

Lower Colorado River Multi-Species Conservation Program



Balancing Resource Use and Conservation

Shark's Tooth Conservation Area Restoration Development and Monitoring Plan



March 2012

Lower Colorado River Multi-Species Conservation Program Steering Committee Members

Federal Participant Group

Bureau of Reclamation
U.S. Fish and Wildlife Service
National Park Service
Bureau of Land Management
Bureau of Indian Affairs
Western Area Power Administration

Arizona Participant Group

Arizona Department of Water Resources
Arizona Electric Power Cooperative, Inc.
Arizona Game and Fish Department
Arizona Power Authority
Central Arizona Water Conservation District
Cibola Valley Irrigation and Drainage District
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City of Lake Havasu City
City of Mesa
City of Somerton
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Golden Shores Water Conservation District
Mohave County Water Authority
Mohave Valley Irrigation and Drainage District
Mohave Water Conservation District
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Unit "B" Irrigation and Drainage District
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Yuma County Water Users' Association
Yuma Irrigation District
Yuma Mesa Irrigation and Drainage District

Other Interested Parties Participant Group

QuadState County Government Coalition
Desert Wildlife Unlimited

California Participant Group

California Department of Fish and Game
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Coachella Valley Water District
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Bard Water District
Imperial Irrigation District
Los Angeles Department of Water and Power
Palo Verde Irrigation District
San Diego County Water Authority
Southern California Edison Company
Southern California Public Power Authority
The Metropolitan Water District of Southern California

Nevada Participant Group

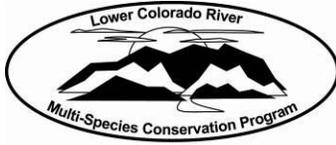
Colorado River Commission of Nevada
Nevada Department of Wildlife
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Basic Water Company

Native American Participant Group

Hualapai Tribe
Colorado River Indian Tribes
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Conservation Participant Group

Ducks Unlimited
Lower Colorado River RC&D Area, Inc.
The Nature Conservancy



Lower Colorado River Multi-Species Conservation Program

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Background

Cibola National Wildlife Refuge (NWR) consists of about 16,600 acres of land located along approximately 12 miles of the lower Colorado River (LCR) in Arizona and California. It was established in 1964 as a refuge and breeding ground for migratory birds and other wildlife. The Cibola NWR is divided into six management units designated as Unit 1, Unit 2, Unit 3, Unit 4, Unit 5, and Unit 6.

On July 17, 2006, lightning ignited a fire on Cibola NWR and burned acreage in both California and Arizona. Approximately 4,600 acres of primarily saltcedar with some intermixed mesquite was burned. Restoration with honey mesquite of approximately 550 acres of this burned area, located on the Cibola NWR in the State of California, is the focus of this development and monitoring plan. Due to the shape of the area to be restored, the site is referred to as the Shark's Tooth Conservation Area.

The Lower Colorado River Multi-Species Conservation Program (LCR MSCP) is providing resources to establish and maintain the Conservation Area. Those resources include the use of Colorado River water through the LCR MSCP Water Accounting Agreement and funding to create and manage the native vegetation. The refuge does not maintain any water rights within the State of California.

Introduction

The LCR MSCP is a partnership of Federal and non-Federal stakeholders responding to the need to balance the use of lower Colorado River (LCR) water resources and the conservation of native species and their habitats in compliance with the Endangered Species Act. This is a long-term (50-year) plan to conserve at least 26 species along the LCR from Lake Mead to the Southerly International Boundary with Mexico through the implementation of a Habitat Conservation Plan (HCP). Most covered species are state and/or Federally listed special status species. The Bureau of Reclamation (Reclamation) is the entity responsible for implementing the LCR MSCP over the 50-year term of the program. A Steering Committee currently consisting of 54 entities has been formed, as described in the *LCR MSCP Funding and Management Agreement*, to provide input and oversight functions to support LCR MSCP implementation.

Development of honey mesquite and cottonwood-willow on Cibola NWR will be undertaken by Reclamation as part of the LCR MSCP HCP and the California Endangered Species Act (CESA) Incidental Take Permit No. 2081-2005-008-06 (Permit). The overall goal for the Shark's Tooth Conservation Area is to develop and maintain as much honey mesquite habitat as practical and stringers of cottonwood-willow that will contribute to the habitat objectives for covered species outlined in the LCR MSCP HCP and CESA Permit.

Purpose

This document serves as the initial guide for the creation and maintenance of the Shark's Tooth Conservation Area, which will continue to evolve through an adaptive management program

described in this plan. Subsequent documents will provide detailed information for each proposed phase and identify the annual development of land cover types on the property.

The intent is to create honey mesquite habitat type III that will be managed for the vermilion flycatcher (*Pyrocephalus rubinus*) and other species covered under the LCR MSCP HCP. The creation of habitat includes both the establishment of native plants and the management of the vegetation and its structural type to meet performance standards.

This plan provides management options for habitats for covered species in Reach 4, described in the LCR MCSP HCP habitat objectives and the CESA Permit. The plan provides habitat restoration design and management methods, including construction (planning and design), monitoring, research, and reporting incorporated within an adaptive management process. Through the adaptive management process, data from monitoring and research results will be integrated into the plan and implemented to provide for future successful habitat restoration and objectives.

Location/Description

The Shark's Tooth Conservation Area consists of approximately 550 acres on Cibola NWR, located in California between river miles 95 and 97 (Figure 1). The initial partnership for the Shark's Tooth Conservation Area includes Reclamation and the U.S. Fish and Wildlife Service (USFWS), Cibola NWR.

The description of this area is as follows:

Township 10 South, Range 21 East, Imperial County, California.

The property lies east of the PVID irrigation main drain, west of the Colorado River, south of active agricultural lands within the PVID, and north of Pretty Water (old river channel).

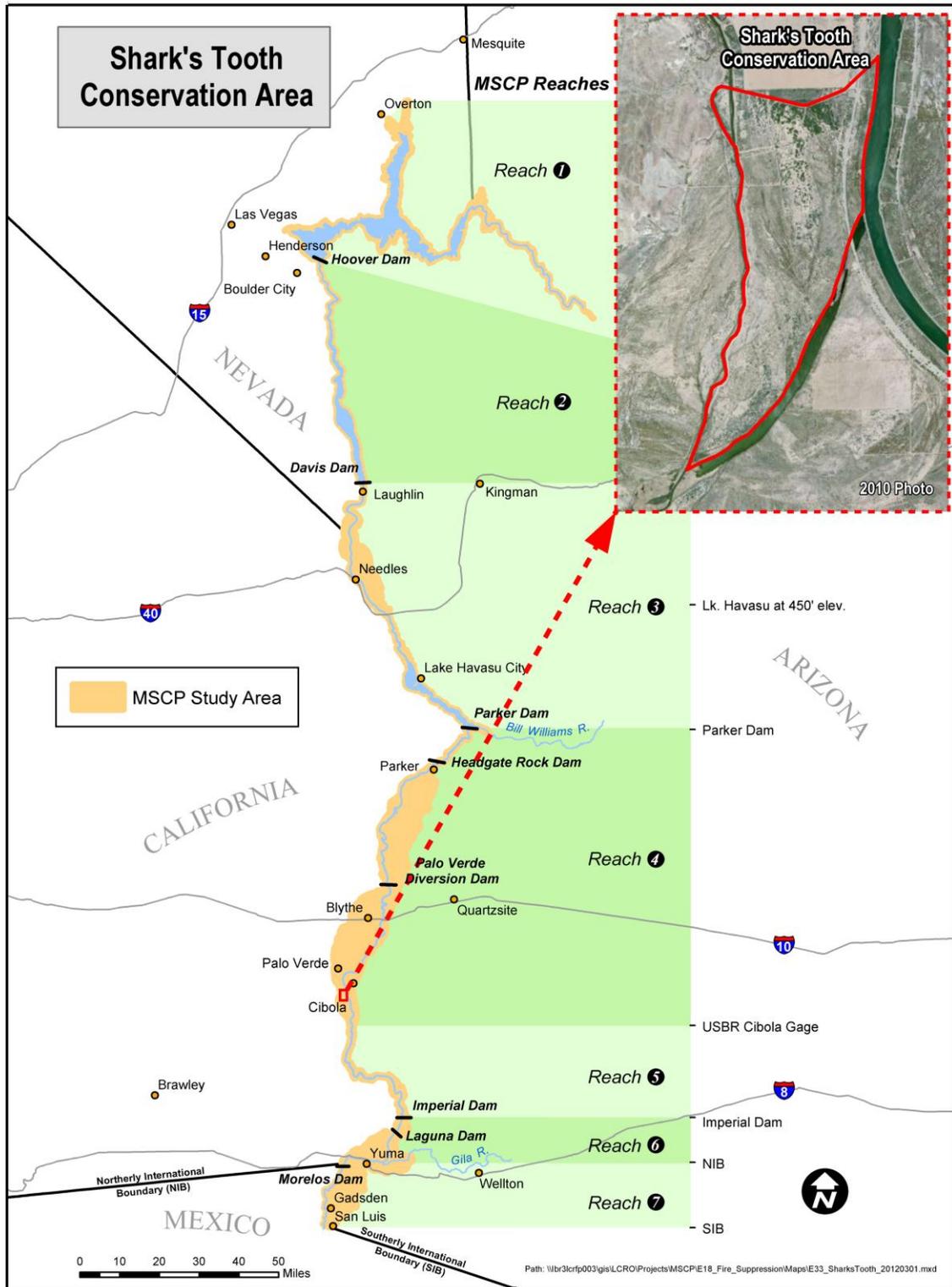


Figure 1. Location map for the Shark's Tooth Conservation Area.

Land Ownership

The property is owned by the USFWS, which will dedicate land to Reclamation to develop and maintain native honey mesquite land cover types and an area of cottonwood-willow for the LCR MSCP. The property will be owned and managed by the USFWS.

Water

Temporary use of Colorado River water to establish the mesquite is anticipated. The source of water and type of irrigation (either drip or flood irrigation) has not been determined. Options include pumping directly from the Colorado River, pumping from the Palo Verde main drain, or installation of a groundwater well. Due to the size of the project area, integrating this restoration project into the program will likely require phasing or development of the property over a number of years. For planning purposes, the project has been divided into six phases with approximately 100 acres developed each year. Cibola NWR does not hold an entitlement for the use of Colorado River water for use in California. However, the LCR MSCP water agreement, signed in March 2010, allows for the use of water on conservation areas where phreatophytes have been removed.

Agreement

A Land Use Agreement for restoration activities has been drafted and when finalized, will secure the availability of land and water resources for the 50-year term of the program. The agreement is typically signed by the USFWS Regional Office and at the complex level.

Restoration Development Plan

The LCR MSCP HCP goals include creation, development, and maintenance of riparian habitat conditions for 1,320 acres of honey mesquite type III. This restoration plan is intended to partially fulfill those commitments. The area will be managed for vermilion flycatcher and other species covered under the LCR MSCP HCP. The draft development plan generally will be used as a guide to create and manage honey mesquite type III and cottonwood-willow (Figure 2). The area will be designed and planted to create the presently known preferred conditions necessary for the covered species. As more specific information regarding habitat conditions for the covered species becomes known, that information will be incorporated into the design plans for future phases and/or incorporated into the management plan as appropriate through the adaptive management process. After completion of site-specific NEPA requirements, including a class III cultural survey, and the final planting design, clearing, contouring, grading, planting, and installation and maintenance of the irrigation system will be contracted.

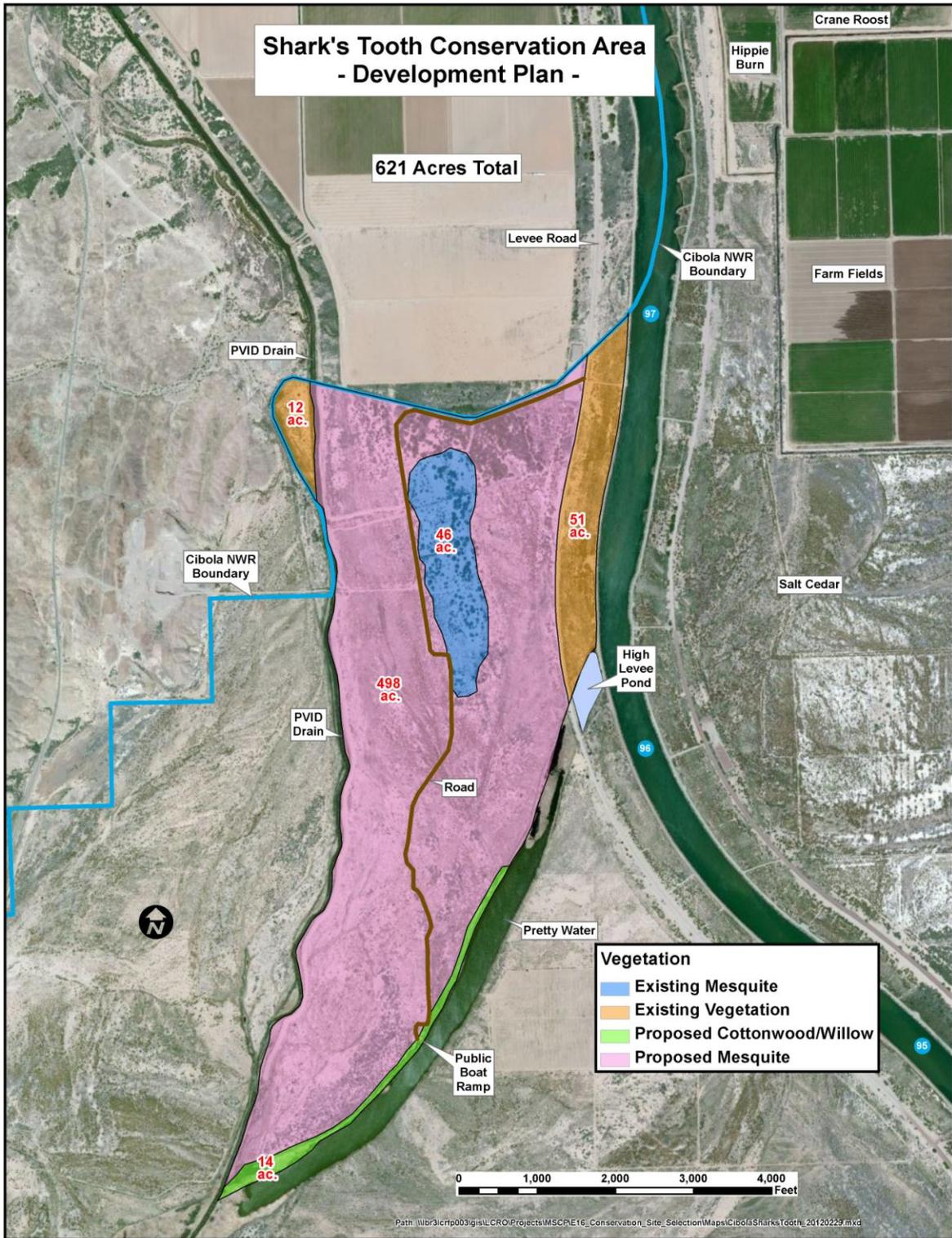


Figure 2. Shark's Tooth Conservation Area development map.

Planting Plan

The Planting Plan will incorporate native honey mesquite along the LCR into a mosaic of created habitats (Figure 3). Patch sizes of created habitats are designed and managed to provide habitat for more than one species as based on information in the LCR MSCP HCP and CESA Permit for each species. Open areas (low shrubs) will be incorporated into the design. By employing this approach, a diverse habitat is anticipated. Selective clearing of the site may or may not leave existing mesquite, depending on the condition of the mesquite. Each phase plan will include the specific plant species and estimated quantities that will be planted (Table 1).

Typically mesquite are planted 15-20 feet on center throughout a site. However, planting in clumps or patches is also an option and may help reduce irrigation costs. The cottonwood-willow area will be planted adjacent to the river bordering the southeastern portion of the area (Figure 4). Typically cottonwood and willow poles will be densely planted to the depth of the ground water.

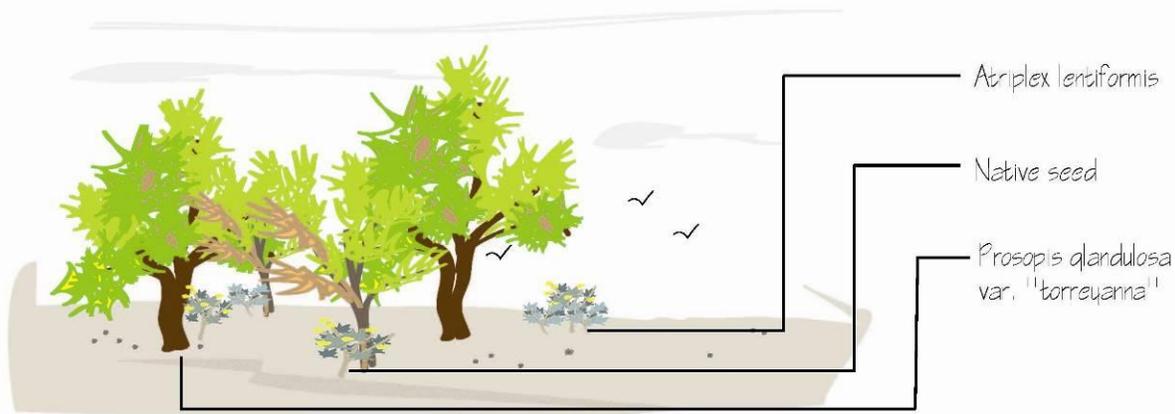


Figure 3. Mesquite and associated vegetation.

Table 1. Potential native plant species list.

Scientific Name	Common Name
<i>Prosopis glandulosa</i> v. <i>torreyanna</i>	Honey Mesquite
<i>Atriplex lentiformis</i>	Quailbush
<i>Atriplex canescens</i>	Fourwing Saltbush
<i>Atriplex polycarpa</i>	Cattle Saltbush
<i>Distichlis spicata</i>	Inland Saltgrass
<i>Encelia farinosa</i>	Brittlebush
<i>Populus fremontii</i>	Fremont Cottonwood
<i>Salix exigua</i>	Coyote willow
<i>Salix goodingii</i>	Gooding's willow

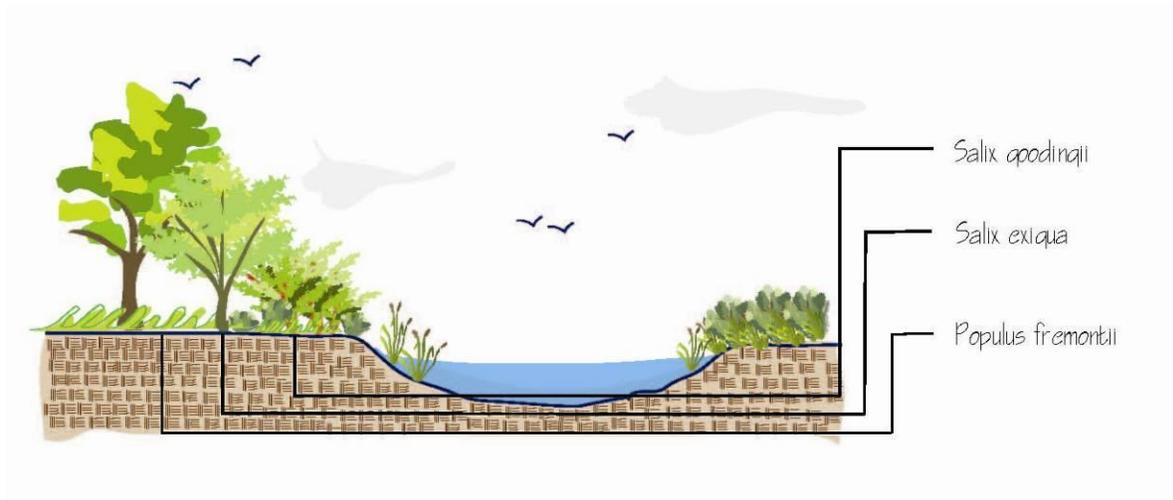


Figure 4. Cottonwood-willow adjacent to river.

Grading and Contouring

Currently, minimal vehicle access is available on the site. The design will incorporate access roads that will support a fire engine weighing approximately of 30,000 lbs, and are a minimum of 12-feet wide. Depending on the type of irrigation methods that will be used, minimal grading and contouring or laser leveling may be used. Furrows may be added if feasible and cost effective.

Planting Material/Planting Techniques

Plant material for the project will be collected from the LCR, Palo Verde Ecological Reserve nursery, or other established MSCP nurseries along the LCR, and from areas that are ecologically similar. Planting techniques that have proven successful include:

- Hand planting
- Deep pot planting
- Furrow planting
- Pole planting

Planting techniques may include a combination of the above or any planting techniques that have been researched or demonstrated to be successful and/or cost effective. The specific planting technique will be determined prior to implementation of the project and will address all phases of development.

Herbicide/Fertilizer/Pesticide Application

To maintain healthy stands of native honey mesquite species, the application of herbicides, fertilizer, or pesticides may be required. All herbicide, fertilizer, or pesticide will be applied or supervised by a current Certified Pesticide Applicator and in compliance with the rules, regulations, and laws set by the State of California, Imperial County, and Cibola NWR for approved herbicides. All records and associated chemical application documents will be stored by the land manager and will include:

- Training records of all employees handling pesticides and herbicides.
- Material Safety Data Sheets for all pesticides, herbicides, and fertilizers.
- Location map of herbicide and pesticide storage site.
- List of California, Imperial County, and Cibola NWR approved herbicide, pesticide, and fertilizers.
- Record of herbicide, pesticide, or fertilizer use.

Management Overview

Land Manager

Reclamation will be responsible for ensuring the long-term operation and maintenance of the Shark's Tooth Conservation Area throughout the 50-year term of the LCR MSCP. The details of operations and maintenance of the conservation area will be agreed upon between Reclamation and Cibola NWR to include soil, water, vegetation structure, law enforcement, public use, wildfire management, and research and monitoring. Each specific area will be addressed in the adaptive management section of the plan.

Soil Management

Because the Shark's Tooth Conservation Area site is located within the Colorado River floodplain, sands and silts have been deposited over time by numerous flood events. Several soil series and associations are found on the property, primarily Rositas fine sand and Gilman sandy loam. There are small areas (less than 4%) of Gadsen clay. Sand and sandy loam soils have a low water retention capacity and drain easily.

Water Management

Irrigation System

The primary water management at the conservation area may include drip irrigation, gated pipe, sprinkler or gated pipe in furrows, moisture enhancing products, or any combination of above

methods or new methods that may become available. Currently, the Shark's Tooth Conservation Area is adjacent to the main PVID drain canal. There are no outlet works or existing infrastructure available to supply the drip system or gated pipe; a pump would need to be installed to deliver water. It is anticipated that when the trees have reached the water table, the irrigation system will be removed.

Irrigation Practices

The irrigation system will be operated immediately after planting, and then a schedule will be set up based on the requirements of the site and trees. These schedules may be modified as needed. If moisture enhancing or moisture replacement products are used, the schedule would be determined by the manufacturer's guidelines. Irrigation is intended to be only for establishment; however, based on site conditions and results of future monitoring, supplemental watering on a short-term basis may be necessary in the future.

Woody Riparian Habitats

Created habitats will be managed to support honey mesquite type III and cottonwood-willow land cover type.

Law Enforcement

Cibola NWR will be responsible for law enforcement.

Public Use

Cibola NWR has the authority to regulate recreation uses. In cooperation with Reclamation, Cibola NWR will coordinate its public use and related activities so they are consistent with and do not adversely affect restoration activities at the Shark's Tooth Conservation Area. Current public use activities include hunting and fishing, including access via a graveled road and boat ramp, and low impact recreation. Those activities are expected to continue, although the road alignment may change to facilitate and manage access for the public, monitoring, and fire suppression.

Wildfire Management

As guided by commitments in the HCP (LCR MSCP 2004), wildfire management practices on Cibola NWR would:

- Reduce the risk of the loss of created habitat to wildfire by providing resources to suppress wildfires (e.g., contributing to and integrating with local, state, and Federal agency fire management plans).
- Implement land management and habitat creation measures to support the reestablishment of native vegetation that is lost to wildfire.

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 results will be used as part of the adaptive management process described in this report. Monitoring is structured into two main categories:

- Pre-development Monitoring
- Post-development Monitoring
 - Implementation Monitoring
 - Habitat Monitoring
 - Response Monitoring (Species Monitoring)

Pre-development Monitoring

Pre-development monitoring is designed to establish baseline data for evaluating post-development and to identify whether covered species inhabit the site 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
 - Pre-development soil samples will be taken as conditions warrant to determine texture, salinity, and nutrients.
- Biotic Monitoring
 - Vegetation
 - General vegetation monitoring will include Ohmart and Anderson classifications for the entire pre-development area using aerial photos followed by ground-truthing.
 - A checklist of perennial plant species for the pre-development area will be developed. Non-random vegetation surveys will be conducted in 10-m by 10-m plots within survey areas and/or along transects established for LCR MSCP covered species groups (i.e., bats, rodents, birds).
 - Avian
 - Marshbirds will not be monitored, as marsh habitat is not present and is not planned for development.
 - For all other avian species, a random sample of plots will be selected throughout the site, and a double sampling/area search method will be

conducted. This method involves a number of rapid area searches with a subset of intensive area searches that delineate breeding territories.

- Species-specific southwestern willow flycatcher pre-development surveys will not be conducted, as the required structure of riparian habitat is not present.
- Species-specific yellow-billed cuckoo pre-development surveys will not be conducted, as the required structure of riparian habitat is not present.
- Small Mammals
 - Cotton rats have been documented using other areas of Cibola NWR on the Arizona side of the river. If any appropriate ground cover habitat is found, presence/absence surveys utilizing a standardized protocol will be conducted. The number of traps will be determined by how much preferred habitat is present.
- Bats
 - Bats will be surveyed using Anabat detectors deployed for two-week sampling sessions once during the winter and once during the summer.
- Amphibians and Reptiles
 - Monitoring will not be conducted because the habitat is not suitable for any covered amphibian or reptile species.
- MacNeill's Sootywing Skipper
 - If present, appropriate habitat will be surveyed for this species using established methods.

Post-development Monitoring

Post-development monitoring will be implemented to assess the effectiveness of each habitat creation site and management activities in achieving the goals of the HCP. Post-development monitoring includes implementation monitoring and response monitoring components that allow each habitat creation site to achieve the target goals of the HCP through an adaptive management process (LCR MSCP 2007).

Implementation Monitoring

Implementation monitoring includes evaluating habitat characteristics and documenting success of habitat creation techniques. Implementation monitoring includes biotic and abiotic components. Habitat characteristics including soil moisture, plant community composition, plant community structure, and microclimate may be evaluated.

Habitat Monitoring

Habitat monitoring was designed to determine whether habitat creation sites are providing the habitat requirements (as defined by performance standards) needed for the targeted covered

species. Monitoring protocols have been developed and will document vegetation characteristics. The site will be monitored according to the LCR MSCP Habitat Monitoring Protocols for vegetation. The vegetation protocol uses a double sampling method with rapid and intensive plot design.

Rapid plots will be conducted to assess the goal of establishing honey mesquite land cover type (planting density per acre differs by phase). Permanent 10 m by 10 m plots (rapid plots) will be systematically placed (every 40 m) along random start transects created in ArcMap. Transects will run across the planting gradient with rapid plot borders at least 15 m from the phase borders. The rapid plots will be used for quick density assessments of target tree species.

Intensive plots will be conducted to address trends in density, species richness, vegetation structure, and microclimate. Permanent (intensive) plot locations will be randomly selected from the rapid point locations described above. The number of intensive plots per phase will depend on the size of the phase. The intensive plots will be nested plots of three sizes, including one primary plot of 10 m by 40 m (divided into four 10-m by 10-m quadrats), one secondary plot of 5 m by 15 m, and four tertiary plots of 0.5 m by 2 m, plus four transects radiating from the center of the primary plot in each cardinal direction.

The secondary plots will be nested in the center within the primary plots. The tertiary plots will be placed within the 10-m by 40-m plot along the long edges but outside of the 5-m by 15-m plot. GPS coordinates will be recorded at each marker using sub-meter accurate GPS units. The number of plots per phase is dependent on the size of the phase being monitored. Intensive plots (10 m by 40 m, 5 m by 15 m, or 0.5 m by 2 m) will be evaluated for overstory trees and intermediate story trees.

Response Monitoring (Species Monitoring)

Species monitoring is designed to determine whether the honey mesquite type III and cottonwood-willow land cover is providing the habitat requirements (as defined by performance standards) needed for the targeted covered species. Species monitoring will also document whether any other species are using the created habitat. Monitoring protocols have been developed for documenting species response to created land cover types:

- MacNeill's Sootywing Skipper
 - If quailbush is planted, quailbush 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.
- Neotropical Birds
 - A standardized, double-sampling, rapid-intensive, area search survey will be employed. Surveys will be conducted annually during the breeding season (April-June) beginning the second week of April after planting. If covered species are observed, 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.
 - Gila woodpeckers and gilded flickers may be detected in area searches and the habitat will be monitored to determine when the site has matured enough to be suitable for woodpeckers. Once the appropriate habitat is present, species-specific surveys will be conducted.
- Small Mammals
 - Post-development monitoring will be conducted for presence of cotton rats if appropriate habitat is found. 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
 - Bats will be surveyed using Anabat detectors deployed for two-week sampling sessions once during the winter and once during the summer.

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). 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 the covered species using the best available science throughout the term of the HCP.

Monitoring Analysis and Evaluation

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. The performance standards are the limiting factors to be considered covered species habitat in accordance to the current knowledge. Created habitats are not anticipated to be managed at these standards but at a higher standard. In order to more effectively and efficiently manage created habitats, sites will be designed to a higher habitat quality standard and monitored over time to see whether habitat quality decreases as the sites change.

Recommendations

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 other phase 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.

Reports

Annual Report

An annual report will be prepared by Reclamation and made available each calendar year summarizing the following:

- General description of the project status and the effects on covered species.
- A description of all restoration activities and monitoring actions conducted over the past year.

- A summary of monitoring and research activities over the past year.
- Results and analyses of monitoring and research data.
- An assessment of the effectiveness of each mitigation measure in minimizing and compensating for project impacts.
- The total number of acres planted.
- The total number of acreage that meets or exceeds the performance standards.
- Any other applicable information.

Final Report

A final report will be prepared by Reclamation and submitted no later than 180 days after the completion of all mitigation measures. The final report is anticipated in 2055 and will include the following information:

- A copy of the table in the MMRP with notes showing when each mitigation measure was implemented.
- All available information regarding project-related incidental take of covered species.
- Information regarding other project impacts on the covered species in the permit.
- An assessment of effectiveness of the permit's conditions of approval for minimizing and compensating for project impacts.
- Recommendations on how mitigation measures might be changed to more effectively minimize and mitigate the impacts of future projects on the species.
- Any other applicable information.

Literature Cited

Lower Colorado River Multi-Species Conservation Program. 2004. Lower Colorado River Multi-Species Conservation Program, Volume II: Habitat Conservation Plan. Final. December 17. (J&S 00450.00) Sacramento, CA.

Lower Colorado River Multi-Species Conservation Program. 2007. Final Science Strategy. Bureau of Reclamation, Lower Colorado River Multi-Species Conservation Program, Boulder City, Nevada.