Lower Colorado River Multi-Species Conservation Program

Balancing Resource Use and Conservation

Planet Ranch
Restoration Development and Monitoring Plan

April 2019

Work conducted under LCR MSCP Work Task E21

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
City of Bullhead City
City of Lake Havasu City
City of Mesa
City of Somerton
City of Yuma
Electrical District No. 3, Pinal County, Arizona
Golden Shores Water Conservation District
Mohave County Water Authority
Mohave Valley Irrigation and Drainage District
Mohave Water Conservation District
North Gila Valley Irrigation and Drainage District
Town of Fredonia
Town of Thatcher
Town of Wickenburg
Salt River Project Agricultural Improvement and Power District
Unit "B" Irrigation and Drainage District
Wellton-Mohawk Irrigation and Drainage District
Yuma County Water Users' Association
Yuma Irrigation District
Yuma Mesa Irrigation and Drainage District

Other Interested Parties Participant Group

QuadState Local Governments Authority
Desert Wildlife Unlimited

California Participant Group

California Department of Fish and Wildlife
City of Needles
Coachella Valley Water District
Colorado River Board of California
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
Southern Nevada Water Authority
Colorado River Commission Power Users
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Native American Participant Group

Hualapai Tribe
Colorado River Indian Tribes
Chemehuevi Indian Tribe

Conservation Participant Group

Ducks Unlimited
Lower Colorado River RC&D Area, Inc.
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Lower Colorado River
Multi-Species Conservation Program

Planet Ranch
Restoration Development and Monitoring Plan

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April 2019

Brooks, J., J. Stolberg, C. Ronning, and B. Blasius. 2019. Planet Ranch Restoration Development and Monitoring Plan. Lower Colorado River Multi-Species Conservation Program, Bureau of Reclamation, Boulder City, Nevada.

ACRONYMS AND ABBREVIATIONS

AGFC	Arizona Game and Fish Commission
Bill Williams River NWR	Bill Williams River National Wildlife Refuge
BLM	Bureau of Land Management
Habitat Area	Lower Colorado River Multi-Species Conservation Program Planet Ranch Habitat Area
HCP	Habitat Conservation Plan
LCR	lower Colorado River
LCR MSCP	Lower Colorado River Multi-Species Conservation Program
lidar	light detection and ranging
mL	milliliter(s)
pH	a measure of hydrogen ion concentration (the acidity or alkalinity of a solution)
PIT	passive integrated transponder
Reclamation	Bureau of Reclamation
USFWS	U.S. Fish and Wildlife Service

Symbols

µm	micrometer(s)
#	number

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1.0 INTRODUCTION

The Lower Colorado River Multi-Species Conservation Program (LCR MSCP) is a multi-stakeholder Federal and non-Federal partnership 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.

The LCR MSCP is a long-term (50-year) plan consisting of conservation measures that provide protection along the LCR from Lake Mead to the Southerly International Boundary with Mexico for 27 species that are currently threatened or endangered or may become listed over the life of the program. In addition, five other species have research and monitoring measures that must be completed so they may be covered under the program in the future if necessary. The LCR MSCP anticipates development and/or protection of a minimum of 8,132 acres of habitat consisting of a mosaic of Fremont cottonwood-Goodding's willow (*Populus fremontii-Salix gooddingii*) (hereafter cottonwood-willow), honey mesquite *(Prosopis glandulosa*), marsh, and backwater components. The program uses adaptive management principles to research and monitor species and habitats as well as to enhance management actions and science applications over the life of the program.

Planet Ranch encompasses 3,418 acres of land within Reach 3 of the LCR MSCP planning area (figure 1). A lease agreement (Contract No. 09-70-30-L0704) between the Bureau of Reclamation (Reclamation) and the Byner Cattle Company for Planet Ranch was signed in 2015. After the property was donated to the Arizona Game and Fish Commission (AGFC), a subsequent Lease Agreement Amendment #1 was signed in 2016 between the AGFC (the new land owner) and Reclamation. The lease amendment split management responsibilities for the property: Reclamation will manage the area west of the main access road that runs through the property. This area, plus two sections that lie east of the road that were reserved for LCR MSCP purposes (Reserved Areas), are designated as the LCR MSCP Planet Ranch Habitat Area (Habitat Area). The AGFC will manage the area east of the road that has not been designated as part of the Habitat Area. The Habitat Area would be developed for LCR MSCP covered species and includes the active river channel. Portions of Planet Ranch not included in the Habitat Area will be managed for AGFC priorities as long as the priorities are compatible with LCR MSCP purposes. Reclamation and the AGFC will consult on compatible uses of the entire property. The two Reserved Areas east of the main access road may be used by Reclamation to further support LCR MSCP restoration goals in the future. This development plan outlines the preliminary concept, project parameters, and monitoring activities for the development of the Habitat Area.

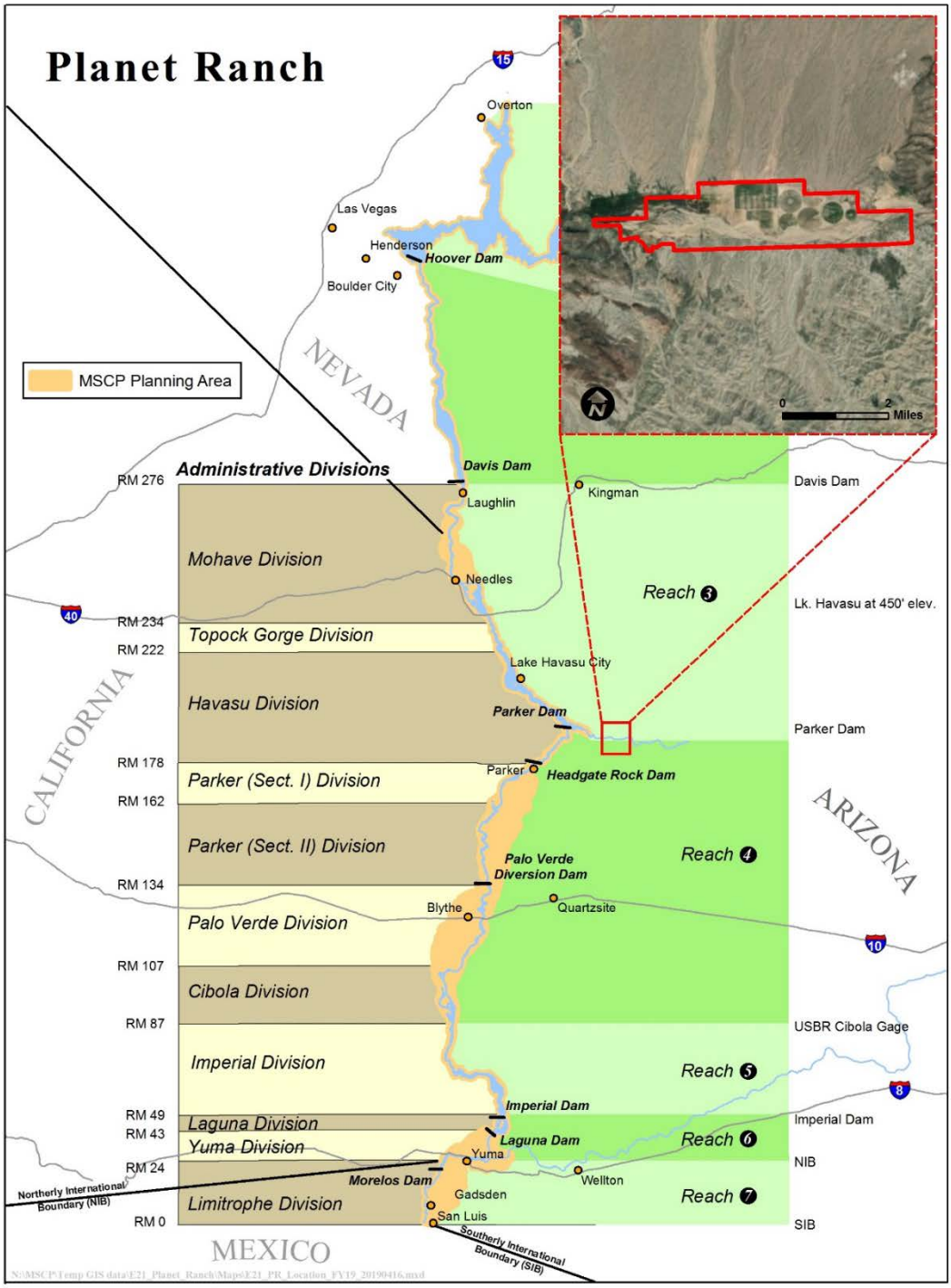

Figure 1.—LCR MSCP planning area location map.

1.1 Purpose

The purpose of this development plan is to guide the creation of a mosaic of two land cover types within the Habitat Area as described in the LCR MSCP Habitat Conservation Plan (HCP): disconnected backwaters and cottonwood-willow. The primary construction component within the Habitat Area is a series of disconnected backwaters, totaling 60 acres, which would be managed for native fishes, specifically bonytail (*Gila elegans*) and razorback suckers (*Xyrauchen texanus).* The HCP (LCR MSCP 2004) prioritizes disconnected backwaters and states:

> *Backwaters that are disconnected from the LCR channel are of considerably higher value to razorback sucker and bonytail than connected backwaters in the LCR and are the preferred type of backwater to achieve the LCR MSCP conservation goals for these species.*

Within the constructed backwaters, some marsh plants will be established as cover for native fishes. Adjacent to the ponds, cottonwood-willow and honey mesquite would be planted. Also, as a result of the land acquisition and sever and transfer of water rights, this project will protect 396 acres of covered species habitat along a section of the downstream river corridor within the Bill Williams River National Wildlife Refuge (Bill Williams River NWR). Credible acreage within the Habitat Area of Planet Ranch will include (1) active restoration of all four land cover types within the property boundary, (2) passive restoration within the active Bill Williams River channel on the property, and (3) downstream credit on the Bill Williams River NWR.

1.2 Location and Description

Planet Ranch is located along the Bill Williams River approximately 20 miles northeast of Parker, Arizona, in Reach 3 of the LCR MSCP planning area. Planet Ranch is adjacent to the Bill Williams River NWR, just upstream of the western boundary of the refuge along the Bill Williams River. The Bill Williams River is the county border between La Paz County to the south and Mohave County to the north; therefore, Planet Ranch is located in both counties.

Planet Ranch is the site of past farming operations. At one point, approximately 2,400 acres of alfalfa (*Medicago sativa*) were grown on the ranch. Planet Ranch encompasses approximately 3,418 acres of land and includes approximately 1,000 acres of alfalfa being grown as pasture. Farming operations are expected to cease in December 2017. Structures and houses were built on the south side of the Bill Williams River by previous owners in what is now the Habitat Area (figure 2) to support farm workers in the past. Residential housing and structures still exist and will be used by the LCR MSCP.

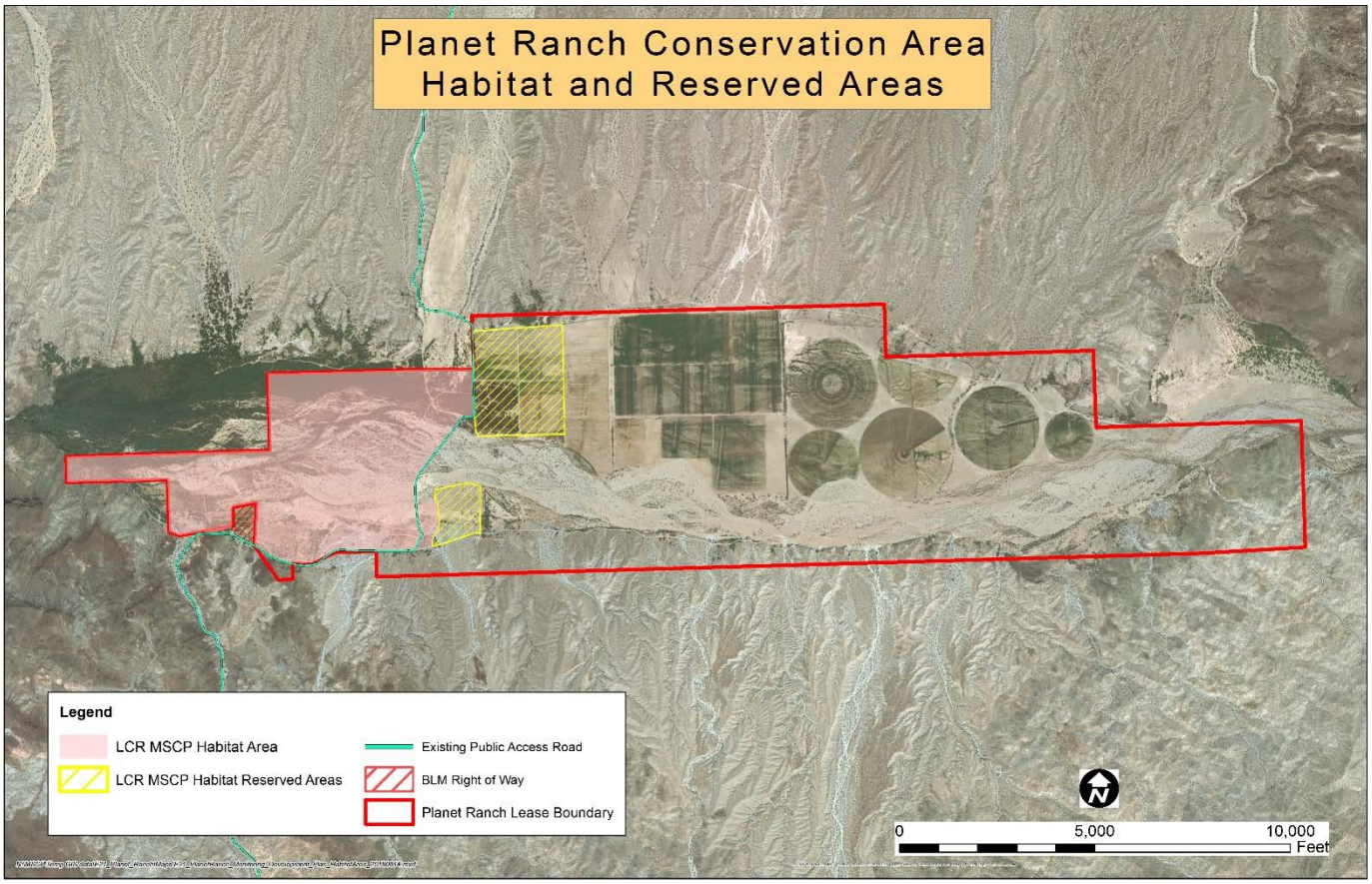

Figure 2.—Habitat Area.

1.3 Landownership

On April 22, 2015, the LCR MSCP Steering Committee approved Program Decision Document 15-002, which authorized Reclamation to enter into a long-term lease with the Byner Cattle Company (a subsidiary of the Freeport Minerals Corporation to secure approximately 3,418 acres of land and 5,549 acre-feet of water per year for $8,300,000. The lease value was determined through the Federal appraisal process. After the lease was enacted, the property was donated by the Freeport Minerals Corporation to the AGFC, who is now the landowner.

A small portion of the Habitat Area is on Federal Land managed by the Bureau of Land Management (BLM), as shown on figure 3, and will be managed by Reclamation under a right-of-way with the BLM.

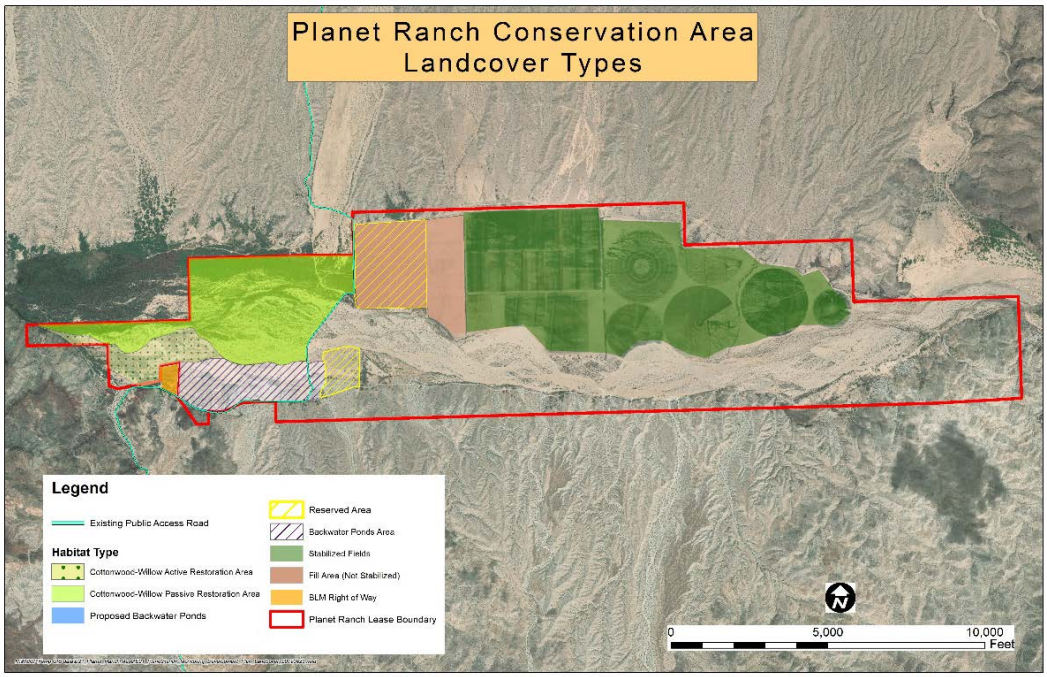

Figure 3.—Conservation area site plan.

1.4 Water

The lease Reclamation has acquired includes a water entitlement of 5,549 acre-feet. This entitlement must be put to beneficial use in its entirety over 1 year throughout a rolling 5-year period to secure the water right. As a result of the sever and transfer of water rights, the uses of the water rights was changed for LCR MSCP purposes. Purposes were defined as irrigation of agricultural fields and habitat creation, restoration, and maintenance uses for the benefit of fish and wildlife resources.

Prior to construction of habitat on Planet Ranch, the water right was secured by growing alfalfa from December 15, 2015, through December 15, 2017. After the alfalfa farming operation was discontinued in December 2017, the water entitlement will be used strictly to establish and maintain habitat within the Habitat Area.

New groundwater wells and pumps will be used to demonstrate a beneficial use of the water by providing freshwater to the backwater ponds and other managed riparian habitats within Planet Ranch. The ponds will be operated as a flow-through system; therefore, excess water will be diverted into riparian communities located on the property. This water will support the existing native cottonwood and willow plant populations. Water usage will be recorded by Reclamation on an annual basis.

1.5 Agreements

The lease agreement (Contract No. 09-70-30-L0704) between Reclamation and the Byner Cattle Company for Planet Ranch was signed in 2015. After the property was donated to the AGFC, a subsequent Lease Amendment #1 was signed in 2016 between the AGFC and Reclamation. The lease amendment split management responsibilities for the property: Reclamation will manage the area of the property that is primarily west of the river crossing (see figure 3). Access to the Habitat Area is restricted to uses compatible with LCR MSCP purposes, including restricted motorized vehicle use and fishing, hunting, and trapping opportunities. In addition, two Reserved Areas east of the main access road will be used by Reclamation to further support the LCR MSCP habitat restoration goals in the future. Public vehicular access is on the main access road between the north and south gates, and other roads, east of the river crossing, as determined by the AGFC after consultation with Reclamation.

Reclamation has entered into a right-of-way with the BLM to utilize the BLM managed ground, shown on figure 2, as part of the conservation area. A portion of the disconnected backwaters are being built on these lands and managed for native fishes.

2.0 RESTORATION AND DEVELOPMENT PLAN

Development of Planet Ranch involves five discrete actions: (1) construction of disconnected backwaters, (2) active restoration of riparian areas, (3) passive restoration of riparian areas in the active river channel, (4) stabilization of agricultural fields, and (5) protection of the middle portion of an existing stand of cottonwood-willow on the Bill Williams River NWR. The five actions collectively make up the development of Planet Ranch and may be creditable to the program, but the approach for restoration and level of management differ on each area; therefore, each area is discussed independently. These actions will occur as shown on the Planet Ranch land cover types (see figure 3) and downstream on the Bill Williams River NWR.

2.1 Construction of Disconnected Backwaters

A major component of this project is the creation and management of a series of disconnected backwaters managed for native fishes. The backwaters will be physically disconnected from the Bill Williams River to eliminate the introduction of non-native, predatory fishes through surface water exchange.

The creation of four large disconnected backwaters, ranging in size from 6 to 20 acres, are expected to provide a total of 60 acres of the backwater land cover type to the program (figure 4).

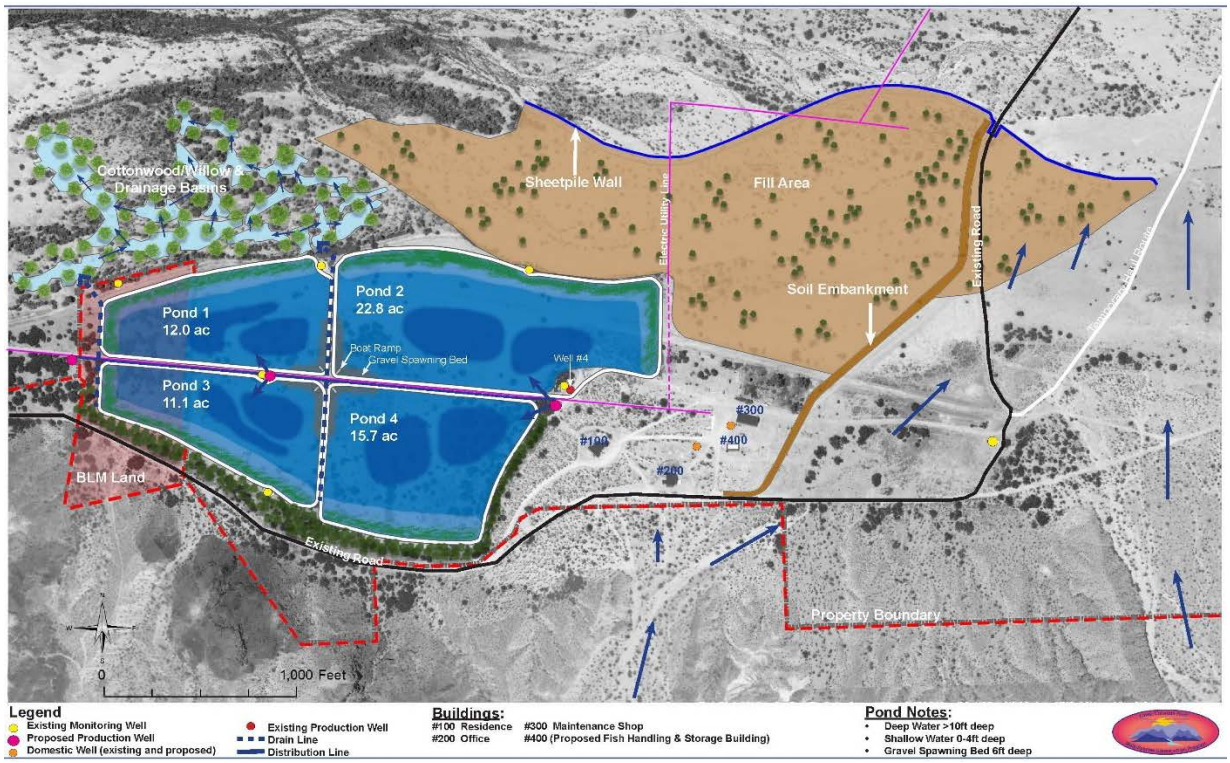

Figure 4.—Disconnected backwater conceptual design plan.

2.1.1 Concept

The backwater ponds would be excavated and the material transported to former agricultural fields south of the Bill Williams River. Depth to the groundwater table varies and is typically deeper than 10 feet below the surface in the areas where the ponds are sited. After flooding from the Bill Williams River occurs, which is very infrequent during drought years, groundwater levels could reach the surface. These are short-lived events that do not maintain an elevated water table. The depth to groundwater is too deep and variable at Planet Ranch for unlined ponds; therefore, groundwater cannot be relied upon to maintain the water levels necessary to support fishes. However, if the existing silty sand material is compacted, infiltration testing indicates that leakage would be reduced to an acceptable rate. The ponds have been designed to use the compacted native soils as a liner to retain water that would be pumped in and otherwise be lost to seepage. The use of native soils will allow for aquatic plant establishment and will provide substrate that would support a sustainable self-generating food supply for the fishes when the ponds are full of water.

Any excavated material that is not used onsite as part of the ponds' construction will be transported to the agricultural fields across the river and used to return topographic diversity to the area (see figure 3).

It is imperative that the ponds be protected from releases from Alamo Dam and flooding from tributaries. Hydrologic and hydraulic modeling is being developed to assist in the design and construction of the flood protection structures. Different materials are planned to be used to accomplish this. A combination of sheet piling, sand, rock, and cement may be used to prevent erosion and to protect the ponds from any inundation from flood waters.

Two new production wells would be installed to deliver filtered groundwater into the backwaters. Two separate and smaller test wells may also be developed next to the production wells, which would be used to pump smaller volumes of water to the ponds if needed.

Marsh species will be planted in the shallow portions of the backwater, mostly around the pond edges, to provide cover for native fish. Native rushes and grasses would be used to create marsh within the disconnected backwater habitat.

Native fish will be brought in and stocked on a regular basis. The goal of creating the disconnected backwater is to allow fishes to live out their lives free from predation of non-native fishes and to complete their life cycle. The LCR MSCP would manage and track the populations, health, and genetics of the fish species.

2.1.2 Flood Protection

Hydrologic modeling of the groundwater and surface flows in the Bill Williams River has been completed. The surface water model addresses both releases from Alamo Dam as well as stormwater from adjacent washes. The maximum flood release possible from Alamo Dam is 7,000 cubic feet per second. Eleven groundwater wells were installed, and 10 have been instrumented with depth sounder data loggers, which have provided current groundwater depth measurements. One additional existing well was also instrumented. Historical well data from the network of existing monitoring wells on the property were also utilized to inform groundwater hydrologic modeling analyses. These data will be used to inform the design of the ponds and a flood protection barrier on the south bank of the Bill Williams River at Planet Ranch. Such a barrier would be required to prevent flooding of the ponds during any future flood events associated with releases from Alamo Dam or other large stormwater events. Vinyl sheet pile is being evaluated as a material to be used along the southern bank of the Bill Williams River to prevent any bank line erosion due to scour or inundation by flood waters. Earthen berms, rock, geotechnical materials, or soil cement may also be used to prevent flooding or inundation of the ponds caused by stormwater flows from the hills south of the ponds.

Soil samples were also collected as part of the groundwater monitoring well installations and analyzed to help determine the geotechnical requirements for slope stability of the ponds and composition of the soil strata. Future soil samples and testing are expected either prior to or during construction activities.

2.1.3 Clearing of Vegetation

The initial phase will be clearing of vegetation, mostly honey mesquite and arrowweed (*Pluchea sericea*), from the footprint of the backwater ponds area. This effort is typically performed with bulldozers and other heavy equipment. Cleared vegetation will remain onsite and incorporated into the landscape. Wherever feasible, native vegetation will be left in place.

2.1.4 Backwater Construction and Fencing

After clearing of the vegetation, land-based equipment will be used to excavate the soil down to the appropriate depths of each pond. This effort will be performed by excavators, bulldozers, graders, and dump trucks or similar equipment. The ponds will be contoured, terraced, and graded to include deeper pools and shallower areas to provide variable depth habitat areas and spawning areas. Excavated soil will be used as fill within the Habitat Area as much as possible. The excavated material will be used to elevate the footprint of the ponds and contoured to a total depth of 12 feet in the deepest areas. Additional fill material that cannot be used or placed within the Habitat Area will be deposited in agricultural fields in the northeastern portion of the property as necessary (see figure 3). It is possible that pipes or other fabricated materials may be installed within the ponds to provide cover for fishes. Four refugia ponds, totaling 60 acres as outlined on figure 4, are anticipated to be constructed.

Based on refugia depth and acreage, it is calculated that approximately 1.0 million cubic yards of material would be excavated and transported to the agricultural fields north of the river and used to return topographic diversity the area. Estimated quantities will be refined upon finalization of the backwater designs. After review and approval of this development plan, detailed site plans, permitting, and preparation of construction drawings will be initiated. Upon completion of these tasks, construction of the backwater complex will commence and is anticipated to occur over a 18–24 month period due to the size and complexity of the project.

Monitoring of native fishes within the refugia ponds is discussed in section 4.1 and is consistent with other disconnected backwaters created under the LCR MSCP. Management of the ponds aims to provide refugia for endangered native fishes over the life of the program.

Due to the presence of burros (*Equus asinus*) at Planet Ranch, the ponds would need to be fenced to exclude them so any risk of damage to the ponds and their infrastructure would be eliminated. Cattle guards may be used at access road gate locations to prevent entry of burros if a gate is left open. Different types of fencing have been suggested and considered, and steel post and rail fencing is the preferred fencing material. The fencing should exclude burros, can be repaired easily, and it can be modified if desired.

2.1.5 Backwater Planting

The planting design and plant quantities will be refined following finalization of site design to address changes in anticipated acreage. The backwater will incorporate native marsh, riparian, and upland species into a mosaic of created land cover types wherever possible (figure 5). In the backwaters, tall and short emergent marsh species will be planted along the bank lines to provide cover, mostly for juvenile fishes. A mix of cottonwood-willow and honey mesquite will be established in adjacent areas. The final planting plan will be prepared during construction and revised based on the placement of fill, final contours, and other factors.

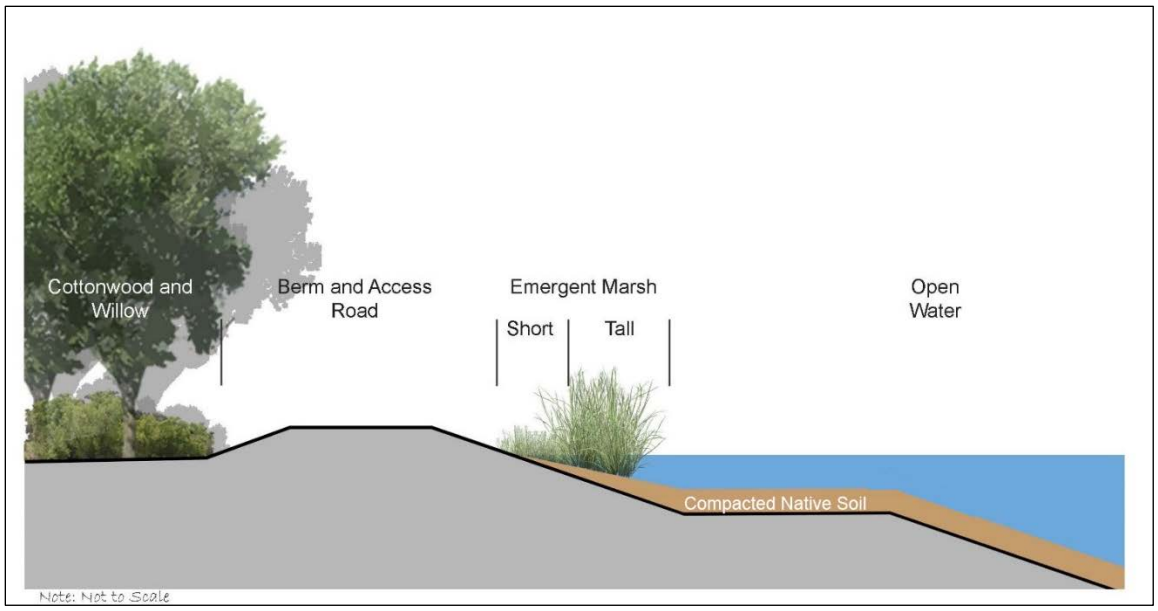

Figure 5.—Typical marsh or backwater planting plan with liner.

2.1.5.1 Marsh

California bulrush (*Schoenoplectus californicus*) is typically planted 3 feet inline spacing with rows 40 inches apart, planted first in the deeper water areas. Chairmaker's bulrush (*Schoenoplectus americanus*) (formerly known as *Scirpus americanus*) is also typically planted 3 feet inline spacing with rows 40 inches apart in shallow margins of ponds.

2.1.5.2 Riparian

Saltgrass (*Distichlis spicata*) is typically planted 1 foot inline spacing with rows 24 inches apart. For high-density riparian areas, coyote willows (*Salix exigua*), Goodding's willows, and Fremont cottonwoods are typically planted 6 feet inline spacing with rows 40 inches apart using a mass transplanter. For low-density riparian areas, plants are spaced 20 feet on-center and are typically hand planted.

One-gallon honey mesquite trees are either typically hand planted 15–40 feet on center or approximately 22 feet inline spacing and 20 feet apart in more upland areas.

Both riparian and upland trees will be planted away from the pond edges and mostly around the perimeter at a safe distance of the ponds to avoid any possible damage to the pond liners by tree roots. Tree roots may puncture or tear the material if allowed to come into contact with the liner.

2.2 Active Restoration of Cottonwood-Willow

2.2.1 Concept

The area identified on figure 3 as "Cottonwood-Willow Active Restoration Area" (86 acres) has substantial cottonwood-willow growing in it currently. Water drainage from the ponds will be directed into this area via pipes and onto the ground surface on a continuous basis. The water is expected to infiltrate down into the ground quickly in the sandy soils that are present in this area. By doing so, the water from the ponds will create moist soils and encourage the expansion of the existing riparian habitat naturally.

Most of this area will also be protected from flooding of the Bill Williams River through the installation of a flood protection barrier, thereby preventing the active river channel from migrating south into this Habitat Area. The riparian trees growing in this area will be "actively" managed. Active management could include planting (either mass transplanting or by hand) and habitat manipulation. Invasive plant species management practices that target invasive plants such as saltcedar (T*amarix* spp.) may be required. Such practices may require the use of herbicides or mechanical removal.

The acreage of cottonwood-willow riparian habitat within this active restoration area would be relatively static and is expected to cover as much as 86 acres of land (see figure 3). Other areas within the Habitat Area that are expected to support cottonwood-willow habitat would likely continue to support honey mesquite and other native upland species.

2.3 Passive Restoration of Cottonwood-Willow

2.3.1 Concept

The area identified on figure 3 as "Cottonwood-Willow Passive Restoration Area" (393 acres) has substantial cottonwood-willow habitat growing in it in addition to some marsh habitat. Water from the ponds will not be used to support this area of cottonwood-willow. This area will also have no protection from flooding from the Bill Williams River, as it is in the active river channel.

Since the area will not be irrigated or protected from flooding, the area is considered "passively" managed. The LCR MSCP may clear ground or even plant native riparian plant species to help the recovery of the riparian forest if, for example, a large flood release from Alamo Dam causes significant damage to the habitat in this area or some other event occurs that would require more temporary active management activities. The acreage of cottonwood-willow would be highly dynamic and would not exceed 393 acres.

2.4 Stabilization of Agricultural Fields

2.4.1 Concept

Placement of material in the agricultural fields would be contoured where necessary to allow for any stormwater coming from the washes north of the fields to flow through naturally and unimpeded, and to increase the topographic diversity in this area. Approximately 450 acres of the agricultural fields would be used for placement of the excavated material. It is anticipated that 300,000–400,000 cubic yards of material would be placed in this area, which includes land in the northern Reserved Area (see figure 2). Allowances would be made for thickness to account for the areas where stormwater drainage is required, and no fill would be placed. If the material was placed equally across the 450-acre area, the depth of the material would average approximately 6 inches.

Fill material may be stockpiled at the lower end of the fields and would be accessible if required elsewhere on the property in the future. Honey mesquite may also be sparingly planted. No additional irrigation would be used on the fill material after the initial establishment phase. The AGFC will provide input on the seed and/or plant mix to be used to stabilize the fill material. Areas north of the river that were farmed have been stabilized through natural recruitment over the past 2 years and will not be receiving any fill material.

2.5 Protection of the Middle Portion of the Bill Williams River NWR

2.5.1 Concept

The Middle Portion of cottonwood-willow shown on figure 6 on the Bill Williams River NWR was protected, and 396 acres of cottonwood-willow became creditable to the LCR MSCP when the lease was signed and the ranch was donated to the AGFC.

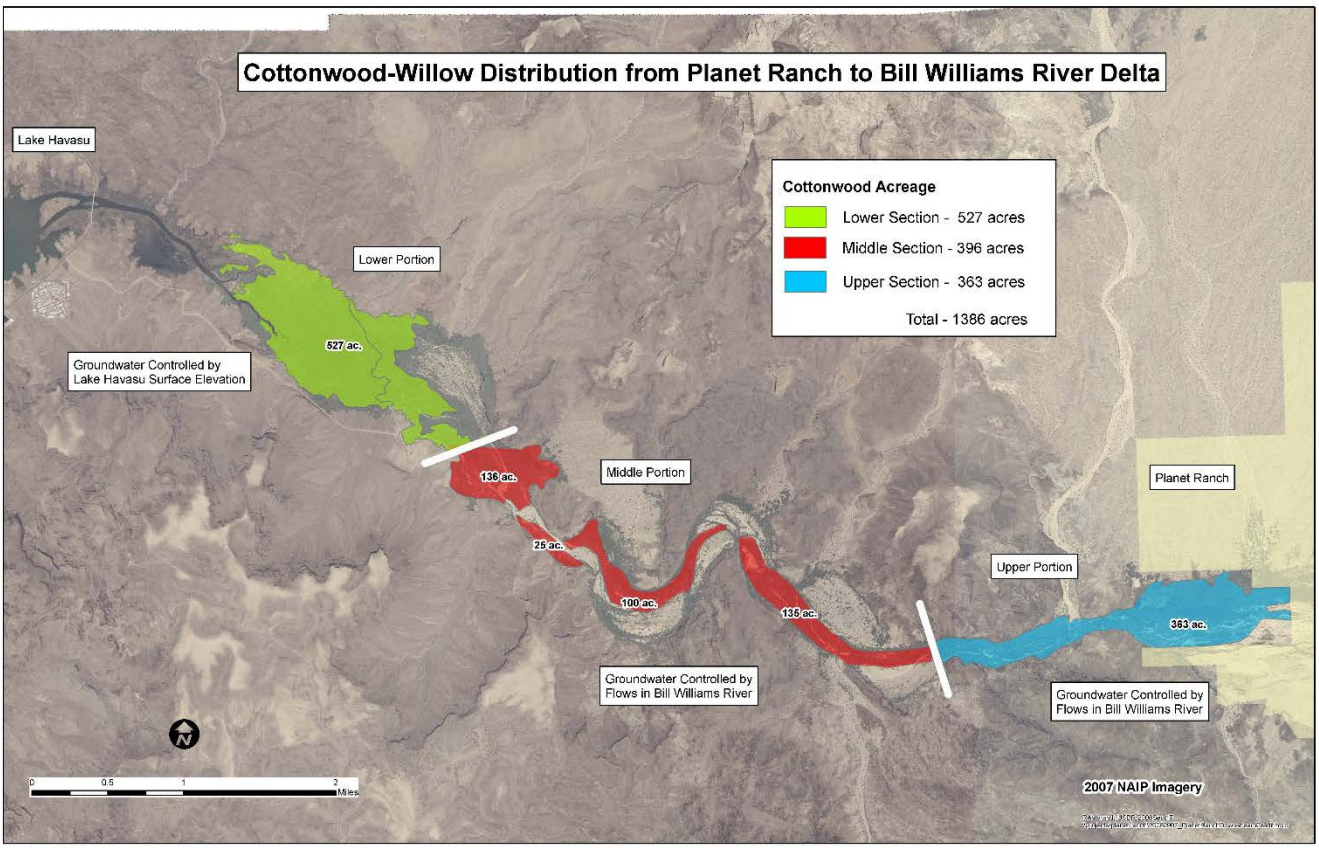

Figure 6.—Downstream cottonwood-willow habitat creditable acreage.

All cottonwood-willow would be "passively" managed in this area. LCR MSCP may clear and/or plant cottonwood-willow if a flood release from Alamo Dam is anticipated and the need to clear and/or plant is determined to be necessary by both the U.S. Fish and Wildlife Service (USFWS) and LCR MSCP. The LCR MSCP is committed to working with the USFWS to maintain or replace the existing cottonwood-willow in this area, and any such management activities would be coordinated with the USFWS as necessary. Any replacement of cottonwood-willow in this area would occur during a planned release from Alamo Dam and not through the establishment of additional infrastructure.

2.6 Improvements

2.6.1 Existing Facilities

The LCR MSCP will be utilizing existing facilities on Planet Ranch, which includes two houses, a maintenance building (figures 7–9), and utility services. Any new infrastructure is the responsibility of the LCR MSCP. The primary uses for the houses and the maintenance building are to support the LCR MSCP habitat management activities. Future maintenance activities, including installing new septic systems at the houses or replacing the existing domestic well, would be the responsibility of the LCR MSCP.

Figure 7.—Existing house (building #100).

2.6.2 Farm Equipment

Farm equipment used to grow alfalfa have been removed. The groundwater pumps, electrical control boxes, and flow meters were removed by the LCR MSCP and will be reused whenever possible. Irrigation systems, side rolls, and center pivots have been removed by the AGFC.

2.6.3 Future Facilities

Future infrastructure development within the Habitat Area or existing building areas may be necessary as the LCR MSCP's management needs change over time. Such development could include new equipment storage areas or buildings, vehicle storage buildings, fish ponds, and fish holding and sorting facilities.

Figure 8.—Existing house (building #200).

Figure 9.—Existing maintenance shop (building #300).

During construction of the Habitat Area ponds, temporary construction trailers may be required to house the workers. Utility connections would be required for these trailers, including electric and septic. New septic systems may be installed if necessary. Other potential options, such as capturing waste in aboveground sanitation tanks that can be pumped out on a regular basis, may be used. Any facilities built by the LCR MSCP would be managed by the LCR MSCP.

2.6.4 Future Equipment

New groundwater wells, pumps, and backup generators are examples of future equipment that may be installed within the Habitat Area. Any new equipment installed in these areas would be the LCR MSCP's responsibility, including their management and operations.

3.0 MANAGEMENT OVERVIEW

3.1 Land Management

3.1.1 Habitat Area

Reclamation will be responsible for ensuring long-term operation and maintenance of the Habitat Area throughout the remaining term of the LCR MSCP and any subsequent extensions. Following development of Planet Ranch, a site-specific management plan will be developed that will include species research and monitoring, law enforcement, and wildfire management.

3.1.2 Arizona Game and Fish Commission Managed Lands

The AGFC will be responsible for ensuring long-term operation and maintenance of AGFC managed lands within Planet Ranch throughout the remaining term of the LCR MSCP and any subsequent extensions.

3.2 Public Use

3.2.1 Habitat Area

The Habitat Area is being developed in an area with limited public access. Within the Habitat Area and LCR MSCP Reserved Areas, no motorized vehicle traffic, hunting, or fishing is allowed; however, low-impact recreation, such as bird watching, is permitted. Public access into the Habitat Area will be from designated parking areas. The Arizona Peace Trail, an off-highway vehicle trail that traverses through La Paz and Mohave Counties, travels through Planet Ranch using the main river crossing road and will remain open for public use. All vehicle traffic is to be limited to the main road that travels across the river in a generally north-south direction through Planet Ranch. Additional land use

restrictions for the entire property are posted on signage at two kiosks – one at each of the north and south main access points. Prohibited land use activities include camping, wood gathering, and open fires.

3.2.2 Arizona Game and Fish Commission Managed Lands

Public access will be allowed on the entire Planet Ranch property with the above-stated restrictions. The portion of Planet Ranch being managed by the AGFC, east of the river crossing, is subject to the rules and regulations of the AGFC and are not addressed in this document.

3.3 Law Enforcement

The AGFC and Reclamation are responsible for law enforcement at Planet Ranch. The AGFC has agreed to patrol Planet Ranch on a regular basis, especially during times of heavy public use (generally during the fall, winter, and spring months). AGFC law enforcement officers will enforce the posted "Rules and Regulations of Planet Ranch" in addition to other applicable Arizona State laws regarding public lands and access to public lands. AGFC law enforcement officers will also respond to public safety issues and manage unauthorized activities at Planet Ranch.

Reclamation currently provides assistance through annual funding to the BLM for additional law enforcement assistance at Planet Ranch. BLM law enforcement officers will also respond to public safety issues and assist with the management of unauthorized activities at Planet Ranch.

3.4 Wildfire Management

The LCR MSCP and AGFC are responsible for wildfire management at Planet Ranch. As guided by commitments in the LCR MSCP Habitat Conservation Plan, wildfire management practices on Planet Ranch will "Reduce the risk of loss of related habitat to wildfire by providing resources to suppress wildfires, e.g., contributing to and integrating with local, State, and Federal agency fire management plans, and implement land management and habitat creation measures to support the reestablishment of native vegetation that is lost to wildfire" (LCR MSCP 2004). Reclamation currently provides assistance through annual funding agreements to the BLM for fire suppression and other support. A site-specific fire management plan will be drafted as described in the LCR MSCP Law and Fire Strategy.

3.5 Site Maintenance

3.5.1 Habitat Area

The LCR MSCP will be responsible for maintaining access roads, infrastructure, buildings, and habitat created within the Habitat Area. Future maintenance activities for the backwater ponds may involve repairing damaged pond liners, excavation to maintain backwater depths, and the use of heavy equipment for activities such as cattail (*Typha* sp.) removal and vegetation clearing if necessary.

3.5.2 Arizona Game and Fish Commission Managed Lands

The AGFC will be responsible for maintaining access roads and any infrastructure on lands they manage.

4.0 MONITORING

Fisheries monitoring at Planet Ranch is designed such that general use of the backwater by LCR MSCP covered fish species can be documented. Methods used will be diverse enough to detect multiple life stages over several seasons, with an emphasis during seasons of highest abundance. In addition to fish surveys, general habitat assessment will include zooplankton and phytoplankton monitoring as well as water quality monitoring and analysis. Wildlife monitoring will be conducted to document the presence of neotropical birds, including southwestern willow flycatchers *(Empidonax trailli extimus*) and yellow-billed cuckoos (*Coccyzus americanus occidentalis*), and other LCR MSCP covered and evaluation species if creditable habitat is present.

4.1 Fisheries Monitoring

4.1.1 Fish Monitoring

The fish assemblage will be monitored using standardized sampling techniques unless otherwise specified in a research study plan. Sampling events will be conducted to meet the management objectives for LCR MSCP backwaters. A sampling protocol will be established using an appropriate scientific design to allow for statistical accuracy and long-term database development. The primary objectives for monitoring include (1) documenting persistence and health of adult populations for LCR MSCP backwater credit and (2) documenting reproduction and recruitment to inform long-term management of the ponds.

The primary means for documenting the persistence and health of adult populations will be accomplished using remote passive integrated transponder (PIT) tag scanning and annual fall surveys. Multiple permanent remote PIT scanning stations will be deployed in each pond. Data from these units will be used to monitor the pond populations throughout the year. These units are only

capable of tracking fishes with a 134.2 kilohertz PIT tag. Due to mortalities of PIT-tagged fishes and possible recruitment, it will be necessary to periodically PIT tag additional fishes from each pond. Annual fall surveys will be the primary means for capturing new fishes to be PIT tagged, and this will be accomplished via electrofishing and trammel netting. The capture of young, untagged fishes will be used for documenting reproduction and recruitment in a pond. All fishes captured will be measured for total length in millimeters, weighed in grams, and tagged with a 134.2-kilohertz PIT tag. Ward et al. (2015) found that PIT tag shed rate and mortality significantly increased for humpback chubs (*Gila cypha*) under 60 millimeters; therefore, no bonytail or razorback suckers less than 60 millimeters will be PIT tagged. The length and weight data will be assembled into histograms by species and used to evaluate the relative health of individuals and populations as a whole.

Electrofishing will be the preferred sampling method due to its efficiency and effectiveness in these types of backwater habitats. Trammel netting will be used to supplement the electrofishing and to diversify sampling methods in order to capture all life stages. Fall surveys will include 2 nights of surveys per pond, with a minimum of 5 days between survey events. Population estimates will be calculated using the modified Lincoln-Peterson method (Ricker 1975).

Two comprehensive electrofishing surveys will be conducted during each sampling event. Each survey will entail driving near shore around the perimeter of each pond, with an emphasis on staying near emergent or submergent vegetation. A minimum of four trammel nets of two different sizes (two at 75 feet x 0.5 inch and two at 150 feet x 1.0 inch) will be deployed during each night of the survey event. The nets are typically set perpendicular to shore, with one end attached to shore or anchored near shore and then stretched toward the center of the pond and marked with a small buoy. The nets will fish throughout the night and then be retrieved the following morning. Catch per unit effort will be determined for each survey method and compared for annual and pond variation.

Spring monitoring will occur monthly from January through May, with the primary focus of targeting larvae and young-of-year. These spring surveys will be conducted to coincide with spawning activities and larval emergence of razorback suckers (Mueller 2003) as well as the presumed spawning period for bonytail (Wagner 1955). Larval collections will be conducted in 15-minute intervals at a minimum of three locations per pond each month. Two 12-volt “crappie” lights will be connected to a battery, placed over each side of the boat, and submerged in 4–10 inches of water. Two “netters” equipped with long-handled aquarium nets will be stationed to observe the area around the lights. Larval fishes that swim into the lighted area will be dip netted out of the water and placed into a holding bucket. Larvae will be identified and enumerated as they are placed into the holding bucket and released at the point of capture once sampling is completed (Albrecht et al. 2010). A subset of larval samples may be retained for genetic analyses or species identification.

4.1.2 Zooplankton/Phytoplankton Monitoring

Zooplankton and phytoplankton will not be monitored unless annual surveys indicate fish health is a concern. If monitoring is deemed necessary as part of the adaptive management process (section 5), it will occur quarterly from two fixed locations – the deepest area near the inflow and outflow. Zooplankton will be collected using a vertical tow with a 64-micrometer (µm) plankton net. The depth of the tow will be recorded and used to calculate sample volume; multiple tows are taken to achieve the desired filtered volume (250 liters). All plankton will be rinsed into an amber sample bottle and preserved. Phytoplankton and zooplankton samples will be preserved using 0.5 and 1.0 milliliter (mL) of Lugol's iodine, respectively, per 100 mL of sample. Samples will be analyzed for biomass and relative abundance and then compared to other regional backwaters.

4.1.3 Water Quality

Fixed water quality stations will be utilized, and a multi-parameter probe will be deployed in each pond at a depth of 1 meter. Parameters of interest include dissolved oxygen, temperature, pH, and conductivity. The probes are programmed to take a measurement twice a day, 12 hours apart, with the first reading occurring within 1 hour before sunrise and the second 12 hours later in late afternoon. This timing allows the capture of the daily minimums and maximums for dissolved oxygen and temperature.

4.1.4 Water Chemistry

Water chemistry samples will be collected once annually between July and September and analyzed for general chemistry. This analysis will include:

- Physical properties, conductivity, pH, total dissolved solids, and total suspended solids
- Major and minor ions
- Metals (including selenium)
- Nutrients, nitrate, nitrite, total nitrogen, orthophosphate, and total phosphate
- Total nutrients

A single 1-liter sample will be collected from each of the three water quality stations within the pond. Collection for all parameters will occur just below the water surface (approximately 0.2 meter depth). All sample bottles will be rinsed with the water at the sampling station prior to collecting the sample. Each sample

will be immediately placed on ice after collection. The three samples from each pond will be mixed as a single composite sample prior to being decanted into the appropriate sample bottles. The samples will then be preserved using the appropriate methods for each water quality parameter (described below) and placed on ice for shipping or delivery to Reclamation's Lower Colorado Region Water and Soil Laboratory.

The recommended size and type of sample bottle is described below for each parameter (table 1). All sample containers shall be labeled correctly, including the site name, date, sample parameter, preservation, and collector.

Table 1.—Water sampling parameters

Sample	Preservation	Filtered	Volume (mL)	Storage
General chemistry	None	No	500	Refrigerate
Metals	Nitric acid (HNO_3) Two drops	Yes 0.45 µm	50	Refrigerate
Nitrate/nitrite	10 percent sulfuric acid (H_2SO_4) 0.4 mL	No	100	Refrigerate
Orthophosphate	None	Yes 0.45 µm	100	Frozen by 48 hours
Total nutrients	None	No	100	Frozen by 48 hours

4.2 Wildlife and Habitat Monitoring

In addition to being managed for native fishes, Planet Ranch will provide habitat for other covered species. Covered species may utilize the backwater, cottonwood-willow, and honey mesquite land cover types. The site will be added to conservation area monitoring for marsh birds, neotropical birds, and small mammals once habitat develops. Monitoring will be conducted to document presence and may not be required annually.

4.2.1 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 construction. Pre-development monitoring will be conducted by the LCR MSCP.

4.2.2 Post-Development Monitoring

Post-development monitoring will be implemented to assess the effectiveness of the conservation area and management activities in achieving the goals of the HCP. Post-development monitoring includes conducting presence surveys for targeted species such as marsh birds.

Habitat monitoring was designed to determine whether conservation areas are providing the habitat requirements needed by targeted covered species. Habitat characteristics will be determined primarily through vegetation structure derived from light detection and ranging (lidar) data. Species monitoring will document targeted covered species' use of the created habitat. Monitoring protocols have been developed for documenting species' responses to created land cover types. The following monitoring may occur:

- The cottonwood-willow and honey mesquite land cover types will be surveyed for neotropical birds during the breeding season (April – June).

- Southwestern willow flycatcher surveys will be conducted in areas of suitable habitat (cottonwood-willow) during the breeding season (May – August). Surveys will be conducted according to the standardized protocol (Sogge et al. 2010). If breeding or resident birds are detected, they may be captured and banded. If breeding occurs at the site, nests may be monitored for success.

- Yellow-billed cuckoo surveys will be conducted in areas of suitable habitat (cottonwood-willow) during the breeding season (June – September). Surveys will be conducted according to a standardized protocol (Halterman et al. 2015). If breeding or resident birds are detected, they may be captured and banded, and nests may be monitored for success.

- The marsh portions of the backwaters and irrigation conveyance structures may be surveyed for marsh birds prior to maintenance activities following the Standardized North American Marsh Bird Survey Protocol (Conway 2011).

- Northern Mexican gartersnake (*Thamnophis eques megalops*) surveys may be conducted prior to maintenance activities to move animals out of harm's way.

- Bat presence monitoring for western red bats (*Lasiurus blossevillii*), western yellow bats (*Lasiurus xanthinus*), California leaf-nosed bats (*Macrotus californicus*) and pale Townsend's big-eared bats (*Corynorhinus townsendii pallescens = Plecotus townsendii pallescens = C. townsendii townsendii*)[1] may be conducted with acoustic monitors or mine outflight counts to document their continued presence in the conservation area.

5.0 ADAPTIVE MANAGEMENT

Adaptive management relies on obtaining 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). Adaptive management ensures conservation areas are biologically effective and fulfill the conservation measures outlined in the HCP. Post-development monitoring and species research results will be used to adaptively manage conservation areas after initial implementation. If it is determined through monitoring 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 Final Science Strategy (LCR MSCP 2007). Alterations or changes to conservation areas can be accomplished through management activities; these activities will be initiated through the adaptive management process. Conservation areas will be manipulated and/or maintained for covered species using the best available science throughout the term of the LCR MSCP.

5.1 Monitoring Analysis and Evaluation

Monitoring data (primarily vegetation structure derived from lidar data) will be assessed to determine whether the site meets species-specific habitat requirements, which are the limiting factors for habitat to be considered covered species habitat in accordance with the current knowledge. In order to more effectively and efficiently manage conservation areas, sites will be designed to ensure that they more than adequately fulfill these habitat requirements and will then be monitored over time to see whether habitat quality decreases as the sites change.

[1] Genetic analyses on the pale Townsend's big-eared bat indicate that the LCR is likely in the range of the Pacific Townsend's big-eared bat (*Corynorhinus townsendii townsendii*) rather than the pale Townsend's big-eared bat (Piaggio and Perkins 2005). The bats recorded along the LCR will be referred to as pale Townsend's big-eared bats in this report, as the nomenclature change has not yet been verified by the USFWS.

5.2 Recommendations

If it is determined that the site does not meet the species-specific habitat requirements, recommendations for site modifications may be made by the following means:

- Comparison of monitoring results with species-specific habitat requirements to identify the habitat characteristics 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 results with previous successful and unsuccessful conservation areas 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 fulfilled the species-specific habitat requirements

- 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 toward fulfilling species-specific habitat requirements will be included in the annual report. They will also be used to improve future project designs where appropriate.

LITERATURE CITED

Albrecht, B., R. Rogers, R. Kegerries, and P.B. Holden. 2010. Razorback Sucker Studies on Lake Mead, Nevada and Arizona, 2009–2010 Annual Report. Prepared for the Bureau of Reclamation by BIO-WEST, Inc., Logan Utah.

Conway, C.J. 2011. Standardized North American marsh bird monitoring protocol. Waterbirds 34:319–346.

Halterman, M.D., M.J. Johnson, J.A. Holmes and S.A. Laymon. 2015. A Natural History Summary and Survey Protocol for the Western Distinct Population Segment of the Yellow-billed Cuckoo: U.S. Fish and Wildlife Techniques and Methods. 45 p.

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

_____. 2007. Final Science Strategy. Bureau of Reclamation, Boulder City, Nevada.

_____. 2010. Lower Colorado River Multi-Species Conservation Program Water Accounting Agreement, Final. March 11.

Mueller, G.A. 2003. The Role of Stocking in the Reestablishment and Augmentation of the Native Fish in the Lower Colorado River Mainstem (1998–2002). U.S. Geological Survey Open File Report.

Piaggio, A.J. and S.L. Perkins. 2005. Molecular phylogeny of North American long-eared bats (Vespertilionidae: Corynorhinus); inter- and intraspecific relationships inferred from mitochondrial and nuclear DNA sequences. Molecular Phylogenetics and Evolution 37:762–775.

Ricker, W.E. 1975. Computation and Interpretation of Biological Statistics of Fish Populations. Department of the Environment Fisheries and Marine Service, Ottawa, Canada. 382 p.

Sogge, M.K., D. Ahlers, and S.J. Sferra. 2010. A Natural History Summary and Survey Protocol for the Southwestern Willow Flycatcher. U.S. Geological Survey Techniques and Methods 2A-10. 38 p.

Wagner, R.A. 1955. Basic Survey of Lake Mohave. Completion Report, Project F-2-R-1. Arizona Game and Fish Department, Wildlife Restoration Division, Phoenix, Arizona. 16 p.

Ward, D.L, W.R. Persons, K.L. Young, D.M. Stone, D.R. Vanhaverbeke, and W.L. Knight. 2015. A laboratory evaluation of tagging-related mortality and tag loss in juvenile humpback chub. North American Journal of Fisheries Management 35(1):135–140.