

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

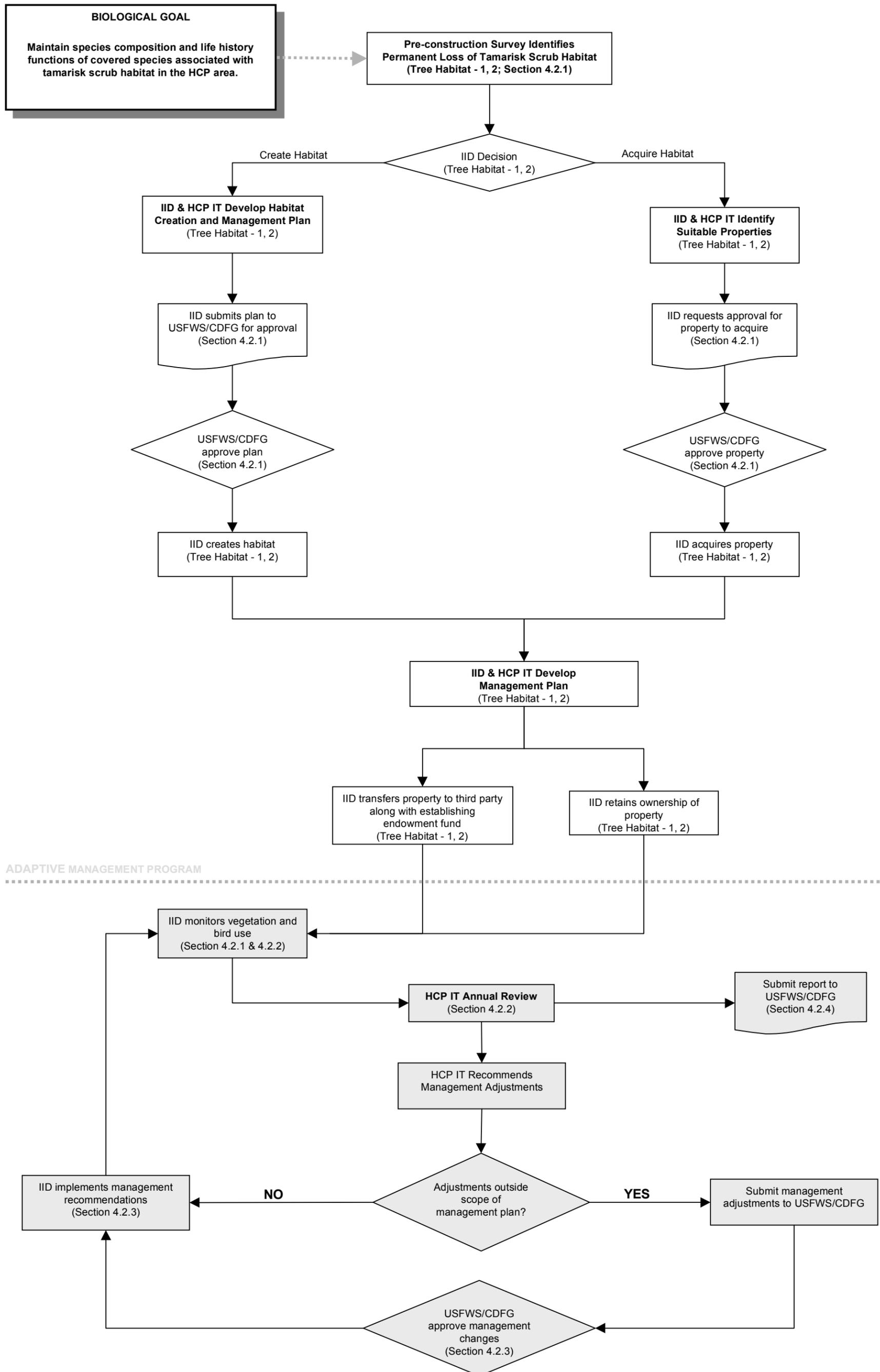


Figure 4.2-1
Tamarisk Scrub Habitat Conservation Strategy Implementation Process

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)

BASELINE ESTABLISHMENT

REPORTING/APPROVAL

CONSERVATION PROGRAM

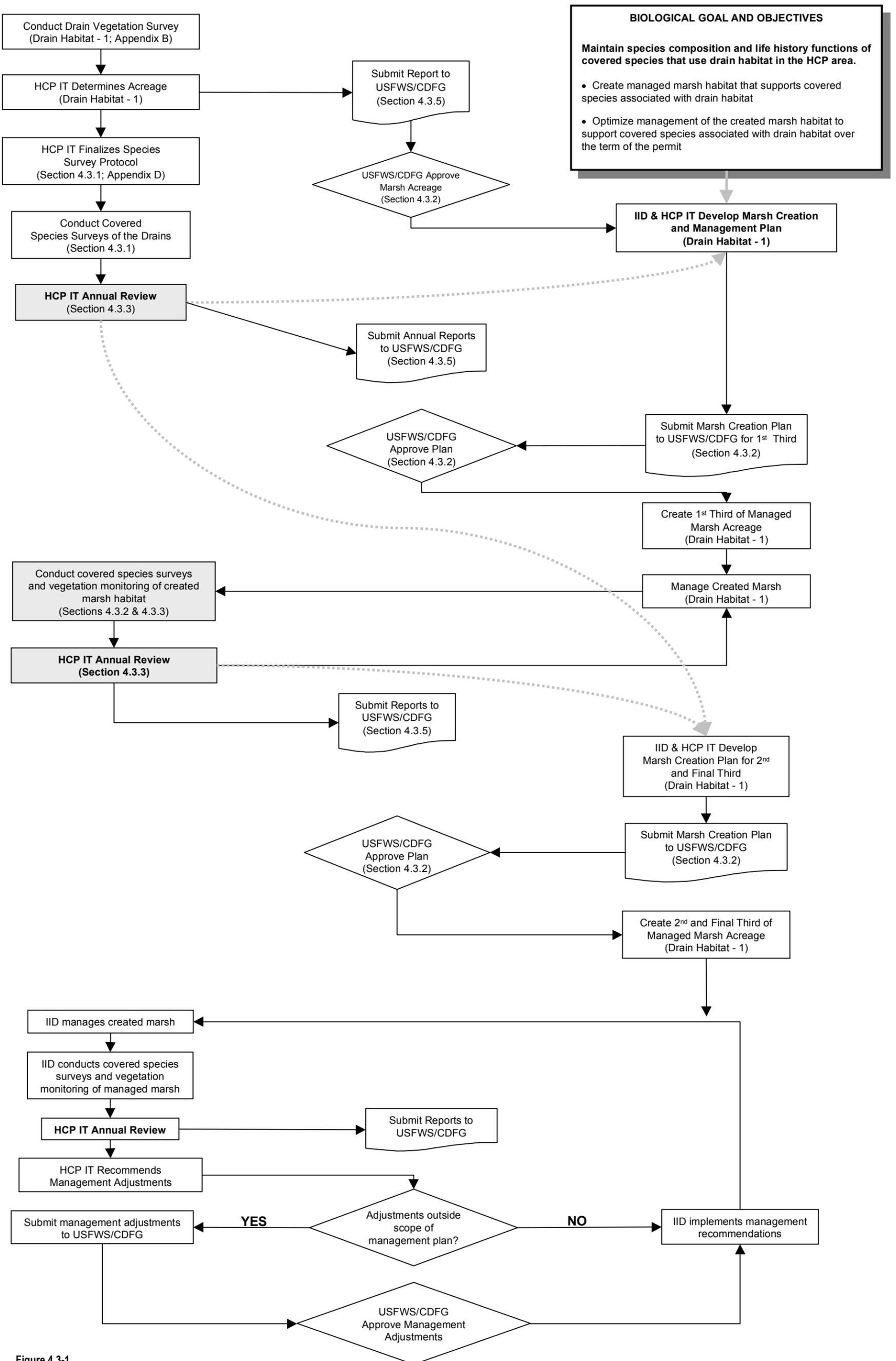


Figure 4.3-1
Drain Habitat Conservation Strategy Implementation Process

- 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.

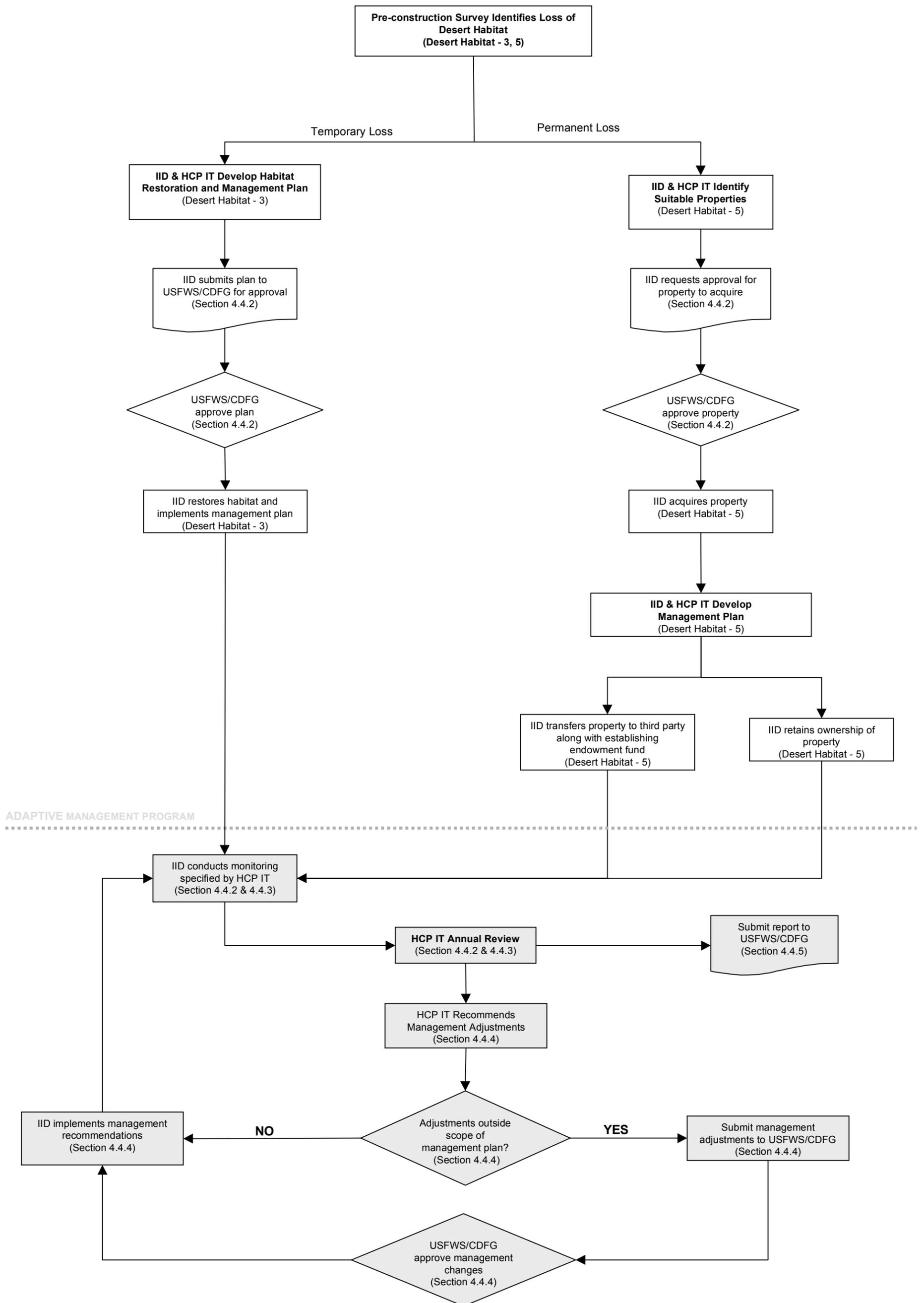


Figure 4.4-1
Implementation Process for Desert Habitat Conservation Strategy Habitat Acquisition/Restoration

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)

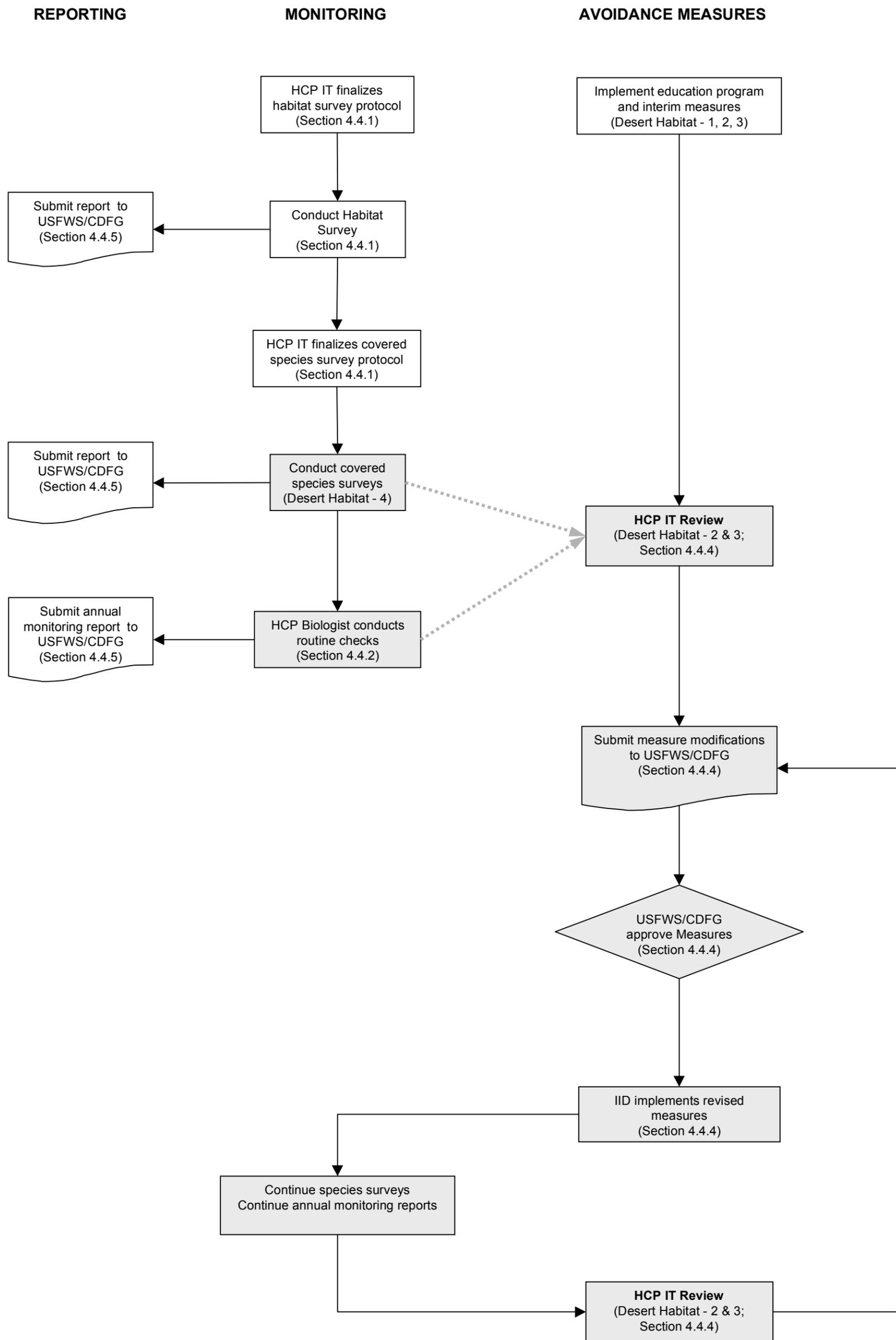


Figure 4.4-2
Implementation Process for Desert Habitat Conservation Strategy Avoidance and Minimization Program

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 assess 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:

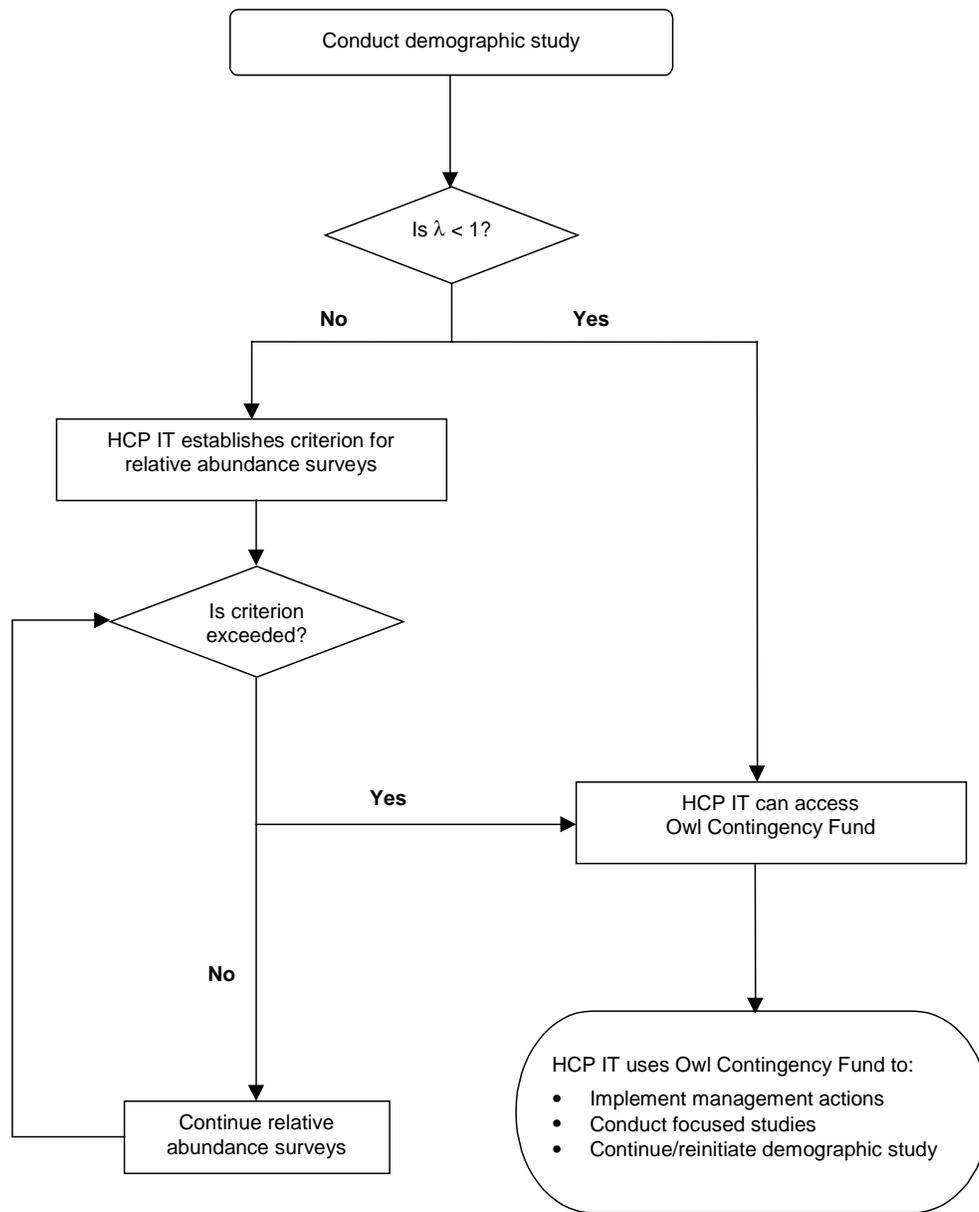


FIGURE 4.5-1
Burrowing Owl Adaptive Management Framework

- 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:

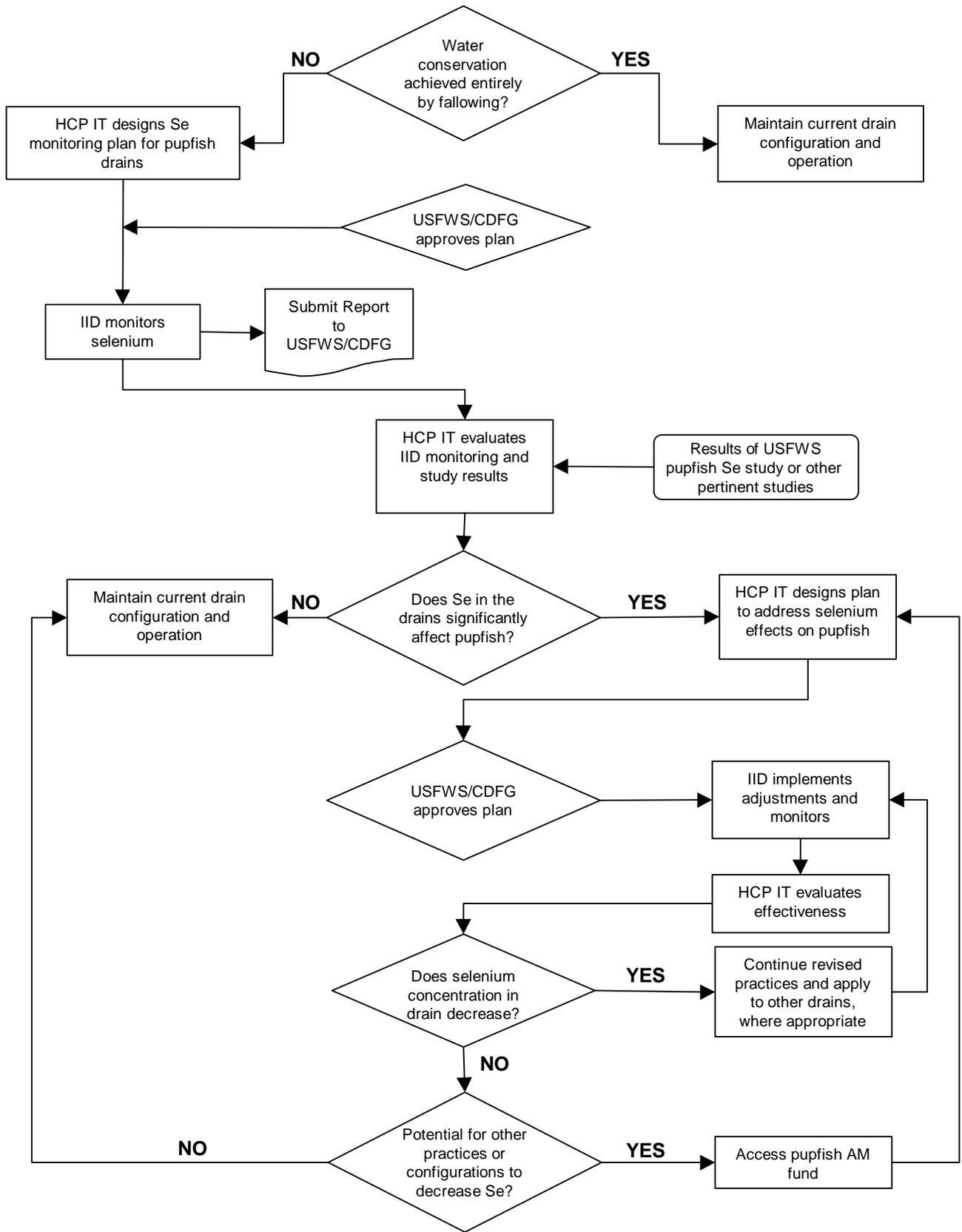


Figure 4.6-1
Desert Pupfish Selenium Evaluation

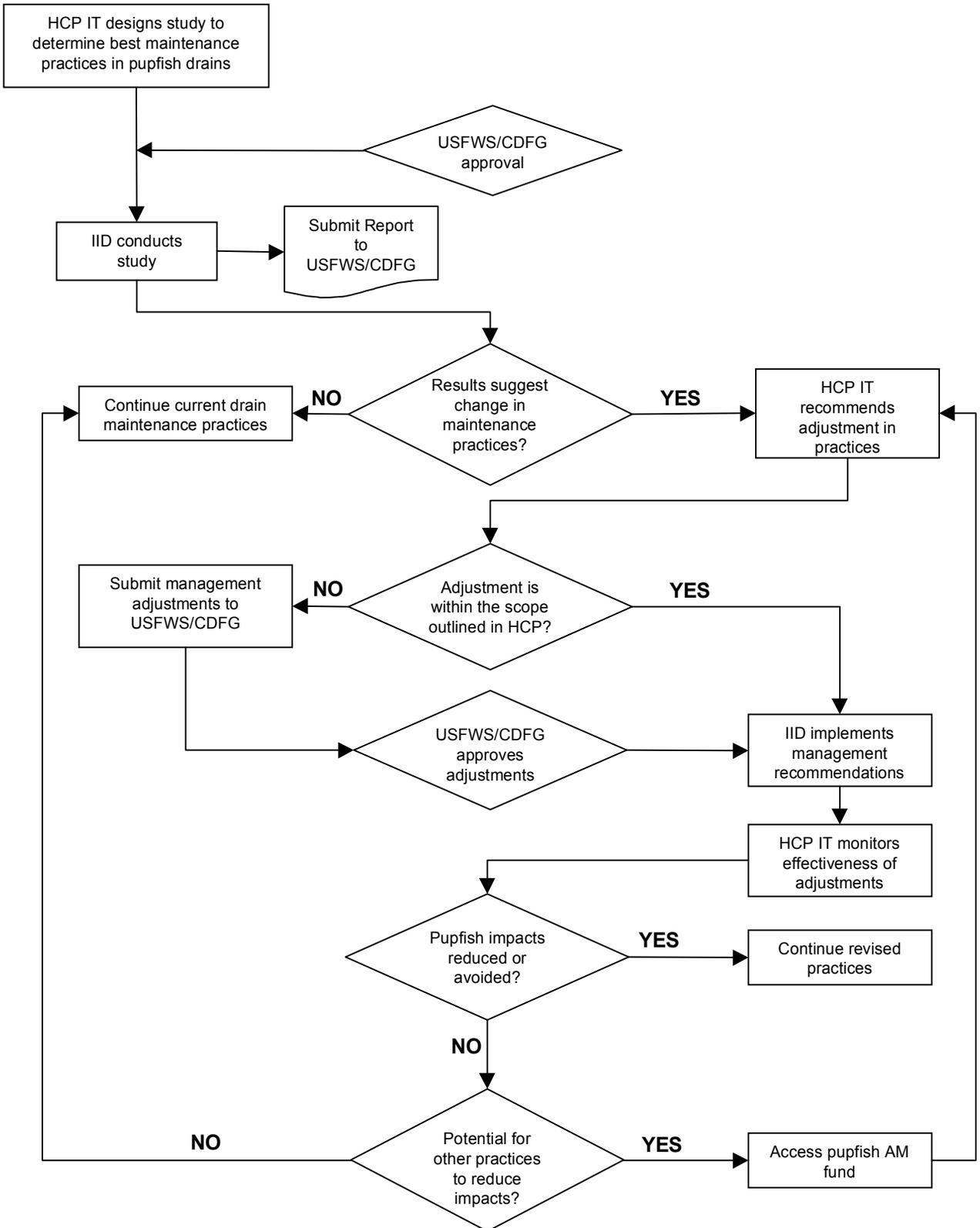


Figure 4.6-2
Desert Pupfish Drain Maintenance Evaluation

- 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.