

Lower Colorado River Multi-Species Conservation Program



Balancing Resource Use and Conservation

Cibola Valley Conservation Area Restoration Development Plan: Phase 4



April 2008

Lower Colorado River Multi-Species Conservation Program

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**Lower Colorado River
Multi-Species Conservation Program Office
Bureau of Reclamation
Lower Colorado Region
Boulder City, Nevada
<http://www.lcrmscp.gov>**

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Acronyms and Abbreviations

AGFD	Arizona Game and Fish Department
BACI	Before-After-Control-Impact
CVIDD	Cibola Valley Irrigation and Drainage District
CVCA	Cibola Valley Conservation Area
CW	Cottonwood-willow land cover type, as defined in the LCR MSCP HCP
HCP	Habitat Conservation Plan
LCR	Lower Colorado River
LCR MSCP	Lower Colorado River Multi-Species Conservation Program
Reclamation	Bureau of Reclamation
SWFL	Southwestern Willow Flycatcher
YBCU	Yellow-billed Cuckoo

Background

In 2007, the Bureau of Reclamation (Reclamation) secured 1,309 acres of land within the Cibola Valley Irrigation and Drainage District (CVIDD) and established the Cibola Valley Conservation Area (CVCA). The Arizona Game and Fish Department (AGFD) acquired the CVCA in September 2007 through an agreement among AGFD, Reclamation, the Mohave County Water Authority, and The Conservation Fund. Through the agreement, AGFD acquired the fee title to the property subject to an existing long-term lease of the land and water rights to Reclamation, expiring April 5, 2055, as part of the Lower Colorado River Multi-Species Conservation Program (LCR MSCP). Several farmers also have short-term leases for crop production on portions of the acquired land. The primary purpose of the LCR MSCP at the CVCA is to replace existing agricultural fields with native riparian cottonwood, willow, and mesquite land cover types which would be managed as habitats for LCR MSCP covered species defined in the LCR MSCP Final Habitat Conservation Plan (HCP).

The proposed development plan for the property is shown in Figure 1. Additional site information can be found on the LCR MSCP Web site (www.lcrmscp.gov) in a report entitled *Cibola Valley Conservation Area Restoration Development Plan: Overview*.

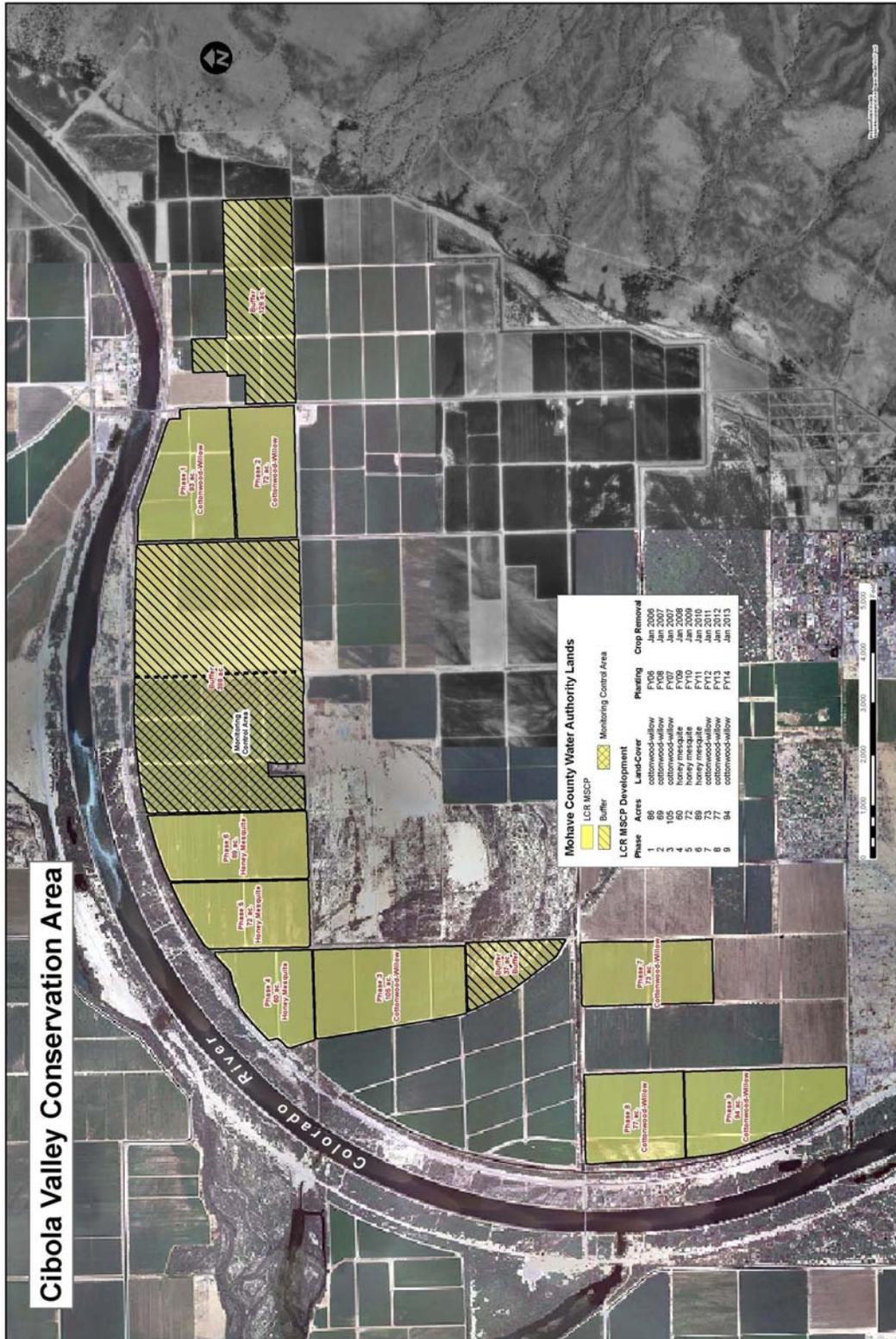
In April 2006, Reclamation planted Phase 1: a 22-acre native plant nursery and approximately 64 acres of cottonwood-willow land cover type (CW). The nursery was established initially as an on-site native plant nursery for future plant stock collection and may be managed for habitat after other nurseries have been developed for the LCR MSCP. Phase 3, consisting of roughly 105 acres, was planted in March 2007, in accordance with the *CVCA Restoration Development Plan: Phase 3*. Phase 2, originally scheduled for early spring of FY 2007 has been delayed for 1 year, but plans for this activity can be found in the report entitled *CVCA Restoration Development Plan: Phase 2*.

1.0 Purpose

Phase 4 will create approximately 60 acres of honey mesquite land cover type for the sooty-wing skipper, elf owl, Arizona Bell's vireo, and other neotropical migrants covered in the LCR MSCP HCP. Honey mesquite will be planted in conjunction with already created cottonwood-willow adjacent to the Colorado River. This habitat area is designed to mimic the historical landscape patterns of plant communities along the LCR and to create an integrated mosaic of habitats.

Implementation of Phase 4 began March 2008 and will expand upon the methodologies used in previous phases. The process includes fallowing the acreage for one year prior to planting. During that year, the field is irrigated during the growing season in order to allow any volunteer morning glory seed to germinate. Following germination, the fields are disked and the process is repeated 3-4 times during the summer.

Figure 1. Proposed Phasing Map



2.0 Planting Design

Phase 4 converts approximately 60 acres of active agricultural fields to honey mesquite land cover that, in coordination with earlier and later planting phases, is designed to create a native vegetation mosaic. This phase consists of seven fields or checks, arranged in size from 8 to 10 acres (Figure 2) with mesquite and atriplex planted in east-west rows. Table 1 lists the number of plants proposed for this phase.

Table 1. Number of Proposed Plants

Scientific Name	Common Name	Number of Plants
<i>Atriplex lentiformis</i>	Quailbush	6,000
<i>Procopis glandulosa "torreyanna"</i>	Honey mesquite	12,500
Total		18,500

Planting Techniques

Prior to planting the native plants, a cover crop may be planted to aid in controlling invasive plant species. Phase 4 will be hand-planted using a mechanical auger to create holes for the 1-gallon potted plants. The plants will be planted on approximately a 20-foot by 20-foot grid pattern. A pre-emergent (herbicide) may be applied prior to tree planting.

Grading

The fields will be laser-leveled prior to planting to ensure complete and even coverage by flood irrigation. Wide borders will be added for efficient water control and delivery.

Irrigation

Irrigation gates are located at on the eastern boundary of Phase 4. A crop consultant may be utilized to recommend schedules for water and fertilizer applications. During the growing season, the consultant may sample and analyze plant tissue for nitrogen levels and other nutrients as necessary.

Figure 2. Phase 4 Habitat Creation Planting Design



3.0 Monitoring

Conservation area monitoring plans are based on elements described in the LCR MSCP HCP (LCR MSCP 2004) and Final Science Strategy (LCR MSCP 2007). Monitoring of CVCA will be structured into four main categories:

- Predevelopment.
- Implementation Monitoring.
- Habitat/Species Monitoring.
- Vegetation Classification.

Pre-development monitoring is designed to establish baseline data for evaluating post development activities, and to identify whether a covered species currently inhabits CVCA. Implementation monitoring will analyze whether the site was created as designed. Habitat/species monitoring will analyze whether the site meets the established life requirements necessary to provide habitat for the targeted covered species. Vegetation classification will classify the vegetation within the stand according to the Anderson and Ohmart (1976, 1984) classification system.

Reference conditions will be used as to benchmark the ultimate goals for the conservation area. The Phase 4 reference conditions will be based on the mesquite habitat goals listed in the MSCP HCP.

The primary goal of Phase 4 is to produce mesquite habitat for sooty-wing skipper, elf owl, vermilion flycatcher, Arizona Bell's vireo, and other neotropical migrants covered in the LCR MSCP HCP. According to Table 5-3 of the LCR MSCP HCP, the minimum requirements for these species are Honey mesquite type III with no minimum patch size.

Monitoring Design

Monitoring design is based on quasi-experimental design using the "Before-After-Control-Impact" (BACI) approach (Stewart-Oaten and Osenberg 1992, Bernstein and Zalenski 1983, Green 1979). The BACI approach prescribes the collection of data prior to an activity and comparison to data collected after the activity (Smith 2002). The quasi-experimental design will use pre-restoration phases as controls, along with a long-term control area. The designs will utilize randomization, where possible. Subsamples of each phase will be taken at the same or similar randomized points both pre- and post-restoration. Control areas and each implemented phase will be monitored during same or similar time periods. To the greatest extent practicable, pre-restoration monitoring will be conducted for a minimum of 1 year prior to the implementation of each phase.

Population and habitat resources are determined based on the appropriate Avoidance and Minimization Measures, Monitoring and Research Measures, and General and Species-Specific Conservation Measures. Monitoring will be conducted both pre- and post-restoration but select resources will only be monitored post-restoration if no potential exists prior to development for the existing agricultural fields to support populations of targeted covered species (e.g., SWFL has never been found to occupy cotton fields). In most cases, resources monitoring will focus on

guilds of species for efficiency. The pre- and post-restoration resources that will be monitored are summarized below in each appropriate monitoring category. Specific protocols that have been developed for each resource may be found in the document entitled *Draft 2006 Monitoring Protocols for the LCR MSCP*.

Predevelopment Monitoring

Pre-development surveys and monitoring will identify the baseline and controls for post-restoration monitoring. The data will be compared to data from a long-term control site at CVCA (a specific area set aside for approximately 7-10 years prior to development), post-restoration data for each specific phase, and data from other restoration sites implemented as part of the LCR MSCP.

- Abiotic Monitoring
 - Soils
 - Soil samples will be taken in each field to determine baseline soil moisture, pH, salinity, textural classification, depth to groundwater, and nutrients (including nitrates, ortho-phosphate, and ammonia). Approximately 5 to 10 samples will be taken on Phase 4 evenly distributed throughout the fields. Soil samples will be collected after existing crops have been harvested and the field has been disked and prior to planting native vegetation.
- Biotic Monitoring
 - Vegetation Monitoring
 - A qualitative overall description of type of vegetation in each agricultural field will be described before planting. Photo points may be established.
 - Avian Monitoring:
 - Neotropical birds will be monitored with an area search protocol beginning during the breeding season the year before planting (May 2008).
 - Small mammal presence/absence transects were conducted between January and March 2008 in areas adjacent to sites to determine potential dispersal areas. Traps were placed in linear transects approximately 500 feet in length, with one trap placed every 33 feet along each transect. Transects were located to most efficiently trap the selected area, with the actual distance apart determined by the size of the area being surveyed. Trapping is being conducted for a minimum of 500 trap nights. A trap night is defined as setting one trap over one night.

- Preliminary presence/absence bat surveys will be conducted using active/passive AnaBat surveys at least two nights during the winter and spring seasons prior to planting. Signals received from the AnaBat will be analyzed to determine bats present according to genus and species when possible. Two Anabat receivers at a minimum will be placed within the fields where planting will take place, and in the control site for comparison.

Implementation Monitoring

Implementation monitoring will be conducted to assess whether land cover type creation and management actions have been implemented as designed on each phase. This type of monitoring quantifies changes immediately after treatments and evaluates whether actions were implemented as prescribed (Block et al. 2001). The results of this monitoring may:

- Determine if the appropriate number of acres of created land cover types has been achieved as designed.
- Determine if the mechanized planting technique is effective and plants have been planted according to design specifications.
- Determine the survival rate, composition, and distribution of trees planted.

Post-restoration data will be compared and contrasted to predevelopment data where appropriate, data from the long-term control area, the existing habitat data for targeted covered species, and data from other restoration sites implemented as part of the LCR MSCP.

- Abiotic Monitoring
 - Soil Salinity and nutrients
 - Salinity and nutrient levels in each irrigated field will be determined by obtaining soil samples at approximately 10 samples per 40 acres. For Phase 4, this equates to approximately 10-12 samples evenly distributed throughout the fields. Soil sampling will be conducted annually, until a steady state has been achieved, and salinity has not increased. Then soil sampling will be conducted every 2 to 5 years, unless data indicates a return to annual sampling.
 - Water use
 - Water deliveries will be recorded by the entity conducting the deliveries.

- Biotic Monitoring
 - Vegetation
 - Four to 6 weeks after planting, a subset of all trees planted will be counted and a general assessment of condition (live, stressed, or dead) will be recorded to determine initial survivorship. This data will be used to guide initial management activities such as water use and re-planting.
 - At the end of the first growing season (October 2009), each land cover type will be monitored to determine vegetation survival. Initial survivorship monitoring will be conducted for 1 year to consider survival during establishment and determine whether mortality within the first growing season is due to implementation-related factors (e.g., planting shock, seed viability, water availability, soil conditions and characteristics, competition with exotics). During the first two growing seasons, growth and survivorship will be sampled from random transects. The number of sample transects will be determined based on several factors including patch size, restoration technique, vegetation species, and variation within each stand. Within each sample transect, every tree will be counted and recorded by species. Diameter at breast height and tree condition (live or dead) will be recorded for every hundredth tree sampled.

Habitat/Species Monitoring

Habitat/Species monitoring will be conducted to determine whether Phase 4 achieved the reference conditions, as discussed in the reference conditions section of this report, and to determine any covered species use of that habitat (Block et al. 2001).

The results of this monitoring may determine whether vegetation has become targeted covered species habitat, as determined by the reference conditions; determine whether created habitat supports multiple layers, seral stages, and age cohorts of trees; and determine whether the habitat is being utilized by targeted covered species.

- Habitat Monitoring
 - Vegetation Monitoring – After the third growing season, habitat condition will be monitored using a standardized protocol based on a nested sample plot design. Fixed radius plots will be measured to track growth and survival over time. The sample interval will depend on stand maturation. Vegetation monitored will include but will not be limited to: overstory trees, sapling, shrub, understory, herbaceous layer, vertical foliage density, and crown closure. This monitoring will be conducted annually in years 3 through 6 after planting, and will then be conducted every other year between years 6 through 10. After year 10, each site will be sampled every 5 years to monitor successional change through year 50. In the case of a catastrophic disturbance to the site (e.g., fire, flood) post-disturbance monitoring will mimic the post-restoration monitoring regime.

- Covered Species Monitoring
 - Neotropical Birds
 - A standardized area search protocol established by the U.S. Geological Survey (Bart 2007) will be used to monitor avian use. Area searches will be conducted during breeding season (May through July) for breeding avian covered species. Area searches will be conducted using the same protocols as pre-restoration monitoring and at the same locations for direct comparison, and will begin the summer after each specific phase is planted. Comparisons will be to other pre- and post-restoration sites, in addition to the control site.
 - Cavity Nesting Birds
 - Elf owl surveys will be conducted after 4 to 6 years, depending on when the land cover type structure and density indicate the habitat has achieved the reference conditions. Any installed nest boxes will be monitored during the breeding season (April-July) for elf owls. If an elf owl is detected during the breeding season, nest searches and targeted banding/mistnetting may be conducted for long-term use of site and refinement of habitat use.
 - Southwestern Willow Flycatcher
 - SWFL presence/absence surveys will not be conducted as they do not use this habitat for nesting.
 - Yellow-Billed Cuckoo
 - YBCU presence/absence surveys will not be conducted as they do not use this habitat for nesting. Any incidental use or foraging use will be determined through the area searches listed above.
 - Small Mammals
 - Small mammal presence/absence surveys may be conducted using a standardized protocol between September-November and late February-May if sufficient ground cover exists. Trapping would be conducted overnight, and traps will be placed in parallel, linear transects approximately 500 feet in length with a trap placed every 33 feet. Transects would be 33 to 50 feet apart, with the actual distance apart determined by the size of the area being surveyed. Trapping would be conducted for a minimum of 500 trap nights (a trap night is defined as setting one trap over one night).

- Bats
 - Presence/absence surveys will be conducted utilizing active/passive AnaBat surveys at least 2 days per season (spring, summer, winter, and fall) annually beginning in fall of 2009. After 5 years, data will be examined and future monitoring decisions for bat species will be made. All locations will be chosen based on suitable habitat for the covered bat species and ability to maximize data collected.

- MacNeill’s Sootywing Skipper
 - Presence/absence surveys will be conducted in post-restoration sites targeted for MacNeill’s sootywing skipper habitat. A spring survey will be conducted to determine areas of suitable habitat. If host plants are found during the spring surveys, those sites will be visited three times during summer utilizing a presence/absence protocol. If needed, a fall survey will be conducted to determine habitat characteristics in sites with presence versus sites with absence.

Vegetation Classification

The HCP (LCR MSCP 2004) outlines the specific habitat acreage to be restored and utilizes the Anderson and Ohmart (1976, 1984) classification system as the performance standard. Reclamation will determine vegetation classification annually until target goals have been met. To map the vegetation at CVCA, Reclamation will use aerial imagery of the site to map each phase according to the Anderson and Ohmart (1976, 1984) system (See Phase 1 report).

Monitoring Analysis and Evaluation

Once the implementation and effectiveness monitoring data are analyzed, the results will be evaluated with two sets of management guidance criteria: thresholds and trigger points. These criteria will be used to evaluate all phases of implementation.

Reference Conditions

Phase 4 reference conditions will be based on needs of the targeted covered species. These variables may change depending on future analysis of system-wide studies that are currently being conducted. Reference variables for Phase 4 are presented in Table 2 and may change as future data refine these ranges.

Table 2. Reference Variables for Phase 4

Canopy Height (M) based on Honey Mesquite III Land cover type	Average greater than 4.0 m
Vertical Foliage Distribution	Greatest between 1 and 3 m above ground based on Ohmart and Anderson Honey Mesquite III land cover type. This may change as additional analysis is completed.

Thresholds

Thresholds signal that conditions are appropriate and to continue current management practices. The thresholds currently established are:

- Vegetation conditions have been achieved for reference conditions.
- Phase 4 is being utilized by one or more covered species during migration.
- Site is being utilized by one or more covered species during breeding.

Trigger Points

Trigger points signal the need to alter current management activities to achieve the conservation area goals of the restoration site or change goals for site. The trigger points currently established are:

- Reference conditions for vegetation conditions have not been achieved.
- 50% or more of non-survival or low densities.

Data Collection and Analysis

All data collected will be entered into the long-term relational database that is in development for the LCR MSCP. Analysis will be both qualitative and quantitative, depending on the data collected.

A summary of vegetation and habitat characteristics will be produced post-restoration.

The area searches will record whether any of the targeted covered bird species were found utilizing the site. Data will be compiled and single factor ANOVA will be used for detection between survey dates. Species diversity, richness, and evenness will be determined using a natural logarithm version (Nur et al. 1999) of Shannon's Index (Krebs 1989).

The analyses methods for small mammals, bats, and MacNeill's sootywing skipper will focus on presence/absence of the species. All analyses will contain a list of species present and will compare species diversity and richness for both pre- and post-restoration.

4.0 Adaptive Management

Data will be evaluated annually to determine if thresholds and trigger points are reached. An annual monitoring report will be prepared with summary results of all monitoring studies conducted that year. A 5-year summary report will be prepared to analyze trends and to determine if results indicate that restoration activities meet or exceed thresholds.

Recommendations will be made in the annual report and in the 5-year summary report for future management actions and for changes in protocols or monitoring regimes. If results indicate that effects are deleterious to species or habitats, potential modifications will be identified and evaluated.

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