southern Illinois, central Indiana and Ohio, and the southern borders of Lake St. Claire and Lake Erie (Drewien and Lewis 1987).

Several populations of greater sandhill cranes (*G. c. tabida*) are now recognized in North America. The eastern population nests in Minnesota, Michigan, and Wisconsin and migrates through Illinois, Indiana, Ohio, Tennesee, Kentucky, and Georgia. The Rocky Mountain population nests from northwestern Colorado and northeastern Utah northward through eastern Idaho, western Wyoming, and southwestern Montana, wintering in New Mexico. The Central Valley population nests in eastern and central Oregon and northeastern California and winters in the Central Valley of California south to Tulare County. The LCR Valley population nests in northeastern Nevada and northwestern Utah and southwestern Idaho. This population winters along the Colorado River with a major wintering site near Poston, Arizona.

Population Status and Threats

The eastern population of greater sandhill cranes contains some 15,000 birds and is increasing (Lovvorn and Kirkpatrick 1982). The Rocky Mountain population consists of approximately 16,500 birds (Drewien and Lewis 1987), and its future seems secure because considerable portions of the nesting grounds are in publicly owned national forests, parks, and wildlife refuges. The Central Valley population is estimated at more than 3,000 birds and has been static for some time (Drewien and Lewis 1987). The LCR Valley population is small at about 1,500 birds and appears to be increasing (Drewien and Lewis 1987). Sandhill cranes are susceptible to nest disturbance. No other threats to this species have been identified.

Habitat Requirements

Greater sandhill cranes breed in open, isolated wetlands surrounded by shrubs or forestland. Diverse structural and compositional vegetation, including species such as bulrush, cattails, and burreed, are used for nesting sites (Tacha et al. 1992). Habitats such as meadows, irrigated pastures and fields, bogs, fens, and marshes are used as foraging areas. Wintering populations roost in shallow open water, marshes, rivers, and lakes where they flock together at night for safety (Eckert and Karalus 1981). Wintering populations feed primarily in irrigated croplands and pastures. Moist sites are commonly used, but this species also feeds on dry plains far from water. Food items include crops such as wheat, sorghum, barley, oats, corn, and rice as well as insects, snails, reptiles, small mammals, seeds, and berries (Tacha et al. 1992).

Habitat in the Proposed Project Area

In the proposed project area, sandhill cranes find suitable roosting habitat in the managed wetlands of the state and federal wildlife refuges and private duck clubs. Sandhill cranes are known to winter at roost sites located in shallow flooded ponds of a private duck club near Imperial (Radke 1992). Sandhill cranes have also been observed at other private ponds in the Imperial Valley, sometimes in association with white-faced ibis. Wheat and sudangrass fields as well as other agricultural crops may be used for foraging.

Proposed Project Area Occurrence

Both the greater and lesser subspecies have been detected in Imperial Valley, with most observations being of the greater subspecies. Greater sandhill cranes regularly winter in the Imperial Valley although in small numbers of 200 to 300 individuals (IID 1994). A flock of approximately 100 to 200 birds regularly winters in the area between Brawley and El Centro, primarily in the area east of Highway 86 (IID and BLM 1987).

Western Snowy Plover *(Charadrius alexandrinus nivosus)*

Range and Distribution

The western snowy plover is one of two subspecies of snowy plover recognized in North America. It breeds on the Pacific Coast from southern Washington to southern Baja California, Mexico, and the interior areas of Oregon, California, Nevada, Utah, New Mexico, Colorado, Kansas, Oklahoma, north-central Texas, coastal areas of extreme southern Texas, and possibly, extreme northeastern Mexico (USFWS 1993c). The western snowy plover is a resident throughout most of its range, except populations on the northern Pacific Coast that withdraw south in winter (Terres 1980). In California, the inland wintering populations are concentrated in the San Joaquin Valley and at the Salton Sea, with small numbers of birds occurring at alkali lakes and sewage ponds in the Great Basin, Mojave, and Colorado Deserts (Shuford et al. 1995).

Population Status and Threats

The Pacific Coast population of the western snowy plover is considered demographically isolated from populations of the western snowy plover breeding in interior regions (USFWS 1993c). The Pacific Coast population of western snowy plovers has declined precipitously and is listed as federally threatened. The decline of this population is attributed to the loss of suitable breeding habitat and by disturbance and destruction of nests in the species' remaining habitat (USFWS 1993c; Ehrlich et al. 1992). The loss of breeding habitat and disturbance continue to threaten this species. The coastal population in the U.S. is estimated at 1,900 birds (Shuford et al. 1995). The coastal population in Mexico was determined to be 1,344 birds occurring along barrier beaches and salt flats along the peninsula in Baja California (Palacios et al. 1994). The interior population of western snowy plovers has also declined, but not as severely as the coastal populations. It is estimated that the interior population in Washington, Oregon, and California is 7,900 birds (Page et al. 1991). The inland snowy plover population in California is estimated at between 300 and 500 birds (Shuford et al. 1995).

Habitat Requirements

Western snowy plovers are found on beaches; open mudflats; salt pans and alkaline flats; and sandy margins of rivers, lakes, and ponds. Interior populations favor shores of salt or alkaline lakes, evaporation ponds, and sewage ponds (Shuford et al. 1995; Terres 1980; Kaufmann 1996; and Ehrlich et al. 1988). Western snowy plovers forage in plowed agricultural fields and on exposed mudflats and shorelines (Rosenberg et al. 1991). At inland sites, snowy plovers forage on the ground primarily for insects, including various flies and beetles (Ehrlich et al. 1988; Kaufmann 1996). Western snowy plovers nest on undisturbed flat, sandy, or gravelly beaches. Snowy plovers tend to be site faithful, with the majority of birds returning to the same breeding locations in subsequent years (USFWS 1993c).

Habitat in the Proposed Project Area

Nesting habitat for the western snowy plover in the proposed project area is limited to the shoreline of the Salton Sea where they are known to nest on undisturbed, flat, sandy, or gravelly beaches (Salton Sea Authority and Reclamation 2000). For foraging, snowy plovers use the shoreline of the Salton Sea but may also forage in agricultural fields in the valley.

Proposed Project Area Occurrence

Western snowy plover are year-round breeding residents and winter migrants at the Salton Sea. The Salton Sea supports the largest wintering population of snowy plovers in the interior western U.S. and is one of only a few key breeding populations in interior California (Shuford et al. 1999). The summer breeding population typically consists of more than 200 individuals (IID 1994 and Shuford et al. 1995).

Mountain Plover *(Charadrius montanus)*

Range and Distribution

Mountain plovers breed from the high plains and plateaus of the central U.S. south through eastern New Mexico and western Oklahoma to western Texas. They winter from central California, western and southern Arizona, and southern Texas south to Baja California, Mexico, and central Mexico. Currently, northeast Colorado is the breeding stronghold of this species with only small breeding populations remaining in Montana, Wyoming, Oklahoma, and New Mexico (Knopf 1996; Terres 1980; and Kaufmann 1996).

In California, they are fairly common but very local winter visitors, with the largest numbers occurring in grasslands and agricultural areas of interior California. Winter flocks regularly occur on the Carrizo Plain in San Luis Obispo County, the western San Joaquin

Valley, Antelope Valley, and Imperial Valley. This species also occurs along the Colorado River, mainly near Blythe (Garrett and Dunn 1981).

Population Status and Threats

Although once abundant throughout its range, the mountain plover is believed to have suffered a 61 percent population decrease between 1966 and 1987. Mountain plovers have disappeared from much of their former breeding range because of agricultural conversion of former shortgrass prairie. Populations of this species now appear to be relatively small and highly restricted in a patchy distribution. In 1995, the North American population of this species was estimated at 8,000 to 10,000 birds (Knopf 1996). The decline of the mountain plover is primarily attributed to human-related disturbances on breeding grounds, including the loss of native habitat to agriculture and urbanization, hunting, range management, gas and oil development, mining, prairie dog control, environmental contamination, and vehicle disturbance (Leachman and Osmundson 1990; Knopf 1996). Habitat loss remains the primary threat to this species.

Habitat Requirements

Mountain plovers are associated with dry, open plains. They nest primarily on shortgrass prairie and grazed grassland. In winter, they occur in flocks of 15 to several hundred individuals, feeding on desert flats, alkaline flats, grazed pastures, plowed ground, and sprouting grain fields (Knopf 1996; Hayman et al. 1986; Kaufmann 1996; and Terres 1980). Mountain plovers eat mostly insects, including grasshoppers, beetles, flies, and crickets (Kaufmann 1996). A sample of six plover stomachs contained beetles and larva, weevils, earwigs, and maggots (Rosenberg et al. 1991). On their wintering grounds, mountain plovers have been successfully attracted to burned grasslands for use as night roost sites (Knopf 1996).

Habitat in the Proposed Project Area

In the Imperial Valley, wintering flocks of mountain plovers frequent bare plowed agricultural fields that have not been irrigated. Bermuda grass crops are also used (Reclamation and IID 1994).

Proposed Project Area Occurrence

Mountain plover is a common winter visitor to the Salton Sea Basin. The Imperial Valley has one of the mountain plover's largest wintering populations in the Pacific Flyway, with between 700 and 1,000 individuals (USFWS 1999). During February 1999 surveys, 2,486 individuals were counted in the valley. This number represents approximately half of the California population and approximately one-quarter of the North American population (Point Reyes Bird Observatory 1999).

Long-billed Curlew (*Numenius americanus*)

Range and Distribution

The long-billed curlew nests from southern Canada south to Utah, New Mexico, and Texas, and formerly in Kansas, Iowa, Minnesota, Wisconsin, and Illinois. The species winters in California, western Nevada, Arizona, Texas, and Louisiana south to Baja California and

Guatemala, returning north in March to April. In California, the long-billed curlew is an uncommon to fairly common breeder from April to September in wet meadow habitat in Siskiyou, Modoc, and Lassen Counties. There is one recent nesting record for Owens Valley, Inyo County (CDFG 1999a). This species is uncommon to locally very common as a winter visitor along most of the California coast and in the Central and Imperial Valleys, where the largest flocks occur. Small numbers of nonbreeders remain on the coast in summer, and larger numbers remain in some years in the Central Valley (Cogswell 1977; Page et al. 1979; and Garrett and Dunn 1981).

Population Status and Threats

The long-billed curlew is currently on the Audubon Society's Blue List because of declining numbers, probably caused by agricultural practices (Tate 1981). This species once nested throughout the grasslands of the west, east to the prairies of southern Wisconsin and Illinois, but disappeared from many places with the plowing of plains and prairies for agriculture in the 1930s. The species was also decimated by hunters along the Atlantic coast in the fall. The long-billed curlew is a proposed candidate for federal endangered status. Breeding range has retracted considerably in the last 80 years, but western populations have not decreased as much as those in the eastern U.S. Agricultural conversion and loss of breeding habitat continue to threaten this species.

Habitat Requirements

The long-billed curlew breeds on grazed, mixed-grass, and shortgrass prairies. Habitats on gravelly soils and gently rolling terrain are favored over others (Stewart 1975). Nests are usually located in relatively flat areas with grass cover 4 to 8 inches high. The nest is a sparsely lined depression, often remote from water (Palmer 1967). Nests are often placed close to cover such as a grass clump, rock, or soil mound (Johnsgard 1981). In California, the long-billed curlew nests on elevated interior grasslands and wet meadows, usually adjacent to lakes or marshes (Grinnell and Miller 1944). Upland shortgrass prairies and wet meadows are used for nesting; coastal estuaries, open grasslands, and croplands are used in winter. When migrating, the curlew frequents shores of lakes, rivers, salt marshes, and sandy beaches.

Habitat in the Proposed Project Area

The Salton Sea and adjacent wetlands, state and federal wildlife refuges, private duck clubs, and areas along the New and Alamo Rivers may provide suitable habitat for this species. Agricultural fields of alfalfa, wheat, and sudangrass may also provide habitat and foraging areas for the long-billed curlew.

Proposed Project Area Occurrence

The long billed curlew is a common, year-round resident at the Salton Sea with large flocks of as many as 1,000 birds observed during the winter. Summer numbers are lower, with flocks of around 150 birds (CDFG 1970).

Black Tern *(Childonias Niger)*

Range and Distribution

In Canada, the black tern breeds from southwestern and east-central British Columbia and the southwestern portion of the Northwest Territories southward to Southern Quebec and New Brunswick (DeGraaf and Rappole 1995). Its breeding range extends to California, Utah, Nebraska, Illinois, and Maine in the U.S. (DeGraaf and Rappole 1995). Nonbreeding birds may occur along the Pacific Coast and in eastern North America to the Gulf Coast. In winter, black terns migrate to Central and South America. In California, nesting populations occur only in the northeastern part of the state (Ehrlich et al. 1992).

Population Status and Threats

Black terns were once a very common spring and summer visitor to fresh emergent wetlands of California (Grinnell and Miller 1944). Numbers have declined throughout its range, especially in the Central Valley (Cogswell 1977). Currently, it is a fairly common migrant and breeder on wetlands of the northeastern plateau area but is absent from some historic nesting localities, such as Lake Tahoe (Cogswell 1977). Despite the presence of apparently suitable habitat in rice farming areas, breeding is questionable in the Central Valley (Gaines 1974). It remains fairly common in spring and summer at the Salton Sea, but evidence of nesting there is lacking (Garrett and Dunn 1981).

Populations in North America have declined sharply since the 1960s. Contributing factors are believed to include loss of wetland habitat, runoff of farm chemicals into wetlands resulting in reduced hatching success, and loss of food supply on wintering grounds due to overfishing (Kaufman 1996). Campgrounds and marinas on the shorelines of large lakes and wetlands also may be partially responsible for population declines (Marcot 1979). These factors continue to threaten populations of this species.

Habitat Requirements

For breeding, black terns are associated with freshwater marshes and lakes, but favor coastal waters during migration. They prefer freshwater marshes with extensive marsh vegetation intermixed with open water. Black terns typically nest in small, scattered colonies (CDFG 1999a). The nest site is situated low in the marsh on a floating mat of vegetation or debris, or on the ground close to the water (Kaufman 1996). The terns may also take over coot and grebe nests for nesting.

Black terns forage primarily on insects and fish, but tadpoles, frogs, spiders, earthworms, and crustaceans are also taken. Their diet shifts seasonally with insects forming a greater portion of the diet during the breeding season, and small fish become the predominant prey during migration and in winter (Kaufman 1996). Black terns forage by hovering above wet meadows and fresh emergent wetlands. Insects are captured in the air or are plucked from the water surface or vegetation (CDFG 1999a). They also frequent agricultural fields for foraging.

Habitat in the Proposed Project Area

Potential nesting habitat occurs in the proposed project area in the wetlands along the Salton Sea and in the managed wetlands of the state and federal wildlife refuges such that nesting could be supported in the future. Beaches or mudflats of the Salton Sea and agricultural fields in the valley are known foraging areas in the proposed project area.

Proposed Project Area Occurrence

Black terns are common at the Salton Sea during the spring, summer, and fall; they rarely occur at the sea during the winter (USFWS 1997b). In the Imperial Valley, black terns are common residents and migrants with up to about 10,000 individuals inhabiting the valley at some times (IID 1994). Although they occur at the Sea throughout the summer, there is no evidence that nesting takes place (CDFG 1999a). The Salton Sea watershed is thought to be the most important staging area for black terns in the Pacific Flyway (Shuford et al. 1999).

Laughing Gull (*Larus atricilla*)

Range and Distribution

In the U.S., laughing gulls range along the Atlantic coast from Nova Scotia south to Florida and along the Gulf Coast. In the western U.S., the species generally occurs along the coast in the extreme southwest, with its range extending southward into Baja California and Mexico through Central America and the northern coast of South America. Laughing gulls also inhabit the West Indies (DeGraaf and Rappole 1995).

Population Status and Threats

The National Biological Survey shows laughing gulls to be increasing in most locations along the Gulf and Atlantic Coasts. Kaufman (1996) considers the current population of laughing gulls in North America to be stable. DeGraaf and Rappole (1995) consider the species common and showing a long-term increase.This species is susceptible to nest disturbance and predation. No other threats to this species have been identified.

Habitat Requirements

Laughing gulls are typically associated with coastal areas, frequenting salt marshes, coastal bays, beaches, and piers. They may also move farther inland and use rivers, fields, dumps, and lakes. The species nests in colonies on beaches in areas supporting grasses or shrubs. Nests are on the ground and consist of a scrape with a sparse lining or a shallow cup lined with grasses, sticks, and debris. Migration is primarily along the coast where birds roost on inland lakes, bays, estuaries, and the open ocean. Optimal habitat is sparse to dense vegetation that provides protection from predators as well as some protection from inclement weather (Burger 1996). Laughing gulls exploit a variety of food resources, but their diet primarily consists of crustaceans, insects, and fish.

Habitat in the Proposed Project Area

In the HCP area, laughing gulls are expected to principally occur at the Salton Sea. The shoreline of the Salton Sea provides suitable habitat for roosting and foraging. Nesting opportunities for laughing gulls have largely been eliminated due to rising water levels of the Salton Sea, resulting in the loss of islets used as nesting sites (Small 1994). Laughing gulls concentrate feeding along the water edge of the Salton Sea but may also use agricultural fields and managed wetlands in the valley as additional foraging areas (Burger 1996).

Proposed Project Area Occurrence

Laughing gulls are a common postbreeding visitor (up to 1,000 individuals) at the Salton Sea and previously nested in the area (USFWS 1997b; IID 1994). Most laughing gulls occur along the shoreline at the south end of the Salton Sea and occasionally in adjacent wetland habitats. The average seasonal population at the Salton Sea is around 400 to 500 birds (Small 1994).

Black Skimmer (*Rhynchops niger*)

Range and Distribution

Black skimmers range approximately from about Massachusetts on the Atlantic Coast south through the Gulf Coast and Central and South America to Argentina (DeGraaf and Rappole 1995). On the Pacific Coast, skimmers occur as far north as the Los Angeles, with breeding documented at the Salton Sea and in San Diego (Kaufman 1996). Its range in the west is currently expanding (Kaufman 1996).

Population Status and Threats

The population of black skimmers declined on the Atlantic Coast in the late 19th century as eggs were harvested and adults were killed for their feathers. Their numbers subsequently have recovered. Black skimmers have been expanding in the west, but nesting colonies are still sensitive to disturbance (Kaufman 1996). In California, nesting distribution is limited. Nesting colonies are located only at the Salton Sea, San Diego Bay, and the Bolsa Chica Refuge in Orange County (Salton Sea Authority and Reclamation 2000). Rising levels of the Salton Sea may threaten continued survival there (Grant and Hogg 1976; Garrett and Dunn 1981). High water levels threaten existing nest sites. Nesting colonies are vulnerable to human disturbance on mainland beaches (Terres 1980). When forced into low sites, entire colonies can be washed away by high tides (Pough 1951).

Habitat Requirements

Skimmers typically occur in coastal areas protected from open surf, such as lagoons, estuaries, inlets, and sheltered bays (Kaufman 1996). They nest in single-species colonies, often near nesting gulls or terns. This is evident at the Salton Sea where nesting colonies are almost always near nesting gull-billed terns or Caspian terns (Molina 1996). Nest sites are on gravel bars, low islands, or sandy beaches. Dredge spoils and dikes are also used for nesting. Skimmers use similar habitats for roosting. Because skimmers are sensitive to human disturbance, suitable nesting areas must be free from human disturbance (CDFG 1999a). The nest itself is simple scrape located above high water (Terres 1980).

Black skimmers begin arriving from wintering grounds in Mexico in April with numbers increasing through June. Upon arrival, skimmers form loose aggregations and often roost in areas that are subsequently used for nesting (Molina 1996). Nesting at the Salton Sea generally starts in June or later; rarely it has continued into October. Nesting dates are probably a function of the level of the sea since this determines the availability of nest sites (Garrett and Dunn 1981).

Skimmers forage on small fish, crustaceans, and aquatic insects. Prey are captured by skimming low over the surface of the water, scooping up fish and aquatic invertebrates. As skimmers never dive for fish, only prey that occurs in surface waters is accessible. Skimmers concentrate foraging activities in calm shallow waters and commonly forage in groups.

Habitat in the Proposed Project Area

In the proposed project area, habitat for the black skimmer is restricted to the Salton Sea and Ramer Lake. At the Salton Sea, black skimmers forage over open water and along beaches and mudflats (Salton Sea Authority and Reclamation 2000). Often, they concentrate foraging where the New and Alamo Rivers as well as agricultural drains empty into the Salton Sea (Garrett and Dunn 1981). Skimmers nest on bare earthen slopes, terraces, and levees along the Salton Sea. Often nests are placed upslope of barnacle bars, 3 to 4 meters from the edge of the water to avoid inundation by wave action (Molina 1996).

Proposed Project Area Occurrence

The black skimmer is a breeding resident at the Salton Sea, with a population of 600 individuals (IID 1994). In some years, the breeding population of skimmers at the Salton Sea may constitute 40 percent of the breeding population in California (Shuford et al. 1999). Skimmer colonies form at the north and south end of the Salton Sea in most years (Shuford et al. 1999). Molina (1996) monitored nesting success of skimmers at the Salton Sea during 1993 and 1995. Hatch rate was found to vary substantially among these years. Nesting success was lowest in 1994 when only 27 percent of the nests were successful as compared to 1993 when 71 percent of the nests were successful.

Between 1991 and 1995, skimmers nested at seven sites. Locations of nesting colonies are Mullet Island, the Whitewater River delta, Morton Bay, Rock Hill, Obsidian Butte, Ramer Lake, and Elmore Ranch (Molina 1996). The Rock Hill site occurs on the Salton Sea NWR and is the only nesting site under active management. However, the suitability of nesting habitat at Rock Hill may be compromised by the heavy recreational use this area receives (Molina 1996). Many of the nesting sites are susceptible to wave action, erosion, and inundation; the past and continuing increase in the elevation of the Salton Sea may have inundated suitable nesting areas (Molina 1996).

California Least Tern (*Sterna antillarum browni*)

Range and Distribution

The discontinuous breeding range of the California least tern extends from Baja California, Mexico, to San Francisco Bay. The majority of the population apparently nests in coastal Southern California. Two nesting colonies are also known in the San Francisco Bay area.

Population Status and Threats

The California least tern was formerly widespread and "common to abundant" (Grinnell and Miller 1944) along the central and Southern California coast. Human use of beaches for recreational, residential, and industrial development has severely diminished the availability of suitable nesting areas in California (Grinnell and Miller 1944; Garrett and Dunn 1981; and Ehrlich et al. 1992) and has led to isolated, small colony sites that artificially concentrate breeding terns. Episodic losses in least terns have occurred due to cold, wet weather; extreme heat; dehydration and starvation; unusually high surf or tides; the El Niño warm sea current; and human disturbance of least tern colonies (Massey 1988). California least terns may also be susceptible to pesticide contamination and bioaccumulation (Boardman 1987a and 1987b). Habitat loss and human disturbance continue to threaten populations of this species.

The California least tern population declined to a known low of between 623 and 763 breeding pairs in the early 1970s (Bender 1974). Because of a variety of management efforts, the California least tern population has increased to an estimated California breeding population of about 2,160 pairs in 1992.

Habitat Requirements

California least terns nest in open sand, salt pans, or dried mudflats near lagoons or estuaries. They feed almost exclusively on small fish captured in shallow, nearshore areas, particularly at or near estuaries and river mouths (Massey 1974; Collins et al. 1979; Massey and Atwood 1981; Atwood and Minsky 1983; Atwood and Kelly 1984; Minsky 1984; and Bailey 1984). California least terns are opportunistic in their foraging strategy and known to take many different species of fish. They also take crustaceans and insects (Ehrlich et al. 1988).

Habitat in the Proposed Project Area

In the proposed project area, California least terns are known to occur only at the Salton Sea. Use of the sea is likely limited to foraging in the open water and resting on the shore (USFWS 1999). Mudflats along the shore of the Salton Sea may provide suitable resting areas and could be suitable for nesting, although nesting by California least terns is unknown at the Salton Sea. Shallow nearshore areas as well as shoreline pools formed by barnacle bars may be used for foraging.

Proposed Project Area Occurrence

The California least tern occurs at the Salton Sea only accidentally. Less than 10 records of this species exist at the Salton Sea NWR (USFWS 1997b). Nesting has not been reported, and based on the low level of use of the Salton Sea by California least terns, nesting is not currently expected.

Elegant Tern (*Sterna elegans*)

Range and Distribution

The elegant tern breeds along both coasts of Baja California, Mexico, and intermittently in northwestern Mexico and extreme southwestern California (DeGraaf and Rappole 1995). The elegant tern's range in North America is extremely limited; it occurs only in a few places in California, including the Salton Sea and San Diego Bay. In winter, it migrates to the west coast of South America (DeGraaf and Rappole 1995).

Population Status and Threats

Formerly, elegant terns were a rare and irregular postnesting visitor to coastal California (Grinnell and Miller 1944). During the 1950s, numbers increased; large flocks now can be seen in most years off the southern coast (Cogswell 1977). Elegant terns breed primarily in Mexico, but a nesting colony was established at San Diego Bay in 1959 (Cogswell 1977). This colony persisted and may have facilitated the recent range extension of nonbreeders northward to the coast of central California (Cogswell 1977). More recently, in 1987, another breeding colony became established in Orange County (Kaufman 1996). However, the elegant tern is considered vulnerable in the U.S. due to the limited number of breeding sites (Kaufman 1996).

Habitat Requirements

The elegant tern typically inhabits inshore coastal water, bays, estuaries, and harbors. It forages for fish in shallow water areas (CDFG 1999a). It captures fish by diving into the water (Ehrlich et al. 1988; Scott 1987). When not foraging, elegant terns often congregate on beaches and mudflats (CDFG 1999a). Roosting occurs on high beaches.

The elegant tern nests in colonies often in association with other terns. In California, nesting colonies are often near Caspian tern colonies that may help deter predators (Kaufman 1996). Nest sites are a simple scrape typically located on upper beaches (about 60 feet from the water line), although the San Diego colony nests on dikes between salt ponds (CDFG 1999a). Elegant tern colonies are sensitive to disturbance, and nesting locations need to be free from human intrusion.

Habitat in the Proposed Project Area

In the proposed project area, elegant terns would be expected to occur only at the Salton Sea. Elegant terns are rarely found at inland locations, but the Salton Sea and adjacent mudflats provide potentially suitable foraging and roosting areas for elegant terns. Breeding has not been reported at the Salton Sea, but potentially suitable conditions exist along the Salton Sea.

Proposed Project Area Occurrence

Elegant terns occur only accidentally at the Salton Sea during spring. Only three records of the species exist at the Salton Sea NWR (USFWS 1997b).

Van Rossem's Gull-Billed Tern (*Sterna nilotica vanrossemi*)

Range and Distribution

The breeding range of Van Rossem's gull-billed tern extends from the extreme southwestern U.S. to Sonora, and Baja California, Mexico. During winter, it migrates to coastal areas of Central and South America (DeGraaf and Rappole 1995). The species colonized Southern California, apparently from Mexico, and began nesting at the Salton Sea in the 1920s (Kaufman 1996). Breeding occurred in San Diego in the 1980s (Kaufman 1996). These two locations are the only known breeding areas of Van Rossem's gull-billed tern in the U.S.

Population Status and Threats

This species as a whole was once common in the eastern U.S. and Gulf States but was nearly exterminated in the early 1900s because of egg and feather collection (DeGraaf and Rappole 1995; Zeiner et al. 1990a), and the populations have not recovered. The status of the Van Rossem subspecies is uncertain, but its limited breeding locations and requirement for undisturbed nesting sites suggest the population may be vulnerable. Numbers of gull-billed terns at the Salton Sea have declined due to flooding of nest sites by rising water levels

(Garrett and Dunn 1981). No other threats to the survival of this species have been identified.

Habitat Requirements

Gull-billed terns are typically associated with salt marshes and coastal bays but also frequent open habitats such as pastures and farmlands for foraging. They primarily feed on insects, such as grasshoppers and beetles, but will also prey earthworms, fish, frogs, lizards, small mammals, eggs, and young of other birds (CDFG 1999a). Prey are captured on the ground, in the air, or off the surface of water. Foraging is typically concentrated over marshes (Kaufman 1996). Rarely, gull-billed terns will dive for fish.

This species breeds in small colonies on open sandy flats, often near nesting colonies of other terns (CDFG 1999a). Dredge spoils, shell mounds, and mudflats may also be used for nesting. Nests are a shallow depression in soft sand, soil, or dry mud (CDFG 1999a).

Habitat in the Proposed Project Area

At the Salton Sea, gull-billed terns nest on sandy flats amid shells and debris around the south end (CDFG 1999a; Shuford et al. 1999). Foraging likely occurs at the mudflats along the sea as well as in adjacent wetland areas and agricultural fields.

Proposed Project Area Occurrence

Van Rossem's gull-billed tern is an uncommon summer breeding resident at the Salton Sea, with up to 160 pairs nesting at the Salton Sea each year (USFWS 1997b; Shuford et al. 1999). The largest breeding colonies are at the southeast corner of the Salton Sea and to the south of Salton City (CDFG 1999a). Numbers of nesting birds at the Salton Sea have declined from earlier estimates of approximately 500 as the rising sea has flooded nests (CDFG 1999a).

Western Yellow-Billed Cuckoo *(Coccyzus americanus occidentalis)*

Range and Distribution

Historically, the western yellow-billed cuckoo was a fairly common breeding species throughout the river bottoms of the western U.S. and southern British Columbia (Gaines and Laymon 1984). Because of the loss of riparian woodland habitat, particularly cottonwood-willow habitat, the cuckoo has become an uncommon to rare summer resident in scattered locations throughout its former range. In California, remnant populations breed along sections of seven rivers, including the Colorado River in the southern part of the state.

Population Status and Threats

Yellow-billed cuckoos were fairly common and widespread in riparian systems throughout the western U.S. until the early 1900s. Since then, this species has decreased substantially in abundance. Surveys conducted in California during 1986 and 1987 found 31 to 42 breeding pairs along the Upper Sacramento River, the Feather River, the south fork of the Kern River, and along the Santa Ana, Amargosa, and LCRs (CDFG 1991). This represents a 66 to 81 percent decline from 1977 surveys when there were an estimated 122 to 163 pairs. Along the LCR, there was a 93 percent decline in cuckoos between the 1976 surveys, which documented 242 individuals, and the 1986 survey in which only 18 individuals were found

(Rosenberg et al. 1991). At Bill Williams Delta, cuckoos decreased about 75 percent during the same surveys, with only 50 to 60 cuckoos remaining in 1986.

The population trend for the western yellow-billed cuckoo is considered to be declining primarily due to the continued loss of cottonwood-willow riparian habitats (CDFG 1991; Rosenberg et al. 1991). Major threats to this species include habitat loss due to reclamation, flood control, and irrigation projects; habitat loss due to urbanization and agricultural activities; and the continued invasion of non-native salt cedar into riparian areas. Exposure to pesticides and other contaminants on wintering and breeding grounds, as well as livestock grazing and off-road vehicle use in riparian habitats, also continues to threaten this species' survival (Rosenberg et al. 1991; CDFG 1991; and Gaines and Laymon 1984).

Habitat Requirements

Mature stands of cottonwood-willow provide the primary habitat for this species. Willows or isolated cottonwoods mixed with tall mesquites are used to a lesser extent (Rosenberg et al. 1991). Monotypic stands of salt cedar are generally uninhabited by cuckoos. The cuckoo arrives on its breeding grounds in mid- to late June and departs by the end of August, spending only about one-quarter of its annual cycle on its breeding territory. As a midsummer breeder, the cuckoo faces extremely high temperatures that could easily kill eggs not protected by behavioral or physiological cooling mechanisms. To counter these midsummer temperatures, the cuckoo is a nest-site specialist, choosing stands of mature cottonwoods that have a subcanopy layer of willows that provide thermal refuge for the nest. Cuckoos maintain larger territories than many birds of comparable size (Platt 1975). Gaines (1974) found very few cuckoos where suitable habitat was less than 330 feet wide and patch size was less than 25 acres. Galli et al. (1976) found cuckoos were rarely present in patches of suitable habitat less than 60 acres.

The restriction of this species' breeding to the midsummer period is thought to be in response to a seasonal peak in large insect abundance (e.g., cicadas, which dominate the cuckoo's diet). Mantids, grasshoppers, and caterpillars are also important food resources for the cuckoo. Cuckoos will occasionally consume lizards and tree frogs (Rosenberg et al. 1991).

Habitat in the Proposed Project Area

The cottonwood-willow habitat that yellow-billed cuckoos require is largely absent from the proposed project area. Riparian areas in the proposed project area are dominated by tamarisk, which yellow-billed cuckoos are not known to use. Seepage areas along the AAC support localized areas of cottonwoods and willows; however, these areas are limited in size and distribution. While these areas provide potential habitat, the small size of these patches and fragmented distribution are unlikely to support any breeding population of yellow-billed cuckoos.

Proposed Project Area Occurrence

Most occurrences are from eastern Imperial County near the LCR near Laguna Dam, Winterhaven, and Bard. Yellow-billed cuckoos have been observed along the AAC across from the mission wash flume, 3 miles north-northeast (NNE) of Bard in stands of mature cottonwoods with a dense understory of cattails and introduced palm trees. Two records of yellow-billed cuckoos exist for the Salton Sea NWR (USFWS 1997b).

Short-Eared Owl (*Asio flammeus*)

Range and Distribution

The short-eared owl breeds from northern Alaska south through most of Canada and the central U.S., and from northern Ohio west to central California. It also breeds in Eurasia, South America, and Cuba. In North America, northern populations of the short-eared owl are strongly migratory, wintering in the Southern U.S. and south to Guatemala (Johnsgard 1988; Terres 1980). In California, the short-eared owl is a year-round resident commonly found in low-lying areas of agricultural lands, estuaries, emergent wetlands, and marshes (Zeiner et al. 1990).

Population Status and Threats

The short eared-owl is currently thought to be declining in most portions of its range, especially in the prairie provinces of Canada, along the Pacific Coast, and in parts of the Southeast (Ehrlich et al. 1988). The range of short-eared owls has decreased over the recent decades. It has disappeared from many locations in the southern U.S. where it previously nested (Kaufman 1996). The loss and fragmentation of grassland and wetland habitats due to agricultural expansion, increased grazing, and urbanization have been implicated as contributors to this range reduction (Remsen 1978). Pesticides may have contributed to declines as well (Marti and Marks 1989). Small (1994) reports the breeding population has declined in California and attributes this decline to a combination of shooting and habitat loss due to marsh drainage, agriculture, recreational development, and expansion of urban development. Habitat loss remains the primary threat to this species.

Habitat Requirements

Short-eared owls breed in open habitats, such as prairies, marshes, grassy plains, and tundra, that support high numbers of small mammals and provide opportunities to roost, nest, and forage. In winter, stubble fields, coastal dunes, meadows, marshes, and pastures are commonly occupied (Johnsgard 1988; Terres 1980; Ehrlich et al. 1988; and Kaufmann 1996). Dense nonwoody vegetation (grasses, reeds, sedges, rushes), brush, and open wetlands are required for roosting and nesting.

Short-eared owls eat mostly rodents, preferring voles over smaller mice. A variety of open-country and marsh-associated birds, such as western meadowlarks, horned larks, and red-winged blackbirds, are also commonly eaten by this species. Other prey includes rabbits, gophers, rats, shrews, insects, and bats (Johnsgard 1988; Terres 1980; Ehrlich et al. 1988; and Kaufmann 1996). It searches by flying low (3 to 20 feet) over the ground, hovering, and swooping down on prey. It uses large mounds and fence posts as perches. Where prey is abundant, large aggregations of short-eared owls often roost and hunt communally.

Habitat in the Proposed Project Area

In the LCR Valley, the short-eared owl is most often associated with agricultural fields (primarily, tall alfalfa); marshes; and grassy edge habitats (Rosenberg et al. 1991). It most likely uses similar habitats in the Imperial Valley, such as the managed wetlands of the state and federal wildlife refuges, wetlands adjacent to the Salton Sea, and agricultural fields throughout the valley.

Proposed Project Area Occurrence

Short-eared owls are rare winter visitors to the Salton Sea area (USFWS 1997b; Garrett and Dunn 1981) but are more common in the fall (USFWS 1997b). Short-eared owls have been observed along the Alamo River, and Hurlbert et al. (1997) observed one owl during surveys of selected drains in the Imperial Valley. Short-eared owls have also been observed near the towns of Calipatra and Westmorland.

Long-Eared Owl (*Asio otus*)

Range and Distribution

Long-eared owls are widely distributed throughout Eurasia, North Africa, and North America. In North America, the species breeds from central Canada south to northern Baja California, Mexico. Although it is a resident species in most of its breeding range, some populations of long-eared owls withdraw from northern areas and winter from Southern Canada south to southern Mexico (Johnsgard 1988; Terres 1980; and Kaufmann 1996).

Population Status and Threats

Although the status of this species is not well known, there is evidence that the overall population of long-eared owls in North America is declining, probably as a result of forest cutting and the destruction of grovelands and riparian habitats, especially in the western states (Kaufmann 1996; Johnsgard 1988). Habitat loss remains the primary threat to this species.

Habitat Requirements

Long-eared owls live in a variety of habitats that contain dense trees for nesting and roosting, and open areas for foraging. Coniferous and mixed coniferous forests containing extensive meadows, prairies supporting groves of trees, and streamside woodlands in desert areas are some of this species' preferred habitats (Kaufmann 1996; Ehrlich et al. 1988; Terres 1980; and Johnsgard 1988). In the southwest, long-eared owls can be found in dense stands of tall cottonwood or tamarisk and in densely vegetated desert washes (Rosenberg et al. 1991). During the breeding season, long-eared owls are territorial and widely dispersed throughout the landscape. The normal breeding density of this species is 10 to 50 pairs per 60 square miles (Johnsgard 1988). Long-eared owls nest in trees, usually in the abandoned nests of corvids. The nests of other large birds, such as herons and hawks, are also commonly used. When nest sites are scarce, long-eared owls occasionally nest in tree cavities or on the ground in heavy cover (Ehrlich et al. 1988; Kaufmann 1996; Johnsgard 1988; and Terres 1980). During the nonbreeding season, aggregations of long-eared owls will often cluster at favored roosting sites (Bent 1938).

The diet of long-eared owls overwhelmingly consists of rodents, but they will also eat small birds, bats, insects, snakes, and other small animals, with prey size being the most important factor in food selection (Ehrlich et al. 1988; Kaufmann 1996; Johnsgard 1988; and Terres 1980).

Habitat in the Proposed Project Area

Long-eared owls are associated with forested habitats, particularly adjacent to a stream or meadow. In the proposed project area, tamarisk scrub is the only potential habitat. Long-eared owls are known to use tamarisk in the southwest. Potential habitat for long-eared owls in the proposed project area consists mainly of tamarisk scrub habitat along the New and Alamo Rivers, Salton Sea, agricultural drains, and in areas receiving seepage from water delivery canals. Long-eared owls could use the agricultural fields throughout the Imperial Valley for foraging.

Proposed Project Area Occurrence

Long-eared owls are occasional winter visitors to the Salton Sea area (USFWS 1997b). They are not known to breed in the area.

Western Burrowing Owl (*Athene cunicularia*)

Range and Distribution

The breeding range of the western burrowing owl extends south from southern Canada into the western half of the U.S. and down into Baja California and central Mexico. The winter range is similar to the breeding range, except most owls from the northern areas of the Great Plains and Great Basin migrate south (Haug et al. 1993).

Population Status and Threats

Burrowing owls have declined in abundance throughout most of their range (Haug et al. 1993). In the western states, 54 percent of 24 jurisdictions reported burrowing-owl populations decreasing; there were no reported increases. Local populations are especially prone to extinction in this species (Haug et al. 1993). The species is listed as endangered or sensitive in 14 states in the U.S. and as threatened or endangered in four provinces in Canada. In California, the burrowing owl is currently considered a federal sensitive and a state species of special concern.

Burrowing owls were once a common, locally abundant species throughout much of California, although a decline in abundance was noticed by the 1940s (Grinnell and Miller 1944). This decline has rapidly continued throughout most of California (Remsen 1978). However, breeding bird surveys between 1980 and 1989 indicate the burrowing owl is increasing in southeastern California, the lower Sonoran deserts, and LCR Valley of western Arizona (Haug et al. 1993).

DeSante and Ruhlen (1995) reported the results of surveys for burrowing owls conducted throughout California, except for the Great Basin and desert areas during 1991 to 1993. During the 3-year census period, 9,450 breeding pairs of burrowing owls were estimated to occur in the area surveyed (95 percent confidence limits for this estimate are 7,206 and 11,695 pairs). This survey also found a 37 to 60 percent decrease in the number of breeding groups since the early 1980s, with the burrowing owl being extirpated from several counties (Marin, San Francisco, Santa Cruz, Napa Ventura, and coastal San Luis Obispo) and nearly extirpated from several additional counties (Sonoma, Orange, and coastal Monterey). Development is believed to have been the primary cause of the extirpation and decline of burrowing owls in these counties. In agricultural regions, removal of ground squirrels, use of chemical herbicides on levees and irrigation canals, and use of chemical insecticides and rodenticides on agricultural fields may have contributed to declines in burrowing owls (DeSante and Ruhlen 1995). Gervais et al. (2000) found low but detectable levels of DDE (n = 7; range = 0.20 – 3.4; mean = 0.62 milligrams per kilogram DDE, fresh weight) and no eggshell thinning in eggs collected from areas around the Salton Sea. In this same study, selenium concentrations in burrowing owl eggs (n = 7; range = 1.6 – 2.4; mean = 1.8 milligrams per kilogram Se, dry weight) were below background levels (less than 3 milligrams per kilogram Se, dry weight; Skorupa et al. 1996).

Burrowing owls have declined through much of their range because of habitat loss associated with urbanization, agricultural conversion, and rodent control programs (Remsen 1978; Johnsgard 1988). Pesticides, predators, and vehicle collisions have also contributed to their decline (Haug et al. 1993; James and Espie 1997). Survival and reproductive success are adversely affected by spraying insecticides over nesting colonies (James and Fox 1987). Burrowing owls also have been incidentally poisoned and their burrows destroyed during eradication programs aimed at rodent colonies (Collins 1979; Remsen 1978; and Zarn 1974). Although burrowing owls are relatively tolerant of lower levels of human activity, there are human-related impacts, such as shooting, burrow destruction, and the introduction of non-native predators, that adversely affect the owls (Zarn 1974; Haug et al. 1993). Populations of native predators (e.g., gray foxes and coyotes) artificially enhanced by development (i.e., availability of artificial food sources and shelter) and introduced predators (e.g., red foxes, cats, and dogs) near burrowing owl colonies adversely impact this species (Zeiner et al. 1990).

Habitat Requirements

Burrowing owls inhabit open areas, such as grasslands, pastures, coastal dunes, desert scrub, and the edges of agricultural fields. They also inhabit golf courses, airports, cemeteries, vacant lots, and road embankments or wherever there is sufficient friable soil for a nesting burrow (Haug et al. 1993). In the Imperial Valley, burrowing owls typically inhabit agricultural fields with extensive dirt embankments. Burrowing owls eat a variety of different prey items, including rodents, frogs, small birds, terrestrial and aquatic invertebrates, and carrion (Zarn 1974; Johnsgard 1988; and Gervais et al. 2000).

Burrowing owls use burrows created by other animals for nesting and shelter. The most commonly used rodent burrow in California is that of the California ground squirrel (Collins 1979). In other locations, burrows of badgers, prairie dogs, tortoises, and other animals may be used (Haug et al. 1993).

Burrowing owl nesting is strongly dependent on local burrow distribution. Nesting densities in the LCR Valley vary from eight pairs per 0.6-square mile in optimal habitat to one pair per 36 square miles in poor quality habitat (Johnsgard 1988). Home range and foraging area may overlap between different pairs, with only the burrow being actively defended (Coulombe 1971; Johnsgard 1988). Telemetry studies of foraging ranges of nesting burrowing owls conducted at three California sites (including Salton Sea) showed a mean range of 300 acres around the burrow (Gervais et al. 2000). Not all individuals capable of breeding do so every year. Breeding is initiated in early March (Coulombe 1971). Eggs are laid from late March to July (Terres 1980). Young fledge in the late summer to fall (Coulombe 1971).

DeSante and Ruhlen (1995) investigated the relationship between various habitat characteristics and the probability that a burrowing owl population at a particular locale significantly increased or decreased over surveys conducted during 1991 to 1993. No habitat characteristics were associated with the probability of the population decreasing. However, the probability that a population would increase was significantly related to several habitat characteristics. Populations with a high probability of increasing were generally associated with undisturbed habitat types, particularly pastures, large distances to the nearest irrigation canal, and the occurrence of a large number of ground squirrels. Populations with a low probability of increasing were associated with linear habitat types (e.g., roadsides and ditches), areas subject to soil disturbance, proximity to irrigation canals, and low numbers of ground squirrels. Crop type was not related to the probability that a population would increase.

Habitat in the Proposed Project Area

In the proposed project area, burrowing owls commonly inhabit the earthen banks of agricultural canals and drains. They concentrate along the edges of agricultural fields, especially where the banks of irrigation ditches provide suitable nesting burrows. Canal embankments are more commonly used for nesting than drains because vegetation is maintained at lower levels in the canals. Burrowing owls at the Salton Sea NWR also use artificial nest burrows placed along roadsides and forage in the surrounding agricultural fields both on and off the refuge (Gervais et al. 2000).

Proposed Project Area Occurrence

Burrowing owls are a common year-round resident adjacent to the Salton Sea and in the Imperial Valley (Garrett and Dunn 1981; USFWS 1997b). Burrowing owls occur at a very high density in the Imperial Valley, and the density of burrowing owls in Imperial County surpasses that of any other single county (Sturm 1999). The Institute of Bird Populations estimated that 6,429 pairs of burrowing owls inhabit the Imperial Valley, a number that represents 69 percent of the estimated total population in California (Shuford et al. 1999). This population level translates into a density of about 236 pairs per 60 square miles (DeSante and Ruhlen 1995). For comparison, the average density of burrowing owls in other lowland areas in California was estimated at 11.9 pairs per 60 square miles (DeSante and Ruhlen 1995).

Elf Owl *(Micrathene whitneyi)*

Range and Distribution

The elf owl breeds in the southwestern U.S.; Baja California, Mexico; and northern mainland Mexico (Terres 1980). In the U.S., it is found in extreme southern Nevada, central Arizona, southwestern New Mexico, western Texas, and the southeastern corner of California (Johnsgard 1988). In winter, it migrates south to Baja California, Mexico; mainland Mexico; and the Rio Grande Valley in Texas. In California, it is a very rare and local summer resident in riparian habitats along the LCR, which lies at the western edge of its range (Rosenberg et al. 1991). Small numbers of elf owls can be found at Bill William's Delta, near Needles, near Blythe, the Fort Mohave area, and at Cibola National Wildlife Refuge. It used to be present south of Yuma. West of the Colorado River, there are records at the oases of Cottonwood Springs and Corn Springs, in Riverside County.

Population Status and Threats

Once more numerous along the length of Colorado River, elf owls have been nearly extirpated from loss of habitat. The population status of the elf owl is directly dependent on available nesting holes made by woodpeckers and on sufficient insects during the breeding season (Johnsgard 1988). In California, at the extreme northwest edge of its range, the elf owl is likely declining in the few desert riparian habitats that it occupies (Johnsgard 1988). There may also be a general decline in Arizona, although it may be increasing its range in north-central Arizona and western New Mexico. It is difficult to determine the species' overall status in the southwest. The elf owl was never a common or widespread species along the LCR, where 1987 surveys of riparian habitats reported between 17 and 24 owls at 10 different sites (CDFG 1991). Population estimates in California for the early 1990s were 17 to 25 breeding pairs (CDFG 1991; Rosenberg et al. 1991).

Although the elf owl has probably never been common, it has declined due to the loss of mature riparian and saguaro habitats (CDFG 1991; Rosenberg et al. 1991). The habitat loss is attributed to agricultural development, river channeling, and flooding (CDFG 1991) and continues to threaten this species. The elf owl is a California state endangered species.

Habitat Requirements

The elf owl occupies desert riparian habitat of moderate to open canopy, often with a moderate to sparse shrub understory, and typically bordering desert wash, desert scrub, or grassland habitats. Taller trees with a shrub understory seem to be required (Grinnell and Miller 1944). This owl uses perches overlooking open ground or grassland (Marshall 1956). Foraging perches are typically in moderately tall cottonwood, sycamore, willow, mesquite, and saguaro cactus. Moderately tall trees and snags, such as cottonwood, sycamore, willow, mesquite, and saguaro cactus, afford perches and woodpecker-excavated or other cavities. Elf owls are dependent on woodpecker-excavated holes for nest sites, usually 15 to 20 feet from the ground (Bent 1938). In California, elf owls have nested in cottonwood (Miller 1946) and saguaro (Brown 1903); this owl is also known to nest in willow, sycamore, and mesquite trees or snags of moderate height.

Habitat in the Proposed Project Area

Little potential habitat for elf owls occurs in the HCP area. Most riparian habitats are dominated by dense stands of tamarisk that are not suitable for elf owls. Cottonwood/willow habitat and mesquite habitats are primarily restricted to scattered and isolated seepage areas adjacent to the AAC.

Proposed Project Area Occurrence

Since 1970, elf owls have been reported only north of Needles, San Bernardino County, 22 miles north of Blythe, Riverside County, and at Corn Springs (Gaines 1977a; Garrett and Dunn 1981). They have not been reported in the HCP area. The general lack of habitat makes it unlikely that elf owls would occur in any portion of the HCP area.

Vaux's Swift (*Chaetura vauxi*)

Range and Distribution

The Vaux's swift breeds in western North America and winters in Mexico and Central America. In California, it primarily nests in the Coast Ranges south to Monterey County but is also likely breed in low densities in Lake, Butte, Tehama, Plumas, and other interior California counties.

Population Status and Threats

Significant population declines of the Vaux's swift have been documented in Oregon and Washington (Sharp 1992), and most populations are believed to be declining throughout the species' range (Bull and Collins 1993). The removal of large, broken-top trees and large, hollow snags, most of which are found in late-seral stage forests, has been suggested as contributing to population declines (Sharp 1992). Habitat loss remains the primary threat to this species.

Habitat Requirements

The Vaux's swift nests in coniferous forests along the central and northern California coast, and mixed oaks and conifers in the interior mountain ranges. Natural cavities and burned-out hollow trees are preferred nest sites (Small 1994). Nests are typically built on the inner wall of a large, hollow tree or snag, especially those charred by fire (Bent 1940). Large-diameter, hollow trees or snags are also important for roosting nonbreeders, recently fledged young, and postbreeding adults. Vaux's swifts feed primarily on insects and spiders (Bull and Collins 1993). Foraging occurs above the forest canopy and at lower levels in meadows, over lakes, rivers and ponds, and above burned areas (Grinnell and Miller 1944; Bull and Collins 1993; and Small 1994).

Habitat in the Proposed Project Area

There is no suitable nesting habitat in the proposed project area. Migrating birds may forage over the Salton Sea, wetlands, streams, agricultural fields, and in residential areas. While less desirable, the desert scrub habitat may also provide some foraging habitat for this species (Sanders and Edge 1998; Zeiner, et al. 1990).

Proposed Project Area Occurrence

Vaux's swifts occur in the HCP area as a migrant during the spring and fall. It is relatively common at the Salton Sea during the spring but considered uncommon in the fall (USFWS 1997b). Thousands of migrating birds have been reported at the north end of the Salton Sea during the spring but are relatively uncommon elsewhere in the Salton Basin during spring migration (Garrett and Dunn 1981).

Black Swift *(Cypseloides niger)*

Range and Distribution

The black swift occurs in western North America, breeding from southeastern Alaska through western Canada and the U.S. and into Mexico (DeGraaf and Rappole 1995). It ranges as far east as Colorado (Kaufman 1996). The black swift's winter range is poorly known, but it may be found in northern South America and in the West Indies (DeGraaf and Rappole 1995). In California, black swifts breed very locally in the Sierra Nevada and Cascade Range, the San Gabriel, San Bernardino, and San Jacinto Mountains and in coastal bluffs and mountains from San Mateo County south probably to San Luis Obispo County (CDFG 1999a).

Population Status and Threats

The current status of black swifts is uncertain. Kaufman (1996) characterized the population as probably stable, but DeGraaf and Rappole (1995) consider the species to be experiencing a long-term decline. Nests are inaccessible to terrestrial predators and human disturbance, with the exception of rockclimbers, who rarely use these wet cliffs. No current threats to the survival of this species have been identified.

Habitat Requirements

Black swifts are associated with mountainous country and coastal cliffs. This association reflects their use of cliffs, often behind waterfalls, for nesting (Kaufman 1996). Foraging, however, occurs over a wide variety of habitats (CDFG 1999a). Like other swifts, black swifts are insectivores that capture insects in flight, and foraging locations reflect the occurrence and availability of insect prey. Common prey items include wasps, flies, mayflies, caddisflies, beetles, leafhoppers, and beetles. When available, black swifts will also feed on emerging swarms of winged adult ants and termites (Kaufman 1996).

Habitat in the Proposed Project Area

The proposed project area does not support nesting habitat for black swifts. However, much of the proposed project area could be used by black swifts for foraging, given this species' preference for open habitats. The Salton Sea, as well as other waterbodies, such as managed wetlands, the New and Alamo Rivers, and major canals, are likely to provide abundant insect prey for foraging black swifts. Agricultural fields may also provide suitable foraging habitat depending on the abundance of flying insects.

Proposed Project Area Occurrence

Black swifts occur accidentally in the proposed project area during the spring. Only two records of this species exist for the Salton Sea NWR (USFWS 1997b).

Gilded Flicker *(Colaptes chrysoides)*

Range and Distribution

The gilded flicker occurs along the LCR Valley in southern Arizona and southeastern California (Rosenberg et al. 1991). In California, the gilded flicker is an uncommon resident along the Colorado River north of Blythe (Garrett and Dunn 1981; CDFG 1991). It was historically widespread in riparian habitat all along the Colorado River Valley. It also used to inhabit saguaro deserts near Laguna Dam, above Yuma (CDFG 1991). Until the late 1970s, a small number of gilded flickers were resident in Joshua Tree woodlands of the eastern Mojave Desert near Cima Dome in California (Garrett and Dunn 1981; CDFG 1991).

Population Status and Threats

The gilded flicker was historically common throughout the LCR Valley. In 1983, however, the entire population along the LCR Valley in Arizona and California was estimated to be about 270 individuals. In the Arizona Sonoran desert east of the Colorado River, the gilded flicker is still common. In California, there were an estimated 40 individuals along the LCR in 1984 (Hunter 1984; CDFG 1991); however, during 1986 surveys, there were no gilded flickers observed in this area. Rosenberg et al. (1991) reported "scattered pairs" between Imperial and Laguna Dams. Gilded flickers were last observed in the eastern Mojave Desert at Cima Dome in 1978.

The decline of the gilded flicker in the LCR Valley is attributed to the loss of upland saguaro habitats and mature riparian forests (CDFG 1991). Other threats to the flicker include water and flood control proposed projects, agricultural operations, livestock grazing, the introduction of exotic plants into native systems, and off-road vehicle activity.

Habitat Requirements

Desert-dwelling gilded flickers are found in saguaro habitats, mature cottonwood-willow riparian forests, and occasionally in mesquite habitats with tall snags during the breeding season (CDFG 1991; Rosenberg et al. 1991). They forage primarily on the ground for ants and termites (Rosenberg et al. 1991). They will also eat mistletoe berries, cactus fruits, and other wild berries but seldom forage in trees for insects as other woodpecker species often do (Terres 1980; Rosenberg et al. 1991). Breeding begins in February, and two broods are usually raised in a year, with fledglings in late May and in July (Rosenberg et al. 1991). Cavities for nesting are usually excavated in saguaros, cottonwoods, and willows. Saguaros are preferred nesting sites, and riparian trees are usually used only when saguaros are unavailable. Gilded flickers rarely nest near human dwellings.

Habitat in the Proposed Project Area

The proposed project area does not contain areas supporting saguaros, the preferred nesting substrate of gilded flickers. Suitable habitat for gilded flickers is generally lacking in the Imperial Valley because most of the riparian habitat is dominated by tamarisk. Large trees potentially suitable for nesting principally occur in urban areas that gilded flickers generally avoid for nesting. The scattered patches of cottonwoods and willows supported by seepage adjacent to the AAC are likely to provide only minimal habit value because of their small size and limited distribution.

Proposed Project Area Occurrence

In California, gilded flickers are generally restricted to rare occurrences along the LCR (CDFG 1999a) and are not known to occur in the Imperial Valley.

Gila Woodpecker *(Melanerpes uropygialis)*

Range and Distribution

Gila woodpeckers occur in the extreme southwestern U.S. and south into Baja California and central Mexico (Terres 1980). In the U.S., they occur in Arizona, southeastern California, southwestern Nevada, and southwestern New Mexico. In California, Gila woodpeckers are a common year-round resident in mature riparian forest in the LCR Valley (Rosenberg et al.

1991). They also occur in groves and ranch yards having tall trees south of the Salton Sea and near Brawley, Imperial County (Garrett and Dunn 1981). Along the LCR, they are now limited to several localities between Needles and Yuma (CDFG 1991).

Population Status and Threats

The Gila woodpecker was formerly widespread and abundant but now is primarily found in remnant native riparian habitats with tall trees in the LCR Valley (Rosenberg et al. 1991). In 1984, an estimated 200 individuals occurred in California along the LCR (CDFG 1991). Relatively low reproductive success was documented for 27 monitored pairs during this time. The total population along the LCR is estimated at approximately 1,000 individuals (Rosenberg et al. 1991).

The Gila woodpecker is declining in California due to the loss and degradation of mature riparian habitats and saguaro habitats in the LCR Valley (Garrett and Dunn 1981; CDFG 1991; and Rosenberg et al. 1991). Other potential threats faced by this species include water and flood control proposed projects, agricultural operations, introduced predators, livestock grazing, and the introduction of exotic plants into riparian systems (CDFG 1991).

Habitat Requirements

Gila woodpeckers are closely associated with saguaros or large trees that they use for nesting (Rosenberg et al. 1991). They are most common in the desert mesas of Arizona (Terres 1980). In California, they are found primarily in mature riparian habitats, although they also use mesquite stands, orchards, and tall cultivated trees and utility poles for nesting (Garrett and Dunn 1981; Rosenberg et al. 1991; and Tierra Madre Consultants 1998). Gila woodpeckers appear to need large blocks of riparian habitat for nesting; isolated patches of riparian habitat less than 50 acres do not support this species (Rosenberg et al. 1991). Although several woodpeckers may occur in residential and park areas with tall trees, they have low reproductive success in these areas because of competition for nesting cavities with the introduced European starling.

Nesting cavities are excavated high in trees or saguaros and may be used for more than one season unless taken over by owls or European starlings. Breeding begins in February with pairing and territorial chasing. Young are dependent on parents for an extended period of time after fledging, although two to three broods can be raised in a season (Rosenberg et al. 1991). Pairs in riparian areas tend to successfully raise more than one brood, each with three to four young. In other habitats, Gila woodpeckers tend to have high rates of nest failure because of the eviction of adults and eggs from nesting cavities by aggressive starlings.

The Gila woodpecker forages by using its sharp bill to search for and chisel prey items from tree trunks and branches. Gila woodpeckers eat mostly insects, such as grasshoppers, beetles, ants, and grubs (Terres 1980). They also eat bird eggs, fruit from orchards, mistletoe berries, cactus pulp, saguaro fruits, and corn (Ehrlich et al. 1988; Scott 1987; and CDFG 1991).

Habitat in the Proposed Project Area

The proposed project area does not contain areas supporting saguaros, a commonly used nesting substrate of Gila woodpeckers. Cottonwoods and willows supported by seepage adjacent to the AAC are limited in size and distribution but may provide suitable habitat for

Gila woodpeckers. Gila woodpeckers may use telephone poles as nesting substrates (Tierra Madre Consultants, Inc. 1998); these occur throughout the proposed project area. Garrett and Dunn (1981) reported Gila woodpeckers also using groves and ranch yards having tall trees south of the Salton Sea and near Brawley, Imperial County. Although Gila woodpeckers use these areas for nesting, reproductive success may be poor due to competition with European starlings.

Proposed Project Area Occurrence

Gila woodpeckers may breed locally but are listed as rare to very uncommon on the Salton Sea Wildlife Refuge, occupying habitats near houses and towns where larger trees are found (USFWS 1997b). They have also been observed in areas near Brawley and along the Alamo River. Gila woodpeckers are also known to occur between the Laguna and Imperial Dams along the LCR. Gila woodpeckers have been observed at two locations along the AAC; across from the mission wash flume in a mature stand of cottonwoods and 6.5 miles to the northeast of Yuma in an area dominated by salt cedar, mesquite, and palo verde. A biological survey that Tierra Madre Consultants, Inc., conducted along the south side of the AAC in 1998 noted several Gila woodpeckers, including one pair nesting in a cottonwood (Tierra Madre Consultants, Inc. 1998). None of the Gila woodpeckers were seen using holes in powerline poles, rather they appeared to use poles as song perches and foraging sites (Tierra Madre Consultants, Inc. 1998).

Southwestern Willow Flycatcher (*Empidonax traillii extimus*)

Range and Distribution

The southwestern willow flycatcher is recognized as one of five subspecies of the willow flycatcher. Willow flycatchers were once widespread and locally common throughout the southwest, and were distributed across southern California, southern Nevada, southern Utah, Arizona, New Mexico, and western Texas (Hubbard 1987; Unitt 1987; and Browning 1993). At present, the willow flycatcher is believed to be extirpated as a breeding species along the lower reaches of most southwestern riverine systems. The largest breeding populations of southwestern willow flycatchers in California occur along the San Luis Rey and Santa Margarita Rivers in San Diego County and along the south fork of the Kern River at the southwest end of the Sierra Nevada Mountains (Salton Sea Authority and Reclamation 2000). Although historical records indicate this species was once abundant along the LCR, recent surveys have found breeding willow flycatchers persisting very locally in small, widely scattered locations, including Grand Canyon National Park, Lake Mead Delta, Adobe Lake, Topock Marsh, the Virgin River Delta, and Mormon Mesa (USFWS 1995a; Sogge et al. 1997; McKernan 1997; McKernan and Braden 1999; and AGFD 1997e). Large numbers of willow flycatchers pass through Southern California deserts during spring and fall migration (Garrett and Dunn 1981).

Population Status and Threats

Since the 1800s, the willow flycatcher has experienced extensive population reductions throughout its range (USFWS 1995a; AGFD 1997e). Based on recent censuses and population estimates throughout the range of the southwestern willow flycatcher, the USFWS (1995a) estimated the total number of remaining flycatchers at approximately 300 to 500 pairs. The population of southwestern willow flycatchers in Southern California was estimated at fewer than 80 pairs in the early 1980s (Unitt 1984). Declines are continuing in most populations that have been monitored since that time (USFWS 1995a). The primary factors responsible for the decline of the southwestern willow flycatcher are the loss and degradation of native riparian habitats, particularly cottonwood-willow associations (USFWS 1995a; AGFD 1997e). Related factors contributing to the decline of this species include brood parasitism by brown-headed cowbirds, increased predation, salt cedar invasion, urban and agricultural development, livestock grazing, water diversion and impoundment, channelization, off-road vehicle use and recreation, floods, pesticides, forest practices, and possible gene pool limitations (USFWS 1995a; AGFD 1997e). These factors continue to threaten the survival of this species. The small size of remaining flycatcher populations (most populations contain fewer than five pairs) suggests that environmental stochasticity, demographic stochasticity, and genetic deterioration may also be playing an increasing role in the species' decline. Recent observations of physical deformities, including crossed bills and missing eyes, in conjunction with the discovery of high levels of several toxic chemicals (e.g., lead, arsenic, and selenium) in or near breeding sites, suggest that environmental contamination may also be threatening this species (Paxton et al. 1997). The willow flycatcher is a California state endangered species.

Habitat Requirements

The southwestern willow flycatcher is a neotropical migrant that is strongly associated with riparian habitats. It is considered a partial obligate on cottonwood-willow riparian systems throughout southwestern riverine systems. Its association with cottonwood-willow habitats is strongest at low elevations (Hunter et al. 1987). Invasion of cottonwood-willow habitats by exotic species, principally tamarisk, may reduce habitat value for southwestern willow flycatchers. In particular, tamarisk may not provide the thermal cover necessary for the southwestern willow flycatcher to nest successfully. At higher elevations, willow flycatchers often use tamarisk stands (Hunter et al. 1987), suggesting that under some circumstances, these altered riparian habitats may support this species.

Breeding habitat consists of dense stands of intermediate-size shrubs or trees, such as willow, Coyote bush, ash, boxelder, and alder, with an overstory of larger trees, such as cottonwood. Exotic species, such as Russian olive and tamarisk, may also be present in composition. Both even- and uneven-aged sites are used by this subspecies for nesting habitat. Typically, nesting habitat for the willow flycatcher has extensive canopy coverage and is structurally homogenous (USFWS 1995a). Occupied habitat is generally associated with surface water or saturated soil (Sogge et al. 1997) and dominated by shrubs and trees 10 to 30 feet tall that provide dense lower and mid-story vegetation, with small twigs and branches for nesting. Apparently, habitat structure and the presence of surface water or saturated soils may be more important than plant species composition in defining suitable flycatcher habitat (USFWS 1995a).

The willow flycatcher is present and singing on its breeding territory by mid-May, and young are fledged by early to mid-July (USFWS 1995a). Territory sizes for the willow flycatcher are not well known due to the subspecies' rarity and variable habitat utilization. However, habitat patches as small as 1.2 acres have been found to support one or two nesting pairs (USFWS 1995a). Nesting success rates for the willow flycatcher appear to be affected by habitat fragmentation, resulting in increased rates of predation and high levels of brood parasitism by the brown-headed cowbird (USFWS 1995a; AGFD 1997e).

This species is insectivorous and forages for insects both within and above dense riparian vegetation. Prey items are taken on the wing and gleaned from foliage. This species also forages along water edges, backwaters, and sandbars adjacent to nest sites.

Habitat in the Proposed Project Area

Cottonwood-willow habitat is largely absent from the proposed project area. Between Drops 3 and 4, seepage from the AAC supports a localized area of cottonwood / willow habitat. Tamarisk also occurs in areas receiving seepage from the AAC and is dominant along the New and Alamo Rivers. Because of the lower structural diversity of tamarisk stands and poor thermal cover, these low-elevation riparian areas are likely to provide marginal nesting habitat at best for willow flycatchers. Tamarisk and common reed supported along the agricultural drains may be used by migrating willow flycatchers.

Proposed Project Area Occurrence

The occurrence and distribution of southwestern willow flycatchers in the proposed project area is poorly known. Willow flycatchers of an undetermined subspecies have been reported at the Salton Sea NWR and are considered an uncommon spring migrant and common fall migrant (USFWS 1997b). These birds may include other subspecies of willow flycatchers that migrate through the area between northern breeding areas and wintering grounds in South America. Willow flycatchers have been reported in the Imperial Valley in residential areas near Niland, in riparian and desert scrub habitats, and along agricultural drains. In addition, 10 agricultural drains were surveyed in the Imperial Valley during 1994 to 1995. Single willow flycatchers were observed along the Holtville Main, Trifolium 2, and Nettle Drains (Hurlbert et al. 1997). Willow flycatchers are also known to use seepage communities along the AAC near the mission wash flume 3 miles NNE of Bard.

These observations show a low but consistent use of the area by willow flycatchers during migration. Nesting has not been reported in the proposed project. However, recent surveys have found willow flycatchers along on the Whitewater River (a tributary to the Salton Sea) during the breeding season, suggesting that nesting could occur in the proposed project area in the future (B. McKernan pers. comm.).

Brown-Crested Flycatcher (*Myiarchus tyrannulus*)

Range and Distribution

The brown-crested flycatcher is a fairly common summer resident (May to July) in desert riparian habitat along the Colorado River. A few flycatchers nest at Morongo Valley, San Bernardino County; birds may nest very locally at other desert oases and riparian habitats northwest to Mojave River near Victorville, San Bernardino County. Vagrants have been recorded west to the South Fork Kern River near Weldon, Kern County, north to Furnace Creek Ranch, Death Valley, Inyo County, and on the Farallon Islands (Gaines 1977a; Garrett and Dunn 1981; and McCaskie et al. 1988).

Population Status and Threats

Numbers of brown-crested flycatchers have declined in recent decades, apparently in response to destruction of desert riparian habitat and to competition for nest cavities from European starlings (Remsen 1978). However, DeGraaf and Rappole (1995) still consider the species common throughout its range. Habitat destruction and competition with exotic species remain the primary threats to this species.

Habitat Requirements

Brown-crested flycatchers are most numerous in riparian groves of cottonwood, mesquite, and willow, which afford suitable nest sites, but often forage in adjacent desert scrub or tamarisk (Garrett and Dunn 1981). This species requires riparian thickets, trees, snags, and shrubs for foraging perches, cavities, and other cover. Brown-crested flycatchers also require woodpecker-excavated cavities for nesting and are thus secondarily dependent on snags; trees with rotten heart-wood; utility poles; and fence posts, in which ladder-backed and Gila woodpeckers, and other primary excavators, dig nesting cavities.

Habitat in the Proposed Project Area

Nesting habitat is minimal in the proposed project area, because cottonwood / willow habitat is rare, occurring only in small isolated patches along the AAC. Where nest sites are present, salt cedar and creosote shrubs provide suitable foraging habitat. Wetland areas on the state and federal refuges and agricultural drains may provide suitable foraging habitat for migrating brown-crested flycatchers.

Proposed Project Area Occurrence

The brown-crested flycatcher is known to occur in riparian areas along the LCR between the Laguna and Imperial Dams and has been observed along the AAC in scattered mature cottonwoods across from the mission flume 3 miles NNE of Bard. Birds have also been observed along the northern shoreline of the Salton Sea.

Vermilion Flycatcher (*Pyrocephalus rubinus*)

Range and Distribution

Vermilion flycatchers occur in the southwestern U.S., southern portions of New Mexico, Arizona, and western Texas (Kaufman 1996). In California, the vermilion flycatcher is a rare, local, year-long resident along the Colorado River, especially in the vicinity of Blythe in Riverside County. A few birds still breed sporadically in desert oases west and north to Morongo Valley and the Mojave Narrows in San Bernardino County (CDFG 1999a). Outside the U.S., they occur throughout much of Central and South America (DeGraaf and Rappole 1995).

Population Status and Threats

Surveys have shown declines in the population in Texas (Kaufman 1996), although the species remains common throughout most of its range (DeGraaf and Rappole 1995). In California, it was formerly much more common and widespread and is now rare in the Imperial and Coachella Valleys. Numbers have declined drastically along the Colorado River, primarily the result of habitat loss; the species faces extirpation in California if the present trend continues (Grinnell and Miller 1944; Gaines 1977b; Remsen 1978; and Garrett and Dunn 1981). Habitat loss remains the primary threat to this species.

Habitat Requirements

Vermilion flycatchers are closely associated with water and inhabit streamside habitats in arid regions. Breeding birds use riparian habitats consisting of cottonwood, willow, mesquite, and other riparian plant species. The use of tamarisk is restricted to high-elevation riparian systems only (Hunter et al. 1987). Often nest sites are adjacent to irrigated fields, irrigation ditches, pastures, or other open and mesic areas (CDFG 1999a). Nests are located in large trees or shrubs, generally 8 to 20 feet above the ground (CDFG 1999a).

Vermilion flycatchers forage on insects, particularly beetles, flies, wasps, bees, and grasshoppers. They forage by sallying from perch sites. Foraging is concentrated over water in other mesic habitats.

Habitat in the Proposed Project Area

The proposed project area supports little cottonwood / willow / mesquite habitat. Seepage from the AAC supports a small amount of this habitat between Drops 3 and 4. Tamarisk scrub habitat is widespread in the proposed project area and may provide suitable habitat for vermilion flycatchers. Tamarisk scrub occurs along the New and Alamo Rivers, Salton Sea, agricultural drainage canals, and in areas receiving seepage from water delivery canals. Wetland areas on the state and federal refuges and agricultural drains could be used for foraging and nesting.

Proposed Project Area Occurrence

Vermilion flycatchers are known to occur in the proposed project area but are considered rare (Shuford et al. 1999). While breeding populations presumably occurred in the proposed project area at one time, no nesting populations are currently known (USFWS 1997b).

Purple Martin (*Progne subis*)

Range and Distribution

The purple martin nests west of the Cascade Range and Sierra Nevada from southwestern British Columbia south to Baja California, Sonora, and Arizona. Nesting occurs east of the Rocky Mountains from northeastern British Columbia and central Alberta east through northern Minnesota, Wisconsin, southern Ontario to central Nova Scotia and south to the Gulf coast and central Florida. In fall, it migrates to and winters in South America.

Population Status and Threats

Purple martins began to decline in California in the late 1950s (Small 1994). Observed declines have been attributed to nest site competition with the introduced European starling, and the loss of suitable nest and roost trees (Remsen 1978). Currently, the purple martin is a California state species of special concern. Habitat loss and competition with exotic species remain the primary threats to this species.

Habitat Requirements

Purple martins are not strongly associated with a particular habitat type. Factors influencing their occurrence and distribution appear to be insect abundance and diversity, presence of open water, humidity, wind speed, and visibility around nest sites. Only the nest substrate itself appears to strongly affect where they occur during the breeding season (Williams 1996). Purple martins typically nest along rivers, estuaries, and other large water bodies and sometimes in old burns or urban situations (Marshall 1992). This species usually nests in old woodpecker cavities, often in tall, large-diameter trees and snags but also uses nest boxes, cornices of old buildings, and occasionally rock cavities (Marshall 1992). In some locations (e.g., Sacramento), hollow box bridges are used for nesting (Williams 1996).

Purple martins forage by capturing insects in flight. Foraging can occur over any habitat type where insects are abundant.

Habitat in the Proposed Project Area

Purple martins could use most of the proposed project area for foraging. Purple martins will forage in most areas with abundant flying insects. In the proposed project area, the Salton Sea as well as other waterbodies, such as managed wetlands, the New and Alamo Rivers, and major canals, may provide these conditions. Agricultural fields may also provide suitable foraging habitat, depending on the abundance of flying insects.

Proposed Project Area Occurrence

Purple martins are occasional visitors to the Salton Sea area as spring and fall migrants (USFWS 1997b). No published records exist of purple martins nesting in the southeastern portion of California (Williams 1996), and purple martins are not expected to nest in the proposed project area.

Bank Swallow (*Riparia riparia*)

Range and Distribution

Bank swallows are a migratory species that ranges throughout much of the U.S. and Canada during the spring and summer. In California, the majority of its habitat is concentrated along the Upper Sacramento River and several tributaries (CDFG 1990). Some small, isolated populations occur at a few sites in northwestern California (CDFG 1990). In winter, it migrates to South America.

Population Status and Threats

In California, the bank swallow's population and range have been declining (Small 1994). Historically, the bank swallow was found throughout the state, but the current distribution is primarily limited to areas along the Upper Sacramento River and several tributaries (CDFG 1990). Garrison et al. (1987) reported a total breeding population in California of about 16,000 pairs in 1987. In 1990, the estimated breeding population was 4,500 pairs (Small 1994). Erosion and flood control measures are considered the primary causes of observed declines (Garrison et al. 1987) and continue to threaten this species. In other portions of the species' range, population numbers are high and appear stable (Kaufman 1996).

Habitat Requirements

The bank swallow is usually found foraging over or near open water and open land areas. While considered a riparian species, the bank swallow does not have specific associations with riparian plant communities (Garrison et al. 1987). Foraging takes place during coursing flights over grasslands, along rivers, and other open areas (Sharp 1992).

Habitat in the Proposed Project Area

Bank swallows do not breed in the proposed project area, and their use of habitats in the proposed project area is restricted to foraging. Bank swallows could use most of the proposed project area for foraging since they will forage in any habitat with abundant flying insects. In the proposed project areas, the Salton Sea and other waterbodies, such as managed wetlands, the New and Alamo Rivers, and major canals, may provide these conditions. Agricultural fields may also provide suitable foraging habitat, depending on the abundance of flying insects.

Proposed Project Area Occurrence

The bank swallow migrates through the Salton Sea area in April and again in September on its way between wintering areas in South America and its nesting areas in Northern California. It is considered a casual visitor to the proposed project area with only a few records (Garrett and Dunn 1981).

Crissal Thrasher (*Toxostoma crissale*)

Range and Distribution

The crissal thrasher is a resident of southeastern deserts. It is found from southeastern California to southern Nevada, southwestern Utah to west-central Texas, and Baja California south to central Mexico. In California, it occurs in the eastern Mojave Desert of San Bernardino and southeastern Inyo counties up to 5,900 feet in elevation. It is also a resident in Imperial, Coachella, and Borrego Valleys.

Population Status and Threats

The crissal thrasher appears to be localized and uncommon throughout much of its range. While it is still fairly common in the Colorado River Valley, population numbers have declined markedly in recent decades (Grinnell and Miller 1944; Remsen 1978; and Garrett and Dunn 1981). Removal of mesquite brushland for agricultural development and introduction of tamarisk are the primary causes of the population reductions (Remsen 1978). Off-road vehicle activity also may also threaten this species by degrading habitat and disturbing these thrashers.

Habitat Requirements

The crissal thrasher occupies dense thickets of shrubs or low trees in desert riparian and desert wash habitats. It also occurs in dense sagebrush and other shrubs in washes in juniper and pinyon-juniper habitats. Cover for this species is provided by thickets of dense, shrubby vegetation along streams and in washes and frequently, mesquite, screwbean mesquite, ironwood, catclaw acacia, and arrowweed willow. Crissal thrashers forage mostly on the ground, especially between and under shrubs. The crissal thrasher nests in thickets of desert shrubs or on forked branches of a small trees.

Habitat in the Proposed Project Area

Dense thickets of tamarisk along canals, drainages, agricultural fields and rivers in the proposed project area may provide suitable nesting and foraging habitat for this species.

Limited stands of mesquite, willow, and cottonwoods found in seepage areas of the AAC may also provide suitable habitat for the crissal thrasher.

Proposed Project Area Occurrence

The crissal thrasher is a resident of the Imperial, Coachella, and Borrego Valleys. Breeding pairs have been observed along the Alamo River and near the towns of Niland and Brawley. Birds have also been observed across from the mission wash flume 3 miles north northeast of Bard and in areas around the Laguna Dam.

Le Conte's Thrasher (*Toxostoma lecontei*)

Range and Distribution

The Le Conte's thrasher is a year-round resident throughout its range (Sheppard 1996). The species can be found from central California to southwestern Utah, south to western Arizona, and Baja California and northwestern Mexico (Terres 1980). Specifically, it is found in the San Joaquin Valley and Mojave and Colorado Deserts of California and Nevada southward into northeast Baja California, Mexico, and farther south into central and coastal Baja California. It is found in the Sonoran Desert from extreme southwest Utah and western Arizona south into west Sonora, Mexico. Within its range, its distribution is patchy with the southernmost occurrence in Mexico at about 26°N latitude and northernmost in northwestern Sonora, Colorado (Sheppard 1970). In California, the species occurs in southern California deserts and in western and southern San Joaquin Valley (Garret and Dunn 1981). The species may have historically extended north to Fresno and Mono Counties (Zeiner et al. 1990).

Population Status and Threats

Numbers of Le Conte's thrasher have declined in recent decades. The species is vulnerable to off-road vehicle activity and other mechanical disturbances, including agriculture and development (Zeiner et al. 1990). Shooting may be a factor in human-related deaths (Sheppard 1996). Habitat loss due to degradation, fragmentation, agricultural conversion, irrigation, urbanization, oil and gas development, fire, and over-grazing are the primary reasons for the decline of the species (Brown 1996). Thse factors continue to threaten the survival of this species.

Habitat Requirements

Le Conte's thrasher occurs in open desert wash, desert scrub, alkali desert scrub, and desert succulent shrub habitats on sandy and often alkaline soils (Zeiner et al. 1990; Unitt 1984; and Sheppard 1970). Desert shrubs and cacti are frequently used for cover (Sheppard 1970). This species often inhabits areas where soil is fine alluvium or sandy and topography is flat and open, including dunes and gently rolling hills (Sheppard 1996; Miller and Stebbins 1964). Le Conte's thrasher requires areas with an accumulated leaf litter under most plants as diurnal cover for its mostly arthropod prey. Surface water rarely exists anywhere within several miles of most of its territories except temporarily after infrequent rains. Le Conte's thrashers nest in dense, spiny shrubs or densely branched cactus. Typical nest sites are characterized by shade above the nest and may be located in an arroyo in relatively deep shade from overhanging branches and roots (Sheppard 1996). Nests are known to persist for several years and are often easier to find than the birds (Miller and Stebbins 1964).

Habitat in the Proposed Project Area

The creosote bush scrub community is widespread throughout the nonirrigated areas of the Sonoran Desert. In the HCP area, the occurrence of this community is limited to the right-of-way of IID along the AAC.

Proposed Project Area Occurrence

The USFWS (1997) reports LeConte's thrasher as an extirpated breeder at the Salton Sea NWR with no recent breeding records. Breeding pairs have been observed in desert scrub habitat east of the Coachella Canal, suggesting the potential for them to occur in desert scrub habitat adjacent to the AAC as well.

Loggerhead Shrike (*Lanius ludovicianus*)

Range and Distribution

Loggerhead shrikes formerly nested throughout much of North America, from Canada south through the Great Basin, along the Gulf Coast, and south to Florida and Mexico (Terres 1980; Cade and Woods 1997). Their range is currently more restricted, encompassing mainly the southern portions of the historic range.

Population Status and Threats

The loggerhead shrike underwent northeastern and north-central range expansions in the late 1800s and early 1900s that were attributed to deforestation and expansion of agriculture (Cade and Woods 1997). Since the 1940s, there has been a contraction of the range, especially in the north, and an overall decrease in abundance that is associated with reforestation, loss of pasture lands, and expansion of intensive row crop agriculture. Christmas Bird Count and breeding bird survey data show that since 1966, there has been an overall decreasing trend in the abundance of loggerhead shrikes across North America, although some locations have stable or increasing populations. Loggerhead shrikes have always been most abundant in the southern and western parts of their range. They appear to be increasing, especially as a winter resident, in the LCR Valley (Rosenberg et al. 1991). The increase in abundance during the winter is attributed to the expansion of agriculture in the valley, which provides suitable wintering habitat.

The primary reasons loggerhead shrikes are thought to have declined are loss and degradation of breeding habitat (Cade and Woods 1997). The pattern of historical range expansion and contraction indicates that natural successional changes in vegetation and human-caused landscape changes have made habitat suitable or unsuitable and that loggerhead shrike populations have tracked these habitat suitability changes. With the decreasing availability of farmland in the Northeast, there has been a decline in the range and abundance of breeding loggerhead shrike. Pasture lands, which have declined even more than other types of farmlands, are especially important to shrikes. Certain types of agriculture do not produce suitable loggerhead shrike habitat, such as intensive, chemically treated row crop monocultures. In the West, localized declines are usually attributed to habitat loss from urbanization and intensive modern agriculture practices. Habitat loss remains the primary threat to this species.

Other causes of decline that have been suggested include possible adverse effects from pesticides, especially organochlorines that can cause eggshell thinning and reduced reproductive success (Cade and Woods 1997). However, at this time, there is no evidence for a direct impact from pesticides; rather, it may be that pesticides have a stronger indirect effect by reducing insect prey abundance. Other factors contributing to the decline of loggerhead shrike populations include collisions with automobiles and predation by domestic and feral cats.

Habitat Requirements

Loggerhead shrikes prefer open country, such as grasslands, meadows, scrublands, deserts, pastures, and certain ruderal or agricultural lands (Terres 1980; Cade and Woods 1997). For nesting, they require suitable nesting shrubs or small trees and hunting perches in an open area with grassy or herbaceous ground cover and bare areas where food is often found (Cade and Woods 1997). Loggerhead shrikes breed in sparse riparian woodland and desert washes in the Colorado River area. Loggerhead shrikes nest in shrubs or trees, and eggs are laid from February to July.

Shrikes are carnivorous, eating a variety of prey including mice, small birds, reptiles, insects (e.g., grasshoppers, crickets, and beetles), and spiders (Terres 1980; Rosenberg et al. 1991). Prey is hunted from perches, the ground, or in aerial pursuit. Thorny trees and bushes or barbed wire are used to impale and store prey.

Recommended management strategies for the loggerhead shrike include providing a mosaic of disturbed grassland patches or pasture lands the size of typical territories within monocultures of row crops (Gawlik and Bildstein 1993; Cade and Woods 1997). Habitat should be managed away from major roads, given the propensity for shrikes to be killed by automobiles (Cade and Woods 1997). Other recommendations include fencing shrub patches from livestock to provide nesting sites and increasing the number of hunting perches where they are scarce (Yosef 1996).

Habitat in the Proposed Project Area

In the proposed project area, habitat for loggerhead shrikes consists mainly of agricultural fields. Vegetation along agricultural drains may be used as perch sites from which loggerhead shrikes forage in adjacent agricultural fields. Nesting may also occur in these habitats. Loggerhead shrikes use urban areas with trees in the Imperial Valley.

Proposed Project Area Occurrence

The loggerhead shrike is a year-round resident at the Salton Sea and Imperial Valley known to occur near the town of Clipatria and areas south of the Salton Sea. The species is known to breed in the vicinity (USFWS 1997b). Ten drains were surveyed in the Imperial Valley during 1994 to 1995. Loggerhead shrikes were detected along 7 of the 10 drains. Numbers recorded ranged from 1 to 11 individuals.

Arizona Bell's Vireo (*Vireo bellii arizonae*)

Range and Distribution

The Arizona Bell's vireo is distributed throughout the river systems of the desert Southwest from the Colorado River in southeastern California to the Grand Canyon. It is a summer resident along the LCR.

Population Status and Threats

Since 1900, populations of this subspecies of Bell's vireo have declined along the lower reaches of the Colorado River where it is now a rare to locally uncommon summer resident from Needles south to Blythe (Brown et al. 1983; Zeiner et al. 1990; and Rosenberg et al. 1991). This subspecies has also declined along the lower reaches of the Gila, Santa Cruz, and Salt Rivers. At higher elevations, it has remained common throughout its range (Hunter et al. 1987). Since the completion of Glen Canyon Dam in 1963, the Arizona Bell's vireo has been expanding its range eastward along the Colorado River into Grand Canyon National Park (Brown et al. 1983). Construction of Glen Canyon Dam has prevented seasonal flooding that formerly scoured the banks of the river and has allowed an extensive riparian scrub to develop in the old high-water zone. This newly created habitat is largely composed of salt cedar and willow species and supports significant populations of Arizona Bell's vireo (Brown et al. 1983). Grand Canyon populations of the Arizona Bell's vireo are regionally significant due to the substantial decline of this subspecies at lower elevations. Elsewhere along the LCR, the Arizona Bell's vireo is now a rare to locally uncommon summer resident from Needles south to Blythe (Zeiner et al. 1990; Rosenberg et al. 1991).

The decline of this subspecies is primarily due to extensive habitat loss and degradation and heavy nest parasitism by brown-headed cowbirds (Rosenberg et al. 1991; CDFG 1992). Current threats to this subspecies include the continued loss and degradation of habitat due to urbanization, water and flood control proposed projects, agriculture, livestock grazing, introduced competitors, exotic invasive plants, off-road vehicles, and nest parasitism by brown-headed cowbirds (Brown 1993; CDFG 1992; and Rosenberg et al. 1991). Populations of the Arizona Bell's vireo appear to be regulated primarily by the availability of suitable nesting habitat and secondarily by the rate of cowbird parasitism (Brown 1993). The Arizona Bell's vireo is a California state endangered species.

Habitat Requirements

The Arizona Bell's vireo is an insectivorous, neotropical migrant that breeds in summer in riparian scrub habitats (Brown 1993; Rosenberg et al. 1991; and CDFG 1992). Bell's vireos are insectivorous, gleaning insects from foliage and branches close to the ground (CDFG 1999a). At low elevations, this subspecies is largely associated with early successional cottonwood-willow. Serena (1986) found that Goodding willow was the most important plant contributing to cover around vireo nest sites in the LCR Valley. The near dependence of this subspecies on cottonwood-willow habitats at low elevations may be due to the extremely high mid-summer temperatures that exist outside these habitats (Walsberg and Voss-Roberts 1983; Hunter et al. 1987). At higher elevations (above 427 meters [1,400 feet]), the Arizona Bell's vireo uses tamarisk and honey mesquite, as well as cottonwood-willow habitats (CDFG 1992; Hunter et al. 1987; and Rosenberg et al. 1991). The elevational differences this subspecies exhibits in its breadth of habitat use is typical of many southwestern riparian birds and appears to be related to the availability of appropriate nest-site environments that may be constrained by restricted thermal tolerances (Hunter et al. 1987). Most nests are located 1.5 to 4.5 feet above ground and are generally suspended from small, lateral, or terminal forks of low branches in dense bushes; small trees; and, occasionally, herbaceous vegetation. In the Grand Canyon, 77 (64 percent) of 121 vireo nests were located in shrub salt cedar and 29 (24 percent) in honey mesquite (Brown 1993).

The Arizona Bell's vireo is a frequent host of the brown-headed cowbird. Although the percentage of cowbird eggs hatched relative to the number laid in vireo nests is low, cowbird parasitism significantly reduces vireo productivity through nest abandonment, the destruction or removal of both eggs and young, and nestling competition (Brown 1993; CDFG 1992; and Rosenberg et al. 1991).

Habitat in the Proposed Project Area

Cottonwood-willow habitat is largely absent from the proposed project area. Seepage from the AAC supports a small area of this habitat between Drops 3 and 4. Tamarisk is also common in this area and other areas receiving seepage from the AAC and along the New and Alamo Rivers. In addition to these areas, tamarisk stands develop along agricultural drains and in areas receiving seepage from unlined canals in the Imperial Valley. While tamarisk provides habitat in parts of the Arizona Bell's vireo range, the extreme temperatures that occur in summer months in the proposed project areas likely preclude extensive utilization of this habitat.

Proposed Project Area Occurrence

Arizona Bell's vireos are not known to occur in the Imperial Valley, and the potential for this species to occur in the Imperial Valley in the future is low (IID 1994). Arizona Bell's vireos have been observed in eastern Imperial County near Bard Lake and Laguna Dam. In the proposed project area, Arizona Bell's vireo is most likely to occur in habitats supported by seepage from the AAC.

Least Bell's Vireo (*Vireo bellii pusillus*)

Range and Distribution

Least Bell's vireos migrate from their wintering ground in Southern Baja California to Southern California between mid-March and early April to Southern California, where they remain until July or August.

Population Status and Threats

The breeding populations north of the U.S.-Mexico border now number only about 400 pairs. Least Bell's vireo currently breeds in only a few scattered areas of riparian habitat in Southern California along the coast and western edge of the Mojave Desert. The decline in least Bell's vireo is related to the loss of riparian habitat. As much as 90 percent of the original extent of riparian woodlands in California has been eliminated, and most of the remaining 10 percent is in a degraded condition. Additionally, widespread habitat losses have fragmented most remaining populations into small, disjunct, widely dispersed subpopulations (Franzreb 1989). The spread of agriculture, excessive livestock grazing, recreational activities, and brown-headed cowbirds continue to threaten the remaining populations.

Habitat Requirements

For breeding, least Bell's vireos are associated with riparian woodlands consisting of willows, cottonwoods, and wild blackberry, and, in desert locations, mesquite. Dense thickets of willow and other low shrubs are used for nesting and roosting sites (CDFG 1999a). Areas containing a high proportion of degraded habitat result in lower reproductive success than areas with high quality riparian woodlands (Pike and Hays 1992). Least Bell's vireos glean insects from foliage and branches, and usually forage close to the ground (CDFG 1999a). Least Bell's vireos are highly territorial and sensitive to many forms of human disturbance including noise, night lighting, and consistent human presence in an area. Excessive noise can cause least Bell's vireo to abandon an area.

Habitat in the Proposed Project Area

High quality breeding habitat for least Bell's vireo does not occur in the proposed project area. Tamarisk thickets along the New and Alamo Rivers and irrigation canals and drains could be used by least Bell's vireo during migration. Habitats that least Bell's vireos use while migrating are not well known, but least Bell's vireos are assumed to use riparian habitats similar to those used for breeding during migration, if such habitats are available. In addition, small wetland areas that support some willows and cottonwoods along the AAC could also be used temporarily by least Bell's vireo but are not expected to support breeding pairs.

Proposed Project Area Occurrence

The least Bell's vireo is a rare and local summer resident in lowland riparian woodlands along the LCR (Garrett and Dunn 1981). In the proposed project area, the subspecies is known to occur accidentally only during migration. Only two records of the least Bell's vireo exist at the Salton Sea NWR (USFWS 1997b). Breeding has not been reported at the Salton Sea or elsewhere in the proposed project area.

Tricolored Blackbird (*Agelaius tricolor*)

Range and Distribution

The tricolored blackbird occurs primarily in California's Central Valley in coastal districts from Sonoma County south. In this portion of its range, it is a year-round resident. In northeastern California, where the species is present only during summer, it occurs regularly only at Tule Lake; but breeding pairs have been observed in some years as far south as Honey Lake. In southern deserts, tricolored blackbirds are found regularly only in Antelope Valley, Los Angeles County (CDFG 1999a). In winter, tricolored blackbirds become more widespread along the central coast and San Francisco Bay area (Grinnell and Miller 1944; McCaskie et al. 1979; and Garrett and Dunn 1981).

Population Status and Threats

Tricolored blackbird populations have declined in recent decades, probably due to habitat loss (Kaufman 1996; DeHaven et al. 1975). Because tricolored blackbirds nest in large, dense colonies, they are vulnerable to nest destruction by mammalian and avian predators (Bent 1958). Currently, the tricolored black bird is a federal sensitive species and a California state species of special concern. Habitat loss remains the primary threat to this species.

Habitat Requirements

Tricolored blackbirds roost in large flocks in areas with emergent wetland vegetation, especially cattails and tules, and in trees and shrubs adjacent to wetland areas (Terres 1980). Tricolored blackbirds forage on the ground in croplands, grassy fields, flooded lands, and along edges of ponds (CDFG 1999a). In California, insects and spiders composed 86 to 91 percent of the nestling and fledgling diet, and 28 to 96 percent of adult diet in spring and summer (Skorupa et al. 1980). The fall and winter diet is composed primarily of seeds and cultivated grains, such as rice and oats.

Tricolored blackbirds nest near fresh water, preferably in emergent wetland with tall, dense cattails or tules, but also in thickets of willow, blackberry, wild rose, and tall herbs. The nest is usually located a few feet over, or near, fresh water or may be hidden on the ground among low vegetation (CDFG 1999a). This species is highly colonial often nesting in a minimum colony of about 50 pairs (Grinnell and Miller 1944).

Habitat in the Proposed Project Area

Potentially suitable habitat for tricolored blackbirds occurs in the managed wetlands of the state and federal wildlife refuges, in other wetlands adjacent to the Salton Sea, along agricultural drains, and in marsh communities supported by seepage from the main water delivery canals. The wetlands on the state and federal refuges probably provide the greatest habitat value since these areas support more cattails and bulrushes in larger patches than other areas of marsh vegetation in the proposed project area. The agricultural drains support only limited amounts of cattails and bulrushes in small patches. More commonly, vegetation along the agricultural canals consists of common reed and tamarisk. Red-winged blackbirds and yellow-headed blackbirds are common and abundant in common reeds along drains in Imperial Valley (Hurlbert et al. 1997), and tricolored blackbirds may similarly find suitable habitat conditions in these areas. Agricultural fields in the area provide suitable foraging habitat.

Proposed Project Area Occurrence

Tricolored blackbirds are rare in the proposed project area. They are not known to breed in the proposed project area, but may occur during spring and winter (USFWS 1997b; Garrett and Dunn 1981). Two records for this species exist for the Salton Sea NWR (USFWS 1997b; Reclamation and IID 1994), and one tricolored blackbird was observed along the Holtville Main Drain during surveys of selected drains in the Imperial Valley in the mid-1990s (Hurlbert et al. 1997).

Yellow Warbler *(Dendroica petechia)*

Range and Distribution

During its summer breeding season, the yellow warbler can be found throughout the U.S. into Canada and Alaska (Kaufman 1996). Yellow warblers migrate to Central and South America where they winter. Their current breeding range in California includes the Great

Basin, Sierra Nevada, Cascade Ranges, Klamath Mountains, Coast Ranges, and northern Sacramento Valley (Zeiner et al. 1990). The yellow warbler is locally common in the central and northern Coast Ranges (Remsen 1978).

Population Status and Threats

Small (1994) reports that the breeding population of yellow warblers in California has been declining since the 1930s. The two primary reasons for declines in yellow warbler populations are the loss of riparian forests, particularly in the Sacramento and San Joaquin Valleys, and nest parasitism by the introduced brown-headed cowbird (Remsen 1978). Along the north coast and Cascade region, populations are thought to be relatively stable, not having experienced similar declines as those in the interior lowlands. A negative trend (nonsignificant) in abundance was noted in the western states by Robbins et al. (1986). The yellow warbler has declined considerably in the coastal lowlands and may be extirpated as a breeder from the Colorado River (Garrett and Dunn 1981). Pesticide use and habitat loss on wintering grounds in South America may have also played a role in the observed declines of this species. Habitat loss and nest parasitism continue to threaten this species.

Habitat Requirements

Yellow warblers nest in riparian scrub and riparian forest habitats from lowland riparian areas up to the mixed north-slope forest zone. Breeding birds are closely associated with alder-cottonwood-willow stands (Harris 1991), but they will apparently also nest in the shrub-sapling stage of Douglas-fir forest (Meslow and Wight 1975). Nests are typically placed low (3 to 6 feet) in shrubs and trees in deciduous riparian habitat (Beedy and Granholm 1985; Zeiner et al. 1990). The species forages mainly in deciduous riparian habitat, but also in adjacent stands of woodlands and conifer forests (Marcot 1979). On the Colorado River, transients are found in any dense riparian vegetation including salt cedar, as well as other exotic trees (Rosenberg et al. 1991). Insects are the primary food item, but yellow warblers will occasionally eat berries.

Habitat in the Proposed Project Area

Cottonwood / willow habitat is largely absent in the proposed project area. It is primarily limited to a seepage area between Drops 3 and 4 along the AAC. Agricultural drains support tamarisk as well as dense stands of common reed that potentially provide suitable habitat for yellow warblers. Tamarisk scrub habitat along the Salton Sea and the New and Alamo Rivers could similarly support yellow warblers. In addition to these areas, chats may use tamarisk and common reed thickets that have invaded areas of the state and federal refuges.

Proposed Project Area Occurrence

The yellow warbler is a common spring and fall migrant and a rare winter visitor to the Salton Sea area (USFWS 1997b). Small numbers regularly winter in the Imperial Valley (Garrett and Dunn 1981) and have been observed near the towns of Niland and Calexico. Yellow warblers were detected along 6 of the 10 drains surveyed in the Imperial Valley during 1994 to 1995, where numbers recorded ranged from 1 to 20 individuals (Hurlbert et al. 1997).

Yellow-Breasted Chat (*Icteria virens*)

Range and Distribution

The yellow-breasted chat's range extends throughout most of the western U.S. and into Mexico (Kaufman 1996). The winter range of this migratory species extends south into Central and South America. This species is a summer resident in Imperial County.

Population Status and Threats

Small (1994) reports that the species has declined throughout California. The loss of riparian forests and nest parasitism by the introduced brown-headed cowbird have been implicated as the primary contributors to this decline (Small 1994). Both these factors have affected populations in the interior lowlands and southern coast of California. Along the north coast, populations are thought to be relatively stable, not having suffered from similar declines (Remsen 1978). Habitat loss on wintering grounds in South America may have also played a role in the observed decline of this species. Habitat loss and nest parasitism continue to threaten this species.

Habitat Requirements

In Northern California, the yellow-breasted chat occurs in well-developed riparian habitats (Harris 1991). Nesting habitat consists of very dense scrub; brushy thickets; and briery tangles (usually willows, blackberry, and grapevines), which are generally adjacent to streams, ponds, or swamps (Zeiner et al. 1990; Kaufman 1996). This species prefers various types of edge habitat, including grass-shrub, shrub-forest, and water-shrub. Occasionally, they will nest in dry overgrown pastures and in upland thickets along the margins of wooded areas (Kaufman 1996). Hunter et al. (1988) found that chats will use the exotic salt cedar; however; they do not report the frequency of nest placement in salt cedar. Brown and Trosset (1998) report that chats nest in tamarisk and native shrubs in proportion to the occurrence of the different types of vegetation. Territory size is up to 4 acres (Brown 1985). Dennis (1958) noted that nesting chats never occupied habitat patches less than 3 acres. Up to half of their diet may be berries and fruit, which explains their preference for shrubby thickets in nonforested areas (Kaufman 1996).

Habitat in the Proposed Project Area

Well developed riparian habitat is largely absent from the proposed project area. Willows and mesquite occur in seepage areas adjacent to the AAC and in a few areas adjacent to the Salton Sea. Agricultural drains and areas along the New and Alamo Rivers support tamarisk as well as dense stands of common reed that potentially provide suitable habitat for yellow-breasted chats. In addition to these areas, chats may use tamarisk and common reed thickets that have invaded areas of the state and federal refuges.

Proposed Project Area Occurrence

Yellow-breasted chats are occasional migrants and summer residents in the proposed project area. They are known to breed in riparian and wetland areas around the Salton Sea (Salton Sea Authority and Reclamation 2000). The species also occurs in Eastern Imperial County near Bard and the Laguna Dam. The species has been observed along the AAC across from the mission wash flume, 3 miles NNE of Bard in scattered mature cottonwoods with a dense understory of cattails and introduced palm trees, surrounded by salt cedar and agricultural fields (CNDDB).

Large-Billed Savannah Sparrow *(Passerculus sandwichensis rostratus)*

Range and Distribution

The large-billed savannah sparrow is a Mexican subspecies of savannah sparrow that breeds in marshes around the head of the Gulf of California, particularly in the delta of the Colorado River (Unitt 1984). It was formerly common in winter along the California coast, primarily from Santa Barbara south, and was recorded as far north as San Luis Obispo County. Its winter range also included the Channel Islands. In California, this subspecies is now a rare to uncommon postbreeding visitor to the Salton Sea and Southern California coast from mid-July through March or April, when it returns to the Colorado River Delta to breed (Garrett and Dunn 1981).

Population Status and Threats

The large-billed savannah sparrow was once widespread in salt marshes and on beaches along the coast of Southern California. The decline of the large-billed Savannah sparrow is attributed to breeding habitat alterations in the Gulf of California and the lower reaches of the Colorado River (Unitt 1984; Garrett and Dunn 1981). The status of the large-billed Savannah sparrow in California is uncertain. It has been stated that “many” of these birds migrate to Southern California marshes (Zink et al. 1991), but also that the migrating portion of that population is “reduced or extinct” (Wheelwright and Rising 1993). Its decline may be partially caused by the drying up of marshes at the mouth of the Colorado River. Habitat loss remains the primary threat to this species.

Habitat Requirements

In winter, large-billed Savannah sparrows are generally associated with saltmarsh, mudflats, and low coastal strand vegetation. At the Salton Sea, they are found primarily in tamarisk scrub (Garrett and Dunn 1981). Like other Savannah sparrows, the large-billed Savannah sparrow is omnivorous and probably eats mostly insects, seeds, tiny crustaceans, and mollusks. Grasses and other weeds are also likely consumed (Kaufmann 1996; Rosenberg et al. 1991).

Habitat in the Proposed Project Area

In the proposed project area, large-billed savannah sparrows are known to use only tamarisk scrub near mouths of the New and Alamo Rivers at the Salton Sea (Garrett and Dunn 1981). However, given this association with tamarisk at the Salton Sea, large-billed Savannah sparrows may also use tamarisk scrub throughout the proposed project area.

Proposed Project Area Occurrence

This subspecies of Savannah sparrow is a rare to uncommon postbreeding and winter visitor to the Salton Sea area. It occurs in the proposed project area from mid-July through the winter, migrating to the Colorado River Delta and Mexico to breed (Garrett and Dunn 1981).

Summer Tanager (*Piranga rubra*)

Range and Distribution

The summer tanager is a neotropical migrant that breeds throughout most of the southeastern and southwestern U.S., including New Mexico, Arizona, southern Nevada, and southeast California. This species winters from Southern Baja California and central Mexico south to South America (Terres 1980; Robinson 1996).

Population Status and Threats

Although summer tanagers are still common and widespread in many areas, their range may be contracting in the eastern U.S.; they have experienced sharp declines along the LCR (Ehrlich et al. 1988; Kaufmann 1996; and Robinson 1996). Elsewhere in the Southwest, summer tanagers are believed to have been extirpated from the lower Gila, Santa Cruz, and Salt Rivers (Hunter et al. 1987). Along the LCR, the severe decline of this species since the 1970s is attributed to the continuing loss of mature cottonwood-willow habitat. Summer tanagers were still fairly abundant in the area until the early 1980s, when severe flooding at Bill Williams Delta and along the Colorado River mainstream resulted in a 36 percent population decrease. After the flooding, only 138 individuals were estimated to occur in the entire valley, while population densities at Bill Williams Delta dropped from 16 to 24 birds per 100 acres to 6 to 10 birds per 100 acres (Rosenberg et al. 1991). Based on these trends, it appears that the summer tanager may become extirpated as a breeding species along the LCR (Rosenberg et al. 1991). The continuing loss of structurally well developed stands of cottonwood-willow riparian forest is the primary threat to this species in the Southwest (Rosenberg et al. 1991; Hunter et al. 1987). However, the summer tanager is still common and abundant elsewhere within its range (Kaufman 1996). The summer tanager is a California state species of special concern.

Habitat Requirements

In the southwestern U.S., summer tanagers occur primarily in cottonwood-willow forests along rivers and streams but can also occur in tamarisk stands along the Colorado River. The species is generally found in association with tall riparian trees, suggesting that canopy height may be a more important factor than species composition in the tanager's selection of foraging and nesting habitats (Rosenberg et al. 1991). Summer tanagers forage mainly in the tops of tall riparian trees for insects. In the Southwest, this species feeds heavily on cicadas, bees, and wasps. It also eats a variety of other insects (e.g., caterpillars, beetles, spiders, and flies) and berries and small fruits (Kaufmann 1996; Terres 1980; and Rosenberg et al. 1991).

Habitat in the Proposed Project Area

Cottonwood/willow habitat is of limited size and distribution in the proposed project area, occurring primarily in the seepage areas along the AAC between Drops 3 and 4. Most riparian areas in the proposed project area are dominated by tamarisk, which may provide suitable habitat along the New and Alamo Rivers, adjacent to the Salton Sea, and along agricultural drains.

Proposed Project Area Occurrence

Summer tanagers are rare in the proposed project area during summer and winter. They are more common in winter but are still considered only occasional visitors (USFWS 1997b). The summer tanager breeds along the Colorado River and has been observed between the Laguna and Imperial Dams in areas with willow, mesquite, and salt cedar (CDFG 1999b). Known or suspected nesting localities outside the Colorado River are Brock Ranch (Imperial County), Borrego Springs (San Diego), Thousand Palms Oasis (Riverside), Palm Springs (Riverside), Whitewater Canyon (Riverside), Morongo Valley (San Benito), Tecopa (Inyo), Mohave River, and Valyermo (Lassen) (Garrett and Dunn 1981). These reports of breeding in arid regions outside the Colorado River indicate that summer tanagers could breed in the proposed project area.

Mammals

Mexican Long-Tongued Bat (*Choeronycteris mexicana*)

Range and Distribution

This species is known from Venezuela northward through Central America and Mexico to southeastern Arizona, southwestern New Mexico, and San Diego, California.The Mexican long-tongued bat reaches the northern limit of its range just across the U.S.–Mexico international border. Only adult females migrate into the U.S., but juvenile bats of both sexes wander widely after they leave the maternity roost (AGFD 1997). In New Mexico and Arizona, long-tongued bats have been found at elevations ranging from sea level to 6,000 feet, occupying desert and montane riparian, desert succulent shrub, desert scrub, and pinyon-juniper habitats. In California, the long-tongued bat is known only from San Diego County. An invasion in 1946 provided most of the California records for long-tongued bats (Olson 1947). California records largely have been in urban habitat in San Diego (Olson 1947).

Population Status and Threats

No information is currently available regarding the density of natural populations. Populations fluctuate as this species is only a summer resident of Arizona (AGFD 1997). Since 1906, fewer than 1000 individuals have been documented throughout the range of this species (Cryan and Bogan 2000). While the biology and population status remain poorly understood, some authors believe that numbers are declining for this species (AGFD 1997) and roost disturbance by human activity is thought to be an important factor. Other authors believe that there is no evidence to support the idea that numbers are declining (Cryan and Bogan 2000). Threats to this species include recreational caving; natural and intentional mine closures; renewed mining activity; mine reclamation; and loss of food plants as a result of development, agriculture, and grazing (Noel 1998). Agave harvests in Mexico may affect *C. mexicana*, as the nectar and pollen of agave and saguaro flowers comprise a major portion of their diet (AGFD 1988). Fluctuations in food resources, both natural and anthropogenic, may influence the seasonal distribution of this species and may result in changes in numbers in any given region (Cryan and Bogan 2000).

Habitat Requirements

The Mexican long-tongued bat occurs in a variety of habitats, ranging from arid scrub habitats to mixed oak-conifer forests (Arroyo-Cabrales et al. 1987) and semidesert grasslands (Cryan and Bogan 2000). It favors desert canyons with riparian vegetation. In Mexico, New Mexico, and Arizona, this bat occupies deep canyons of desert mountain ranges. A variety of roost sites is used, including caves, mines, buildings, and trees. Most roost sites are located near a water source and near areas of riparian vegetation (Cryan and Bogan 2000). Caves, mines, and probably buildings are used as nursery sites. This species forages in desert and montane riparian, desert scrub, desert succulent shrub, and pinyon-juniper habitats. The long-tongued bat feeds mainly on nectar, fruit, and pollen.

Habitat in the Proposed Project Area

Desert scrub is widespread throughout the nonirrigated areas of the Sonoran Desert. This habitat type surrounds the Salton Sea between the higher rock hillsides and the more saline desert saltbrush community. Succulent shrubs comprise a minor component of the vegetation community, and foraging habitat may be limited. The only portion of the HCP area that supports desert scrub habitat is in the right-of-way of IID on the AAC.

While mining activity has occurred throughout Imperial County, the nearest abandoned mine shafts are located near Hedges at the southwestern tip of the Cargo Muchacho Mountains, well outside of the proposed project area. Areas along the AAC supporting cottonwoods, landscape trees, and buildings may provide roosting sites.

Proposed Project Area Occurrence

This species has not been reported to occur in Imperial County; however, the area is within the distributional range of the species. The limited availability of roosting sites and potentially sparse forage makes the occurrence of this species unlikely in the proposed project area.

California Leaf-Nosed Bat (*Macrotus californicus*)

Range and Distribution

California leaf-nosed bats range from coastal and eastern California to western New Mexico, and from southeastern Nevada south into Baja California, northern Sinaloa, and southwestern Chihuahua, Mexico (AGFD 1997d; Hall 1981).

Population Status and Threats

The status of this bat remains unknown (USFWS 1994). In Southern California, this species has disappeared from most coastal basins and declined in many other areas. In Nevada, no recent sightings of this species have been reported (NNHP 1997). Like many cave dwelling bats, loss of foraging habitat and disturbances at roost sites are thought to be responsible for the declines (Williams 1986). Filling or plugging of cave and abandoned mine entrances, intrusion by explorers, and renewal of historic mining sites may also be contributing factors.

This species is particularly susceptible to human disturbance that may cause abandonment of roosts during the breeding season. The impact of human disturbance on roost sites may be significant due to the specific thermal regime required for maternity roosts. Closing of mines and caves or improper gating of entrances can also affect colonies (AGFD 1996). The AGFD (1997b) describes modification of cave conditions, including changes in air movement, humidity, and temperature, as potentially serious concerns for this species. In some situations, roosting sites remain intact, but nearby foraging habitat is lost due to development, agriculture, or grazing. Habitat loss and human disturbance remain the primary threats to this species.

Habitat Requirements

California leaf-nosed bats occur in arid regions, using habitats such as desert scrub, alkali scrub, desert washes, riparian associations, and palm oases (Zeiner et al. 1990). The California leaf-nosed bat is known from caves, mines, and rock shelters, mostly in Sonoran desert scrub (AGFD 1997d). Like most bats, this species often forages near open water where greater quantities of insects are available. The species uses separate daytime and nighttime roosts. During winter months, the California leaf-nosed bat forms large colonies in only a few geothermally heated mines in the deserts of the Southwest (Brown and Berry 1991). Day roosts are often in deeper caves or mines and occasionally in abandoned structures (Zeiner et al. 1990). This species requires warm roosts with temperatures of 80.6°F or more due to its inability to lower its body temperature and become torpid (Bell 1985). Maternity colonies are generally located in mines with temperatures that reach 80.6° to 89.6°F. California leaf-nosed bat roost sites typically have high ceilings and room for flight. Roosting takes place far enough from the entrance (30 to 80 feet) to take advantage of the humidity and moderate temperatures of the cave (Vaughan 1959). Night roosts are in bridges, mines, buildings, overhangs, or other structures with overhead protection (Zeiner et al. 1990). The species may form colonies of up to 500 individuals (Zeiner et al. 1990).

California leaf-nosed bats forage for insects within 3 feet of the ground by hovering and picking prey off vegetation or the ground. This species feeds on large flying insects, such as grasshoppers, moths, and beetles (AGFD 1997b). Foraging ranges are small, with most activity within a mile of day roosts in winter months and up to 5 miles during summer months (Brown, pers. comm.). The presence of woody riparian vegetation, such as mesquite, ironwood, and palo verde, is required in foraging areas. California leaf-nosed bats do not hibernate, and some populations migrate south for the winter.

Habitat in the Proposed Project Area

California leaf-nosed bats use caves and mines as day roosts. The only mine shafts in the area occur near Hedges, at the southwestern tip of Cargo Muchacho Mountains. Plant species preferred for foraging (mesquite, palo verde, ironwood) are rare in the proposed project area and restricted to scattered patches along the AAC. It is unknown whether they forage in riparian areas dominated by tamarisk.

Proposed Project Area Occurrence

Leaf-nosed bats are known to feed on grasshoppers, beetles, cicadas, and moths in various places along the Colorado River (Hoffmeister 1986). Roost sites have been reported in several abandoned mines in the Chocolate and Carago Muchacho Mountains. However, the lack of daytime roost sites along with the scarcity of suitable foraging habitat makes the occurrence of this species in the proposed project area unlikely.

Pallid Bat *(Antrozous pallidus)*

Range and Distribution

The pallid bat has a wide range extending from southern British Columbia and Montana into Central Mexico and east to Texas, Oklahoma, and Kansas (Sherwin 1998). It is a year-round resident of grassland and desert habitats in the southwestern U.S. (Hermanson and O'Shea 1983). The pallid bat is a locally common species of low elevations in California where it occurs throughout most of the state, except the high Sierra Nevada from Shasta to Kern Counties and the northwestern corner of the state from Del Norte and western Siskiyou Counties to northern Mendocino County.

Population Status and Threats

The pallid bat is a California state species of concern due to limited population numbers. Current threats include mine closures; human disturbance of roost sites; extermination in buildings; pesticides; and loss of foraging areas due to urban development, logging activities, and vineyard development (Sherwin 1998).

Habitat

The pallid bat typically roosts in rock crevices but will also use caves, mines, buildings, and trees. It primarily forages on ground-dwelling arthropods, such as scorpions, crickets, and grasshoppers (Hermanson and O'Shea 1983).

The pallid bat is most often found in arid, low-elevation habitats, including grasslands, shrublands, woodlands, and forests. These bats are nocturnal and emerge up to an hour after sunset. Day roosts include caves, crevices, mines, trees, and buildings. Night roosts are generally in more open sites and are near day roosts. Horizontal crevices with stable temperatures are preferred day roosts in summer; vertical crevices with fluctuating temperatures are preferred during cooler periods. Pallid bats are relatively inactive during the winter and may hibernate. Migrational patterns include local movements to hibernacula and a postbreeding season dispersal.

Habitat in the Proposed Project Area

Pallid bats are well adapted to human environments and frequently use buildings, bridges, and trees as roosts. Thus, they could roost throughout the proposed project area. Foraging may also occur throughout the proposed project area in any habitat where insect prey is abundant, including agricultural areas, wetlands, riparian areas, canal drains, and desert scrub.

Proposed Project Area Occurrence

While specific populations have not been identified in the proposed project area, roosts have been identified in the general proposed project vicinity at the Mary Lode Mine in the Chocolate Mountains and in the Queen Incline and the Mesquite Adit near the Tumco wash in the Carago Muchacho Mountains.

Pale Western Big-Eared Bat *(Corynorhinus townsendii pallescens)*

Range and Distribution

The big-eared bat occurs throughout the western U.S., from southern British Columbia southward to southern California on the west and the Black Hills of South Dakota and West Texas on the east through the Mexican uplands to the Isthmus of Tehuantepec in southern Mexico. Isolated, relict populations of this species are found in the southern Great Plains and Ozark and Appalachian Mountains (AGFD 1998a; Noel and Johnson 1993). The pale western subspecies (*C. t. pallescens*) occurs in Washington, Oregon, California, Nevada, Idaho, Arizona, Colorado, New Mexico, Texas, and Wyoming (Handley 1959).

Population Status and Threats

The results of a survey performed by Pierson and Rainey (1994) suggest that drastic population declines for the pale western big-eared bat have occurred in California throughout the last 40 to 60 years. Among these declines are a 52 percent loss in the number of maternity colonies, a 44 percent decline in the number of roosts, a 55 percent decline in the number of animals, and a 32 percent decrease in the average size of remaining colonies in the state. The lower Colorado desert along the Colorado River, an area that experiences heavy recreational use, is one of three areas in California in which marked declines in the numbers of pale western big-eared bat colonies have taken place. The overall population trend appears to be declining in Arizona, as well. Currently, there are only 13 verified maternity roosts in the state, representing 10 separate colonies, with a total population of about 1,000 adult females (Pierson and Rainey 1994). More than half of the known maternity roosts are in mines, and only 4 of these roosts contain 200 or more individuals. There may be losses or reductions of maternity colonies, which are easily disturbed; these disturbances often result in abandonment (AGFD 1996). In the absence of human disturbance, maternity colonies tend to remain stable over time (Pierson and Rainey 1994).

This species is threatened by human disturbance at major maternity roosts; renewed mining; closure and sealing of abandoned mines naturally or for hazard abatement; and, possibly, the use of nontarget pesticides (AGFD 1996). Pale western big-eared bats are extremely sensitive to human disturbance, and simple entry into a maternity roost can result in the abandonment of the site (Pierson et al. 1991). This bat feeds heavily on noctid moths, which require wetland habitats. The significant loss of wetlands has resulted in a decrease in prey base for the pale western big-eared bat (ISCE 1995).

Habitat Requirements

Pale western big-eared bats can be found in a variety of habitats but are most commonly associated with Mohave mixed scrub (e.g., sagebrush, sagebrush-grassland, blackbrush, and creosote-bursage) and lowland riparian communities. It has been found in Sonoran Desert Scrub, Madrean evergreen woodland (oak woodland, oak/pine, and pinyon/juniper), and coniferous forests in Arizona. Separate day and night roosts are used. Day roosts are in caves, mines, or tunnels. Hibernation roosts are cold, but stay above freezing (Zeiner et al. 1990) and must be quiet and undisturbed. Pale western big-eared bats usually hibernate singly or in small groups and are almost always found in ceiling pockets (Pierson et al. 1991). In climatically moderate areas, this species appears to arouse from torpor frequently on warm nights to feed and changes roost locations often. In these areas, roosts are often Lshaped, with both a vertical and a horizontal entrance that creates a cold sink and generates a strong airflow (Pierson et al. 1991). Maternity roosts are generally located in mines and caves, with the favored roost for clusters of mothers and young often in a ceiling pocket or along the walls just inside the roost entrance, well within the twilight zone (Pierson et al. 1991). The determining factor for maternity roost site selection may be temperature related. In California, maternity roosts are generally warm; the species appears to select the warmest available sites, some of which reach 30°C (86°F) (Pierson et al. 1991). Night roosts may be in buildings or other structures. Separate hibernation and maternity roosts are often used.

Foraging takes place over desert scrub, riparian habitats, or open water with 15 miles of the roost sites. Small moths are the primary food of this species, but other insects are also sometimes eaten (AGFD 1998a). This species has poor urine concentrating abilities compared to other bats of the region and, therefore, requires access to a nearby water supply (Zeiner et al. 1990).

Habitat in the Proposed Project Area

Pale western big-eared bats use caves and mines for roosting. The only mine shafts in the area occur near Hedges, at the southern extent of the Cargo Muchacho Mountains, which are well outside the proposed project area. Pale western big-eared bats could forage throughout the proposed project area, although they probably would concentrate foraging activities along the LCR, Salton Sea, New and Alamo Rivers, agricultural drains, and water conveyance canals, given this species' association with water. Tall tress, bridges, and buildings could be used as night roosting sites.

Proposed Project Area Occurrence

The species has been observed in eastern Imperial County near Bard. It has been reported to roost in the Senator Mine and Picacho Mine in the Chocolate Mountains. This species is known to occur in the project area.

Spotted Bat *(Euderma maculatum)*

Range and Distribution

The spotted bat has been reported from scattered locations from southern British Columbia to Montana and from coastal California, Texas, and northern Mexico (Hall 1981). In California, it is found primarily in foothills, mountains, and deserts in the southern part of the state (Zeiner et al. 1990a and 1990b). It is generally considered widespread, but rare.

Population Status and Threats

The population status of the spotted bat is not well known because of the low number of sightings reported. The spotted bat is considered one of the rarest North American mammals. The species appears linked to riparian habitats in many areas, which are generally declining throughout the species' range. The spotted bat is a federal and California state species of special concern. Current threats to this species' survival have not been identified.

Habitat Requirements

Spotted bats have been found foraging in many different habitats, especially in arid or ponderosa pine forests and marshlands. The habitat requirements and preferences of this species are varied and not well understood. It is known to occur in the openings of conifer forests in montane habitats, riparian woodlands, and desert scrub (Hoffmeister 1986; NMDGF 1997; and AGFD 1998b). Roost site localities are poorly known. This species is thought to use crevices and cracks in cliff faces, and occasionally caves and buildings for roost sites. Roots are often in the vicinity of open water (AGFD 1998b). Moths seem to be the primary food item of this species, although other insects may be consumed (AGFD 1998b).

Habitat in the Proposed Project Area

The types of habitats potentially used by spotted bats in the proposed project area are uncertain because this species' ecology is poorly known. Spotted bats could use much of the proposed project area since this species appears to be associated generally with open habitats. Foraging may be concentrated along waterways, such as the Salton Sea, New and Alamo Rivers, large canals, and agricultural drains. Potentially, spotted bats could roost at gravel quarries, highway bridges, or in buildings.

Proposed Project Area Occurrence

No information is available on the occurrence of spotted bats specifically in the proposed project area. Male spotted bats are often observed foraging near the Colorado River in and near the Grand Canyon; however, females are usually observed at higher elevations (Herder, pers. comm.). Occurrences have also been reported from the Yuma area (Hoffmeister 1986).

Western Small-Footed Myotis (*Myotis ciliolabrum*)

Range and Distribution

The small-footed myotis ranges from southern Canada south to central Mexico and from California eastward to west Texas. It is a year-round resident in California, occurring in a variety of habitat types.

Population Status and Threats

In 1996, this species was delisted as threatened by the U.S. Fish and Wildlife Department. It remains a federal species of concern. Threats to this species include loss of suitable roosting sites, habitat destruction and disturbance, and pesticide use.

Habitat Requirements

The small-footed myotis is a common bat of arid uplands in the upper Sonoran Desert. It occurs in a wide variety of habitats, primarily in relatively arid, open stands in forests, woodlands, and brushy uplands near water. The small-footed myotis feeds on a variety of small flying insects, including moths, flies, and beetles, while flying over water and among trees. It requires more water than most other bats and can be found drinking shortly after night emergence. The small-footed bat can be found roosting in caves, buildings, crevices, and under loose bark. Occasionally, it will also roost under bridges (Zeiner 1990).

Hibernation takes place in caves and mines. Summer roosts are in crevices, cracks, holes, under rocks, and in buildings (AGFD 1997). Colonies can be as large as 50 or more individuals (Zeiner et al. 1990).

Habitat in the Proposed Project Area

Areas adjacent to the Salton Sea and along the New and Alamo Rivers, agricultural drains, and possibly the water conveyance canals may be used for foraging. Because this species uses a wide variety of natural and constructed structures for roosts, suitable roost sites could occur throughout the proposed project area.

Proposed Project Area Occurrence

Historic records indicate this species has been present in the Salton Sea area (SSA and Reclamation 2000). However, the only known roost in the vicinity of the proposed project area is the Mary Lode Mine, located in the Chocolate Mountains to the northeast of the Algodones Dunes (CDFG 1999b). Still, because this bat will use buildings for roosts and forages in a diversity of habitats, it may occur throughout the HCP area.

Occult Little Brown Bat (*Myotis lucifugus occultus*)

Range and Distribution

The occult little brown bat occurs locally throughout most of the U.S. and Canada, as far north as Alaska and as far south as central Mexico. The subspecies *M. l. occultus* (identified as a separate species, *M. occultus*, by Hoffmeister [1986]) occurs throughout Arizona and into eastern California, western New Mexico, and central Mexico.

Population Status and Threats

This species is declining due to using pesticides, disturbance of nesting colonies, collecting by researchers, humans disturbing hibernating individuals, and harvesting timber that removes mature or dead trees and snags (Williams 1986; Fenton and Barclay 1980). Disturbance of hibernating colonies can cause mortality due to use of remaining fat reserves; disturbance to maternity roosts may cause abandonment. Increased exploration of caves and mines has probably caused a decrease in population numbers. Pesticide use has also caused drastic declines in some areas (Kunz et al. 1977; Clark et al. 1978). One and possibly two of the three or four known maternity roosts of this species in Arizona have been eliminated. The status of a third colony on the Verde River is unknown (AGFD 1997g). The occult little brown bat is a federal and California state species of special concern. Human disturbance and habitat loss remain the primary threats to this species.

Habitat Requirements

In the southwest, the occult little brown bat occurs in a variety of habitats, including ponderosa pine forests, oak-pine woodlands (near water), and along permanent water or in riparian forests in some desert areas (AGFD 1997g). It is usually closely associated with open water sources, such as rivers, ponds, or reservoirs, and it flies low along shorelines while foraging (Hoffmeister 1986). It often feeds over open water habitats (Zeiner et al. 1990). This species generally hunts low over water for flying insects, including mosquitoes and midges (AGFD 1997g). It roosts in hollows in living or dead trees, under rocks or wood, or sometimes in buildings or mines (NMDGF 1997). This species seems to prefer human structures to natural ones for maternity roosts, and may use mines or caves for hibernation (AGFD 1997g). Separate day, night, hibernation, and nursery roosts are used. Seasonal movement of several hundred miles between summer roosts and winter hibernacula have been recorded (NMDGF 1997). Site fidelity is correlated to the permanence of the roost (e.g., cave verses foliage roosts). Colonies can be very large with up to 300,000 individuals (Cockrum 1956).

Habitat in the Proposed Project Area

The Salton Sea, lakes, wetlands, rivers, canals, and agricultural drains may provide suitable foraging habitat for this species. Because this species uses a wide variety of natural and constructed structures for roosts, suitable roost sites could occur throughout the proposed project area.

Proposed Project Area Occurrence

The occult little brown bat has been known to use riparian areas along the LCR (Reclamation and IID 1994); however, no recent records exist for this species in this area, and it may be extirpated in this portion of its range (Brown, pers. comm.).

Southwestern Cave Myotis (*Myotis velifer brevis*)

Range and Distribution

In the U.S., the cave myotis is found in the southwestern half of Arizona and immediately adjacent areas of California, Nevada, and New Mexico (AGFD 1997c). It is also found in west and south Texas and Oklahoma, then southward through Mexico to Guatemala. In California, the southwestern subspecies is restricted to lowlands of Colorado River and adjacent mountain ranges and in San Bernardino, Riverside, and Imperial Counties, although it is more common farther east.

Population Status and Threats

Population trends for this species are not well understood, but populations of cave myotis appear to be declining. Large colonies, each containing approximately 1,000 individuals, have been observed in the past in the Riverside Mountains of Riverside and San Bernardino Counties; however, more recent examinations in this area suggest a significant decline in population size (Williams 1986). Like many other cave-dwelling bats, declines in populations of this species are probably due to pesticide use, mining, and loss of riparian habitats, as well as disturbances to roost sites by humans exploring caves or mines or by the filling or plugging of cave and abandoned mine entrances (Williams 1986). The species is particularly vulnerable at maternity roosts, where they congregate in large numbers (AGFD 1997c). The southwestern cave myotis is a federal and California state species of special concern. Habitat loss and human disturbance remain the primary threats to this species.

Habitat Requirements

This species prefers arid habitats dominated by creosote bush, palo verde, brittlebrush, cactus, and desert riparian. Roosts are typically in caves or mines, but buildings and bridges have also been used. The diet of the southwestern cave myotis consists primarily of moths and beetles that are taken over open washes and near vegetational boundaries. Dense, linear stands of mesquite, salt cedar, and catclaw acacia bordering the still water of oxbow ponds are considered optimal foraging areas (Vaughan 1959; Hoffmeister 1986). The southwestern cave myotis is a colonial cave dweller, occurring in colonies of several thousand individuals in most of its range. Mines, buildings, and bridges may also be used as roosting sites. Hibernation caves have high humidity, often with standing or running water and little air movement. Hibernating cave myotis may form clusters. This species uses temporary night roosts. Nursery colonies are in the hibernation cave or another cave. Occasionally, other sites, such as bridges, are used. Optimal sites are relatively warm, with little human disturbance.

Habitat in the Proposed Project Area

The extensive stands of salt cedar bordering the Alamo and New Rivers could provide foraging habitat for this species. Some agricultural drains that support dense tamarisk and common reed could also provide suitable foraging habitat. Bridges and buildings throughout the area could be used as temporary roosting sites.

Proposed Project Area Occurrence

This species may have been extirpated from the proposed project area by agricultural practices and habitat conversion (USFWS 1999). No recent surveys have been conducted in the area to determine the occurrence of this species.

Yuma Myotis *(Myotis yumanensis)*

Range and Distribution

The range of the Yuma myotis extends across western North America from British Columbia to central Mexico, and from the West Coast to as far east as Idaho and west Texas. It is thought to migrate seasonally throughout much of its range. The Yuma myotis is known to roost in caves, abandoned buildings, and other structures. The Yuma myotis is uncommon in Mojave and Colorado Desert regions, except for the mountain ranges bordering the Colorado River Valley. Found in a wide variety of habitats ranging from sea level to 11,000 feet, it is uncommon to rare above 8,000 feet. It is not known where the Yuma bat goes for winter, but it has been captured in Arizona in February.

Population Status and Threats

Breeding has not been studied, except for a couple of isolated sites in Colorado. At that site, the colony was estimated to number around 100 adult individuals and is the first western record of a breeding site for this species. Elsewhere throughout its range, this species is known to form maternity colonies upwards of several thousand individuals in caves or attics (Hoffmeister 1986; Hall 1981; Findley et al. 1975). Threats include mine closure, human disturbance to roost sites, and pesticides.

Habitat Requirements

The Yuma myotis prefers cliffs and rocky walls near desert scrub, pinyon-juniper woodlands, and other open woodlands and forests. Like many bat species, it is closely tied to an open water source for foraging and drinking (Zeiner et al. 1990) and tends to be found near permanent watercourses (AGFD 1997). Small moths, midges, termites, and other insects that fly over water are preferred food items of this species. Insects are caught while foraging low over rivers, irrigation canals, permanent ponds, streams, or creeks (AGFD 1997). The Yuma myotis roosts in narrow crevices in rock; bridges; buildings; and, occasionally, mines (Hoffmeister 1986). Preferred roosting habitats, however, are buildings and abandoned cliff swallows' mud nests (AGFD 1997). This species is somewhat tolerant of human activity, as evidenced by roosts in attics of inhabited houses or other human-occupied structures (Hoffmeister 1986). Colonies can be as large as several thousand individuals (Zeiner et al. 1990). Separate daytime and night roosts are used.

Habitat in the Proposed Project Area

The canals, rivers, lakes, and streams throughout the proposed project area offer suitable foraging habitat for the Yuma myotis. This species is relatively tolerant of human activity and may roost in houses, under bridges, or in other natural and artificial structures throughout the proposed project area.

Proposed Project Area Occurrence

This species is known to occur in Imperial County and has historically been reported to occur in the proposed project area (Hall 1981). No recent surveys have been conducted for this species in the proposed project area, but suitable roosting and foraging habitats are present.

Western Mastiff Bat *(Eumops perotis californicus)*

Range and Distribution

The greater western mastiff bat ranges from San Francisco Bay east to Arizona and Texas, then south to northwestern and central Mexico (AGFD 1997e). The majority of the western mastiff bats in California are year-round residents; however, some are believed to migrate in the winter to warmer, lowland climates (Williams 1986).

Population Status and Threats

Threats to this species reportedly include human disturbances at roost sites, limited numbers of adequate watering sites, cultivation of major foraging areas, and poisoning and reduction of insects by insecticide use (AGFD 1996; Williams 1986). Populations in California are believed to have undergone significant declines in recent years, primarily due to extensive loss of habitat and the widespread use of insecticides (Williams 1986). Populations in Arizona may also be declining, and some roost sites are no longer occupied (AGFD 1996 and 1997e). In other areas, greater western mastiff bat populations appear fairly stable (NMDGF 1997). This western mastiff bat is a federal and California state species of special concern.

Habitat Requirements

Mastiff bats favor rugged, rocky areas in Sonoran Desert scrub habitats, where suitable crevices are available for day roosts (AGFD 1996). They inhabit crevices in cliff faces, high buildings, trees, and tunnels (Zeiner et al. 1990). Colonies prefer deep crevices up to 10 feet or more (AGFD 1997e). Because of their large size and long wings, these bats require considerable space to launch themselves into flight, so roosting sites are usually situated to permit a free downward fall for at least 6.5 to 10 feet.

Western mastiff bats forage in open areas, generally over mesquite as far as 25 miles from roost sites (Vaughan 1959; Jameson and Peeters 1988). They require long or unobstructed waterways for drinking and feed on moths, bees, wasps, and flying ants that get caught in thermal currents (AGFD 1996). Mastiff bats roost singly or in small colonies, sometimes with other bat species; several alternate day roosts may be used (Zeiner et al. 1990). Movement among different roost sites is thought to be influenced by temperature, as well as human disturbance (AGFD 1996). Colonies often support two to several dozen individuals but typically number fewer than 100 individuals (AGFD 1996).

Habitat in the Proposed Project Area

Western mastiff bats are generally associated with open desert habitats near unobstructed waterways. In the proposed project area, these types of habitats occur adjacent to the Salton Sea and along the All American, East Highline, and Westside Main Canals. The availability of suitable roost sites in the proposed project area is unknown. Gravel quarries near the Salton Sea could provide roost sites. Other types of potential roost sites in the proposed project area include bridges, buildings, and trees.

Proposed Project Area Occurrence

Western mastiff bats are known to occur in Imperial County, and roost sites have been found in several abandoned mine sites in the Carago Muchacho Mountains; occurrences in the proposed project have not been reported. Because of the extensive foraging range and availability of habitat in the proposed project area, the western mastiff bat could potentially occur there.

Pocketed Free-Tailed Bat (*Nyctinomops femorosacca*)

Range and Distribution

The pocketed free-tailed bat occurs in western North America, from Southern California, central Arizona, southern New Mexico, and western Texas south into Mexico, including Baja California (Navo 1998a). The pocketed free-tailed bat is found in Riverside, San Diego, and Imperial Counties. This species is rare in California, but is more common in Mexico.

Population Status and Threats

The pocketed free-tailed bat is currently a California state species of special concern due to limited population size and rarity of occurrences. No known threats have been identified for this species; however, human disturbance to roosting sites, loss of foraging habitat, and pesticides could pose potential threats to this species (Navo 1998a).

Habitat Requirements

The pocketed free-tailed bat prefers arid lowlands, especially desert canyons, dominated by creosote bush or chaparral vegetation. Habitats used include pinyon-juniper woodlands, desert scrub, desert succulent shrub, desert riparian, desert wash, alkali desert scrub, Joshua tree, and palm oasis. This species prefers rock crevices in cliffs as roosting sites. It must drop from the roost to gain flight speed. The pocketed free-tailed bat reproduces in rock crevices, caverns, or buildings and primarily feeds on moths and beetles.

Habitat in the Proposed Project Area

Creosote scrub habitat is found in areas adjacent to the Salton Sea and along the All American, Coachella, and Westside Main Canals. Areas along the New and Alamo Rivers and along larger drainages and canals may also provide foraging habitat. The availability of suitable roost sites in the proposed project area is unknown. Gravel quarries near the Salton Sea may provide suitable roost sites.

Proposed Project Area Occurrence

The pocketed free-tailed bat is known to occur in Imperial County, but this species has not been reported in the proposed project area. Foraging habitat occurs in the proposed project area, but roosting sites may limit the occurrence of this species.

Big Free-Tailed Bat (*Nyctinomops macrotis*)

Range and Distribution

The big free-tailed bat is a migratory species. It ranges from most of South America northward to include Mexico, Arizona, New Mexico, southern and western Texas, Southern California, southeastern Nevada, northeastern Utah, and as far north as central Colorado (Navo 1998; Hall 1981).

Population Status and Threats

This species is a California state species of special concern due to its rarity. The big free-tailed bat is common in parts of its range and does not appear to be threatened. No known threats have been identified for this species; however human disturbance to roosting sites, loss of forage habitat, and pesticides are likely to have negative impacts on this species (Navo 1998b).

Habitat Requirements

Big free-tailed bats generally inhabit rugged rocky habitats, although a wide range of habitats– including desert scrub, woodlands, and evergreen forests– are visited during foraging and migration (Navo 1998b). Roosts are usually in buildings, caves, and rock crevices. This bat feeds almost exclusively on moths, but crickets, grasshoppers, flying ants, and stinkbugs are occasionally taken (Easterla 1973; Easterla and Whitaker 1972).

Habitat in the Proposed Project Area

The preferred rocky habitat of the big free-tailed bat does not occur in the proposed project area. Desert scrub, agricultural fields, wetlands, lakes, rivers, canals, and drainages where insects are abundant could provide suitable foraging habitat for migrating bats.

Proposed Project Area Occurrence

Big free-tailed bats are known to migrate through the proposed project area during the spring and fall (USFWS 1997). No roost sites are known to occur in the proposed project area.

Jacumba Little Pocket Mouse *(Perognathus longimembris internationalis)*

Range and Distribution

The range of the Jacumba little pocket mouse is restricted to the deserts of extreme Southern California and northern Mexico. Its range extends from Jacumba, California, approximately 62 miles south of the U.S.–Mexican border.

Population Status and Threats

This subspecies has an extremely limited range and is endemic to Southern California. The population status of this subspecies is unknown at this time. Current threats have not been identified but may include habitat destruction by off-road vehicle activities and predation by introduced species.

Habitat Requirements

Habitat requirements are not well understood, but it is known to occupy sandy habitats on the desert floor. Preferred habitats include desert riparian, desert scrub, desert wash, and sagebrush. Little pocket mice generally dwell in burrows and may stay underground for up to 5 months in winter. Burrow systems are rarely occupied by more than one mouse, and some animals may use more than one burrow (Kenagy 1973). Sandy soils are preferred for burrowing (Hall 1946), but burrows are also found on gravel washes and on stony soils (Beatley 1976; Miller and Stebbins 1964).

Habitat in the Proposed Project Area

Desert scrub habitats occur in the proposed project area only within the right-of-way of IID on the AAC. No native desert riparian habitat occurs in the HCP area because tamarisk has invaded riparian areas of the New and Alamo Rivers. It is uncertain whether Jacumba little pocket mice would use these areas.

Proposed Project Area Occurrence

While potential habitat does occur in the area, the known range of the Jacumba little pocket mouse does not extend into the proposed project area.

Colorado River Hispid Cotton Rat (*Sigmodon arizonae plenus*)

Range and Distribution

The Colorado River hispid cotton rat occurs in the vicinity of the Colorado River and its tributaries in southeastern California. In Arizona, it occurs along the Colorado River from Parker to Ehrenberg (Hoffmeister 1986). One additional locality has been reported in Nevada, along the Nevada-California border (Hall 1946); however, populations once occurring in Nevada are now thought to be extinct (Hall 1946; Bradley 1966). The distributional limits of the Colorado River cotton rat have not been established, and the southern limits of its range are not known (Hafner et al., in press). McKernan (unpublished data) has provided records for this species at Topock Marsh, Parker Dam, near Parker, Arizona; on the Colorado River Indian Tribe (CRIT) Reservation north of the Palo Verde Division Dam, near Blythe, California; and on and near Cibola National Wildlife Refuge. The dates of these observations range from 1974 to 1998.

Population Status and Threats

The population status and reasons for decline of this species are not well understood. The Colorado River hispid cotton rat has a limited range and occurs along an area of the river that is subject to a number of human disturbances. Agricultural and urban development, draining of wetlands, livestock grazing, and water diversion proposed projects have probably all contributed to the species' decline. The Colorado River hispid cotton rat is a federal and California state species of concern. Current threats to this species' survival have not been identified.

Habitat Requirements

This species primarily occurs in grassland and mixed grassland/scrub habitats but may also occur in agricultural fields. It is most common in grassland and cropland habitats near water (Fleharty and Mares 1973; Kaufman and Fleharty 1974), including grass-forb understories in early successional stages of other habitats (McClenaghan and Gaines 1978). Tall, dense grass is preferred. The species also occurs in overgrown clearings and herbaceous borders of fields and brushy areas (Hall and Dalquest 1963). Trapping success for this subspecies occurs most often in areas dominated by common reed (Zimmerman pers. comm.). Runways are made through dense herbaceous growth and are similar in appearance to vole runways but much larger. The hispid cotton rat sometimes feeds on sugar beets, citrus, and other crops. Nests of woven grass are constructed either in burrows or on the surface (Baar et al. 1974).

Habitat in the Proposed Project Area

Habitat for this species is widespread throughout the proposed project area. Irrigated agricultural fields of alfalfa, wheat, sudangrass, and sugar beets provide suitable habitat for the cotton rat. Many drainages and ditches adjacent to agricultural fields include dense patches of common reed, a habitat known to be used by this species.

Proposed Project Area Occurrence

Habitat and historical records for this species occur in the proposed project area (SSA and Reclamation 2000). Populations have also been reported near the Colorado River, a few miles above the Laguna Dam and near Bard. Establishment of cotton rats in the Imperial Valley was apparently in response to agricultural irrigation practices (Dixon 1922).

Yuma Hispid Cotton Rat *(Sigmodon hispidus eremicus)*

Range and Distribution

The Yuma hispid cotton rat is known from Yuma County, Arizona; Imperial County, California; and northern Baja California, Mexico (Hall 1981; Hoffmeister 1986). The distributional range of the Yuma hispid cotton rat has increased as agricultural development has expanded along the LCR (Hafner et al. in press).

Population Status and Threats

The status of Yuma hispid cotton rat populations is unknown. It is believed this species has adapted to agricultural conditions along the LCR and expanded its range. The Yuma hispid cotton rat is a federal and California state species of special concern. Current threats to this species' survival have not been identified.

Habitat Requirements

Hispid cotton rats occupy moist, grassy habitats where they cut runways through the grass. Hoffmeister (1986) indicates that cotton rats in Yuma County have been found mostly along the Colorado River and adjacent sloughs in brushy areas. Cotton rats have been reported from habitats vegetated with common reed, arrowweed, and cattails. Agricultural fields, especially Bermuda grass farms, also provide habitat (Hoffmeister 1986). Hispid cotton rats eat many grasses and forbs and are more vegetarian than most native mice (Jameson and Peeters 1988). The Yuma hispid cotton rat has benefited from the expansion of irrigated fields and shown success in using agricultural areas. (Zimmerman pers. comm.). Yuma hispid cotton rats prefer tall, dense grasses close to water. The AAC may serve as a dispersal corridor for cotton rats to move from the LCR into the Imperial Valley.

Habitat in the Proposed Project Area

Potentially suitable habitat for the Yuma hispid cotton rat is abundant throughout the proposed project area. Irrigated agricultural fields of Bermuda grass, alfalfa, wheat, sudangrass, and sugar beets provide suitable habitat for the cotton rat. Many drainages and ditches adjacent to agricultural fields include dense patches of cattails, arrowweed, and common reeds.

Proposed Project Area Occurrence

Dixon (1922) reported this species in the Imperial Valley earlier this century, and the subspecies is commonly found along roadsides adjacent to alfalfa and clover fields (Zimmerman pers. comm.).

Nelson's Bighorn Sheep (*Ovis canadensis nelsoni*)

Range and Distribution

Bighorn sheep are well distributed in the mountainous regions of North America from Canada to Mexico. The desert subspecies (*O. c. nelsoni*) is found in the mountainous desert regions of Utah, Nevada, Arizona, and California south into Mexico.

Population Status and Threats

Historic hunting, disease introduced from domestic sheep, and competition from domestic livestock resulted in dramatic declines in bighorn sheep populations throughout the 1800s. While hunting was banned in the early 1900s, poaching continues to threaten the survival of this species. It is estimated that 90 percent of the historic population has been eliminated, and recovery has been slow (Banfield 1974; Darymple 1985; Geist 1979; and Nowak and Paradiso 1983). The Nelson's bighorn sheep is a federal species of concern.

Habitat Requirements

Habitats used by bighorn sheep include alpine dwarf-shrub, low sage, sagebrush, bitterbrush, pinyon-juniper, palm oasis, desert riparian, desert succulent shrub, desert scrub, subalpine conifer, perennial grassland, montane chaparral, and montane riparian

(DeForge 1980; Monson and Sumner 1980; Wehausen 1980). Bighorn sheep graze and browse on a wide variety of plant species; green, succulent grasses and forbs are preferred; and browse is important all year, especially for populations in arid habitats. Some populations use mineral licks, and some may be limited by phosphorus. Bighorn sheep feed in open habitats, such as rocky barrens, meadows, and low, sparse brushlands (Dunaway 1972; Monson and Sumner 1980; Wehausen 1980; Ginnett and Douglas 1982; and Lawson and Johnson 1982); they use rocky, steep terrain for escape and bedding. Steep, rugged slopes and canyons are used for lambing areas (Wehausen 1980). Water is critical in arid regions.

Habitat in the Proposed Project Area

No suitable habitat occurs in the proposed project area. While desert scrub habitat does occur, there are no adjacent mountainous regions to offer escape and breeding habitat. In addition, the desert scrub habitat in the proposed project areas occurs in proximity to significant human activity, such as off-road vehicle recreation sites and major highways.

Proposed Project Area Occurrence

Approximately 120 Nelson's bighorn sheep are known to inhabit area the Chocolate Mountains (CDFG 1999b). There is, however, no suitable habitat in the proposed project area for bighorn sheep, and, given the sensitivity of this species to human disturbance, their occurrence is unlikely.

Plants

Algodones Dunes Sunflower (*Helianthus niveus* ssp. *tephrodes*)

Range and Distribution

The Algodones Dunes sunflower occurs in southwestern Arizona, the Southern Sonoran Desert of Imperial County, California, and northern Mexico. In California, it is restricted to the Algodones Dunes. The main distribution of this species is in the Algodones Dunes system in California and, secondarily, in the Yuma dunes in Arizona. Although these stands may not be large in terms of numbers of individuals, they are potentially significant in maintaining genetic flow between populations of this subspecies in California and Arizona.

Population Status and Threats

This subspecies is naturally limited throughout its range by the availability of suitable dune habitat and is considered rare throughout its range. It occurs on the Barry M. Goldwater Air Force Range in Arizona (USFWS 1992), where it may be threatened by military activities. In California, this species is threatened primarily by off-road vehicles (Skinner and Pavlik 1994).

Habitat Requirements

The Algodones Dunes sunflower is restricted to active sand dunes or sandy desert areas, typically below 700 feet in elevation, and is also found in association with creosote bush scrub.

Habitat in the Proposed Project Area

Potential habitat occurs where the AAC traverses the Algodones Dunes.

Proposed Project Area Occurrence

On the Algodones Dunes, it is generally found only on the central axis of the dunes. During the 1984 surveys, a total of 885 plants was found evenly distributed along the survey area between Interstate 8 and Drop 1 along the north side of the AAC (Reclamation and IID 1994). No plants were observed along the AAC corridor to the east of Interstate 8.

Giant Spanish Needle (*Palafoxia arida* var. *gigantea*)

Range and Distribution

The giant Spanish needle occurs in southwestern Arizona, southeastern California, and northeastern Baja California, Mexico. In Arizona, this variety is currently known only in the vicinity of Yuma. In California, it is restricted to southeastern Imperial County, where it is found primarily in the Algodones Dunes system. In Baja California, it has been noted in sand dunes along or near the international border with California.

Population Status and Threats

The giant Spanish needle is naturally limited throughout its range by the availability of suitable dune or sandy habitat. While it is not considered endangered, potential threats to the populations include military activities; off-road vehicle use; habitat degradation; and direct impacts resulting from highway improvements, utility corridors, and quarry and stockpile operations.

Habitat Requirements

The giant Spanish needle is restricted to active or stable sand dunes or sandy desert areas, typically below 350 feet, and is also found in association with creosote bush scrub.

Habitat in the Proposed Project Area

Potential habitat occurs where the AAC traverses the Algodones Dunes.

Proposed Project Area Occurrence

The giant Spanish needle occurs primarily in the Algodones Dunes system. As part of the AAC Lining Proposed Project, a 600-foot-wide corridor along the portion of the AAC that passes through the Algodones Dunes was surveyed for special-status plant species (Reclamation and IID 1994). These surveys identified 2,908 individuals in the corridor to the west of Interstate 8, and 787 individuals were found east of Interstate 8.

Orcutt's Aster *(Xylorhiza orcuttii)*

Range and Distribution

Orcutt's aster occurs in Imperial, Riverside, and San Diego Counties in California and Baja California, Mexico.

Population Status and Threats

Orcutt's woody aster is considered extremely rare because of limited populations. The plant is considered endangered in parts of its range; however, many of the known populations lie within Anza-Borrego State Park boundaries and are well protected. Populations are presumed stable on the Southern deserts. Outside of protected areas, threats to the populations include off-road vehicle use.

Habitat Requirements

Orcutt's aster occurs primarily in Sonoran creosote scrub habitats in rocky canyons and sandy washes at elevations between 65 and 1,200 feet. Generally, this species has been observed in areas with little shrub cover.

Habitat in the Proposed Project Area

This species is associated with creosote scrub. The only portion of the HCP area that supports this plant community is the right-of-way of IID along the AAC.

Proposed Project Area Occurrence

No plants have been observed in the proposed project area, although potential habitat exists. The nearest known populations are in Anza-Borrego Desert State Park to the west of the HCP area.

Foxtail Cactus *(Escobaria vivipara var. alversonii)*

Range and Distribution

The foxtail cactus occurs in the Sonoran and southern Mojave deserts of Arizona and California. In California, it occurs along the border between the Mojave and Colorado Deserts in Riverside, San Bernardino, and Imperial Counties.

Population Status and Threats

The current population status of the foxtail cactus is not definitively known, although it has been reported as occurring in "large, healthy populations" throughout much of its range (Warren and Laurenzi 1987). This species is uncommon, but is not considered to be threatened or endangered at this time. It appears to have a relatively restricted geographic distribution, and populations have been affected primarily by horticultural collecting. No other threats to the survival of this species have been identified.

Habitat Requirements

The foxtail cactus occurs in both sandy and rocky areas but seems to prefer heavy, rocky soils with decomposing granite or basalt and is often found on basalt between 250 and 5,000 feet in elevation. It may also occur in association with creosote bush scrub.

Habitat in the Proposed Project Area

Potential habitat occurs in the creosote scrub habitat along the AAC and Coachella Canal and potentially in scrub habitat adjacent to the Salton Sea between the higher rock hillsides and the more saline desert saltbrush community.

Proposed Project Area Occurrence

While no plants have been observed in the proposed project area, this variety is known from upland habitats primarily west of the LCR. At least one population occurs in the vicinity of the Palo Verde Dam quarry site.

Munz's Cactus (*Opuntia munzii*)

Range and Distribution

Munz's cactus occurs in the Sonoran Desert where the species occurrences are primarily from the Chocolate and Chukwalla Mountains in Riverside and Imperial Counties.

Population Status and Threats

This species is endemic to California and considered extremely rare, with only a few known small populations. Due to the general inaccessibility of the habitats, the plant is not considered endangered, and no current threats have been identified.

Habitat Requirements

Munz's cactus grows at elevations between 500 and 2,000 feet in sandy or gravelly soils found in washes and along canyon walls associated with creosote scrub.

Habitat in the Proposed Project Area

This species is associated with creosote scrub. The only portion of the HCP area that supports this plant community is the right-of-way of IID along the AAC.

Proposed Project Area Occurrence

No plants have been reported to occur in the proposed project area. Known locations for this species are primarily washes below the Chocolate Mountains along the eastern edge of the Imperial Valley.

Flat-Seeded Spurge *(Chamaesyce platysperma)*

Range and Distribution

The flat-seeded spurge is generally restricted to Southern California occurring in Imperial, San Diego, Riverside, and San Bernardino Counties. Rare occurrences outside California have been reported from Arizona and Sonora, Mexico.

Population Status and Threats

The present status of this species is poorly known. Population occurrences are typically highly restricted, but presumably stable. The Coachella Valley has been heavily impacted in recent years; however, lack of sufficient collection data precludes determination of the effects on this species (Reiser 1994). No threats to this species have been identified.

Habitat Requirements

The flat-seeded spurge is an annual herb found on sandy flats, dunes, and in creosote bush scrub. It flowers from February to September and is undetectable during other times of the year or in years when environmental conditions are less than optimum.

Habitat in the Proposed Project Area

This species is associated with creosote scrub. The only portion of the HCP area that supports this plant community is the right-of-way of IID along the AAC.

Proposed Project Area Occurrence

While potential habitat is present in the proposed project area, no plants have been observed.

Wiggin's Croton (*Croton wigginsii*)

Range and Distribution

Wiggin's croton occurs in the southwest portion of Imperial County, Arizona, and Baja California and Sonora, Mexico.

Population Status and Threats

Occurrences of Wiggin's croton in California are confined to several populations, some of which may be endangered. Outside California, the plant is more common and widespread. No threats to this species have been identified.

Habitat Requirements

Wiggin's croton is a woody shrub that occurs primarily in stable and active dunes, and sandy washes at elevations ranging from 160 to 350 feet. Although less common, it also occurs on sandy sites in the Sonoran Desert creosote scrub habitat. Like all croton species, Wiggin's croton prefers areas with sandy and/or loose soils.

Habitat in the Proposed Project Area

Potential habitat for Wiggin's croton in the HCP area occurs in the creosote scrub and dune habitats along the AAC.

Proposed Project Area Occurrence

In California, Wiggin's croton occurs in the Algodones Dunes system. As part of the AAC Lining Proposed Project, a 600-foot-wide corridor along the portion of the AAC that passes through the Algodones Dunes was surveyed for special-status plant species (Reclamation and IID 1994). These surveys identified 1,447 individuals in the corridor to the west of Interstate 8, and 43 individuals were found east of Interstate 8. Results of the 1993 surveys indicated occurrences of this species in the high dune system as well as isolated populations in the smaller dunes. A total of 338 individuals was observed in the proposed canal right-of-way. Wiggin's croton was also observed south of Power Drop Station No. 1 between transmission poles 8191 and 8178 (Reclamation and IID 1994).

Peirson's Milk-Vetch *(Astragalus magdalenae var. peirsonii)*

Range and Distribution

The current distribution of Peirson's milk vetch is thought to be restricted to the Algodones Dunes in Imperial County, California; northeastern Baja California; and the Gran Desierto in Sonora, Mexico. The historic occurrence reported from the Borrego Valley in San Diego

County, California, has not been observed for several decades and is presumed to have been extirpated (USFWS 1998).

Population Status and Threats

Peirson's milk-vetch is currently state and federally listed as endangered. The species' population is believed to be declining (CDFG 2000). Approximately 25 percent of the known populations are in the North Algodones Dunes Wilderness, managed by the Bureau of Land Management. The remaining populations continue to be threatened by off-road vehicles, grazing and trampling by livestock and feral burros, trampling by recreational users, competition from non-native plants, urban development, construction related to fisheries development, and alteration of soil hydrology.

Habitat Requirements

Peirson's milk-vetch is a short-lived perennial that occurs on the slopes and hollows of well developed dune systems at elevations between 150 and 800 feet. It is adapted to habitats with specific substrate or hydrologic conditions that occur as inclusions within creosote bush scrub or sagebrush dominated communities.

Habitat in the Proposed Project Area

Potential habitat occurs in the creosote scrub and dune habitats along the AAC.

Proposed Project Area Occurrence

In the Algodones Dunes area, Peirson's milk-vetch tends to grow in the west and central portions of the dunes. During the 1984 surveys, 1,422 plants were found in the sand dune habitat between Interstate 8 and Drop 1 of the AAC (Reclamation and IID 1994). Results of the 1993 surveys found more than 1,300 individuals within a 1-mile reach of the proposed canal right-of-way in the high dunes area (USFWS 1996b).

Sand Food *(Pholisma sonorae)*

Range and Distribution

The sand food occurs scattered in a roughly 3,900-square-mile area that includes habitat surrounding the Gulf of Mexico in southwestern Arizona, the Sonoran Desert of California, northeastern Baja California, and northwestern Mexico. In Arizona, the species occurs in Southern Yuma County along the U.S.-Mexico boundary. In California, it occurs in southeastern Imperial County, in or near the Algodones Dunes. Its southernmost extent is Bahia Adair on the Sea of Cortez coast of Sonora, Mexico.

Population Status and Threats

Considered rare throughout its range, this species is naturally limited by the availability of suitable habitat and host plants. Both habitat and host plants have been reduced in extent or degraded by a variety of land uses, including military maneuvers, recreational vehicles, agriculture, bulldozing and clearing of native dune vegetation, litter, and invasion of dunes by nondune species (AGFD 1998d and CDFG 1999b).

Habitat Requirements

The sand food is a perennial root parasite that lacks chlorophyll and occurs on sand dunes or in sandy areas in association with creosote bush scrub below 650 feet. It is parasitic on dune buckwheat, Palmer coldenia, plicate coldenia, white bursage, and arrowweed (Hickman 1993; and Yatskievych and Mason 1986).

Habitat in the Proposed Project Area

Potential habitat occurs in the creosote scrub and dune habitats along the AAC.

Proposed Project Area Occurrence

Major populations of this species are found in the Algodones Dunes system. As part of the AAC Lining Proposed Project, a 600-foot-wide corridor along the portion of the AAC that passes through the Algodones Dunes was surveyed for special-status plant species (Reclamation and IID 1994). These surveys identified 208 individuals in the corridor to the west of Interstate 8, and 363 individuals were found east of Interstate 8.

Orocopia Sage (*Salvia greatae*)

Range and Distribution

Endemic to southeastern California, orocopia sage occurs in San Bernardo, Riverside, and Imperial Counties. The largest known populations occur in the Orocopia Mountains to the Chocolate Mountains, in Riverside County.

Population Status and Threats

Orocopia sage is a federal species of concern and is considered extremely rare throughout its range but not endangered. Threats to this species have not been identified.

Habitat Requirements

Orocopia sage occurs in creosote bush scrub, in desert dry washes, on alluvial fans, and woodlands below 590 feet.

Habitat in the Proposed Project Area

Potential habitat occurs only in the creosote scrub and dune habitats along the AAC.

Proposed Project Area Occurrence

There are no known occurrences of this species in the proposed project area. Most of the suitable habitat is found north and east of the proposed project area.

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APPENDIX B

Methodology for Characterizing Vegetation in the IID Drainage System

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Methodology for Characterizing Vegetation in the IID Drainage System

A comprehensive survey of vegetation in the IID drainage system will be conducted. The survey will collect data necessary to quantify the amount and type of vegetation supported in the drainage system. The survey will be conducted by teams of two people. Prior to initiating the surveys, field personnel will be instructed in field techniques and data collection to ensure consistent characterization among crews.

Standard Methodology

The entire drainage system will be surveyed. For each drain, vegetation will be characterized starting at the upstream end of the drain and moving downstream. Crossings occur at regular intervals of about 0.5 mile along every drain (Figure B-1). Vegetation will be characterized by drain segment, with a segment defined as that portion of the drain between two crossings.

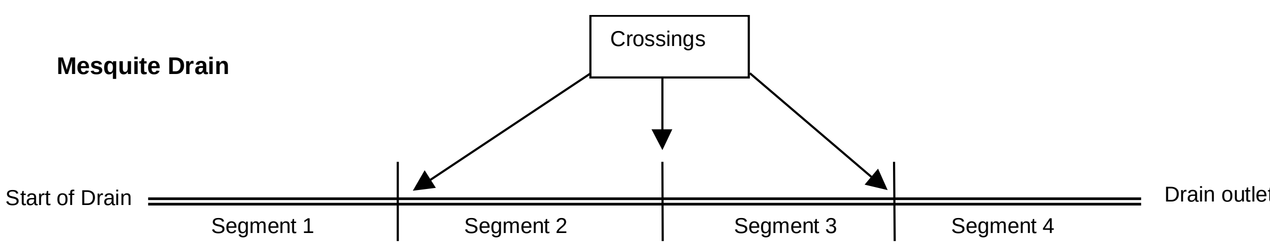


FIGURE B-1
Schematic of Drain Showing Crossings and Designations of Segments for Vegetation Characterization

In each segment, the following measurements, indicated on Figure B-2, will be taken:

- Top width of the drain, including overburden
- Projected (i.e., horizontal) width of the vegetation in the drain, including the width of the water surface
- Width of the water surface

The actual width of the vegetation will be developed from these measurements after field data collection. Because the width of the vegetation can vary along the length of the drain segment, the vegetation width measurement will reflect where the vegetation is concentrated and will not include small “pockets” of vegetation that occur sporadically on the banks of the drain. In addition, the height of the overburden will be estimated.

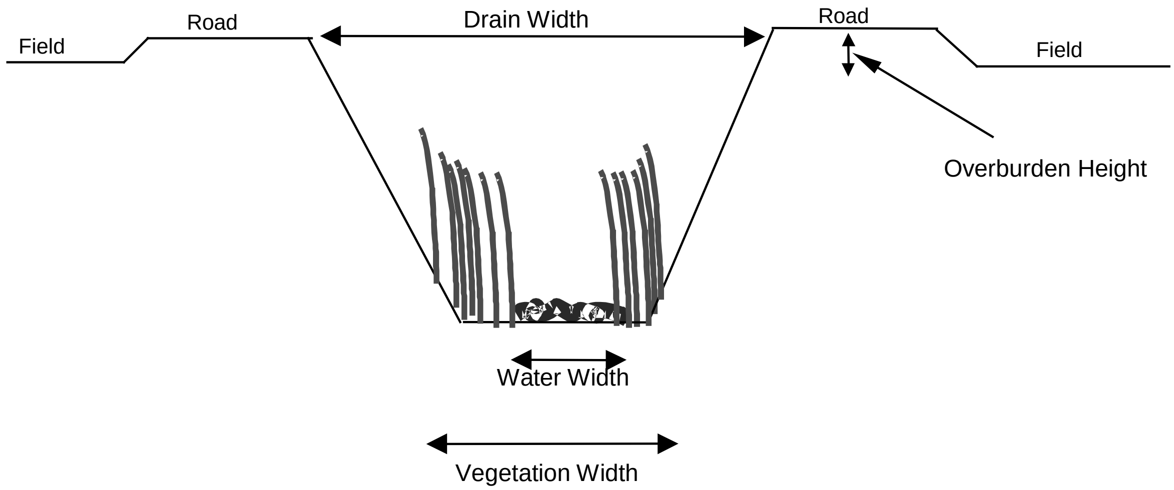


FIGURE B-2
Schematic of Drain Showing Data to Be Collected

Vegetation can occur on the drain banks and on the bottom of the drain. The vegetation width will be measured as the horizontal distance or projection rather than the slope distance covered by vegetation. Measuring vegetation width as the slope distance covered by vegetation was considered but not pursued for the following reasons:

- Habitat created under the HCP would be higher quality than the habitat in the drains, thus, compensating for any underestimation in the amount of vegetation resulting from using the horizontal distance rather than the slope distance to estimate the amount of habitat.
- Some portions of the drains could be inaccessible and may require using aerial photography to determine the amount of vegetation. If aerial photography were used, the acreages generated would reflect a horizontal distance rather than a slope distance.

To ensure consistency in the event that aerial photography is necessary to delimit certain areas of vegetation for this survey (or future surveys), vegetation width will be measured as the horizontal distance.

The total percent coverage of vegetation will be classified, according to the California Native Plant Society system (Table B-1). In estimating the percent coverage, the area covered by water will be excluded so the estimate reflects the density of the vegetation along the banks. Within the vegetated area (i.e., that portion of the drain covered by vegetation [vegetation width – water width]), the plant species composition will be characterized by identifying the plant species present and assigning a vegetation cover class, according to Table B-1. Plant species likely to occur in the drains that will be individually identified are listed in Table B-2. The percent coverage of herbaceous plants not listed in Table B-2 will be addressed collectively as “herbaceous.” Additional plant species of importance to wildlife could be encountered during the field surveys; such species will be individually identified and added to Table B-2. Dead or senescent vegetation will be included in estimating the total percent coverage and species composition.

TABLE B-1
Vegetation Cover Classes

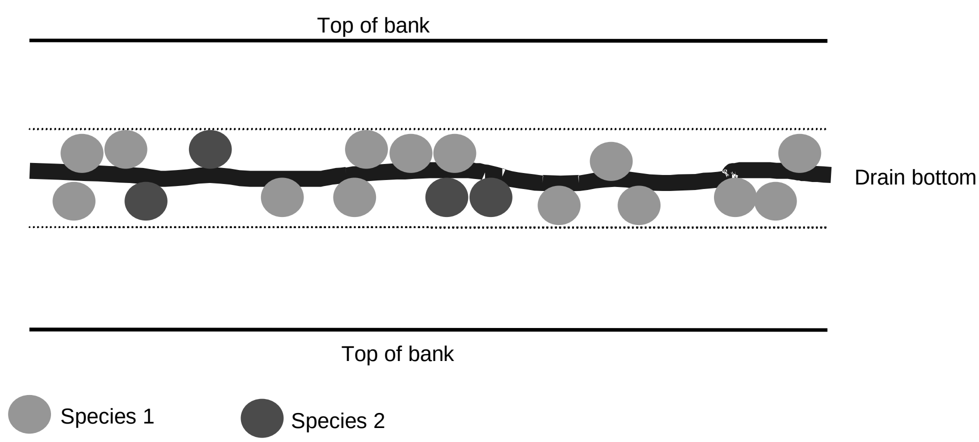
Class	Percent Coverage
1	≤ 1
2	> 1 – 5
3	> 5 – 25
4	> 25 – 50
5	> 50 – 75
6	> 75 – 100

TABLE B-2
Plant Species for Which Percent Coverage Will Be Individually Classified

Atriplex spp. (saltbush)	*Prosopis* spp. (mesquite)
Carex spp. (sedge)	*Rumex crispus* (curly dock)
Juncus spp. (rush)	*Salix* spp. (willow)
Larrea tridentata (creosote bush)	*Scirpus* spp. (bulrush)
Phragmites communis (common reed)	*Suaeda torreyana ramosissima* (iodine bush)
Pluchea sericea (arrowweed)	*Tamarix* spp. (salt cedar)
Polygonum spp. (smartweed)	*Typha* spp. (cattail)

EXAMPLE

Total percent coverage: Class 5 (>50 – 75%)
Plant Species 1: Class 6 (>75 – 100%)
Plant Species 2: Class 3 (>5 – 25%)



In addition to the quantitative information on vegetation, the field crew will note the following information:

- Presence of aquatic vegetation
- Dead vegetation
- Indication of recent maintenance activities (e.g., herbicide application, mechanical cleaning)

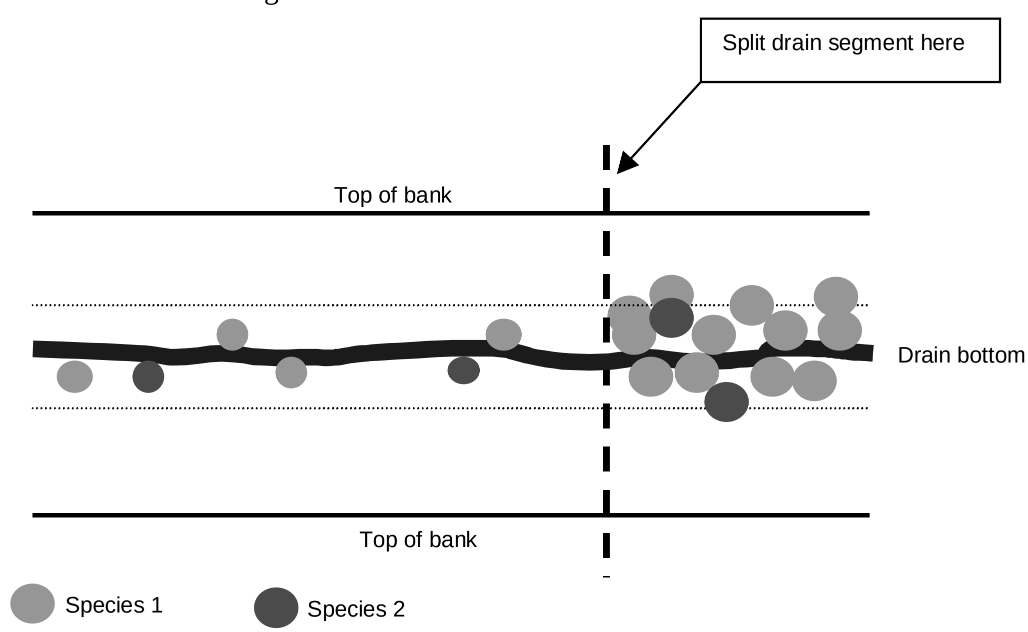
Although the focus of the survey is to characterize the vegetation, the field crews also will note covered species in or along the drains.

Special Conditions Methodologies

Most of the drains have vegetation consisting of one or two plant species in a narrow band along the water's edge for most of the length of the segment. However, some drains have a more complex vegetation pattern. Two special conditions were identified during a field visit to develop the survey protocol. First, along some drains, the type and extent of vegetation varies substantially along the segment length. Second, vegetation in the drain exists as two distinct bands, with dense emergent vegetation on the bottom of the drain and more xeric species on the drain banks. The following describes the approach to characterizing vegetation in these two circumstances. These techniques will be used only where there are distinct differences in plant species composition or percent coverage.

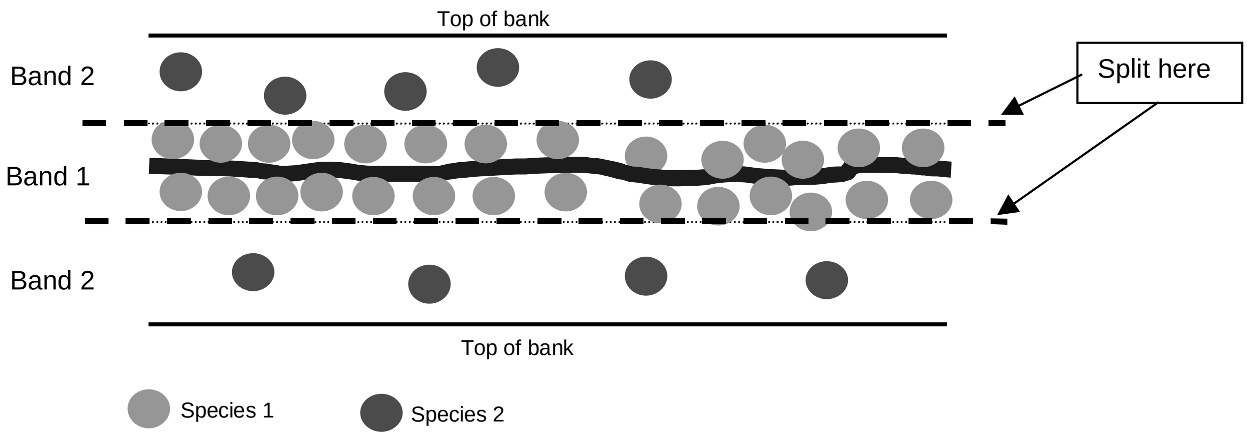
Condition 1: Variable Vegetation Along Segment Length

Along some drains, the density or width of the vegetation can change abruptly, as shown schematically. In this case, the drain segment will be split into two subsegments and the vegetation characteristics quantified individually for each subsegment. The subsegments will be distinguished with a letter (e.g., Mesquite Drain Segment 1a and 1b). The location of the split will be designated through Global Positioning System coordinates or as a distance from the nearest crossing.

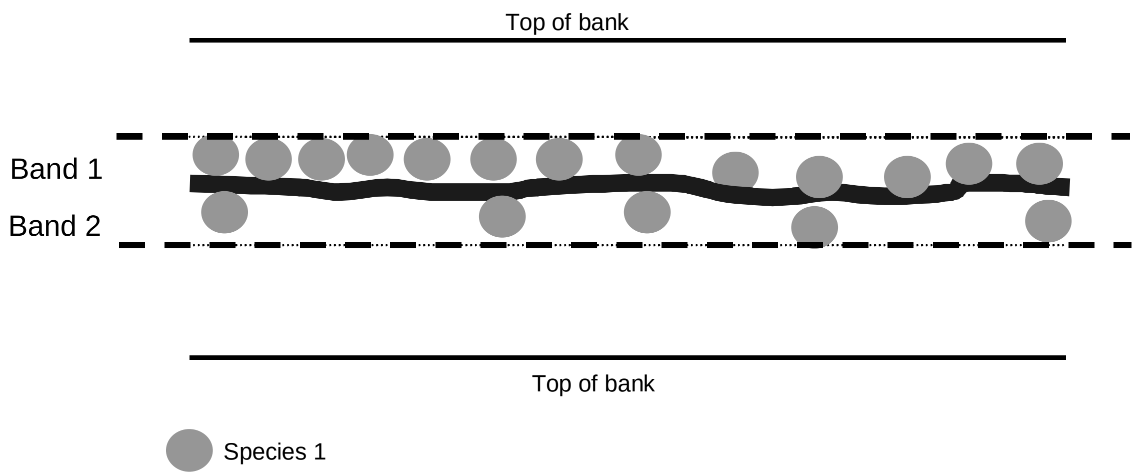


Condition 2: Two or More Distinct Vegetation Bands

Along some drains, two distinct bands of vegetation with different species composition and percent coverage occur. This condition is illustrated below. In this case, the vegetation will be split into two bands and the vegetation characteristics quantified. The band flanking the water will be referred to as Band 1, with the band occurring higher on the drain bank referred to as Band 2. Typically, the vegetation characteristics of Band 2 are the same on both sides of the drain and, therefore, will be combined in estimating the width and percent coverage.



Vegetation flanking the water, but on opposite sides of the water, could differ substantially in terms of percent coverage as illustrated below. If the percent coverage of the vegetation differs by more than 50 percent between the two sides, the vegetation flanking the water will be split into two bands as shown. The side with the highest percent coverage will be designated Band 1, and vegetation width will be measured as the width of the vegetation in Band 1 plus the water width. The vegetation on the opposite bank will be designated Band 2, and its width and percent coverage estimated as described above.



APPENDIX C

Species-Specific Avoidance and Minimization Measures for Construction Activities in Desert Habitat

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Species-Specific Avoidance and Minimization Measures for Construction Activities in Desert Habitat

Desert Tortoise

If a tortoise occurs on the project site during construction, construction activities adjacent to the tortoise's location will be halted and the tortoise allowed to move away from the construction site. If the tortoise is not moving, the biological monitor will move it to nearby suitable habitat outside the construction area. The tortoise will be placed in the shade of a shrub.

Before construction, the construction area and adjacent areas within 100 feet of the construction site will be searched for burrows that could be used by desert tortoises. When burrows are found, they will be checked for desert tortoises. Both occupied and unoccupied burrows will be flagged and avoided (employing a 50-foot buffer) during construction. If an occupied burrow cannot be avoided, it will be excavated and the tortoise moved to an unoccupied burrow outside the construction area that is approximately the same size as the one from which it was taken. If an existing burrow is unavailable, the biologist will construct or direct the construction of a burrow of similar shape, size, depth, and orientation as the original burrow. Desert tortoises moved during inactive periods will be monitored for at least two days after placement in the new burrows to ensure their safety. All desert tortoise handling and burrow excavation will be in accordance with handling procedures developed by the USFWS and conducted by an authorized biologist.

Any construction pipe, culverts, or similar structures with a diameter of 3 to 12 inches that are stored on the construction site for one or more nights will be inspected for tortoises before the material is moved, buried, or capped. Alternatively, all such structures may be capped before being stored on the construction site.

Trench segments or other excavations will be fenced with temporary tortoise-proof fencing, covered at the close of each working day, or provided with tortoise escape ramps. All excavations will be inspected for tortoises before filling.

Construction activities will be conducted only between dawn and dusk.

A clearance survey will be conducted during the 48 hours before construction activities begin. Desert tortoises found on the construction site will be moved to nearby suitable habitat outside the construction area. Following the clearance surveys, exclusion fencing will be erected or a biological monitor will be on-site during construction activities, consistent with Desert Habitat – 3.

Colorado Desert Fringe-Toed Lizard and Flat-Tailed Horned Lizard

A clearance survey will be conducted during the 48 hours before construction activities begin. Colorado desert fringe-toed lizards (CDFLs) and flat-tailed horned lizards (FTHLs) found on the construction site will be moved to nearby suitable habitat outside the construction area. Following the clearance surveys, exclusion fencing will be erected or a biological monitor will be on-site during construction activities, consistent with Desert Habitat – 3.

Construction areas will be examined hourly for the presence of CDFLs and FTHLs when surface temperatures exceed 30 degrees Celsius and construction activities are occurring.

If a CDFL or FTHL occurs on the project site during construction, construction activities immediately adjacent to the lizard's location will be halted and the lizard allowed to move away from the construction site. If the lizard is not moving, the biological monitor will capture and relocate the lizard. Relocated lizards will be placed in the shade of a shrub. If the surface temperature in the sun is less than 30 degrees Celsius or greater than 50 degrees Celsius, the lizard will be held for later release. Initially captured CDFLs or FTHLs will be held in a cloth bag, cooler, or other appropriate clean dry container. Lizards will be maintained at temperatures between 25 and 35 degrees Celsius and will not be exposed to direct sunlight. Release will occur as soon as possible after capture and during daylight hours when the surface temperatures range from 32 to 40 degrees Celsius.

Trenches, holes, or other excavations will be examined for these two types of lizards before filling. If lizards are found, they will be moved by the biological monitor to nearby suitable habitat.

Western Chuckwalla

A clearance survey will be conducted during the 48 hours before construction activities begin. Western chuckwallas found on the construction site will be moved to nearby suitable habitat outside the construction area. Following the clearance surveys, exclusion fencing will be erected or a biological monitor will be on-site during construction activities, consistent with Desert Habitat – 3.

If a chuckwalla occurs on the project site during construction, construction activities adjacent to the individual's location will be halted and the individual allowed to move away from the construction site. If the individual is not moving, the biological monitor will move it to nearby suitable habitat outside the construction area. It will be placed in the shade of a shrub.

Before construction, the construction area and adjacent areas within 100 feet of the construction site will be searched for burrows that could be used by western chuckwallas. If potentially suitable burrows are found, they will be checked for occupancy. Occupied burrows will be flagged and avoided (employing a 50-foot buffer) during construction. If the burrow cannot be avoided, it will be excavated and the occupant moved to an unoccupied burrow outside the construction area and of approximately the same size as the one from which it was taken. If an existing burrow is unavailable, the biologist will construct or direct the construction of a burrow of similar shape, size, depth, and orientation as the original.

Trenches, holes, or other excavations will be examined for these species before filling. If individuals are found, the biological monitor will move them to nearby suitable habitat.

Couch's Spadefoot Toad

Based on the baseline habitat, species surveys, and the preconstruction surveys, water sources used by Couch's spadefoot toad will be identified. If construction activities occur within 0.6 mile of water sources used by Couch's spadefoot toads, construction activities will be conducted only between dawn and dusk.

If water sources used by Couch's spadefoot toads occur on or within 500 feet of the construction site, a 500-foot buffer will be established around the water source. The buffer will be staked and flagged. No construction activities will be permitted within the buffer.

If a water source used by Couch's spadefoot toads for breeding cannot be avoided, and would be permanently lost as a result of construction, IID will acquire and protect in perpetuity two ponds known to be used by Couch's spadefoot toads for breeding for each affected water source.

Harris Hawk

Before construction activities begin, potential nesting habitat on the construction site and within 0.25 mile of the construction site will be surveyed to determine if Harris hawks are nesting. If nesting Harris hawks are found, a 0.25-mile buffer will be established around the nest site. The buffer will be staked and flagged. No construction activities will be permitted within the 0.25-mile buffer from February 1 to October 15 or until young have fledged. Vegetation within the 0.25-mile buffer may be removed after the young have fledged.

Elf Owl

Before construction activities begin, potential nesting habitat on the construction site and within 0.25 mile of the construction site will be surveyed to determine if elf owls are nesting. If nesting elf owls are found, a 0.25-mile buffer will be established around the nest site. The buffer will be staked and flagged. No construction activities will be permitted within the 0.25-mile buffer from April 1 to July 31 or until young have fledged. Vegetation within the 0.25-mile buffer may be removed after the young have fledged.

Loggerhead Shrike, Le Conte's Thrasher, and Crissal Thrasher

Before construction activities begin, potential nesting habitat for these species on the construction site and within 500 feet of the construction site will be surveyed to determine whether any are nesting. If nesting shrikes or thrashers are found, a 500-foot buffer will be established around the nest site. The buffer will be staked and flagged. No construction activities will be permitted within the buffer during the species-specific breeding periods as follows:

- Loggerhead shrike: February 1 through July 31 or until young have fledged
- Crissal thrasher: January 15 through June 15 or until young have fledged
- Le Conte's thrasher: January 15 through June 15 or until young have fledged

Vegetation within the 500-foot buffer may be removed after the young have fledged.

Pierson's Milk-Vetch, Algodones Dunes Sunflower, Wiggin's Croton, Giant Spanish Needle, and Sand Food

Before construction activities begin, the construction area will be surveyed for the presence of covered plant species. Surveys will be conducted during the time period necessary to identify these species but will be conducted within one year of initiating construction activities.

If covered plant species occur on the construction area, an activity exclusion zone, 25 feet in radius, will be established around each plant. Exclusion zones will be flagged and staked in the field before construction begins. No surface disturbing activity will occur within the exclusion zones. If a 25-foot-radius exclusion zone cannot be established, IID will confer with the USFWS and CDFG regarding the best configuration of the exclusion zone, given the location of the plants and construction area requirements. If the plants cannot be avoided, IID will confer with USFWS and CDFG. The USFWS and CDFG will determine if the plants can be transplanted. If the plants can be transplanted, IID will work with USFWS and CDFG to identify a location and the appropriate procedures for transplanting those plants that cannot be avoided.

APPENDIX D

Procedures for Removing Burrowing Owls

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Procedures for Removing Burrowing Owls

Part of the Burrowing Owl Conservation Strategy includes ensuring that burrowing owls are absent from burrows prior to conducting specific activities that would fill or collapse the burrow. The Habitat Conservation Plan (HCP) Implementation Biologist will follow one of the following four procedures to ensure that owls are absent from burrows that will be affected.

Option 1

Prior to conducting the activities, the biologist will use a scope to determine if an owl is present in a burrow.

If the burrow is unoccupied, the burrows will be made inaccessible to owls, and the activities may proceed.

If the burrow is occupied, the biologist will install a one-way door to remove the owl from the burrow. The biologist will scope the burrow to confirm that the owl has vacated. After confirming that the owl has vacated the burrow, the burrow will be made inaccessible to owls.

Option 2

Prior to conducting the activities, the biologist will install a one-way door with a trap in burrows that would be affected. The biologist will check the trap approximately every 4 hours until the owl is trapped. The owl will be relocated to suitable habitat; the burrows will be made inaccessible to owls.

Option 3

At least 3 days before conducting the activities, the biologist will install a one-way door in burrows that would be affected. Prior to conducting the activities, the biologist will use a scope to verify that burrows are vacant. After confirming that the owl has vacated the burrow, the burrow will be made inaccessible to owls.

Option 4

The HCP Implementation Biologist may use any other procedure approved by the HCP Implementation Team for ensuring that owls are not present in burrows.

Table E-1

Acreages of Crops in the Imperial Irrigation District During 1974 - 2000

Crops with Less Than 1,000 Acres Not Shown

Crop	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Broccoli	710	773	1,302	1,860	2,359	2,756	2,368	2,466	2,306	4,427	5,050	5,560	3,409	9,020	9,106	11,343	10,484	9,543	8,889	64,069	6,406	5,926	6,311	6,480	9,589	12,305	10,916
Cabbage	1,429	319	198	230	405	754	938	510	444	63	359	653	392	802	867	866	1,225	1,431	1,077	1,511	1,483	757	710	966	1,126	1,441	877
Carrots	6,385	5,988	7,572	4,394	6,489	9,211	7,666	6,755	8,917	7,402	10,053	13,361	8,736	12,976	11,678	11,874	12,682	14,635	15,557	16,312	16,312	14,959	16,469	16,014	16,416	16,995	18,167
Cauliflower	-	5	94	-	-	152	211	179	84	151	942	1,506	1,886	3,928	5,964	6,673	7,334	6,087	6,237	3,755	3,755	2,762	2,776	2,553	3,313	3,960	3,642
Ear Corn	273	4	273	297	1,052	620	127	2	658	510	809	1,238	364	1,639	3,006	1,724	1,822	2,973	3,830	2,879	4,491	3,896	4,372	5,500	6,088	6,790	5,921
Garbanzo Beans	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	75	1,211	1,034	51	1,057	108
Garlic	708	1,395	499	380	658	584	840	159	306	376	523	411	339	-	-	42	353	464	414	85	457	335	437	165	104	308	76
Lettuce	48,376	44,912	44,420	39,230	41,499	43,629	43,728	36,772	31,086	26,086	26,807	28,063	30,964	24,842	28,477	32,628	38,929	31,292	22,959	21,847	22,143	20,516	19,299	20,172	19,046	22,558	18,089
Cantaloupes	8,888	7,559	9,169	10,446	13,196	10,427	11,047	14,587	14,020	13,263	15,326	23,213	21,211	32,407	30,104	28,858	33,335	21,236	12,304	13,582	14,339	14,931	13,337	13,535	14,087	14,030	11,270
Honeydews	148	842	655	985	1,470	1,362	755	1,804	2,917	1,434	2,325	1,160	920	2,562	1,430	2,150	2,948	792	232	335	782	550	998	868	863	1,459	1,421
Watermelons	1,573	2,472	1,964	3,146	1,022	3,136	3,215	3,917	5,354	4,972	4,656	5,057	2,757	4,786	4,113	3,830	3,234	2,326	2,485	2,596	3,498	2,619	2,822	2,419	1,635	2,158	1,143
Onions	6,273	7,509	4,539	4,605	6,917	6,970	5,498	5,739	10,013	7,248	7,887	6,802	8,192	9,133	10,217	8,903	10,125	11,862	10,126	10,767	12,004	11,258	13,324	10,176	9,757	11,526	12,377
Onions (Seed)	1,469	1,248	1,701	1,769	1,866	2,449	2,440	3,232	2,371	2,886	1,715	1,382	1,853	1,736	1,483	2,261	3,339	2,540	2,790	2,315	1,929	1,317	1,882	3,573	2,256	3,541	3,812
Potatoes	-	-	-	-	-	-	-	-	-	-	-	-	-	20	80	152	177	621	604	970	1,304	1,923	2,538	2,784	2,622	3,159	2,775
Rapini	280	259	189	110	149	170	90	305	156	184	123	46	46	146	191	505	479	520	520	589	546	744	704	722	1,150	1,323	1,505
Spinach	-	-	-	-	-	-	-	30	-	16	48	55	55	-	-	85	191	222	169	451	366	345	372	646	950	1,229	485
Squash	970	1,287	1,272	971	1,105	1,112	1,358	1,471	1,286	797	1,009	549	391	694	467	206	216	201	187	102	220	223	59	150	114	191	108
Tomatoes	2,909	5,736	3,621	4,355	3,281	3,215	1,713	3,433	3,071	2,822	4,604	4,441	3,194	3,482	5,128	13,208	11,416	6,385	3,483	2,850	3,486	1,985	2,022	862	655	2,024	798
Vegetables, Mixed	122	212	232	41	26	10	18	121	4	402	687	813	266	911	1,463	1,350	1,382	1,635	1,178	2,059	2,134	1,663	803	1,761	1,711	2,162	1,961
Alfalfa	155,608	158,784	168,637	176,328	178,120	187,609	187,205	171,745	202,180	205,138	216,687	208,498	218,890	190,250	183,462	166,732	190,808	202,145	186,205	182,910	188,309	185,512	152,834	160,982	174,363	168,271	177,854
Alfalfa (Seed)	2,383	627	738	1,524	2,356	3,362	2,082	2,515	833	2,685	4,516	5,394	3,069	2,594	5,030	3,070	4,523	17,397	7,099	7,949	6,675	13,423	13,238	14,248	19,781	24,362	18,223
Alicia Grass	2,797	2,900	1,961	821	965	325	168	62	52	50	14	14	13	-	71	-	-	1	71	1	1	1	1	1	1	1	1
Barley	5,358	3,481	3,585	6,761	7,735	4,098	1,895	382	232	259	259	311	464	325	-	-	203	145	92	182	239	606	58	91	337	868	109
Bermuda Grass	2,403	2,158	2,344	3,047	2,351	2,215	2,315	3,745	3,684	2,816	2,786	2,077	1,763	5,680	4,083	4,249	4,498	5,776	15,359	17,367	17,056	21,704	20,952	24,301	31,774	31,731	41,918
Bermuda Grass (Seed)	964	1,046	1,362	1,349	2,837	4,939	5,019	5,929	7,849	16,428	13,175	17,402	20,238	2,966	3,926	3,778	13,410	15,890	19,098	20,494	17,535	17,854	22,636	20,613	21,865	23,448	22,185
Cotton	78,808	43,000	66,792	138,118	61,740	82,757	83,376	80,076	42,217	18,079	27,316	20,744	18,977	22,791	20,760	9,568	11,014	9,401	4,227	7,255	6,891	6,881	4,601	3,970	4,640	7,131	5,641
Field Corn	-	-	-	-	484	-	-	-	-	294	388	1,232	471	223	272	142	210	35	178	477	405	734	453	1,683	579	844	824
Kleingrass	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	135	135	452	567	1,623	3,113	6,998
Oats	1,002	275	148	780	182	511	271	39	717	274	464	372	533	1,046	472	4,806	2,602	3,750	1,981	1,262	1,539	2,063	1,267	1,753	2,411	212	850
Rape	46	-	-	-	-	-	-	-	-	267	-	-	-	-	-	-	-	-	-	45	558	919	773	778	5,098	3,034	621
Rye Grass	8,875	8,766	6,978	5,571	8,294	2,438	1,065	2,332	4,892	2,540	6,717	3,306	3,172	5,727	7,369	8,205	8,876	9,091	9,591	6,227	5,867	4,685	2,978	4,600	4,968	3,034	2,860
Sorghum Grain	31,610	24,271	16,961	7,164	15,060	8,497	3,807	2,300	2,335	1,616	1,572	598	485	3	70	50	-	-	68	98	113	20	2,536	255	40	82	205
Soy Beans	-	-	-	87	3,338	3,092	38	91	181	-	5	-	78	120	-	144	-	-	-	-	80	-	-	-	-	-	-
Sudan Grass	14,450	13,047	26,155	6,566	11,761	23,732	20,587	22,122	8,013	10,410	24,311	15,202	10,527	24,914	34,509	48,792	41,482	64,513	53,352	57,850	78,878	77,383	81,896	83,562	66,568	62,286	53,446
Sudan Grass (Seed)	-	-	-	-	75	-	-	-	-	228	115	76	-	153	-	342	1,055	167	72	273	266	151	300	310	391	595	148
Sugar Beets	69,108	71,425	73,813	59,789	36,459	47,784	36,861	43,929	37,607	39,525	38,102	37,340	34,048	41,504	41,099	29,163	41,508	41,591	39,703	41,492	34,802	31,612	33,980	39,327	34,258	33,997	31,475
Wheat	101,499	155,575	146,744	67,503	135,488	99,952	142,073	164,463	175,047	99,507	97,043	77,057	92,831	68,199	60,290	99,891	56,833	32,552	69,180	59,283	58,247	62,117	106,513	90,005	80,184	42,464	49,868
Asparagus	5,066	4,426	4,423	3,719	3,565	3,473	3,308	2,568	2,459	2,992	3,541	5,049	3,928	4,478	5,039	5,376	6,145	6,445	6,466	6,111	6,136	5,265	4,919	5,337	5,574	6,166	5,922
Citrus - Grapefruit	657	600	546	442	368	295	295	294	444	464	353	520	329	417	690	688	688	864	920	1,036	1,078	1,157	1,200	1,194	1,337	1,412	1,384
Citrus - Lemons	967	968	697	660	765	777	776	776	671	710	1,045	870	575	563	580	580	580	660	691	789	799	811	1,161	1,834	1,914	2,094	2,357
Citrus - Mixed	285	292	287	219	220	220	176	191	191	390	203	299	108	104	30	33	33	33	33	29	29	29	78	278	944	1,004	872
Citrus - Oranges	444	409	401	380	354	334	334	369	353	356	355	355	335	325	402	402	472	1,060	525	632	632	667	667	780	840	947	927
Duck Ponds (Feed)	7,020	6,809	7,106	7,635	7,213	7,178	7,768	8,064	8,169	12,908	8,866	8,904	9,157	7,940	7,763	7,819	7,863	8,099	8,244	8,243	8,070	7,994	8,798	8,837	8,979	9,105	10,025
Fish Farms	465	425	448	537	529	529	624	684	754	1,196	784	724	664	671	771	721	908	908	903	1,175	1,173	1,173	1,173	1,263	1,293	1,293	1,293
Guar Beans	-	-	-	-	-	-	-	299	1,892	-	-	18	-	-	-	-	-	-	-	-	-	20	276	104	153	-	-
Jojoba	-	-	-	2	2	2	2	508	3,062	3,005	3,005	3,005	2,844	2,119	2,117	2,117	2,117	2,117	2,117	2,017	2,017	1,943	400	202	2	2	2
Pasture, Permanent	556	997	1,802	729	277	457	300	312	386	449	473	550	545	527	498	501	599	607	610	695	798	728	696	722	684	701	546

APPENDIX F

General Survey Methods for Covered Species

APPENDIX F

General Survey Methods for Covered Species

As described in Chapter 4, the Imperial Irrigation District (IID) will conduct baseline surveys for covered species and periodic ongoing surveys. This appendix describes the general methods that IID will use to survey for covered species. Because the number of sample points and location of sample points for the covered species surveys will be influenced by results of the drain and desert habitat surveys, the Habitat Conservation Plan (HCP) Implementation Team (IT) will finalize procedures for the covered species surveys after completion of the habitat surveys.

Covered Species Surveys

Drain Habitat

Covered species potentially using drain habitat include birds, amphibians, and mammals. The amphibians associated with drain habitat are the lowland leopard frog and Colorado River toad, and the mammals associated with drain habitat are Colorado River hispid cotton rat and the Yuma hispid cotton rat. These four species are addressed separately and individually under Other Species–1 and 2 (Section 3.9). Survey protocols for these species would be developed as part of the study programs implemented under Other Species–1 and 2. Therefore, the covered species surveys for drain habitat focus on birds. Two different survey methods will be used for birds in drain habitat: call surveys and point counts. These two survey methods are described below.

Call Surveys

Call surveys will be used to survey for Yuma clapper rails, California black rails, and least bitterns. Standard survey protocols have been developed for Yuma clapper rails and California black rails. The protocols are similar and combined here into one protocol. The HCP IT may modify the survey protocol for local conditions or in response to new information.

For surveys of the drains, survey points will be randomly distributed in appropriately vegetated areas of the drains. Within the created managed marsh, survey points will be distributed on a 100-meter (328 foot) grid system (Conway et al., 2001). In drains, survey points will be distributed linearly. Survey points will be spaced about 100 meters (328 feet) apart (Conway et al., 2001). The number of survey points will depend on the acreage of drain vegetation and the created managed marsh. Conway et al. (2001) recommend one point per one hectare of habitat (i.e., 1 point per 2.47 acres). This recommended density will be used to determine the number of survey points with modification as necessary to maintain adequate spacing among points. The location of the survey points will be recorded so they can be incorporated into a geographic information system (GIS) and plotted on a map.

Surveys will be initiated 30 minutes before sunrise and completed no later than 3 hours after sunrise. Surveys will not be conducted if the wind speed is greater than 10 mph. Three surveys will be conducted in a year, one each during March, April, and May. For black rails, Conway et al. (2001) recommend conducting the first survey during March 21 – 30, the second survey during April 21 – 30, and the third survey during May 21 – 30. These timings are also appropriate for Yuma clapper rails and will be used unless the HCP IT identifies a more appropriate site-specific survey schedule.

Following the protocol developed by Conway et al. (2001), at each survey point, the observers will first wait quietly for 3 minutes, recording all birds seen or heard. Following this quiet period, observers will broadcast recorded calls of rails and bitterns over a 3-minute period. The tape used to broadcast calls will include 30 seconds of calls interspersed with 30 seconds of silence. The 30 seconds of calls will consist of calls interspersed with 5 seconds of silence. Conway et al. (2001) provide additional information on the broadcast call period of the surveys. Observers will record each individual detected and indicate when each individual is detected during the initial 3-minute passive period and/or during any of the 1-minute broadcast periods. Observers also will estimate whether the response is within or beyond 50 meters of the survey point.

Point Counts

Point counts will be used to detect the remaining covered bird species associated with drain habitat. The point counts will be conducted following the protocol of Ralph et al. (1993, 1995) with modifications based on Guers and Flannery (2000). Based on these protocols, counts at each point will last 5 minutes. The species and number of individuals of all birds seen or heard during this period will be recorded. Birds detected within a 50-meter radius of the point will be recorded separately from those detected farther away and those observed flying overhead. In addition to recording birds observed, the surveyors will indicate whether a bird was observed using the drain vegetation. The survey points established for the call surveys will be used for the point counts with the additional constraint that points must be at least 250 meters apart (Guers and Flannery, 2000). Counts will be conducted three times during each of the three seasons (spring: March – June; fall: October – November; and winter: December – February). Counts will be separated by at least 2 weeks.

Desert Habitat

Covered species potentially occurring in desert habitat in the HCP area include birds, amphibians, reptiles, mammals, and insects. However, nine of the species potentially occurring in desert habitat are addressed separately and individually under Other Species—1 and 2. These species are:

- Cheeseweed moth lacewing
- Andrew's scarab beetle
- Banded gila monster
- Jacumba little pocket mouse
- Flat-seeded spurge
- Foxtail cactus
- Munz's cactus
- Orocopia sage
- Orcutt's aster

Because these species are addressed separately, they were not considered in developing the survey methods. Survey protocols for these species would be developed as part of the study programs implemented under Other Species—1 and 2. The survey protocols that will be used to detect covered birds, amphibians, and mammals associated with desert habitat are described subsequently.

Birds

Point counts will be used to detect birds in desert habitat following the same protocol as described for drain habitat. The location and number of points will be determined based on the desert habitat survey. A stratified random sampling approach will be used to distribute points among the various habitats identified during the habitat surveys. Points will be located at least 250 meters apart (Guers and Flannery, 2000).

The point counts will be conducted three times during each of the three seasons (spring: March – June; fall: October – November; and winter: December – February). Counts will be separated by at least 2 weeks.

Amphibians

The only amphibian covered by this HCP with the potential to occur in desert habitat is the Couch's spadefoot toad. Surveys for Couch's spadefoot toad will be conducted after rainstorms when these toads breed in pools formed by rain. Following heavy rainstorms, IID will survey the rights-of-way of the All American Canal (AAC) and East Highline Canal. Pools that could be used by Couch's spadefoot toads will be identified and mapped. The presence / absence of Couch's spadefoot toads and tadpoles also will be noted for each pool.

Reptiles

Four different survey methods will be used to survey for reptiles in desert habitat: pitfall traps, area searches, desert tortoise protocols, and flat-tailed horned lizard protocols. The HCP IT may modify survey methods as appropriate to survey most effectively and efficiently for the covered reptile species.

Pitfall Traps

Pitfall traps will be used to survey for western chuckwalla and Colorado Desert fringe-toed lizards. Used with drift fences, pitfall traps are a preferred method for detecting many reptiles. Drift fences intercept animals moving along the ground and direct them into the pitfall trap. Pitfall traps and fences will be established at each of the points used for point count surveys of birds. Traps will be run for 3 consecutive nights at each location. The traps will be checked and closed soon after sunrise each day. Pitfall trapping will be conducted once each month during March, April, May, June, October, and November.

Area Searches

Some reptile species are not sampled effectively with pitfall trapping. Thus, area searches will be used to increase the likelihood of detecting covered reptile species. Area searches consist of systematically searching a specified area for animals (Heyer et al., 1994). Area searches will be conducted in areas of suitable habitat for western chuckwalla and Colorado Desert fringe-toed lizards as determined by HCP IT. Plots 25 meters by 25 meters will be established in areas considered most likely to contain covered reptiles (Heyer et al., 1994). This area will be intensively searched for covered reptile species or their sign. Area search surveys will be conducted each month during March, April, May, June, October, and November.

Desert Tortoise

Surveys for desert tortoise will be conducted following the standard protocols for this species. The survey protocol for desert tortoise consists of searching specified transects for signs of desert tortoise. Surveys will be conducted between March 25 and May 31. Transects for desert tortoise surveys will be established in areas of suitable habitat for desert tortoise as determined by the HCP IT.

Flat-Tailed Horned Lizard

Surveys for flat-tailed horned lizards will be conducted following the standard protocols for this species with any modifications deemed appropriate by the HCP IT. The current survey protocol for flat-tailed horned lizards is as follows. Transects consisting of parallel, linear routes will be evenly spaced in areas of suitable habitat for flat-tailed horned lizards as determined by the HCP IT. The number and distribution of transects will be such that a minimum of 10 hours of survey effort will be expended per 640 acres surveyed. Each transect will be traversed by a single worker. On each transect, either scat or lizards will be surveyed. The location of transects and each flat-tailed horned lizard and scat will be recorded. However, all observations of horned lizards or scat will be noted regardless of whether the transect is a scat or lizard transect. Scat and lizard survey routes will be alternated or randomly assigned to the transects at the HCP IT’s discretion. Three surveys will be conducted, spaced at least 2 weeks apart during April through September. Lizard surveys will be conducted when surface temperatures in the sun range from 35° to 50°C. Scat surveys will not be conducted for at least 12 days after heavy rains, hailstorms, or strong winds of an intensity sufficient to move considerable amounts of sand across roads or to damage signs and trees.

In addition, road surveys will be conducted by driving all roads in or near the areas where transects are situated and recording observations of horned lizards. Surveyors will drive very slowly (no faster than 10 mph). Three road surveys will be conducted during April through September. Roads will be driven in the morning when substrate temperatures adjacent to the roads and in the sun range from 35° to 50°C. The location of each flat-tailed horned lizard observed will be recorded.

Mammals

Nelson’s bighorn sheep is the only covered mammal species potentially occurring in desert habitat in the HCP area. Surveys for Nelson’s bighorn sheep will be conducted in conjunction with the desert tortoise and/or flat-tailed horned lizard surveys. During the desert tortoise and flat-tailed horned lizard surveys, the surveyors will also search for and record signs of bighorn sheep presence. Because bighorn sheep could occur near the AAC at times other than March 25 through May 31, when desert tortoise surveys are conducted, surveys for bighorn sheep also will be conducted during the summer (July – September), fall (October – November), and winter (December – February).

References

Conway, C.J., C. Sulzman, and B.E. Raulston. 2001. *Population Trends, Distribution, and Monitoring Protocols for California Black Rails.* Draft Final Report. AGFD Heritage Program IIPAM Grant #I99010. Submitted to Arizona Game and Fish Department, California Department of Fish and Game and U.S. Bureau of Reclamation. July 1.

Guers, S. L. and M. E. Flannery. 2000. "Landbird Migration and Monitoring at the Salton Sea: 1999 Field Season." In *Avifauna of the Salton Sea: Abundance, Distribution, and Annual Phenology*. USEPA.

Heyer, W. R., M. A. Donnelly, R. W. McDiarmid, L. C. Hayek, and M. S. Foster. 1994. *Measuring and Monitoring Biological Diversity: Standard Methods for Amphibians.* Smithsonian Institution Press, Washington, D.C.

APPENDIX G

California Endangered Species Act, Application for an Incidental Take Permit Under Section 2081 of the Fish and Game Code for Incidental Take of State-Listed Species Along the Lower Colorado River

APPENDIX G

California Endangered Species Act, Application for an Incidental Take Permit Under Section 2081 of the Fish and Game Code for Incidental Take of State-Listed Species Along the Lower Colorado River

This permit application was prepared to support the Imperial Irrigation District's (IID's) application for an Incidental Take Permit (ITP) in conformance with Section 2081 (b) of the California Endangered Species Act (CESA). This permit application describes management actions that will be implemented to mitigate the impacts of any take of state-listed species associated with IID's implementation of the IID / San Diego County Water Authority (SDCWA) Transfer Agreement and Quantification Settlement Agreement (QSA).

Applicant's Name, Mailing Address, and Telephone Number:

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P.O. Box 937
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Principal Officer:
Registered Agent for the Service of Process:
Point of Contact:

List of Species for Which Coverage Is Requested

IID is seeking authorization under Section 2081 (b) of the CESA for incidental take of state-listed species that could occur along the Lower Colorado River (LCR) (Table APP G-1).

TABLE APP G-1
Species to be Covered by the ITP

Common Name	Scientific Name	Federal Status	State Status
Bonytail	*Gila elegans*	Endangered	Endangered
Razorback sucker	*Xyrauchen texanus*	Endangered	Endangered
Arizona Bell's vireo	*Vireo bellii arizonae*		Endangered
Bald eagle	*Haliaeetus leucocephalus*	Threatened	Endangered
Brown pelican	*Pelecanus occidentalis*	Endangered	Endangered
California black rail	*Laterallus jamaicensis*		Threatened
Elf owl	*Micrathene whitneyi*		Endangered
Gilded flicker	*Colaptes chrysoides*		Endangered
Gila woodpecker	*Melanerpes uropygialis*		Endangered
Peregrine falcon	*Falco peregrinus*		Endangered
Southwestern willow flycatcher	*Empidonax traillii extimus*	Endangered	Endangered
Western yellow-billed cuckoo	*Coccyzus americanus*		Endangered
Yuma clapper rail	*Rallus longirostris yumanesis*	Endangered	Threatened

Description of the Project

The IID/SDCWA Transfer Agreement is a long-term transaction between IID and SDCWA involving the voluntary conservation by IID of up to 300,000 acre-feet/year (300 KAFY) and the subsequent transfer of all or a portion of the conserved water to SDCWA. The transferred, conserved water is intended for use in SDCWA's service area in San Diego County, California. Under certain circumstances, up to 100 KAFY of the water conserved by IID may be transferred to Coachella Valley Water District (CVWD) and/or Metropolitan Water District (MWD). Key aspects of the project are summarized subsequently. A more detailed description of the proposed project is located in Chapter 1 of the Habitat Conservation Plan (HCP), and Chapter 1 of the Environmental Impact Report/Environmental Impact Statement (EIR/EIS) for the IID Water Conservation and Transfer Project.

Subsequent to execution of the IID/SDCWA Transfer Agreement, a settlement agreement was negotiated by and among IID, CVWD, and MWD, with the participation of the State of California and the Department of the Interior (DOI). The proposed terms of the settlement agreement were incorporated in the QSA. The QSA facilitates several component agreements and actions, which, when implemented, will enhance the certainty and reliability of Colorado River water supplies available to the signatory agencies and will assist these agencies in meeting their water demands within California's normal-year apportionment of Colorado River water. The QSA establishes water budgets for IID, MWD, and CVWD and sets forth approved parameters of various water transfers and exchanges, including the conservation by IID of up to 300 KAFY for transfer to SDCWA, CVWD, and/or MWD.

The Secretary of DOI, in the role as water master for the LCR, must implement the terms of the QSA by delivering Colorado River water in accord with its terms. The actions required of the secretary are set forth in a proposed Secretarial Implementation Agreement (SIA), which is intended to be effective concurrently with the QSA. As a condition precedent to implementation of the QSA, certain other federal actions are required, including the adoption of interim surplus criteria and the adoption of an inadvertent overrun program to facilitate the payback of inadvertent exceedances by IID or CVWD of their respective priority 3 diversion caps.

If the QSA is approved and implemented, it would change the project described in the IID/SDCWA Transfer Agreement in certain respects. The QSA would limit the amount of conserved water transferable to SDCWA to a maximum of 200 KAFY and would provide for CVWD's option to acquire up to 100 KAFY of water conserved by IID, in lieu of transfer of this increment of conserved water to SDCWA. The QSA also provides for MWD's option to acquire any portion of the 100 KAFY of conserved water available to, but not acquired by, CVWD.

The EIR/EIS for the IID Water Conservation and Transfer Project addresses the environmental impacts of IID's consensual limit on its priority 3 diversions and the conservation by IID of up to 300 KAFY for transfer pursuant to the IID/SDCWA Water Transfer Agreement and/or the QSA. The accompanying HCP supports the issuance of ITPs under the Federal Endangered Species Act of 1973 (FESA) and CESA for this project in Imperial Valley, the Salton Sea, and along the All American Canal (AAC). This permit application supports issuance of an ITP under 2081(b) of CESA for take of state-listed species that could occur along the LCR between Imperial Dam and Parker Dam as a result of the conservation by IID of up to 300 KAFY for transfer pursuant to the IID/SDCWA Water Transfer Agreement and/or the QSA. Incidental take of federally listed species is covered in the U.S. Bureau of Reclamation’s (Reclamation’s) *Biological Opinion for the Interim Surplus Criteria (ISC), Secretarial Implementation Agreements (SIAs)* for change in point of diversion of up to 400,000 acre-feet of California apportionment waters within California, and implementation of certain conservation measures on the LCR, Lake Mead to the Southerly International Boundary in Arizona, California and Nevada (U.S. Fish and Wildlife Service [USFWS] 2001). The EIR/EIS for the IID Water Conservation and Transfer Project will satisfy CEQA requirements for issuance of the Section 2081 permit.

Project Area Location and Affected Environment

The portion of the LCR affected by the proposed project is defined as the mainstem and the 100-year floodplain of the Colorado River from Parker Dam downstream to Imperial Dam. This geographic subregion includes approximately 140 miles. IID currently diverts water from the Colorado River at Imperial Dam, located about 18 miles northeast of Yuma, Arizona.

Habitats supported along the LCR and potentially affected by the proposed project include:

- Riparian communities (e.g., cottonwood-willow, mesquite, salt-cedar)
- Backwaters and marshes
- Mainstem riverine

Table APP G-2 shows the acreage of the various plant communities comprising riparian communities along the LCR. Table APP G-3 summarizes the acreage of riparian communities (all plant communities combined), backwaters, and marshes along the LCR between Parker and Imperial Dams. Additional information on habitats along the LCR is provided in Section 3.2.3.1 of the EIR/EIS.

TABLE APP G-2
Plant Communities in the LCR 100-Year Floodplain

Structure Type	Acres	Percent of Total Vegetation[a]
Cottonwood-willow	1,502	3
Salt cedar–honey mesquite	14,200	24
Salt cedar–screwbean mesquite	5,025	9
Salt cedar	30,840	53
Honey mesquite	3,128	5
Arrowweed	2,773	5
Atriplex	511	<1
Creosote	317	<1
Total	**58,296**	

[a] Excluding 1,723 acres of agriculture
Source: CH2M HILL 1999

TABLE APP G-3
Acreage of Habitats Along the LCR Between Parker and Imperial Dams

Habitat	Acreage
Riparian communities	58,296
Backwater (open water portions)	3,955
Marsh	6,710

Source: CH2M HILL, 1999
Source: Ogden Environmental and Energy Services Geographic Information System

Project Effects and Proposed Conservation Measures

Effects on Habitats

The conserved water consists of Colorado River water that otherwise would be diverted by IID for use within IID's service area in Imperial County, California. For conserved water transferred to SDCWA or MWD, IID's annual diversions of Colorado River water at Imperial Dam would be reduced by the amount of the conserved water, and this amount would be diverted at MWD's Whitsett Intake at Parker Dam on the Colorado River for delivery through MWD's Colorado River Aqueduct. For conserved water transferred to CVWD, IID's annual diversions of Colorado River water at Imperial Dam also would be reduced by the amount of the conserved water, and this amount will be diverted into the Coachella Canal from the AAC. The effect of the change in the point of diversion would be to reduce flows in the LCR between Parker and Imperial Dams.

The USFWS (2001) evaluated the impact on federally listed species of changes in points of diversion for 400 KAFY of California allocation water in its *Biological Opinion for the Interim Surplus Criteria (ISC), Secretarial Implementation Agreements (SIAs)* for change in point of diversion of up to 400,000 acre-feet of California apportionment waters within California, and implementation of certain conservation measures on the LCR, Lake Mead to the Southerly International Boundary in Arizona, California and Nevada. Reclamation also is currently preparing a programmatic EIS (PEIS) addressing these actions. The 300 KAFY of water that IID would conserve and transfer under the IID/SDCWA Transfer Agreement and QSA is encompassed by the 400 KAFY contained in Reclamation's project. Therefore, the analyses conducted for the biological opinion and PEIS are used for the analysis of effects of this project on state-listed species.

The change in the points of diversion would reduce flows in the LCR between Parker and Imperial Dams. This flow reduction would decrease the amount of open water habitat and/or change the characteristics (e.g., depth, velocity) of open water habitat in the mainstem and in backwaters. Lower water levels in marsh habitat in backwater areas would be expected to reduce the extent of marsh vegetation or change the plant species composition. Riparian communities in some locales would experience reduced groundwater and surface water levels, a change that could alter the amount and characteristics of the affected communities.

Table APP G-4 summarizes the acreage and potential effects on these habitats as a result of the proposed project, based on analyses conducted for the biological opinion and the PEIS. As explained in more detail in Section 3.2 of the EIR/EIS, the acreages in Table APP G-4 were derived from the biological opinion by assuming the acreage affected was proportional to the amount of water transferred from IID and diverted at Parker Dam.

TABLE APP G-4
Acreage of Each Habitat Potentially Affected by the Proposed Project

Habitat	Acreage	Comments
Riparian (occupied by Southwestern willow flycatcher)	279	Acreage predicted to experience reduced groundwater and surface water levels. Actual changes in acreage, plant species composition, and structure cannot be predicted and are uncertain.
Backwater (open water)	12	
Marsh	21	Acreage predicted to experience reduced groundwater and surface water levels. Actual changes in acreage, plant species composition, and structure cannot be predicted and are uncertain.
Mainstem riverine	26	

Under the biological opinion, Reclamation committed to certain actions to mitigate impacts to federally listed species as a result of the change in the points of diversion of 400 KAFY. These conservation measures are as follows.

- Monitor 372 acres of occupied habitat that could be affected by the change in the point of diversion for 400 KAFY of water.
- Restore and maintain 372 acres of new replacement willow flycatcher habitat along the LCR within 5 years of execution of the SIA that provides federal approval for the water transfer actions.
- Restore and maintain additional habitat (up to 744 acres) if monitored habitat is found to be affected.
- Restore 44 acres of backwater habitat (marsh and open water combined) along the LCR between Parker and Imperial Dams.
- Re-introduce and monitor 20,000 sub-adult razorback suckers below Parker Dam.
- Continue the ongoing study on Lake Mead for an additional 4 years to determine reasons for persistence of adult razorback suckers in the reservoir.
- Fund the capture of wild-born or F1-generation bonytail chubs from Lake Mohave to be incorporated into the broodstock for this species.

The first four measures compensate for potential impacts to marsh, backwater (open water), and riparian habitat, while the last three measures address the net reduction in open water in the mainstem. These measures address the impacts associated with the change in the points of diversion for 400 KAFY of water and encompass the impacts associated with IID's proposed project. The following analysis considers impacts on state-listed species in the context of the conservation measures to be implemented by Reclamation.

Effects on Listed Species

Razorback Sucker

Razorback suckers inhabit the mainstem and backwater habitats along the LCR. Detailed information on the range, distribution, abundance, and habitat requirements of this species is presented in Appendix A of the HCP, the biological assessment for the ISC/SIA (Reclamation 2000), and associated biological opinion (USFWS 2001).

Potential effects to razorback suckers attributable to the proposed project consist of projected reductions in backwater habitat (33 acres) and mainstem riverine habitat (26 acres). These reductions have the potential to take a razorback sucker. The construction of 44 acres of backwater habitat by Reclamation would offset the projected reduction in this habitat. Further, Reclamation would re-introduce razorback suckers below Parker Dam and continue funding an ongoing study of this species at Lake Mead. These measures would mitigate potential effects on razorback suckers from the small change in the amount of mainstem riverine habitat. With the conservation measures to be implemented by Reclamation, any take of razorback suckers resulting from a change in the point of diversion of the 300 KAFY of water conserved by IID would be fully mitigated. No additional mitigation is necessary.

Bonytail

Bonytail are presently found in Lakes Mohave and Havasu. Detailed information on the range, distribution, abundance, and habitat requirements of this species is presented in Appendix A of the HCP, the biological assessment for the ISC/SIA (Reclamation 2000), and associated biological opinion (USFWS 2001).

The change in the point of diversion for 300 KAFY of water conserved and transferred by IID would not affect the operation of those lakes (Reclamation 2000). Because bonytail do not currently inhabit the LCR between Parker and Imperial Dams, no take of this species is expected over the short term with implementation of the proposed project. However, efforts are under way to re-introduce bonytail to the LCR below Parker Dam. Depending on when bonytail are re-introduced relative to the ramp-up for water conservation by IID, re-introduced fish could experience a small decline in backwater habitat and mainstem riverine habitat. The conservation measures implemented by Reclamation to construct replacement backwater habitat and contribute to maintenance of broodstock for this species would fully mitigate any take caused by a change in the point of diversion. Therefore, no additional mitigation is necessary.

Arizona Bell's Vireo

The Arizona Bell's vireo is a summer breeding resident along the LCR. This species uses riparian habitats similar to the southwestern willow flycatcher. Additional information on the range, distribution, abundance, and habitat requirements of this species is presented in Appendix A of the HCP.

A change in point of diversion of 300 KAFY of water under the proposed project could affect 279 acres of riparian habitat occupied by southwestern willow flycatchers. Given their similar habitat associations, this acreage also represents habitat potentially occupied by Arizona Bell's vireo. Thus, impacts on the Arizona Bell's vireo would be generally similar to those described for the southwestern willow flycatcher in the biological opinion. No information is available on the number of occupied territories that may be affected by the loss of 372 habitat acres. However, a reduction in riparian habitat could cause take of Arizona Bell's vireo through displacement of adults, reduced productivity, or reduced survivorship of adults and/or young.

Conservation measures implemented by Reclamation for the change in the points of diversion for 400 KAFY of water would consist of restoring 372 acres of riparian habitat and monitoring and restoring up to an additional 744 acres, if monitoring shows an impact on riparian habitat. With these measures, Reclamation would at least replace any affected riparian habitat. Thus, these measures would encompass and fully mitigate any take of Arizona Bell's vireo potentially resulting from the change in the point of diversion of 300 KAFY under IID's proposed project. No additional mitigation measures are necessary.

Bald Eagle

Information on the range, distribution, abundance, and habitat requirements of this species is presented in Appendix A of the HCP and the biological assessment for the ISC/SIA (Reclamation 2000). In its biological assessment, Reclamation concluded that implementation of the ISC/SIA (including the change in the points of diversion of 400 KAFY) would not likely adversely affect the food resources, foraging opportunities, or nesting habitat of the bald eagle. The USFWS concurred with Reclamation's determination that Reclamation's proposed action is not likely to adversely affect bald eagles (USFWS 2001).

Based on Reclamation's and USFWS' evaluations, no take of bald eagles is expected. Any take that did occur as a result of a change in the point of diversion for the 300 KAFY of water conserved by IID would be fully mitigated by Reclamation's conservation measures. No additional mitigation measures are necessary.

California Brown Pelican

Along the Colorado River, the brown pelican is a rare but annual post-breeding wanderer from Mexico in late summer and early fall (Reclamation 2000). It is most frequently seen around Imperial Dam, but individuals have occurred north to Davis Dam and Lake Mead. Virtually all records are of lone immature birds, likely dispersing from breeding colonies in the Gulf of California or perhaps via the Salton Sea (Reclamation 2000). Along the river, they prefer large open-water areas near dams. Additional information on the range, distribution, abundance, and habitat requirements of this species is presented in Appendix A of the HCP and the biological assessment for the ISC/SIA (Reclamation 2000).

In its biological assessment for the ISC/SIA project, 4.4. Plan, Reclamation made a finding of no effect for the brown pelican because the action would not change the character of aquatic habitat potentially used by this species (Reclamation 2000). The USFWS concurred with this determination. Based on Reclamation's and USFWS' evaluations, no take of brown pelicans is expected. Any take that did occur as a result of a change in the point of diversion for the 300 KAFY of water conserved by IID would be fully mitigated by Reclamation's conservation measures. No additional mitigation measures are necessary.

California Black Rail

The California black rail is associated with marsh habitats along the LCR. Information on the range, distribution, abundance, and habitat requirements of this species is presented in Appendix A of the HCP and the biological assessment for the ISC / SIA (Reclamation 2000).

A change in point of diversion of 300 KAFY of water under the proposed project could affect an estimated 21 acres of marsh habitat in backwater areas. Given their similar habitat associations, impacts on the California black rail would be generally similar to those described for the Yuma clapper rail in the biological opinion. A reduction in marsh habitat could cause take of California black rails through displacement of adults, reduced productivity, or reduced survivorship of adults and / or young.

Conservation measures implemented by Reclamation for the change in the points of diversion for 400 KAFY of water would consist of restoring 44 acres of backwater habitat (open water and marsh combined). With this measure, Reclamation would replace any impacted marsh habitat. Thus, these measures would encompass and fully mitigate any take of California black rail resulting from the change in the point of diversion of 300 KAFY under IID’s proposed project. No additional mitigation measures are necessary.

Elf Owl

The elf owl is a very rare and local summer resident in riparian habitats along the LCR, which lies at the western edge of its range (Rosenberg et al. 1991). Historically, it occurred south of Yuma. Elf owls are not known to use riparian habitats along the LCR for breeding. Additional information on the range, distribution, abundance, and habitat requirements of the elf owl is presented in Appendix A of the HCP.

A change in point of diversion of 300 KAFY of water under the proposed project could affect 279 acres of riparian habitat. Because elf owls are very rare and not known to breed along the LCR, the potential for take of elf owls because of these potential habitat effects is very low. Nonetheless, conservation measures implemented by Reclamation for the change in the points of diversion for 400 KAFY of water would consist of restoring 372 acres of riparian habitat and monitoring and restoring up to an additional 744 acres, if monitoring shows an impact on riparian habitat. With these measures, Reclamation would at least replace any affected riparian habitat. Thus, these measures would encompass and fully mitigate any take of elf owls resulting from the change in the point of diversion of 300 KAFY under IID’s proposed project. No additional mitigation measures are necessary.

Gilded Flicker

The gilded flicker occurs along the LCR Valley in southern Arizona and southeastern California (Rosenberg et al. 1991). In California, an estimated 40 individuals were found along the LCR in 1984 (Hunter 1984; California Department of Fish and Game [CDFG] 1991); but during 1986 surveys, there were no gilded flickers observed in this area. Rosenberg, et al. (1991) reported “scattered pairs” between Imperial and Laguna Dams. The preferred nesting substrate for this species is saguaros; however, they also use mature cottonwood-willow riparian forests to a more limited degree. Additional information on the range, distribution, abundance, and habitat requirements of this species is presented in Appendix A of the HCP.

A change in point of diversion of 300 KAFY of water under the proposed project could affect 279 acres of riparian habitat occupied by southwestern willow flycatchers. This acreage also represents habitat potentially occupied by the gilded flicker. Thus, impacts on the gilded flicker would be generally similar to those described for the southwestern willow flycatcher in the biological opinion. No information is available on the number of occupied territories that could be affected by changes in the amount or characteristics of 279 acres of riparian habitat. However, a reduction in riparian habitat could cause take of a gilded flicker through displacement of adults, reduced productivity, or reduced survivorship of adults and/or young.

Conservation measures implemented by Reclamation for the change in the points of diversion for 400 KAFY of water would consist of restoring 372 acres of riparian habitat and monitoring and restoring up to an additional 744 acres, if monitoring shows an impact on riparian habitat. With these measures, Reclamation would at least replace any affected riparian habitat. Thus, these measures would encompass and fully mitigate any take of the gilded flicker resulting from the change in the point of diversion of 300 KAFY under IID's proposed project. No additional mitigation measures are necessary.

Gila Woodpecker

Gila woodpeckers are known to occur between the Laguna and Imperial Dams along the LCR. In 1984, an estimated 200 individuals occurred in California along the LCR (CDFG 1991). The total population along the LCR is estimated at about 1,000 individuals (Rosenberg et al. 1991). While saguaros are a commonly used nesting substrate for the species, in California, the Gila woodpecker primarily uses mature riparian habitat. Gila woodpeckers appear to need large blocks of riparian habitat for nesting; isolated patches of riparian habitat less than 50 acres in size do not support the species (Rosenberg et al. 1991). Additional information on the range, distribution, abundance, and habitat requirements of this species is presented in Appendix A of the HCP.

A change in point of diversion of 300 KAFY of water under the proposed project could affect 279 acres of riparian habitat occupied by southwestern willow flycatchers. This acreage also represents habitat potentially occupied by the Gila woodpecker. Thus, impacts on the Gila woodpecker would be generally similar to those described for the southwestern willow flycatcher in the biological opinion. No information is available on the number of occupied territories that could be affected by changes in the amount or characteristics of 279 acres of riparian habitat. However, a reduction in riparian habitat could cause take of a Gila woodpecker through displacement of adults, reduced productivity, or reduced survivorship of adults and/or young.

Conservation measures implemented by Reclamation for the change in the points of diversion for 400 KAFY of water would consist of restoring 372 acres of riparian habitat and monitoring and restoring up to an additional 744 acres, if monitoring shows an impact on riparian habitat. With these measures, Reclamation would at least replace any affected riparian habitat. Thus, these measures would encompass and fully mitigate any take of the Gila woodpecker resulting from the change in the point of diversion of 300 KAFY under IID's proposed project. No additional mitigation measures are necessary.

Peregrine Falcon

Peregrine falcons occur in a wide range of open country habitats. The presence of tall cliffs is the most characteristic feature of the peregrine's habitat and is considered a limiting factor for the species. Nearby waterbodies or wetlands that support abundant prey of small to medium-size birds are another common habitat feature and influence the species distribution and abundance (Johnsgard 1990). These habitat features are present in the project area, and the species may use areas affected by the water diversion for both foraging and nesting. Information on the range, distribution, abundance, and habitat requirements of this species is presented in Appendix A of the HCP.

Nesting habitat for this species would not be affected by the proposed project. Potential impacts on 279 acres of riparian habitat and 21 acres of marsh habitat could affect the abundance and distribution of prey species of the peregrine falcon. However, given this species' mobility and the abundant prey base in the river corridor, it is unlikely that any take of peregrine falcons would occur. In the unlikely event that take of peregrine falcons did occur from these habitat changes, the conservation measures implemented by Reclamation would fully mitigate the take.

Southwestern Willow Flycatcher

The southwestern willow flycatcher is associated with riparian habitats. The majority of southwestern willow flycatchers found during the past 5 years of surveys on the LCR have been in saltcedar, or a mixture of saltcedar and native cottonwood and willow, especially Goodings willow, coyote willow, and Fremont cottonwood (Reclamation 2000). In 1998, 64 nesting attempts were documented on the LCR from southern Nevada to Needles, California (Reclamation 2000). Additional information on the range, distribution, abundance, and habitat requirements of this species is presented in Appendix A of the HCP, the biological assessment for the ISC/SIA (Reclamation 2000), and the associated biological opinion (USFWS 2001).

A change in point of diversion of the 300 KAFY of water conserved and transferred by IID could degrade or reduce the amount of willow flycatcher habitat by lowering river and groundwater elevations (USFWS 2001 and Reclamation 2000). An estimated 279 acres of occupied southwestern willow flycatcher habitat could be affected. A reduction in occupied habitat could cause take of a southwestern willow flycatcher through displacement of adults, reduced productivity, or reduced survivorship of adults and/or young.

Conservation measures implemented by Reclamation for the change in the points of diversion for 400 KAFY of water would consist of restoring 372 acres of riparian habitat and monitoring and restoring up to an additional 744 acres, if monitoring shows an impact on riparian habitat. With these measures, Reclamation would at least replace any affected riparian habitat. These measures would encompass and fully mitigate any take of southwestern willow flycatchers resulting from the change in the point of diversion of 300 KAFY under IID's proposed project. Therefore, no additional mitigation measures are necessary.

Western Yellow-Billed Cuckoo

Mature stands of cottonwood-willow provide the primary habitat for western yellow-billed cuckoos. In the LCR area, cuckoos have been detected as far south as Gadsden and Imperial National Wildlife Refuge (Reclamation 2000). Additional information on the range, distribution, abundance, and habitat requirements of this species is presented in Appendix A of the HCP and the biological assessment for the ISC/SIA (Reclamation 2000).

A change in point of diversion of 300 KAFY of water under the proposed project could affect 279 acres of riparian habitat occupied by southwestern willow flycatchers. This acreage also represents habitat potentially occupied by western yellow-billed cuckoos. Thus, impacts on the western yellow-billed cuckoo would be generally similar to those described for the southwestern willow flycatcher in the biological opinion. No information is available on the number of occupied territories that could be affected by changes in the amount or characteristics of 372 habitat acres. However, a reduction in riparian habitat could cause take of a western yellow-billed cuckoo through displacement of adults, reduced productivity, or reduced survivorship of adults and/or young.

Conservation measures implemented by Reclamation for the change in the points of diversion for 400 KAFY of water would consist of restoring 372 acres of riparian habitat and monitoring and restoring up to an additional 744 acres, if monitoring shows an impact on riparian habitat. With these measures, Reclamation would at least replace any affected riparian habitat. These measures would encompass and fully mitigate any take of western yellow-billed cuckoos potentially resulting from the change in the point of diversion of 300 KAFY under IID's proposed project. Therefore, no additional mitigation measures are necessary.

Yuma Clapper Rail

The Yuma clapper rail is associated with marsh habitats along the LCR. Information on the range, distribution, abundance, and habitat requirements of this species is presented in Appendix A of the HCP, the biological assessment for the ISC/SIA (Reclamation 2000), and associated biological opinion (USFWS 2001).

A change in point of diversion of 300 KAFY of water under the proposed project could affect an estimated 21 acres of marsh habitat in backwater areas. A reduction in marsh habitat could cause take of Yuma clapper rails through displacement of adults, reduced productivity, or reduced survivorship of adults and/or young. Conservation measures implemented by Reclamation for the change in the points of diversion for 400 KAFY of water would consist of restoring 44 acres of backwater habitat (open water and marsh combined). With this measure, Reclamation would replace any affected marsh habitat. These measures would encompass and fully mitigate any take of Yuma clapper rail potentially resulting from the change in the point of diversion of 300 KAFY under IID's proposed project. Therefore, no additional mitigation measures are necessary.

Incidental Take Determinations and Jeopardy Analysis

Razorback Sucker

The USFWS determined that all razorback suckers inhabiting the 44 acres of backwater habitat affected by the change in the points of diversion for 400 KAFY could be taken, but determined that this level of take would not jeopardize the species. IID's proposed project is encompassed by the USFWS' determination and therefore would have a lower level of take and would not jeopardize the species.

Bonytail

No bonytail are present in reach of the LCR from Parker to Imperial Dams. Take of bonytail is not expected in the short term but could occur if bonytail are re-introduced in the LCR in the future. The USFWS determined that implementation of Reclamation's ISC/SIA project, 4.4 Plan would not result in jeopardy to bonytail. IID's proposed project is encompassed by the USFWS' determination on this project and therefore would have a lower level of take if any and would not jeopardize the species.

Arizona Bell's Vireo

This species is not federally listed and was not covered in the biological assessment or biological opinion for the ISC/SIA. Consistent with the USFWS determination for the southwestern willow flycatcher, all Arizona Bell's vireos inhabiting the 279 acres of riparian habitat potentially affected by the proposed project could be taken. With implementation of the conservation measures, this level of take is not likely to result in jeopardy to the species.

Bald Eagle

No take of bald eagles is expected. With implementation of the conservation measures, any take of bald eagles that did occur would not result in jeopardy to the species.

California Brown Pelican

No take of California brown pelicans is expected. With implementation of the conservation measures, any take of brown pelicans that did occur would not result in jeopardy to the species.

California Black Rail

The California black rail is not a federally listed species and was not addressed in the USFWS Biological Opinion. However, Reclamation addressed the species in their biological assessment and concluded the project effects on this species would be the same as for the Yuma clapper rail (Reclamation 2000). Impacts on 21 acres of marsh habitat under the proposed project could result in take of the California black rail inhabiting these areas. However, with implementation of the conservation measures, this potential take is not likely to result in jeopardy to the species.

Elf Owl

Because this species is not federally listed, it was not covered in the biological opinion for the ISC/SIA. Take of this species is not expected. Nonetheless, a very low level of take could occur as a result of the potential effects of the proposed project on riparian habitat. With implementation of the conservation measures, the very low level of take potentially occurring is not likely to result in jeopardy to the species.

Gilded Flicker

The gilded flicker is not federally listed and was not covered in the biological assessment or biological opinion for the ISC/SIA. Consistent with the USFWS determination for the southwestern willow flycatcher, all gilded flickers inhabiting the 279 acres of riparian habitat potentially affected by the IID's proposed project could be taken. With implementation of the conservation measures, this level of take is not likely to result in jeopardy to the species.

Gila Woodpecker

The gila woodpecker is not federally listed and was not covered in the biological assessment or biological opinion for the ISC/SIA. Consistent with the USFWS determination for the southwestern willow flycatcher, all gila woodpeckers inhabiting the 279 acres of riparian habitat potentially affected by the IID's proposed project could be taken. With implementation of the conservation measures, this level of take is not likely to result in jeopardy to the species.

Peregrine Falcon

No take of peregrine falcons is expected. With implementation of the conservation measures, any take of peregrine falcons that did occur would not result in jeopardy to the species.

Western Yellow-Billed Cuckoo

This species is not federally listed and was not covered in the biological opinion for the ISC/SIA. Consistent with the USFWS determination for the southwestern willow flycatcher, all western yellow-billed cuckoos inhabiting the 279 acres of riparian habitat affected by IID's proposed project could be taken. With implementation of the conservation measures, this potential take of yellow-billed cuckoos is not likely to result in jeopardy to the species.

Yuma Clapper Rail

The USFWS determined that impacts on 28 acres of marsh habitat with the change in the points of diversion for 400 KAFY could harm Yuma clapper rails (USFWS 2001) and could adversely affect the habitat use of approximately 100 clapper rails in the Parker Dam to Imperial Dam reach of the LCR. The level of take that would occur is uncertain. However, with implementation of the conservation measures by Reclamation, the USFWS determined that the potential take was not likely to result in jeopardy to the species (USFWS 2001). IID's proposed project is encompassed by USFWS' determination and therefore would have a lower level of take and would not jeopardize the species.

Southwestern Willow Flycatcher

The USFWS determined that all southwestern willow flycatchers inhabiting the 372 acres of riparian habitat affected by the change in the points of diversion for 400 KAFY could be taken, but this take would not jeopardize the species. IID's proposed project is encompassed by USFWS' determination and therefore would have a lower level of take and would not jeopardize the species.

Compliance Monitoring and Funding Assurances

Responsibility for funding and implementing the conservation measures associated with the ISC / SIA project, 4.4 Plan was assumed by Reclamation and five designated applicants through their consultation with the USFWS under Section 7 of the Federal Endangered Species Act (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.). No additional mitigation is necessary to meet the permit requirements for incidental take authorization of state-listed species on the LCR for IID's proposed project.

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APPENDIX H

Species-Specific Avoidance and Minimization Measures for 25 Other Covered Species

APPENDIX H

Species-Specific Avoidance and Minimization Measures for 25 Other Covered Species

In Chapter 3.9, a strategy is described for addressing 25 species that might not be adequately addressed through the habitat-specific conservation strategies or whose ecology and occurrence in the Habitat Conservation Plan (HCP) area are poorly understood. For each of these 25 species, interim avoidance, minimization, and mitigation measures are identified below. During and after completion of the study program for these species, the HCP Implementation Team (IT) will review the measures and adjust or revise them as necessary to provide the most appropriate avoidance, minimization, and mitigation measures strategy. Implementation of revised measures would require approval from the U.S. Fish and Wildlife Service (USFWS) and the California Department of Fish and Game (CDFG).

Cheeseweed Moth Lacewing

- Prior to the start of construction activities, the construction area will be surveyed for the presence of creosote bush.
- An activity exclusion zone, 25 feet in radius, will be established around each creosote bush. Exclusion zones will be flagged and staked in the field prior to the start of the construction. No surface disturbing activity will occur within the exclusion zones. If a 25-foot-radius exclusion zone cannot be established, the Imperial Irrigation District (IID) will confer with the USFWS and CDFG regarding the best configuration of the exclusion zone, given the location of the bushes and construction area requirements. If the bushes cannot be avoided but are known or likely to be inhabited by lacewing, IID will confer with USFWS and CDFG to determine if the bushes should be transplanted. If the bushes can be transplanted, IID will work with USFWS and CDFG to identify a location and the appropriate procedures for transplanting those occupied bushes that cannot be avoided. Regardless of whether the shrubs are transplanted, IID would protect native desert habitat in accordance with Desert–5 for permanent loss of native desert habitat.

Andrew's Dune Scarab Beetle

- Prior to the start of construction activities, the construction area will be surveyed for the presence of dune scarab beetles. Surveys will be conducted during the time period necessary to identify this species and will be conducted within 1 year of initiating construction activities.
- Construction will be planned to avoid, if possible, areas of open dune known to be occupied by these beetles. If areas with beetles cannot be avoided, IID will acquire and protect land that is occupied by the dune scarab beetle at a 1:1 ratio for the acreage affected.

Banded Gila Monster

- A clearance survey will be conducted within 48 hours prior to the start of construction activities. Banded gila monsters found on the construction site will be relocated to nearby suitable habitat outside the construction area. Following the clearance surveys, exclusion fencing will be erected or a biological monitor will be onsite during construction activities consistent with Desert Habitat–3.
- If a Gila monster occurs on the project site during construction, construction activities adjacent to the individual's location will be halted and the individual allowed to move away from the construction site. If the individual is not moving, the biological monitor will relocate it to nearby suitable habitat outside the construction area. It will be placed in the shade of a shrub.
- Prior to construction, the construction area and adjacent areas within 100 feet of the construction site will be searched for burrows that could be used by gila monsters. If potentially suitable burrows or rock piles are found, they will be checked for occupancy. Occupied burrows will be flagged and avoided (employing a 50-foot buffer) during construction. If the burrow cannot be avoided, it will be excavated and the occupant relocated to an unoccupied burrow outside the construction area and of approximately the same size as the one from which it was removed. If an existing burrow is unavailable, the biologist will construct or direct the construction of a burrow of similar shape, size, depth, and orientation as the original.
- Trenches, holes, or other excavations will be examined for this species prior to filling. If individuals are found, the biological monitor will relocate them to nearby suitable habitat.

Jacumba Little Pocket Mouse

- Prior to the start of construction activities, the construction area will be surveyed for the presence of Jacumba little pocket mice. Surveys will be conducted during the time period necessary to identify this species and will be conducted within one year of initiating construction activities.
- Construction will be planned to avoid, if possible, areas of desert habitat where Jacumba little pocket mice are found. If areas with pocket mice cannot be avoided, IID will acquire and protect land that is occupied by the Jacumba little pocket mouse at a 1:1 ratio for the acreage affected.

Yuma Hispid Cotton Rat and Colorado River Hispid Cotton Rat

- Conduct surveys to determine the extent of habitat used by hispid cotton rats in the HCP area.
- Based on the surveys, create portions of the 190 to 652 acres of managed marsh habitat with characteristics conducive to use by cotton rats.
- For scheduled construction activities associated with the drainage system, before initiation of construction activities, survey the construction site to determine whether

any cotton rats are likely to occupy site as evidenced by the occurrence of appropriate vegetation and / or species-specific surveys. If cotton rats occupy the project site, schedule construction activities that would remove habitat to occur outside of the breeding season.

Colorado River Toad

- Conduct surveys to determine the extent of drain habitat used by Colorado River toads and identify other breeding locations (e.g., seepage areas and washes along the All American Canal [AAC]).
- Based on the surveys, create portions of the 190 to 652 acres of managed marsh habitat with characteristics conducive to use by toads.
- Introduce toads into managed marsh habitat if appropriate.
- Survey prior to the start of construction activities to determine if any potentially suitable breeding ponds occur in the construction area.
- Known breeding pools would be avoided during construction. If breeding pools could not be avoided, two known breeding pools would be acquired and protected in perpetuity for every breeding pool permanently affected. No loss of a breeding pool would be authorized until at least three pools had been identified. This practice would allow protection of two pools to mitigate the loss of one pool.
- Conduct a worker education program to minimize vehicle strikes during Operations and Maintenance (O&M) activities.

Lowland Leopard Frog

- Conduct surveys to determine the extent of drain habitat used by lowland leopard frogs.
- Based on the surveys, create portions of the 190 to 652 acres of managed marsh habitat with characteristics conducive to use by frogs.
- Introduce frogs into managed marsh if necessary to establish consistent use.
- Manage bullfrog and *R. berlandeiri* populations in managed marsh to minimize competition with lowland leopard frog.

Western Mastiff Bat, California Leaf-Nosed Bat, and Southwestern Cave Myotis

- Conduct surveys to determine the extent of desert dry wash woodland (DDWW) adjacent to the AAC or East Highline Canal used for foraging by these bats. Surveys will also be used to determine if other areas are important as foraging grounds or roost areas.
- Avoid foraging habitat in DDWW during construction activities. If foraging habitat cannot be avoided, acquire and protect with a conservation easement suitable habitat at a ratio of 3:1 in the immediate vicinity of removal or within 5 miles of the roost being used.

- If other areas are found to be important as roosts or foraging grounds, avoid construction or maintenance activities in these areas or replace with suitable habitat at a minimum ratio of 1:1.
- Known maternity roosts would be avoided during construction.

Mexican Long-Tongued Bat, Pocketed Free-Tailed Bat, and Big Free-Tailed Bat

- Conduct surveys to determine the extent of foraging habitat within proposed construction areas that is used by these bats. Surveys will also be used to determine if other areas are important as foraging grounds or roost areas.
- Avoid foraging habitat during construction activities. If foraging habitat cannot be avoided, replace with suitable habitat at a ratio of 3:1 in the immediate vicinity of removal.
- If other areas are found to be important as roosts or foraging grounds, avoid construction or maintenance activities in these areas or replace with suitable habitat at a minimum ratio of 1:1.
- Known maternity roosts would be avoided during construction.

Occult Little Brown Bat, Pale Western Big-Eared Bat, and Yuma Myotis, Western Small-Footed Myotis

- Conduct surveys to determine roost locations and important foraging areas.
- Avoid roost locations or replace with suitable roosts at a minimum ratio of 1:1 within the immediate vicinity of the roost being used.
- If other areas are found to be important as foraging grounds, avoid construction or maintenance activities in these areas or replace with suitable habitat at a minimum ratio of 1:1.
- Known maternity roosts would be avoided during construction.

Pallid Bat and Spotted Bat

- Conduct surveys to determine roost locations and important foraging areas.
- Avoid roost locations or replace with suitable roosts at a minimum ratio of 1:1 within the immediate vicinity of the roost being used.
- Known maternity roosts would be avoided during construction.

Flat-Seeded Spurge, Orcutt's Aster, Foxtail Cactus, Munz's Cactus, and Orocopia Sage

- Prior to the start of construction activities, the construction area will be surveyed for the presence of covered plant species. Surveys will be conducted during the time period necessary to identify these species but will be conducted within one year of initiating construction activities.
- If covered plant species occur on the construction area, an activity exclusion zone, 25 feet in radius, will be established around each individual. Exclusion zones will be flagged and staked in the field prior to the start of the construction. No surface disturbing activity will occur within the exclusion zones. If a 25-foot-radius exclusion zone cannot be established, IID will confer with the USFWS and CDFG regarding the best configuration of the exclusion zone, given the location of the plants and construction area requirements. If the plants cannot be avoided, IID will confer with USFWS and CDFG. The USFWS and CDFG will determine if the plants can be transplanted. If the plants can be transplanted, IID will work with USFWS and CDFG to identify a location and the appropriate procedures for transplanting those plants that cannot be avoided.