Lower Colorado River Multi-Species Conservation Program

Balancing Resource Use and Conservation

Palo Verde Ecological Reserve Restoration Development and Monitoring Plan: Phase 6

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

May 2010

Lower Colorado River Multi-Species Conservation Program
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Lower Colorado River Multi-Species Conservation Program

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Multi-Species Conservation Program Office
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Lower Colorado Region
Boulder City, Nevada
http://www.lcrmscp.gov

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Background

An important requirement of the Lower Colorado River Multi-Species Conservation Program (LCR MSCP) is to create habitat (as defined by Anderson and Ohmart vegetation classification) and fulfill conservation measures for covered species. The Palo Verde Ecological Reserve (PVER) encompasses 1,352 acres of the historical floodplain of the Colorado River near Blythe, California, and is intended to help fulfill this requirement. Formerly, the property was known as the Riverview Ranch and was owned by the Travis family. The ranch was acquired by the Trust for Public Lands in 2004 to offset degradation of wildlife habitat along the lower Colorado River. On September 3, 2004, the property was conveyed to the State of California. California has identified a minimum of 1,100 acres of active agricultural lands on this property for habitat restoration under the LCR.

The California Department of Fish and Game (CDFG) and the LCR MSCP are jointly planning the conversion of portions of PVER from agricultural crops to a mix of native plant species. After planting is complete, the created habitats will be managed for species covered under the MSCP throughout the 50-year life of the program.

The proposed development of the property is shown in Figure 1. Additional site information can be found on the LCR MSCP Web site (www.lcrmscp.gov) in the report, *Palo Verde Ecological Reserve Restoration Development Plan*: *Overview*.

In Phase 1, during Fiscal Year 2006 (FY06) 61 acres of riparian nursery (to include cottonwood-willow and mesquite) were established (Table 1). In Phase 2 (FY07), 78 acres were established. In Phase 3, 45 acres were established in FY08 and 39 acres were established in FY09. In Phase 4 (FY09), 100 acres were established, and in Phase 5 (FY10), 216 acres will be planted.

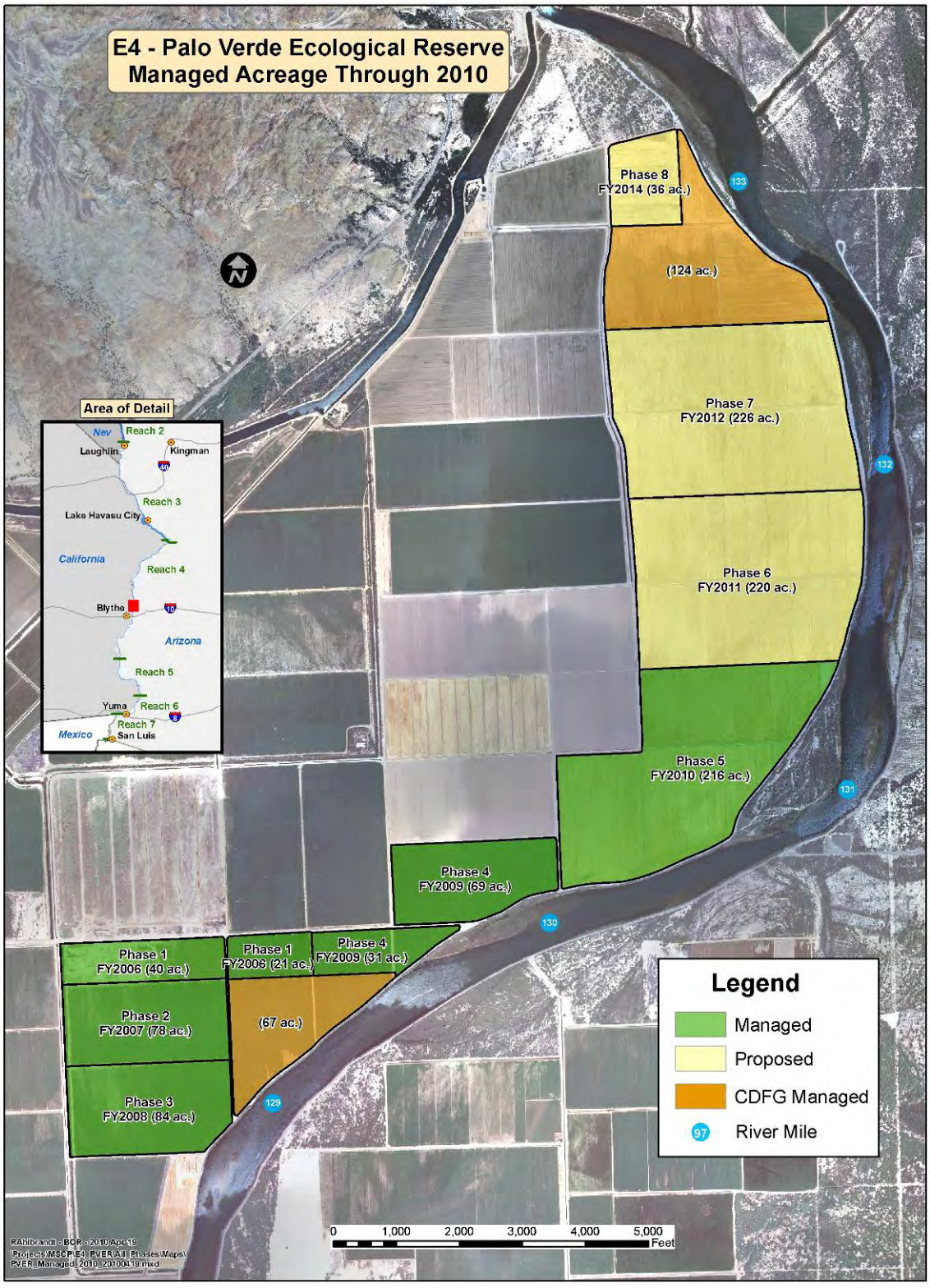
Additional information on the design, planting, and monitoring of Phases 1-3 can be found in the reports: *Palo Verde Ecological Reserve Restoration Development Plan: Phase 1; Palo Verde Ecological Reserve Restoration Development Plan: Phase 2*; *Palo Verde Ecological Reserve Restoration Development Plan: Phase 3; Palo Verde Ecological Reserve Restoration Development Plan: Phase 4*; and *Palo Verde Ecological Reserve Restoration Development Plan: Phase 5*, available on the LCR MSCP Web site.

Table 1. Phase 1-5 Managed Acres

Phase	Fiscal Year	Acres Planted	Land Cover Type	Cumulative Total
1	2006	61	CW	61
2	2007	78	CW	139
3	2008	45	CW	184
3	2009	39	CW	223
4	2009	100	CW	323
5	2010	216*	CW	539

*acres to be planted in 2010

Figure 1. Proposed Phasing Map



1.0 Purpose

The objective of Phase 6 is to create, develop, and maintain approximately 220 acres of cottonwood-willow (CW) seral stages I, II, III, and IV. Each phase builds upon previously created habitat mosaics within the site, with the eventual goal of creating approximately 1,100 acres of riparian habitat.

Phase 6 will be managed for the southwestern flycatcher (SWFL) and the yellow-billed cuckoo (YBCU), and will benefit other species covered under the LCR MSCP (LCR MSCP 2004) that use CW. Vegetation specifically identified as important for habitat and foraging for the Colorado River cotton rat (CRCR) and MacNeill's sootywing skipper (MNSW) will be planted in several checks of Phase 6.

2.0 Design and Planting Plan

In Phase 6 of PVER development, 220 acres of CW will be developed with the intent of creating habitat using both mass transplanting and hand planting techniques. Riparian species composition and density will mimic a natural riparian landscape. The design incorporates cottonwood, willow, and *Baccharis* species, and open areas of native grasses, quailbush, and mesquite (Table 2). The acreage will be divided into 24 checks (areas between borders) for water management. After the initial growing season, it is anticipated that irrigation schedules for vegetation species with higher water requirements, such as cottonwood and willow, will be kept on the same schedule, whereas vegetation with lower water requirements, such as mesquite and quailbush, will be placed on a reduced schedule.

Table 2. Phase 6 Native Plant Species List

Scientific Name	Common Name	Type
Populus fremontii	Cottonwood	Tree
Salix exigua	Coyote willow	Tree
Salix gooddingii	Goodding's willow	Tree
Prosopis glandulosa var. *torreyana*	Honey mesquite	Tree
Baccharis sarothroides	Desertbroom	Shrub
Baccharis salicifolia	Mule-fat	Shrub
Atriplex lentiformis	Quailbush	Shrub
Sporobolus airoides	Alkali sacaton	Grass
Bouteloua gracilis	Blue grama	Grass

The entire acreage will be disked and prepared for planting using standard farming techniques. Borders will be disked and placed, separating the fields into 24 checks (Figure 2). Prior to tree planting, a cover crop of alfalfa/ryegrass will be seeded in all checks except 1, 12, 13, and 24. In these checks native grasses and shrubs will be seeded as an understory. Cover crops planted in previous restoration sites have proven effective for reducing the amount of invasive weeds.

Figure 2. Typical Riparian Planting

Trees and shrubs with similar water requirements are planted between borders for control of irrigation. A typical check is planted with Goodding's willow, coyote willow, and *Baccharis*.

Check Size and Infrastructure

Checks 1-12 vary from 250 feet to 332 feet wide and from 1,320 feet to 1,304 feet long. Checks 11-17 vary from 200 feet to 330 feet wide and from 1,300 feet to 775 feet long. Each check has four slide gates to control irrigation water to each field. When planted, Phase 6 will include approximately 220 acres of CW cover type (Figure 3).

Check 2-9 and 12-19 will be planted with cottonwood, Goodding's willow, coyote willow, and *Baccharis* at percentage rates listed in Table 3. All mass-transplanted trees will be spaced 6 feet in-line with 40-inch rows in between. This spacing allows for tree growth and density of vegetation identified for LCR MSCP covered species.

Check 1 and 13 will be planted with mesquite trees 20 feet on-center with quailbush planted in between the trees (Figure 4). Native grass will be seeded at the same time.

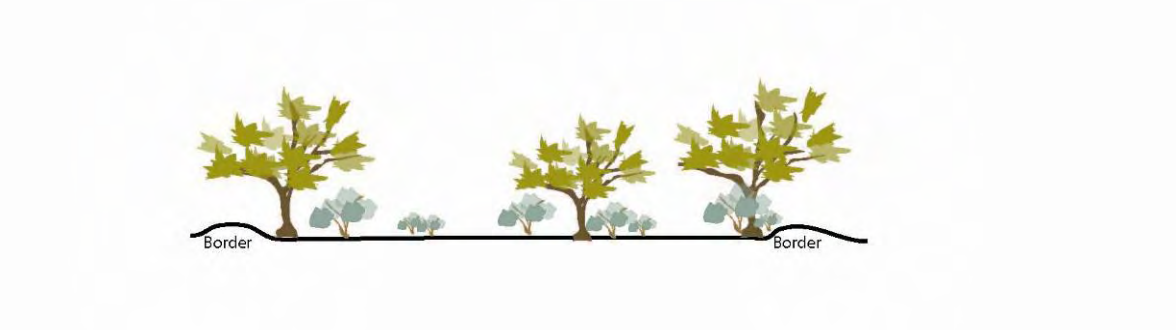
Checks 12 and 24 will be seeded with a native grass seed mix and a random planting of 500 and 100 mesquite trees, respectively.

Figure 3. Phase 6 Pre-Development Design

Table 3. Phase 6 Check Planting Percentage Rates and Spacing

Check	Cottonwood	Goodding's Willow	Coyote Willow	Desert-broom and Mule-fat	Honey Mesquite	Quail-bush	Native Grass Seed	6-ft inline 40-in rows	20-ft on center	Total Plants
1					700	2744	X		X	3,444
2	50%	30%	15%	5%				X		15,463
3	30%	50%	25%	5%				X		20,256
4	10%	40%	50%					X		19,819
5	50%	30%	15%	5%				X		20,256
6	30%	50%	25%	5%				X		20,475
7	10%	40%	50%					X		20,256
8	50%	30%	15%	5%				X		19,819
9	30%	50%	25%	5%				X		20,475
10	10%	40%	50%					X		20,050
11	50%	30%	15%	5%				X		16,775
12					500		X			500
13					625	2400	X	X	X	3,025
14	50%	30%	15%	5%				X		16,125
15	30%	50%	25%	5%				X		20,050
16	10%	40%	50%					X		20,050
17	50%	30%	15%	5%				X		20,100
18	30%	50%	25%	5%				X		20,100
19	10%	40%	50%					X		20,100
20	50%	30%	15%	5%				X		19,600
21	30%	50%	25%	5%				X		20,100
22	10%	40%	50%					X		19,820
23	50%	30%	15%	5%				X		13,510
24					100		X			100

Figure 4. Typical Mesquite and/or Quailbush Planting



Plants with similar water requirements, such as mesquite and/or quailbush, are planted together in the same check for irrigation control. Typically, these areas will include honey mesquite, quailbush, and grasses.

Weed Management

If necessary, invasive weeds such as morning-glory, pigweed, and dodder will be managed by a Certified Pesticide Applicator or controlled by manual hand picking.

Grading/Contouring

The fields will be laser-leveled to ensure efficient flood irrigation and drainage. No grading or contouring is expected on Phase 6. Borders will be reworked for efficient water control and delivery.

Irrigation

The anticipated irrigation schedule for the first calendar year is shown in Table 4 for CW and in Table 5 for mesquite and/or quailbush. Irrigation regimes may be modified due to climatic conditions such as rain, wind, and high temperatures, or to ensure vegetation moisture requirements are met.

Irrigation water will be delivered by two canals. Checks 1-12 will be irrigated with flows of water from north to south. The second lateral irrigation ditch will irrigate checks 13-24, north to south.

Table 4. Phase 6 Irrigation Schedule—Cottonwood-Willow

Day/Week/Month	Frequency	Comments
Planting day	Immediately post-planting	
Week 1-4: April, May	Once per week	Or as necessary to keep root ball moist
Week 5-9	Every 10 days	Or as necessary to keep root ball moist
Week 10-12	Every 10-14 days	
Week 12 through August	Every 14 days	
September	Twice	
October	Twice	
November	Once	
December	No water	

Table 5. Phase 6 Irrigation Schedule—Mesquite and/or Quailbush

Day/Week/Month	Frequency	Comments
Planting day	Immediately post-planting	
Week 1-4: April, May	Once every 3 weeks	Or less if plants show signs of overwatering
June, July, August	Once per month	Or less if plants show signs of overwatering
September	No water	
October	Once	Immediately after planting mesquite
November	Once	
December	No water	

3.0 Monitoring

Conservation area monitoring plans are based on elements described in the LCR MSCP Habitat Conservation Plan (LCR MSCP 2004) and Final Science Strategy (LCR MSCP 2007). Monitoring results will be used as part of the adaptive management process as discussed in Section 4.0. Monitoring at PVER is structured into two main categories:

- Pre-development Monitoring
- Post-development Monitoring
    - Implementation Monitoring
    - Habitat/Species Monitoring
    - Vegetation Classification

Pre-development Monitoring

Pre-development monitoring is designed to establish baseline data for evaluating post-development and to identify whether covered species inhabit PVER prior to implementation of each phase. Pre-development monitoring is divided into abiotic (soil features) and biotic (vegetation and covered species) factors.

- Abiotic Monitoring
    - Soil

      Past planting results at PVER do not indicate problems with soils; therefore, pre-development soil samples will not be taken unless conditions warrant.
- Biotic Monitoring
    - Vegetation

      Prior to planting of cottonwood, willow, mesquite, or any other habitat type, all fields at PVER are planted with agricultural crops; no riparian or marsh habitat is present except for possible small patches of quailbush. When present, these areas are isolated and too small to support the MacNeill's sootywing skipper.
    - Avian

      Marshbirds will not be monitored, as marsh habitat is not present.

      Pre-development monitoring for neo-tropical avian species has been conducted sufficiently on agricultural fields and in 1-year-old planted fields at PVER; cavity nesting birds will not be monitored, as the required structure of riparian habitat is not present.

      Species-specific SWFL pre-development surveys will not be conducted, as the required structure of riparian habitat is not present.

Species-specific yellow-billed cuckoo (YBCU) pre-development surveys will not be conducted, as the required structure of riparian habitat is not present.

- Small Mammals

  The agricultural fields do not provide habitat for the LCR MSCP covered species; therefore, pre-development monitoring for small mammals will not be conducted.

- Bats

  Pre-monitoring: bats are being monitored acoustically for two nights quarterly per year using Anabat bat detectors at three locations in different agricultural fields, which will serve as pre-development monitoring for all future phases.

- Amphibians and Reptiles

  Monitoring will not be conducted because PVER is outside the known range of the covered amphibian species and does not currently meet covered reptile species habitat requirements.

- MacNeill's Sootywing Skipper

  The agricultural fields do not provide habitat for this species.

Post-development Monitoring

Implementation Monitoring

Implementation monitoring will be conducted to assess whether land cover type creation and management actions have been implemented as described in Section 2.0. Implementation monitoring quantifies changes immediately after treatments and evaluates whether actions were completed as prescribed.

After planting has been completed, the site will be continually assessed through the first growing season to detect potential issues that may impact early development of the site. Qualitative assessments will be made to evaluate planting results, weed infestations, irrigation problems, or plant/soil disease and pathogens. If potential implementation or management issues are observed by the Project Manager or other parties, these issues will be discussed with the Wildlife Monitoring Coordinator to determine whether action is needed. Implementation monitoring includes both abiotic and biotic conditions:

- Abiotic Monitoring
  - Water

    Water deliveries will be documented and compared to amounts prescribed in Table 5 and Table 6.
- Biotic Monitoring
  - At the onset of dormancy following the first growing season, vegetation parameters (height, diameter at breast height (DBH), density by species,

groundcover species and abundance, crown/canopy closure, total vegetation volume/foliage height diversity) for overstory trees, shrubs, intermediate-sized trees, and groundcover, will be monitored using a standardized monitoring protocol based on a nested, stratified random sample plot design.

Habitat/Species Monitoring

Habitat/Species monitoring is designed to determine whether Phase 6 is providing the habitat requirements (as defined by performance standards) needed for the targeted covered species. The monitoring will also document whether any other species is using the created habitat. Monitoring protocols have been developed or are in development for documenting habitat characteristics and species response to created land cover types.

- Abiotic Monitoring

  Soil

  - Soil samples will be collected and analyzed from a subset of existing vegetation monitoring plots. Specific soil protocols are in development. Soil moisture measurements will be collected and analyzed to determine average moisture content and duration of saturated soils or standing water.

  Water

  - Water delivery to the site will be documented.

  Microclimate

  - Within each phase, HOBO data loggers will be placed at a subset of vegetation plots to record temperature, relative humidity, and photosynthetically active radiation (PAR). Data will be offloaded approximately every 6 months. Rainfall monitoring data will be collected at PVER and offloaded approximately every 6 months.

- Biotic Monitoring

  Vegetation

  - Vegetation parameters (height, DBH, density by species, groundcover, canopy closure, and total vegetation volume) will be monitored using a standardized monitoring protocol (Bangle in prep).

  MacNeill’s Sootywing Skipper

  - Quailbush planted at PVER will be surveyed for MacNeill's sootywing beginning when the plants are in their first year of growth. The entire quailbush-planted areas will be examined for adult sootywings twice during April-August, and arbitrarily selected plants will be sampled for sootywing eggs and larvae.

  Marshbirds

  - Monitoring will not be conducted because no marshbird habitat has been created at PVER.

Neotropical Birds

- A standardized intensive area search survey methodology (Bart et al. in prep) will be used. Surveys will be conducted annually during the breeding season beginning in April of the second growing season. No covered bird species are known to use habitat in its first year of growth.
- If covered species are observed, species-specific surveys, nest searches, and mistnetting/banding may be conducted.

Cavity Nesting Birds

- Elf owl presence/absence surveys will be conducted once appropriate habitat is present. Because elf owls are secondary cavity nesters, the habitat will need to mature and cavities or nest boxes will need to be present prior to elf owl occupation. The habitat will be observed during neotropical bird surveys for the presence of cavities and primary cavity nesters (woodpeckers). If nest boxes are installed, they will be monitored during the breeding season. If elf owls are detected during the breeding season, nest searches and mistnetting/banding may be conducted.
- Gilded flickers and Gila woodpeckers will be surveyed as part of the system-wide neotropical bird monitoring effort. Once suitable nesting habitat (snags and cavities) develops on the site, more directed presence/absence surveys may be conducted for gilded flicker or Gila woodpeckers. If these species are detected during breeding season, nest searches and mistnetting/banding may be conducted.

Southwestern Willow Flycatcher

- Standardized presence/absence surveys (Sogge et al. 1997, USFWS 2000) will be conducted in the riparian habitat after three growing seasons. A minimum of five surveys each year will be conducted beginning in May and ending in July. If a SWFL is detected after June 15, or positive breeding evidence is identified, nest searches will be conducted to determine breeding status and use of habitat. Targeted banding and mistnetting may be conducted to document long-term use of the site and to define habitat requirements.

Yellow-billed Cuckoo

- Standardized presence/absence surveys (Halterman and Johnson 2005) will be conducted. A minimum of five surveys will be conducted beginning June and ending in September. If a YBCU is detected during the breeding season, nest searches will be conducted and targeted banding and mistnetting may be conducted to document long-term use of the site and to define habitat requirements.

- Rodent Surveys

  Post-development monitoring will be conducted for presence of cotton rats. Trapping will occur at night and will be concentrated in areas where native grasses are being planted. The number of traps will be determined by how much of the native grass successfully develops in dense enough patches that a cotton rat population can be sustained. Once presence is established, a standardized protocol will be developed and implemented.

  Bats

  - Acoustic monitoring may be conducted in Phase 6, because acoustic monitoring is being conducted in other similarly planted phases within PVER. Bats are being monitored acoustically two nights quarterly per year using Anabat bat detectors. One detector is placed in the nursery area and two detectors are placed at opposite ends of Phase 2. These three locations will serve as post-development monitoring for cottonwood-willow cover types for all phases in PVER.
  - Three Anabat bat detectors are also being deployed concurrently within monotypic saltcedar habitat adjacent to PVER to compare differences in bat activity between saltcedar, agricultural fields, and cottonwood-willow cover types. Additional detectors may be placed within mesquite cover types once those areas have become established.

  Reptiles and Amphibians

  - No monitoring will be conducted because no habitat for covered reptiles and amphibians will be created or altered.

Vegetation Classification

The LCR MSCP Habitat Conservation Plan (LCR MSCP 2004) outlines the specific habitat acreage to be created. The Anderson and Ohmart vegetation classification system (Anderson and Ohmart 1976, 1984) will be used to track the total land covered type managed by the program annually. To map the vegetation at PVER, Reclamation will annually obtain aerial imagery of the site. Each phase will be classified using the Anderson and Ohmart system (Tables 6 and 7).

Table 6. Vegetation Communities, Criteria, and Types

Community Type	Criteria	Vegetation Structural Type
Cottonwood-willow (CW)	*P. fremontii* and/or *S. gooddingii* constituting at least 10% of total trees	I, II, III, IV, V, VI
Saltcedar (SC)	*Tamarix* spp. constituting 80-100% of total trees	I, II, III, IV, V, VI
Saltcedar-Honey mesquite (SH)	*P. glandulosa* constituting at least 10% of total trees	I, II, III, IV, V, VI
Saltcedar-Screwbean mesquite (SM)	*P. pubescens* constituting at least 20% of total trees	I, II, III, IV, V, VI
Honey mesquite (HM)	*P. glandulosa* constituting at least 90% of total trees	I, II, III, IV, V, VI
Arrowweed (AW)	*Tessaria sericea* constituting at least 90-100% of total vegetation area	I, II, III, IV, V, VI
Atriplex spp. (ATX)	*A. lentiformis*, *A. canescens*, and/or *A. polycarpa* constituting 90-100% of total vegetation in area	I, II, III, IV, V, VI

(From Anderson and Ohmart 1984)

Table 7. Vegetation Classification

Structure Type	Characteristics
I	Mature stand with distinctive overstory greater than 15 feet high, intermediate class from 2-15 feet tall, and understory from 0-2 feet high
II	Stand with overstory (>15 feet) constituting greater than 50% of the trees with little or no intermediate class present
III	Stand with largest proportion of trees between 10 and 20 feet high with few trees above 20 feet or below 5 feet
IV	Few trees above 15 feet present; 50% of the vegetation is 5-15 feet tall with the other 50% between 0-2 feet high
V	60-70% of the vegetation present is between 0-2 feet tall with the remainder in the 5-15 foot class
VI	75-100% of the vegetation is from 0-2 feet high

(From Anderson and Ohmart 1984)

4.0 Adaptive Management

Adaptive Management relies on the initial receipt of new information, the analysis of that information, and the incorporation of the new information into the design and/or direction of future project work (LCR MSCP, 2007). The Adaptive Management Program's role is to ensure habitat creation sites are biologically effective and fulfill the conservation measures outlined in the HCP for 26 covered species, and potentially benefit five evaluation species. Post-development monitoring and species research results will be used to adaptively manage habitat creation sites after initial implementation. If it is determined through the monitoring results that additional

information is needed to better define covered species habitat requirements, these data will be collected using the procedures outlined in the LCR MSCP Science Strategy (LCR MSCP, 2007). The Science Strategy provides for an adaptive management process for improving the effectiveness of HCP implementation and identification of monitoring and research priorities. Alterations or changes to habitat creation sites can be accomplished through management activities; these activities will be initiated through the adaptive management process. Habitat creation sites will be manipulated and/or maintained for covered species using the best available science throughout the term of the HCP.

Another role of the Adaptive Management Program is to determine habitat credit using vegetation classifications and the conservation measures for a given species as outlined in the HCP. This is accomplished through analysis of all monitoring data, and comparison with other relevant studies. Annual reports will summarize each created habitat land cover type and its acreage.

Monitoring Analysis and Evaluation for Habitat Credit

The LCR MSCP is determining the process for covered species conservation measure accomplishment, including species-specific habitat performance standards. Once this process has been determined, monitoring data will be assessed to determine whether the site meets the performance standards.

If it is determined that the site meets the performance standards, the habitat credit acreage will be reported in PVER annual reports. If monitoring activities document the presence of SWFL and/or YBCU or other covered species before performance standards are met, the performance standards will be evaluated and updated as appropriate.

If it is determined that the site does not meet any of the performance standards, recommendations for site modifications may be made by the following means:

- Comparison of monitoring results with performance standards to identify those standards not being met that can be remedied by site manipulations (plant removal, additional plantings, site contouring, etc.) or changes to the watering regime.
- Comparison of Phase 6 results with previous successful and unsuccessful habitat restoration projects to look for differences in site characteristics (elevation, distance to river, climate, etc.), baseline conditions, planting design, plant and animal species composition, watering regimes, and abiotic conditions that may help explain why the site has not met the performance standards.
- Review of other studies that may provide insight into additional covered species habitat requirements or different restoration techniques to achieve the desired conditions.

These recommendations of how to move towards achieving performance standards will be included in the annual report. These recommendations will also be used to improve future project designs, where appropriate.

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